Medicinal Properties.—Useful in pneumonia, bronchitis, bronchial catarrh, asthma. It has also been employed in poisoning by coal-gas, and Carbon Monoxide. In the form of Hydrogen Peroxide it has been used in Cyanide poisoning.

A case of acute double pneumonia successfully treated with Oxygen.—*L.* '01, ii. 840.

Case of fetid bronchorrhœa treated by inhalation for several hours daily.—*B.M.J.* '02, i. 509.

Treatment at the Oxygen Hospital of 88 cases of various skin diseases, including also 9 cases of consumption; of these 50 were discharged cured, and 13 were greatly relieved; in all the cases of consumption the disease was arrested.—*L.* '03, ii. 274.

Tried with success (*L.* '05, ii. 636) in epileptic fits.

In pneumonia is seldom required, and its value is stated (*B.M.J.* '05, i. 812; *L.* '07, i. 808) to be much over-estimated and disappointing.

Its administration is stated (*B.M.J.E.* '05, ii. 48) to have given favourable results in cases of chlorosis, more particularly those manifesting severe gastric disturbance and intolerant of Iron.

Foreign Pharmacopœias.—Official in Fr. (*Oxygène*); Ital. (*Ossigeno*); Mex. and Span. (*Oxygeno*).

OZONE.—Is an allotropic modification of Oxygen, produced by passing a silent discharge of electricity through Oxygen Gas. This gas possesses a peculiar odour, somewhat suggestive of dilute Chlorine. It is a powerful oxidising agent. When present in the air in large quantities it frequently produces irritation of the mucous membrane.

SODIUM PEROXIDE.—A white amorphous powder, which dissolves in Water with a hissing noise, with evolution of heat and formation of Hydrogen Peroxide. It is a powerful oxidising agent.

Under the names of **Biogen** and **Hopogan**, Manganese Peroxide and Magnesium Peroxide have been prepared and introduced into commerce; they evolve Oxygen on contact with a dilute Acid.

BENZOYL PEROXIDE.—Well-formed white prisms, m.p. 103·5° C. (218·3° F.). Insoluble in Water; soluble in Oil to the extent of 2 to 3 p.c. Prepared by the action of Sodium Peroxide on Benzoyl Chloride. It is a powerful disinfectant (*P.J.* '05, ii. 330), useful in the treatment of burns, wounds and many skin diseases. It may be prescribed in oily solution or as the following ointment: Benzoyl Peroxide, 1; Vaseline, 5; Lanolin, 5.

OXYMEL. *See* MEL.

OXYMEL SCILLÆ. *See* SCILLA.

Not Official.

PANCREAS ENZYMES.

Pancreatic Juice, the fluid secreted by the fresh and healthy pancreas of the pig, Sus scrofa, or of the ox, Bos taurus, is known to possess four distinct properties: (*a*) the conversion of proteids, (*b*) the conversion of Starch and Glycogen, (*c*) the emulsification of fats, and (*d*) the curdling of Milk. Each of these properties is attributable to a peculiar ferment or enzyme, which as originally present in the pancreas is in an insoluble and inactive condition, known as a Zymogen, the ultimate solution depending upon the conversion of this insoluble and inactive Zymogen into a soluble and active enzyme by the aid probably of the digestive action of the intestinal ferment Entero-kinase. The conversion may also be brought about by the action of diluted acids. The enzymes act only in neutral or alkaline solutions. Their action is suspended in feebly acid solutions, and when digested at 40° C. (140° F.) for an hour in a solution of Pepsin of the normal acidity of the stomach (equal to 0·2 p.c. Hydrochloric Acid), or when digested with gastric juice, they are destroyed. They are also destroyed in solution by heating to 75° C. (167° F.). The juice is precipitated by mineral acids, metallic salts, and by Tannic Acid. When treated with an excess of Alcohol (90 p.c.) or stronger, it is precipitated. It undergoes putrefactive change with great rapidity. The process of isolating the ferments in an active condition from the fresh juice of the pancreas gland, is extremely complicated and involves much time and careful work. The products usually obtainable commercially are of a widely divergent character, and, considered from the point of view of their proteolytic and amylolytic activity, some are quiet inert.

An even greater divergence exists in solutions of the enzymes prepared for hypodermic use, than in the commercial dried ferments, some solutions indicating the devotion of but little attention in their preparation to the purposes which they are intended to serve.

Official Preparation.

LIQUOR PANCREATIS. Pancreatic Solution.

A liquid prepared from 5 oz. of the fresh fat-free pancreas of the pig, from which the external membrane has been removed, and finely divided by triturating with washed sand or powdered pumice-stone. The mixture is digested in a closed vessel in 20 fl. oz. of Alcohol (20 p.c.) for a week and filtered.

Tests.—A measured quantity of 2 c.c. of the solution is mixed with 0·2 of a gramme of Sodium Bicarbonate and 20 c.c. of Water, and the mixture added to 80 c.c. of fresh cow's Milk, previously brought to a temperature of 45° C. (113° F.). The mixture is kept at this temperature for 1 hour, at the end of this time the milk should be so completely peptonised that a portion removed and added to some Nitric Acid in a test-tube should no longer produce a coagulation. In carrying out the test it is preferable to add a little Ether to dissolve the fat, which may otherwise be mistaken for a coagulation.

The above resembles **Liquor Pancreaticus** (Benger), which was introduced in 1879.

Not Official.

The ferments which have been prepared from the juice, and regarding which more or less definite knowledge exists at the present time, are **Trypsin, Amylopsin, Lipase** (Steapsin) and **Rennin** (Chymosin).

PANCREATINUM (Pancreatin).—Commercial Pancreatin is a mixture of the enzymes existing in the pancreas of the hog. It is not official in either the *B.P.* or the *P.G.* The *U.S.P.* defines Pancreatin as a mixture of the enzymes naturally existing in the pancreas of warm-blooded animals, usually obtained from the fresh pancreas of the hog (Sus scrofa *var.* domesticus, Gray), or the ox (Bos taurus, Linné), and consisting principally of Amylopsin, Myopsin, Trypsin and Steapsin, and proved to be capable, when assayed by the under-mentioned method, of converting not less than 25 times its own weight of Starch into substances soluble in Water. A method is also given of ascertaining its power of digesting soluble proteids.

It is a yellowish, cream-coloured, or greyish amorphous powder, possessing a faint characteristic though not unpleasant odour, and a taste somewhat resembling meat. It dissolves slowly and almost completely in Water, but is only partially soluble in Alcohol (90 p.c.). It digests both soluble and insoluble Albumens, and when brought into contact with amylaceous material rapidly induces hydrolysis, converting it into soluble products, *e.g.*, Sugar, Dextrose, or Maltose. It exhibits these powers to the greatest advantage in alkaline or in neutral solutions. The presence of mineral acids or an excess of alkali has a retarding influence upon its digestive activity, whilst, similarly to the juice, its activity is altogether destroyed by Pepsin in acid solution.

Foreign Pharmacopœias.—It is official in Fr. and Mex. (Pancreatin); Ital. (Pancreatina Medicinale); Jap. (Pankreatinum); Span. (Pancreatina); and U.S. (Pancreatinum).

Tests.—Pancreatin may be assayed for its proteolytic and amylolytic activity by its action upon the soluble Albumens of Milk and upon Starch. The *U.S.P.* employs a process of which the following embraces the essential features:—A weighed quantity of 0·28 gramme of Pancreatin is mixed with 1·5 grammes of Sodium Bicarbonate and 100 c.c. of tepid Water. A measured quantity of 400 c.c. of fresh cow's Milk is raised to a temperature of 38° C. (100·4° F.), and the Pancreatin mixture is added, the whole being maintained at the above temperature for 30 minutes. At the end of this time the Milk should be so completely peptonised that a small portion when diluted with three times its volume of water should produce no coagulation when mixed with some Nitric Acid.

The *U.S.P.* method of determining the amylolytic activity is as follows:—A weighed quantity of 7·5 grammes of Starch is mixed with 120 c.c. of Water and boiled until a translucent mixture results, which is then cooled to 40·5° C. (105° F.). A weighed quantity of 0·3 of a gramme of Pancreatin, dissolved in about 10 c.c. of Distilled Water at 40·5° C. (105° F.), is then added, the flask well shaken, and the temperature of the mixture maintained at 40·5° C. (105° F.) during 5 minutes, at the end of which time the Starch should have been converted into substances soluble in Water. 2 drops of Tenth-normal Volumetric Iodine Solution are mixed with 60 c.c. of Water, and 4 drops of the warmed converted Starch Solution are added to the mixture; either no coloration or at most a wine-red colour should result, showing the presence of Dextrin and Maltose. The appearance of a blue colour will indicate the presence of unconverted Starch, and the Pancreatin is below the standard, namely, that of converting not less than 25 times its own weight of Starch into substances soluble in Water.

TRYPSIN.—Trypsin is not official in the *B.P.*, *U.S.P.*, or *P.G.* It is given as a synonym for Pancreatin in the Spanish Pharmacopœia. It acts slowly on solid albuminoid masses, *e.g.*, boiled Egg Albumen, but with great rapidity on soluble Albumen, such as the Casein of Milk. It converts Albumens into Peptones and subsequently into bodies which are not proteids, Leucin, Tyrosin, etc. The activity gradually increases with the temperature up to 50° C. (122° F.), and rapidly diminishes up to 75° C. (167° F.) when the ferment is destroyed. Although the activity of the ferment is thus manifest with increasing temperature, solutions of the enzymes undergo rapid deterioration when subjected to prolonged warmth, and carefully-prepared solutions, which have been subjected to temperatures such as those experienced in a voyage through the tropics, have lost as much as 75 p.c. of their activity during their passage out and home.

Trypsin forms a yellowish or yellowish-brown powder, possessing a meaty odour. It occurs together with Amylopsin, Lipase (Steapsin), and Myopsin in the fresh juice of the pancreas. It is partially soluble in Water; insoluble in Alcohol (90 p.c.). The commercial dried product varies enormously, some specimens being exceedingly active proteolytically as well as amylolytically, others only relatively proteolytically active, whilst again other preparations possess neither a proteolytic nor an amylolytic action.

Although Trypsin acts best in alkaline solution, *e.g.*, Sodium Bicarbonate or Sodium Carbonate, when in solution with the latter it rapidly deteriorates at a temperature of (or above) 38° C. (100·4° F.).

It is regarded (*J.C.S. Abs.* '05, ii. 47) as possible that the pancreatic enzyme Trypsin really consists of a number of specific ferments, each acting on different proteids. No free Trypsin is present in the secretion of the pancreas (*J.C.S. Abs.* '03, ii. 559), the liberation of that enzyme is the work of the intestinal juice, gastric juice not being able to affect it.

Tests.—Trypsin may be assayed for its proteolytic and amylolytic activity by the methods described under Pancreatinum, using either a proportionately smaller quantity of the enzyme or correspondingly reducing the time allowed for the reaction. The comparative strengths of the various Trypsin preparations are referred to under the heading of Injectio Trypsini Co. (*Squire*).

AMYLOPSIN (Pancreatic Diastase).—It occurs together with Trypsin, Lipase (Steapsin), and Myopsin in the fresh juice of the pancreas. The dried ferment is not found in an active condition as a commercial article. Solutions of the ferment are extremely difficult to prepare, and even the best known products, although claiming to be free from the proteolytic ferment (Trypsin), can only be considered relatively so, as will be seen from the results published by Dr. P. Tetens Hald in his paper upon the comparative strengths of some commercial Trypsin preparations, in the *Lancet* '07, ii. 1371. It possesses great activity in digesting amylaceous material, and when carefully prepared possesses but relatively little action on soluble or insoluble proteids.

Pancreatic diastase converts Starch into Dextrin and Maltose. Its action on Starch foods is very similar to or identical with that of Ptyalin, the salivary ferment. It is usually stated to be identical with the Diastase of Malt, but it is doubtful if it is so, as it is found to be affected quite differently to the latter by acid or alkali. Diastase from either source acts most rapidly in solutions which are practically neutral. The Malt ferment is retarded by acid, but almost stopped by a very small quantity (about 0·1 p.c.) of alkali. The pancreatic ferment, on the contrary, is retarded by alkali and almost stopped by a minute quantity of acid; moreover, the activity of Malt Diastase towards Starch Solution is inversely proportional to the quantity of the ferment present, whilst the activity of the Amylopsin (Pancreatic diastase) is inversely proportional to the square root of the quantity of ferment present.

Tests.—The amylolytic activity of Amylopsin or solutions of Amylopsin may be determined by the test with Starch Solution described under Pancreatinum.

Medicinal Properties.—The various pancreatic solutions, powders and tablets are used to peptonise foods previous to administration, but they are also given with food at the beginning of a meal. Pancreatin in pills (Keratin coated) has been given in certain cases of diabetes. The enzymes of the pancreas gland have been employed with a certain measure of success in the treatment of malignant growths. A sufficient length of time has not elapsed, nor has a sufficient amount of evidence yet been accumulated, to enable a positive opinion to be expressed regarding their exact value in the treatment, but there is little doubt that they are now being given an extensive trial. There can also be little doubt that failure has in numerous instances been due to the use of almost inert preparations of the enzymes. That there is considerable variation in strength even in the best and most trustworthy preparations is evidenced by the comparative researches on the tryptic strength of different Trypsin preparations recorded (*L.* '07, ii. 1371) in the paper by P. Tetens Hald.

The 'Problems of Cancer' formed the subject of a lecture at the Edinburgh Pathological Club, and the text appears in the *L.* '04, ii. 1200. A further communication was made in a lecture at the University of Liverpool on January 20th, 1905, and afterwards reported in the *L.* '05, ii. 283.

A record of the action on Jensen's mouse tumour is given in the *B.M.J.* '06, i. 140.

We (Editorial) certainly think that he (Morton) has made out a case for a trial on a larger scale.—*B.M.J.* '07, i. 159. In the pathological reports and results of the microscopical examination of sections taken from the tumour mass of one of Morton's cases there were evidences of degenerative changes indicative of some destructive process, but whether they were due to X-rays or to Trypsin it was impossible to say. No new nodules were observed from the time the patient received these large doses of Trypsin to the time of his second operation, nor did those already existing increase materially in size. Microscopic examination of the nodules showed the cancer was still active. There was no evidence that the Trypsin treatment had exerted any definite influence on the tumour cells.—*B.M.J.* '07, i. 488, 520.

A paper on the Trypsin treatment for cancer appears in the archives of the

Middlesex Hospital (6th Cancer Report); from the observations the authors conclude that the course of cancer, both as a disease and as a morbid process, is unaltered by the administration of Trypsin and Amylopsin.—*B.M.J.* '07, i. 1447.

The cell solution produced by Pancreatin is mostly only a circumscribed process, and when sufficiently large quantities of the ferment are injected there is no selection between the carcinomatous and healthy tissue. The pancreatic ferment possesses a theoretical interest only (Leyden and Bergell).—*Deut. med. Wochenschrift*, 1907, xxiii. 913; *B.M.J.* '07, ii. 161.

Amongst a number of favourable conclusions to a report of experiments instituted by W. J. Morton to test Beard's statements, are the following:—In all cases signs of amelioration in the progress of the disease have been observed; enlarged glands associated with cancer have rapidly diminished in size under the influence of Trypsin; Trypsin has a decided effect in reducing cancer cachexia and in improving the general health; patients frequently refer their greatest feeling of improvement to the period of time when they are taking Amylopsin followed by Trypsin; the pure diastase (Injectio Amylopsini) had much to do with the favourable results; Trypsin should be used in larger doses feeling one's way, for instance, from 20 to 30 minims daily for from 4 to 6 weeks and then resorting to Amylopsin; Trypsin deserves further trial.—*B.M.J.E.* '07, i. 11.

The direct action of Trypsin on growing cancer cells, as shown clinically and microscopically, is sufficient warrant to continue the treatment in inoperable cases, especially in view of the fact that there are apparently no serious results that can occur from its use.—*B.M.J.E.* '07, i. 27.

Case of sarcoma of the testicle successfully treated with Trypsin injections. At the end of the treatment the wound remained closed, and the growth, as far as one could feel, was completely absorbed, the lumbar pains had disappeared, and the man was able to follow his employment without fatigue.—*B.M.J.E.* '07, ii. 79.

A case of growing abdominal tumour treated by hypodermic injections of Trypsin and Amylopsin. The vomiting, nausea, and flatulence disappeared, and the appetite improved, then gradually the pain lessened and the swelling also steadily diminished, while the weight regularly increased.—*B.M.J.* '07, ii. 525.

We (Editorial) have no wish to condemn the Trypsin treatment; we have heard of cases where improvement appeared to have resulted from the Trypsin injections. We have also heard of cases where no benefit occurred. When the treatment has been tested systematically both on mice and men it seems to have failed completely, and it is only by a thorough trial that we can come to a correct conclusion as to its value.—*L.* '07, ii. 240.

A record of six cases successfully treated by hypodermic injections of Trypsin, including a case twice operated upon at the Middlesex Hospital and finally discharged as hopeless.—*G.P.*, 1907, 548.

A case described as malignant disease of the cæcum treated by hypodermic injections of Trypsin. Whilst not wishing to minimise the beneficial effects which followed the injections and which began to be experienced almost immediately, it is not desired that the record of the case should raise false hopes.—*G.P.* '07, 804.

A case of extreme malignancy treated by hypodermic injection of Trypsin and local application of a pancreatic lotion. Decrease in size, disappearance of faetor, and discharge scarcely more than that from a simple healing ulcer.—*G.P.* '07, 807.

The technique of the Trypsin-Amylopsin injections.—*G.P.* '07, 810, 818.

A case of carcinoma of the liver treated by injections. Growth materially reduced in size, and pain and nausea disappeared.—*G.P.* '08, 178.

Trypsin is of considerable value in cancer. Carcinoma of the cervix uteri, rodent ulcer, and epithelioma are eminently suitable for the treatment. Gout, rheumatoid arthritis, and chronic rheumatism ought to be treated by Trypsin injections when other better known methods have failed. Regarding Amylopsin, when injected singly or in combination with Trypsin, it has been found to be of no value in the treatment of cancer.—*B.M.J.* '08, i. 80.

INJECTIO TRYPSINI COMP. (*Squire*). Squire's Compound Injection of Trypsin.—A standardised sterilised liquid, prepared direct from the fresh and healthy pancreas of the pig. It is of maximum potency, containing a definite number of units of the proteolytic enzyme (Trypsin), and of the amylolytic enzyme (Amylopsin). It is made in three strengths, known as Standards I., II., and III., and is contained in hermetically-sealed glass capsules of a dark amber tint holding 1 c.c., sufficient for an average dose of the injection.

Dose.—The average dose varies from 17 to 34 minims = 1·0 to 2·0 c.c., subcutaneously injected deeply, not into the growth itself, but into the healthy tissue in the immediate neighbourhood of the growth, or into the back or buttock; the injections being made daily and the dose gradually increased. Small doses of Trypsin are quite useless.

Method of Hypodermic Use.—When required for use the glass capsule should be rinsed first in 1 in 1000 Corrosive Sublimate solution, then in sterilised Distilled Water, broken at the file-mark on the neck, and the contents drawn into the carefully sterilised all-glass hypodermic syringe. The injections should be carried out under the strictest aseptic precautions, and the employment of heat avoided at all stages of the process.

Injectio Trypsini Comp. should be used at the commencement of the treatment, starting with 1 c.c. of Standard II., and if no bad symptoms arise, continue these injections daily for at least 6 weeks. If after a few injections the patient gets lethargic or depressed, with headache and palpitation, put him for a few days on Standard I., then on alternate days on Standards I. and II., and subsequently, with careful watching, get back to Standard II. every day. After 2 months' treatment the medical practitioner must be guided by each individual case as to how much Trypsin and Amylopsin to give. The method for the next month or so is to give about 5 Trypsins to 1 Amylopsin, with 1 day's rest to each week. After a long course of Trypsin, or if any septic symptoms arise, Amylopsin must be pushed, and even then the method is to give a Trypsin in the morning and an Amylopsin in the evening.

INJECTIO AMYLOPSINI (*Squire*). Squire's Injection of Amylopsin.—A standardised sterilised liquid of maximum potency, prepared direct from the fresh and healthy pancreas of the pig. It contains a high number of Amylopsin units, and is relatively free from the proteolytic enzyme (Trypsin).

It is contained in hermetically-sealed glass capsules of a dark amber tint holding 1 c.c., sufficient for an average dose of the injection.

Dose.—The average dose varies from 17 to 34 minims = 1·0 to 2·0 c.c., subcutaneously injected deeply, not into the growth itself, but into the healthy tissue in the immediate neighbourhood of the growth, or into the back or buttock; the injections being made daily and the dose gradually increased.

Method of Hypodermic Use.—When required for use the glass capsule should be rinsed first in a 1 in 1000 Mercury Perchloride solution, then in sterilised Distilled Water, broken at the file-mark on the neck, and the contents drawn into the carefully sterilised all-glass hypodermic syringe. The injections should be carried out under the strictest aseptic precautions, and the employment of heat avoided at all stages of the process.

The Amylopsin injection is meant to replace the Trypsin injection in the later periods of the treatment, and to meet bad symptoms, such as nausea, vomiting, pain in the back, drowsiness, albuminuria, etc., which may arise.

LIQUOR PANCREATICUS FORT. (*Squire*). Squire's Strong Pancreatic Solution.—A standardised solution of the enzymes prepared from the fresh and healthy pancreas of the pig, for internal administration.

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c. 3 times daily half an hour before food.

LIQUOR TRYPSINI COMP. (*Squire*). Squire's Compound Trypsin Solution.—A solution prepared on somewhat similar lines to the above.

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c. 3 times daily half an hour before food.

TABELLÆ PANCREATICÆ FORT. (*Squire*). Squire's Strong Pancreatic Tablets.—Tablets for internal exhibition, weighing about 8 grains, containing the digestive enzymes of the fresh and healthy pancreas of the pig.

Dose.—1 or 2 tablets 3 times daily half an hour before food.

LOTIO PANCREATICA FORT. (*Squire*). Squire's Strong Pancreatic Lotion.—A standardised limpid liquid, containing the digestive enzymes of the fresh and healthy pancreas of the pig. It exerts a powerful solvent action on animal proteids, and is of value as a surgical solvent. For use as a pigment it may be applied locally with a brush undiluted, or when diluted 1 to 5 to 1 to 10 as a rectal or vaginal injection.

A corresponding Lotio Trypsini Comp. (*Squire*) is also made.

GYNECOL AND ENICOL PANCREATICUS FORT. (*Squire*). Squire's Strong Pancreatic Pessary and Suppository.—These preparations are made for continuous local solvent action in such cases (uterine and rectal) as admit of this form of treatment.

They are made in small and large sizes.

LIQUOR PANCREATICUS.—Glycerin of Pancreatin, 16·50; Sodium Bicarbonate, 3·50; Glycerin, 5; Alcohol, 15; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

ELIXIR PANCREATIN.—Pancreatin, 5; Sodium Bicarbonate, 3; Alcohol, 15; Distilled Water, 45; Aromatic Elixir, *q.s.* to produce 100.—*B.P.C.*

GLYCERINUM PANCREATIN. *Syn.* Glycerol of Pancreatin.—Pancreatin, 10; Glycerin, 50; Simple Elixir, 5; Distilled Water, *q.s.* to produce 100.—*P.J.F.* and *B.P.C.*

PULVIS PANCREATICUS COMPOSITUS. *Syn.* Peptonising Powder.—Pancreatin (*U.S.P.*), 20; Sodium Bicarbonate, 80. Mix them by trituration.—*U.S.N.F.*

Note.—1·5 grammes of this powder are sufficient to peptonise 500 c.c. of fresh cow's Milk, or 25 grains will peptonise 20 fl. oz. in the following manner:—Add 1·5 grammes of the Compound Pancreatic Powder to 125 c.c. of tepid Water contained in a suitable flask, and afterwards add 500 c.c. of fresh cow's Milk previously heated to 38° C. (100·4° F.). Maintain the mixture at this temperature for 30 minutes, then transfer to a cold place. Milk thus peptonised should not be used after it has been kept for 24 hours or when it has developed a bitter taste.—*U.S.N.F.*

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

PULVIS PRO LACTE HUMANISATO. *Syn.* Humanising Milk Powder.—Compound Pancreatic Powder (*N.F.*), 35; Sugar of Milk, 965. It is used for preparing Milk as follows:—Triturate, 6·5 grammes of the Milk Powder with 62 c.c. of Water, transfer to a clean bottle containing 62 c.c. of fresh cow's Milk, and 15 c.c. of Fresh Sweet Cream, and immerse the bottle in Water heated to 38° C. (100° F.) for 15 minutes. Then pour the mixture into a vessel and heat it quickly to boiling and immediately allow it to cool to the body temperature. Humanised Milk should be prepared immediately before use and the directions carefully followed.—*U.S.N.F.*

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

PEPTONISED MILK.—A pint of Milk is diluted with 4 fl. oz. of Water and heated to 140° F. (60° C.).* To this add 2 teaspoonfuls of Liquor Pancreatis and 20 grains of Sodium Bicarbonate. Place in a jug and cover with a 'cosey' to keep it warm. At the end of an hour, or rather more, boil the contents of the jug. The product can be used like ordinary Milk.

Peptonised Milk can also be prepared at about 60° to 65° F. Dilute a pint of Milk with half a pint of Lime Water, or with half a pint of Water containing 20 grains of Sodium Bicarbonate in solution; to this add 3 teaspoonfuls of Liquor Pancreatis. The mixture is set aside in a jug for 3 or 4 hours, by which time the Milk will have developed a slightly bitter taste and will be ready for use.

The bitter taste is well covered by Soda Water, or it may be warmed and sweetened for infants.

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* If a thermometer is not at hand, the proper temperature may be obtained by boiling one-half of the mixture and adding it to the other half which is cold.

If it is used as soon as ready it need not be boiled, but if not it must be boiled to prevent the change proceeding far enough to render it unpalatable.

Peptonising Powders and Tablets are also used in place of the Liquor Pancreatis. The powders generally contain the Sodium Bicarbonate mixed with the Pancreatin, ready for use.

PEPTONISED GRUEL.—Gruel from wheaten flour, oatmeal, arrowroot, sago, pearl barley, pea or lentil flour, should be very well boiled and made thick and strong. It is then poured into a covered jug and allowed to cool to a lukewarm temperature. Liquor Pancreatis is then added, 2 teaspoonfuls to a pint of gruel. At the end of 3 hours the product is boiled and strained. The starch of the meal is converted into sugar, and the albuminoid matters are peptonised.

PEPTONISED MILK-GRUEL.—To a good thick Gruel, prepared from any of the above-mentioned farinaceous articles, while still hot, add an equal quantity of cold Milk; the mixture will be about 125° F. (52° C.). To each pint of this mixture add 2 teaspoonfuls of Liquor Pancreatis and 20 grains of Sodium Bicarbonate. Set aside in a warm place for 2 or 3 hours until a perceptible bitterness is developed and not longer, then heat to the boiling point and strain.

PEPTONISED BEEF-TEA.—Half a pound of finely minced lean beef is mixed with a pint of Water and 20 grains of Sodium Bicarbonate. This is simmered for 2 hours in a covered saucepan; the resulting Beef-tea is decanted off into a covered jug, the undissolved beef residue is then beaten up with a spoon into a pulp and added to the Beef-tea. When it has cooled down to about 140° F. (60° C.) a tablespoonful of the Liquor Pancreatis is stirred in. The mixture is kept warm for 2 or 3 hours and occasionally stirred. At the end of this time the contents of the jug are boiled briskly for 2 or 3 minutes and finally strained. Beef-tea prepared in this way is rich in peptone, and when seasoned with salt is scarcely distinguishable in taste from ordinary Beef-tea.

A concentrated preparation is supplied as **Peptonised Beef Jelly.**

PEPTONISED NUTRITIVE ENEMATA.—The enema may be prepared in the usual way with milk-gruel and beef-tea, and a dessertspoonful of Liquor Pancreatis should be added to it just before administration.

In the warm temperature of the bowel the ferments find a favourable medium for their action on the nutritive materials with which they are mixed.

It must be borne in mind that peptonised foods are very liable to change on keeping, and that fresh quantities should be prepared every 12 hours or they must be re-boiled.—*Sir W. Roberts, Lumleian Lectures,* 1880.

PANCREATISED FAT or PANCREATIC EMULSION.

Introduced in the treatment of consumption and other wasting diseases, by Dobell.

Dose.—From 1 to 4 fl. drm. = 3·6 to 14·2 c.c., mixed in Milk or Water, from 1 to 4 times in 24 hours.

Not Official.

PAPAIN.

Syn.—PAPAYOTIN.

A white, or whitish, amorphous powder, soluble in Glycerin. It is a digestive ferment extracted from Papaw Juice (*Carica Papaya*, L.).

Papaw leaves contain an alkaloid **Carpaine**, the **Hydrochloride** of which is readily soluble in Water; it has been used as a heart tonic and febrifuge.

Papain possesses a solvent action on animal proteids, and acts best in neutral or slightly alkaline solution.

Some commercial Papains possess such activity in acid solution that they have been suspected of being admixtures containing Pepsin.

Medicinal Properties.—Its solution (5 p.c.) is stated to dissolve false membrane in diphtheria, and to be a good application to warty epitheliomatous growths.—*B.M.J.* '85, ii. 151; '88, i. 1296; *M.P.* '94, i. 633; *Pr.* li. 372; *B.M.J.E.* '93, ii. 39. Internally in gastric ulcer.—*L.* '94, i. 840; '95, i. 333. In atonic dyspepsia.—*L.* '95, i. 1050. In gastritis.—*B.M.J.E.* '93, ii. 36.

The results of a research (*L.* '05, i. 589) show that Papain contains a fibrin-digesting but not peptolytic proteose of the nature of Pepsin, as well as a peptolytic but not fibrin-digesting proteose of the nature of an erepsin.

Some further importance has recently been attached to this substance by its use in the treatment of malignant growths, attention being drawn to it by the publication of several letters relating to the action of certain other ferments on inoperable cancers. A mass of scirrhus was injected (*B.M.J.* '06, i. 1439) with 2 grains of this substance. Since then, the same procedure was adopted with three tumours of similar nature. These injections were followed by a burning feeling of short duration and then by an occasional gnawing sensation. The tumours softened in a few days, burst, and gave out a copious discharge of thick grey fluid for about a week. When the discharge ceased, the lumps were found to have disappeared or become much smaller. One tumour had to be injected 3 times before it burst. The temperature rose from 2 to 4 degrees, but became normal in 2 or 3 days.

Injections of ½ grain and upwards into malignant growths with good results.—*B.M.J.* '07, i. 135.

Dose.—2 to 10 grains = 0·13 to 0·65 gramme.

Prescribing Notes.—*May be given in* **cachets, mixture, pills,** *or as a* **hypodermic injection.** *A good pill may be made by using 'Dispensing Syrup' q.s. Given also in the forms of* **Elixir** *and* **Glycerole,** *in doses of* 1 *teaspoonful.*

Foreign Pharmacopœias.—Official in Mex.

ELIXIR PAPAIN (*Squire*).—Glycerinum Papain (*Squire*), 8 fl. oz.; Carmine solution, 2 fl. drm.; Spiritus Nucis Juglandis, 2 fl. drm.; Elixir Aurant, sufficient to produce 16 fl. oz.

1 fl. drm. (3·6 c.c.) contains 2½ grains (0·16 gramme) of the purified and dried juice.

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c. twice or thrice daily, half an hour before food.

Papain, 11; Saccharin, 0·4; Glycerin, 60; Sherry, 150; Chloroform Water (1 in 200), 390.—*Hager.*

Papain, 5; Alcohol, 15; Distilled Water, 45; Aromatic Elixir, *q.s.* to produce 100.—*B.P.C.*

GLYCERINUM PAPAIN (*Squire*).—Papain purified and dried, 640 grains; Sodium Bicarbonate powder, 40 grains; Glycerin, 8 fl. oz.; Aqua Dest. sufficient to produce 16 fl. oz.

Papain, 1 oz.; Hydrochloric Acid, 40 minims; Purified Talc, 120 grains; Glycerin, 8 fl. oz.; Water, to 16 fl. oz.—*Pharm. Form.*

Papain, 8; Diluted Hydrochloric Acid, 8; Simple Elixir, 5; Glycerin, *q.s.* to produce 100.—*B.P.C.*

INJECTIO PAPAIN FORT. (*Squire*).—A sterilised limpid liquid possessing the full digestive powers of the purified and dried juice. 1 c.c. (17 minims) contains 2 grains (0·13 gramme) of the purified and dried juice.

Dose.—1 to 2 c.c. = 17 to 34 minims, hypodermically injected deeply into the subcutaneous tissue.

The above injection is prepared in the form of hermetically sealed glass capsules of a dark amber tint, each capsule containing sufficient for an average hypodermic dose.

LOTIO PAPAIN (*Squire*).—A clear permanent solution of the enzymes in a Glycerin basis, prepared for use as a surgical solvent. It may be applied locally undiluted, with a camel's-hair brush.

PAPAVERIS CAPSULÆ.

POPPY CAPSULES.

FR., PAVOT; GER., UNREIFE MOHNKÖPFE; ITAL., PAPAVERO;
SPAN., ADORMIDERA.

The nearly ripe dried Fruits of the Opium Poppy, *Papaver somniferum*, L.

Medicinal Properties.—Similar to Opium, but much weaker and of uncertain strength. The **decoction** is used as a soothing anodyne fomentation.

Not Official.—Decoctum Papaveris, Syrupus Papaveris and Extractum Papaveris Liquidum.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr. (Pavot), Ger., Hung., Mex. (Adormideras), Port. (Dormideiras), Russ., Span. (Adormidera), and Swiss. Not in the others.

Descriptive Notes.—Poppy capsules are usually dried gradually on the plant, the stalk being bent downwards as soon as the poppy head has arrived at its full size, and the capsule is thus allowed to become hard on the plant. The first capsule formed is usually the largest; the subsequent, smaller, capsules are sorted out, and sold separately; and the smallest are usually broken up and sold at a lower price, for making fomentations, etc. There are two forms of the capsules, viz. (1) nearly spherical, and depressed at base and apex, and (2) oblong oval. The seeds are white when derived from the white flowered form, but are often greyish when derived from the red flowered variety of *Papaver somniferum*. The white seeded form is the one official in the *B.P.* The capsule is described as being the nearly ripe dried fruit usually 2 to 3 in. (5 to 7½ cm.) in diameter, and suddenly contracted below into a neck, and covered above with stellately arranged stigmas; the pericarp being pale yellowish-brown externally, and frequently marked with dark spots, and having a bitter taste but no odour. The seeds, and the fixed Oil derived from them, are both official in the *P.G.*, in which the unripe capsules are directed to be cut in half longitudinally and freed from the seeds before use, without which they should weigh 3 to 4 grammes and show dried milky juice at the edges. The seeds are described as reniform, 1 mm. long, with a network of six-sided meshes on the surface. Neither the seeds nor the capsules nor the Oil are official in the *U.S.P.*

Tests.—Poppy capsules yield about 10 p.c. of ash.

Not Official.

DECOCTUM PAPAVERIS.—Poppy Capsules, bruised, 2; Distilled Water, 30; boil 10 minutes in a covered vessel, and strain; then pour over the contents of the strainer as much Distilled Water as will make up the strained product to 20. (1 in 10)

An external soothing application, applied warm.

Foreign Pharmacopœias.—Span., Infusion, 1 in 35.

SYRUPUS PAPAVERIS (*B.P.* '85).—36 of Poppy Capsules is exhausted with boiling Water, and the liquid evaporated to 60; this is treated with 16 of

Alcohol (90 p.c.), and subsequently evaporated to 40, in which is dissolved 64 of Sugar. (1 in nearly 2¼)

Dose.—1 fl. drm. = 3·6 c.c.

On the average, 60 minims will equal 8 minims of Tincture of Opium.

This Syrup can be made from the Liquid Extract (*given below*) by evaporating 80 of the Liquid Extract to 40, and dissolving in it 64 of Sugar.

Liquid Extract (*given below*), 40; Sugar, 70; dissolve and make up to 100.—*B.P.C.*

This is less than half the strength of the preparation given above, but the difference is probably unintentional.

Foreign Pharmacopœias.—Official in Austr. (Syrupus Opiatus.)—Extract Opium 1, Simple Syrup 999. Dutch, Ger. and Russ., 1 in 10; Belg. (Syrupus Opii dilutus), Syrup of Opium 1, Simple Syrup 4. Dan., about 1 in 12; Hung. (Syr. Diacodii) 1 in 27; Ital. (Sciroppo di Oppio), Extract of Opium, 1 in 1000; Mex. (Jarabe diacodio), 1 of Ext. Opii in 2000; Port. (Xarope de Dormideiras), 1 in 13½; Span. (Jarabe de Adormideras), 1 extract in 100; Swiss, Extract of Opium 1, Water 4, Simple Syrup 995. Not in Fr., Ital., Jap., Norw., Swed. or U.S.

EXTRACTUM PAPAVERIS LIQUIDUM.—The liquid obtained by the process for making the Syrup (previous to adding the Alcohol and the Sugar), 3; Alcohol (90 p.c.), 1; mix.

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

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

PARAFFINUM.

Petroleum Oil and Shale are mixtures of the hydrocarbons of the Paraffin series, some of which are official under the names Paraffinum Durum, Paraffinum Liquidum, Paraffinum Molle. Hard Paraffin is obtained chiefly from Shale, the Liquid and Soft Paraffins from Petroleum.

PARAFFINUM DURUM. HARD PARAFFIN.

Fr., Paraffine; Ger., Festes Paraffin; Ital., Paraffina; Span., Parafina.

A colourless, crystalline, wax-like solid, which is a mixture of several of the harder members of the Paraffin series.

Solubility.—Insoluble in Water, sparingly soluble in Absolute Alcohol; 1 in 80 of Ether, sp. gr. 0·720; 1 in 140 of Ether, *B.P.*

In *B.P.* '85 it was stated to be 'freely soluble in Ether, which is altered in *B.P.* '98 to 'almost entirely soluble in Ether.'

The solubility in Ether (sp. gr. 0·720) depends upon the m.p. of the Paraffin, a sample, m.p. 120° F., dissolved 1 in 40.

Official Preparation.—Unguentum Paraffini. Contained in Unguentum Creosoti and Unguentum Eucalypti.

Not Official.—Emulsio Paraffini and Massa Paraffinum.

Foreign Pharmacopœias.—Official in Belg., Ger., Hung., Jap. and Russ., all Paraffinum Solidum (m.p. 74° to 80° C.); Dutch m.p. 56° to 60°; Fr., Paraffine (distils between 375° and 435°), m.p. not given; Span., m.p. 44° to 65°; Swiss, m.p. 65° to 80°; U.S., Petrolatum Spissum (m.p. 45° to 48° C.). Not in the others.

Paraffin Injections.—Very frequent references to this method of remedying deformities have been current. An exhaustive paper (*B.M.J.* '04, ii. 1154) shows that the best form of syringe is an all-metal one with a screw piston. The

Paraffin is melted by placing the containing bottle up to its neck in very hot Water. Then it and the syringe are kept in Water about 5° above the m.p. of the Paraffin. The syringe is filled, the needle dipped for a few minutes in very hot Water to prevent the Paraffin from setting in the needle, the needle is inserted well under the skin and the injection made quickly.

Thrombosis is avoided by using screw syringe, so that Paraffin may be injected slowly and steadily.

Ethyl Chloride should not be used to cool the Paraffin, but only a stream of cold Water. The Paraffin used should have a m.p. about 105° F., and the injection should be made about 120° F. About 1 c.c. may be enough in cases of sunken nose. In prolapse of the rectum or the vagina 1 oz., or in bad cases 1½ oz., may be required (*B.M.J.* '04, ii. 1155).

For remedying deformities of the nose an interesting method of procedure is given in the *B.M.J.* '04, ii. 1239. The Paraffin used is a mixture of Hard and Soft Paraffin having a m.p. of 106° F. From an experience of over one hundred cases it has been shown that the operation, if properly performed, is practically devoid of danger.

For external injections a Paraffin liquefying between 45° and 50° C. (113° and 131° F.) should be used (*B.M.J.* '06, i. 1408), while for the treatment of atrophic ozæna cold injection of Paraffin melting at 45° C. (113° F.) should be used.

Some cases of bone cavities treated by stopping with Paraffin method described; Paraffin of a m.p. of 120° F. should be used, *L.* '08, i. 155.

A new syringe, *L.* '07, i. 1612.

Tests.—Hard Paraffin has a sp. gr. according to the *B.P.* from 0·820 to 0·940; the *U.S.P.* gives the sp. gr. at 0·890 to 0·905 at 25° C. (77° F.). It melts according to the *B.P.* at 54·4° to 57·2° C. (130° to 135° F.). The *U.S.P.* m.p. is 51·6° to 57·2° C. (125° to 135° F.). The *P.G.* m.p. is 74° to 80° C. (165·2° to 176° F.). No sp. gr. figure is included in the *P.G.* The *B.P.* states that it melts at the temperature given above, and burns with a bright flame. The *U.S.P.* more correctly states that when strongly heated it ignites and burns with a luminous flame. The *U.S.P.* states that if 0·5 of a gramme of Paraffin be heated in a dry test-tube with 0·5 of a gramme of Sulphur, Carbon is separated and the mixture becomes black, Hydrogen Sulphide gas being simultaneously evolved; no similar test is given in either the *B.P.* or the *P.G.*; all three Pharmacopœias state that an alcoholic Solution should not redden blue Litmus paper.

The more generally occurring impurities are free acid, Stearic Acid, and fixed Oils. The presence of free acid may be shown by the acid reaction of the alcoholic solution, fixed Oils or other organic impurities may be shown by the Sulphuric Acid test described below, and the presence of Stearic Acid by the Fuchsin test described below, and also by the acid nature of the solution in Alcohol (90 p.c. or 94·9 p.c.). It should leave no weighable residue when ignited with free access of air.

Sulphuric Acid.—It should not be acted upon nor coloured by Sulphuric Acid, *U.S.P.* 3 grammes heated on a water-bath with 3 c.c. of Sulphuric Acid in a glass previously rinsed out with warm Sulphuric Acid and carefully agitated for 10 minutes should not be affected and the acid should not be coloured more than faintly brown, *P.G.*

Nitric Acid.—It should not be acted upon nor coloured by Nitric Acid, *U.S.P.*

Fuchsin.—If 0·5 gramme of Paraffin and 0·1 gramme of powdered Fuchsin added to the fused mass, the latter should not assume a pink or red colour, *U.S.P.*

Preparation.

UNGUENTUM PARAFFINI. PARAFFIN OINTMENT.
Hard Paraffin, 3; Soft Paraffin, 7.

At first sight this would appear to be a definite formula, but official permission is given to use White or Yellow Soft Paraffin, to suit the colour of the ingredients with which it may be mixed, and the proportions of the Paraffins may be varied to suit climate and temperature.

Official Preparations.—The **White** is used in the preparation of Unguentum Acidi Borici, Unguentum Acidi Carbolici, Unguentum Acidi Salicylici, Unguentum Glycerini Plumbi Subacetatis, Unguentum Hydrargyri Ammoniati, Unguentum Plumbi Acetatis, and Unguentum Plumbi Carbonatis. The **Yellow** is used in Unguentum Hydrargyri Oxidi Rubri, Unguentum Iodoformi, and Unguentum Plumbi Iodidi.

An Ointment is official in Jap. and Ger. Solid Paraffin 1, Liquid Paraffin 4.

PARAFFINUM LIQUIDUM. LIQUID PARAFFIN.

A colourless, odourless and tasteless, transparent, oily fluid, which is officially required to be 'not fluorescent.'

Solubility.—It mixes with Chloroform, Ether, and the fixed and volatile Oils. It dissolves Bromine, Iodine, Iodoform and Phosphorus.

Medicinal Properties.—It has been used, alone or mixed with Castor or Olive Oil, as an application in chronic eczema accompanied by desquamation. Has been used as a solvent or emulsifier for substances to be given hypodermically or used in sprays and atomisers.

Ordinary lamp Paraffin, applied with a camel's-hair brush to diphtheritic patches (after scraping).—*B.M.J.* '91, ii. 645; '01, i. 1645; '01, 504, 838.

Not Official.—Emulsio Petrolei et Glycerophosphatis, Emulsio Petrolei cum Hypophosphitibus, Oleum pro Nebula.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Ger., and Russ. sp. gr. 0·880; Dutch, not less than 0·860; Fr. (Huile de Vaseline), sp. gr. about 0·875, and Huile Lourdes de Pétrole, sp. gr. 0·880–0·905; Jap., sp. gr. 0·875 to 0·945; Mex. (Vaselina liquida), sp. gr. 0·875 to 0·890; Norw., sp. gr. 0·895 to 0·905; Span. (Aceite de Parafina), sp. gr. 0·840; Swed., sp. gr. 0·88 to 0·90; Swiss, sp. gr. 0·880 to 0·885; U.S., about 0·870 to 0·940 at 25° C. (77° F.).

Paroleine, Oleum Deelinæ, Adepsine Oil, Glymol, Vaseline Oil, Chrismaline, are forms of Liquid Paraffin.

Tests.—Liquid Paraffin has a sp. gr. from 0·865 to 0·890. The *B.P.* gives the sp. gr. from 0·885 to 0·890, but the lower limit has been fixed too high; many good samples have a much lower sp. gr., and some of them in good demand are as low as 0·865. The purification of the Oil from tarry constituents reduces the gravity to 0·882, whilst it is generally reduced to 0·880. The *U.S.P.* gives the sp. gr. of 0·870 to 0·940 at 25° C. (77° F.). The *P.G.* give the gravity of not under 0·880. The *B.P.* and the *P.G.* both give a boiling point of not below 360° C. (680° F.).

The more generally occurring impurities are those of a readily carbonisable organic nature, free acid, Sulphur compounds, and mineral impurity. Free acid, if present, is indicated by the reaction towards blue Litmus paper. The presence of readily carbonisable organic impurities is shown by Sulphuric Acid. A test for these impurities appeared in the first issue of the *U.S.P.*, and read as follows:—If 2 volumes of concentrated Sulphuric Acid be added to 1 volume of liquid Petrolatum in a test-tube placed in hot Water, and the contents occasionally agitated during 15 minutes, the acid should not acquire a deeper tint than brown, nor lose its transparency. The test was evidently considered too stringent, and was deleted in the list of Additions and Corrections (1907). The *B.P.* contains a Sulphuric Acid test, and requires that when equal volumes of the liquid Paraffin and Sulphuric Acid are heated together during 10 minutes at a temperature of boiling Water, and agitated at frequent intervals, the lower acid layer should not acquire a deeper colour than a pale brown. The *B.P.* includes a test with Sodium Hydroxide Solution saturated with Lead Oxide, and requires that when 2 drops of such a solution is mixed with 4 c.c. of liquid Paraffin and 2 c.c. of Absolute Alcohol, the mixture should remain colourless when maintained at 70° C. (158° F.) for 10 minutes. Fixed Oils and Rosin are saponifiable with Potassium or Sodium Hydroxide Solution, their presence may therefore be detected by saponifying a portion of the sample, removing the aqueous layer and acidifying with Sulphuric Acid. The *U.S.P.* employs 10 grammes of the liquid Paraffin for this test and saponifies for half an hour at a temperature of 100° C. (212° F.) with a solution of 10 grammes of Sodium Hydroxide in 50 c.c. of Water. A portion of the sample when carefully heated to remove the more volatile portions and finally ignited with free access of air should leave no weighable residue.

Litmus.—Boiled with Alcohol (an equal volume, *P.G.*) the Alcohol should not redden blue Litmus paper, *B.P.* and *P.G.* Shaken vigorously in a half-filled test-tube with a piece of moistened blue Litmus paper, the paper should not be reddened, *U.S.P.*

Sodium Hydroxide and Sulphuric Acid.—10 grammes digested at 100° C. (212° F.) for 30 minutes with 10 grammes of Sodium Hydroxide and 50 c.c. of Water yields an aqueous layer which, when separated and mixed with Sulphuric Acid in excess should yield no oily or solid substance, *U.S.P.*

Not Official.

EMULSIO PETROLEI ET GLYCEROPHOSPHATIS.—Liquid Petroleum, 2 fl. oz.; Powdered Gum Acacia, 1 oz.; Calcium Glycerophosphate, 24 grains; Magnesium Glycerophosphate, 12 grains; Sodium Glycerophosphate 12 grains; Potassium Glycerophosphate, 12 grains; Citric Acid, 5 grains; Spirit of Chloroform, 2 fl. drm.; Tincture of Lemons, 1 fl. drm.; Elixir of Saccharin, 10 minims; Distilled Water, *q.s.* to produce 6 fl. oz.

Triturate the Petroleum with the Gum and emulsify with 1½ oz. of Water added all at once. Dissolve the Glycerophosphates and Acid in 1 oz. of Water, and add to this solution the other ingredients, then add gradually to the emulsion and adjust the volume to 6 oz. with Water.—*Bournemouth Formulary.*

This appears in the *B.P.C.* with the quantities as below; read ingredients in order written above:—

33, 16·50, 1, 0·50, 0·50, 0·50, 0·20, 4, 2, 1, *q.s.* to produce 100.

EMULSIO PETROLEI CUM HYPOPHOSPHITIBUS.—Mix in a mortar Liquid Paraffin, 8 fl. oz.; Gum Acacia, in powder, 4 oz.; Cinnamon Oil, 24 minims; Tragacanth, in powder, 120 grains. Add in one quantity 6 fl. oz. of Water, and emulsify completely; add Calcium Hypophosphite and Sodium Hypophosphite, of each 192 grains, dissolved in 4 fl. oz. of Water, and finally sufficient

Water to produce 24 fl. oz.—*B.P.C. Formulary* 1901, now incorporated in the *B.P.C.*, adding 1 p.c. by volume of Elixir Glusidi.

OLEUM PRO NEBULA.—Purified White Petroleum Oil, 4 fl. oz.; Balsam of Peru, 40 grains. Digest in a bottle on a water-bath for 10 minutes, and filter when cold.—*Bournemouth Formulary.*

PARAFFINUM MOLLE.—Soft Paraffin.

A semi-solid translucent substance. Either the white or the yellow variety may be used, according to circumstances.

Vaseline, Adepsine, Salvo Petrolia, Chrisma, and Cosmoline are forms of Soft Paraffin.

Solubility.—Insoluble in Water, slightly soluble in Absolute Alcohol, freely in Ether, Chloroform, Benzol, Oil of Turpentine, the fixed and volatile Oils.

Description of a syringe suitable for making hypodermic injections.—*L.* '03, ii. 611; *B.M.J.* '03, ii. 741.

Official Preparations.—Unguentum Paraffini. The **White** is used in the preparation of Unguentum Creosoti, Unguentum Eucalypti and Unguentum Zinci Oleatis. The **Yellow** in Unguentum Hydrargyri Nitratis Dilutum and Unguentum Hydrargyri Oxidi Flavi.

Not Official.—Emulsio Paraffini, Massa Paraffinum, Ceratum Paraffini, Linogenum Spissum, Parenols, Parogens, Vasenol, Vasogen, and Vasolimenta, Petroleum Spirit (Petroleum Ether).

Foreign Pharmacopœias.—Official in Austr., Dan., Jap., Norw., Swed. and Swiss (Vaselinum); Belg. (Paraffina Mollis); Dutch (Vaselinum Album and V. Flavum); Fr. (Vaseline Officinale); Ger. and Russ. (Unguentum Paraffini); Hung., Ital. and Span. (Vaselina); Mex. (Vaselina Solida); U.S. (Petrolatum Molle).

Tests.—Soft Paraffin is officially stated to possess a sp. gr. of 0·840 to 0·870 at the temperature of its m.p. The *U.S.P.* states that it has a sp. gr. of from 0·820 to 0·850 at a temperature of 60° C. (140° F.) The m.p. is given in the *B.P.* as from 35·5° to 38·9° C. (96° to 102° F.) or even somewhat higher. The *U.S.P.* gives the m.p. as between 45° and 48° C. (113° and 118·4° F.).

The more generally occurring impurities are free acid, readily carbonisable organic impurities, fixed Oils, fats, Rosin, and mineral matter. Soft Paraffin is digested with Alcohol (90 p.c.), and the insoluble oily matter separated, the alcoholic solution should be neutral in reaction towards Litmus paper. When mixed with twice its volume of Sulphuric Acid and warmed in a water-bath for 15 minutes the acid should not be coloured more than a light brown; when boiled with Sodium Hydroxide Solution, and the aqueous alkaline liquid separated from the oily residue, should yield no precipitate or oily matter on acidifying with Sulphuric Acid. The *U.S.P.* uses the same test as is described under Liquid Paraffin. A portion of the sample when carefully ignited with free access of air should leave no weighable residue. Paraffin Molle is not official in the *P.G.*

Litmus.—Water shaken with melted Petrolatum should not redden blue Litmus, *U.S.P.*

Sodium Hydroxide.—Digest 10 grammes of Soft Paraffin, 10 grammes of Sodium Hydroxide, and 50 c.c. of Water for half an hour on a water-bath and then separate the aqueous layer. No oily or solid substance should separate from this when it is supersaturated with Sulphuric Acid, *U.S.P.*

Sulphuric Acid.—When 2 volumes of conc. Sulphuric Acid and 1 volume of melted Petrolatum in a test-tube be placed in hot Water for 15 minutes, with occasional agitation, the acid should not acquire a deeper tint than brown nor lose its transparency, *U.S.P.* 1906, but deleted in list of Additions and Corrections 1907.

Not Official.

EMULSIO PARAFFINI. *Syn.* Aseptic Shaving Cream.—Hard Paraffin (m.p. 55° C.), 22; Prepared Suet, 3; Soft Soap, 2; Tragacanth, in powder, 2; Glycerin, 2; Oil of Lavender, 1; Boiling Water, 68. Place the Hard Paraffin and Suet in a vessel surrounded by hot Water, add the Soap and boiling Water and vigorously beat the mixture until a smooth white emulsion is obtained. Remove the surrounding hot Water, and gradually add the Tragacanth, continuing the beating and stirring until the temperature has fallen below 50° C. When nearly cold, add the Glycerin and Oil of Lavender. This product should have the consistence of a soft paste, and is used to facilitate the shaving of skin areas so as to obviate the use of a shaving brush and soap.—*St. Thomas's.*

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

MASSA PARAFFINUM.—Hard Paraffin (m.p. 120° F.), 1; White Soft Paraffin 1½; melt together.

A good mass for making Silver Nitrate and Potassium Permanganate into Pills.

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

Ceratum Paraffini.—Beeswax, 6; Soft Paraffin, 94.—*B.P.C.*

PARENOL.—It has been shown by A. Kopp (*Apotheker Zeitung*, 19, 786) that Soft and Liquid Paraffin can be formed into stable emulsions with Water by the addition of a small quantity of Wool Fat, Beeswax, Spermaceti or other substances, consisting chiefly of the higher Alcohols or esters of those Alcohols. The resulting emulsions are absorbed readily through the skin, cause no irritation, and do not become rancid, while they serve a useful purpose as vehicles for the application of various medicaments.

The following formulæ are found to yield satisfactory products, the first being somewhat better than the second and third:

Wool Fat Parenol.—Soft Paraffin, 65; Wool Fat, 15; Distilled Water, sufficient to produce 100. Warm the Water, and mix gradually with the melted Soft Paraffin and Wool Fat in a warm mortar.

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

Beeswax Parenol.—Soft Paraffin, 70; white Beeswax, 5; Distilled Water, sufficient to produce 100. Proceed as in the former case.

Spermaceti Parenol.—Soft Paraffin, 70; Spermaceti, 5; Distilled Water, sufficient to produce 100. Proceed as in the first case.

These solid Parenols are of ointment-like consistence, can be made to take up more than their own weight of Water, mix with all fats, and can be used alone or in combination with other substances.

Liquid Parenol.—Liquid Paraffin, 70; white Beeswax, 5; Distilled Water, sufficient to produce 100. Proceed as in the case of Wool Fat Parenol.

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

The Liquid Parenol is a neutral liniment, possessing similar properties to the solid preparations, and can be used in the treatment of skin diseases, for lubricating catheters, or as a vehicle for injections.—*P.J.* '06, ii. 623; *Y.B.P.* '07, 278.

VASOGEN (Oxygenated Vaseline. Valsol).—A yellow, or dark brown, thick oily liquid which forms with Water a stable white emulsion. It has been introduced as a basis for various medicated preparations, *e.g.*, Creosote-Vasogen (5 and 20 p.c.), Ichthyol-Vasogen (1 p.c.), Iodene-Vasogen (6 and 10 p.c.), Iodoform-Vasogen (15 p.c.), and Menthol-Vasogen (2 p.c.).

A mixture of Vaseline Oil and Oleic Acid, when saturated with Ammonia, yields a similar preparation to Vasogen.—*Proc. Amer. Pharm. Assoc.* xliii. 632; *P.J.* '02, ii. 259.

A brown fatty solid is also known under the name of **Vasogenum Spissum.**

VASENOL.—A yellow vaseline preparation containing 25 p.c. Water, introduced as an ointment basis; and a **liquid vasenol** (white), which may be medicated as desired, has also been introduced where a creamy application is used. —*B.M.J.* '04, ii. 1414.

A combination of a Liquid Paraffin with a small quantity of the higher Alcohols obtained from Spermaceti, Wool Fat, etc. The product mixes readily with aqueous liquids producing neutral emulsions.—*L.* '05, i. 1396.

VASOLIMENTA.—Under this name (*Pharm. Centr.*, xli. 756) a combined soap hydrocarbon basis for medical inunction has been introduced. *Simple Vasoliment*, or *Liquid Vasoliment*, is prepared by saponifying Oleic Acid, 50, with Alcoholic Ammonia, 25, the soap being heated with Liquid Paraffin, 100, until solution is effected. The weight is then made up to 175 with Alcohol. *Thick Vasoliment* is prepared in a similar manner, but the Alcohol is evaporated off. Medicated Vasoliments are prepared as solutions of the active ingredients in simple Vasoliment in the following percentage proportions respectively: *Salicylic Acid*, 2 p.c.; *Camphorated Chloroform*, Camphor 30 p.c. and Chloroform 30 p.c.; *Iodine*, 6 p.c.; *Ichthyol*, 10 p.c.; *Creolin*, 5 p.c.; *Menthol*, 2 p.c.; *Venice Turpentine*, 20 p.c.; *Iodoform*, 1·5 p.c; *deodorised Iodoform*, Iodoform, 1·5 p.c., Eucalyptol, 1·5 p.c.; *Eucalyptol*, 20 p.c.; *Naphthol*, 10 p.c.; *Guaiacol*, 20 p.c.; *Thiol*, 5 p.c.—*Y.B.P.* '01, 212 and *Hager*.

PAROGENUM. *Syn.* Liquid Parogen; Vasoliment; Oxygenated Paraffin. —Liquid Paraffin, 40; Oleic Acid, 40; Ammoniated Alcohol (5 p.c.), 20.—*B.P.C.*

PAROGENUM SPISSUM. *Syn.* Thick Vasoliment.—Hard Paraffin, 12; Liquid Paraffin, 48; Oleic Acid, 30; Ammoniated Alcohol (10 p.c.), 10; evaporate to 90 by weight.—*B.P.C.*

Vasoliments have been incorporated in the *B.P.C.* under the title Parogeni.

Mindes' Vasoliments.—No. 1: Liquid Paraffin, 35; White Olein, 35; Alcoholic Solution of Ammonia, 25; strong Alcohol, 5. No. 2: Liquid Paraffin, 35; white Olein, 35; Alcoholic solution of Ammonia, 30. The No. 2 formula is recommended for the preparation of a solution of Iodine, or of any other medicament soluble in Ether.

Linogens are obtained by substituting Linseed Oil for Liquid Paraffin in the two preceding formulæ.

Linogenum Spissum.—Linseed Ointment (Linseed Oil, 3, Paraffin, 2), 60; white Olein, 30; Alcoholic solution of Ammonia, 10. Mix intimately in a mortar. The product, of a bright, yellow colour, readily absorbs large quantities of water.

Linogens of Iodine, Creolin, Creosotal, Creosote, Ichthyol, Resorcin and Veratrine are obtained by simple solution of the prescribed quantities of the active ingredient in liquid Linogen. Iodine Linogen containing 6 to 10 p.c. of Iodine, although quite bright when first made, becomes cloudy on keeping, especially if exposed to light.—*P.J.* '02, ii. 415.

PETROLEUM SPIRIT. *Syn.* Petroleum Ether.—Now appears in the Appendix of the *B.P.* '98, and is there described as 'a colourless, very volatile and highly inflammable liquid. Sp. gr. 0·670 to 0·700, boiling point 120° to 140° F.,' and is used as a solvent; the Petroleum Ether for use in conjunction with Methylated Ether (sp. gr. 0·717) for the production of local anæsthesia, has a much lower sp. gr. (0·640), and boils at a much lower temperature.

PARALDEHYDUM.

PARALDEHYDE.

$C_6H_{12}O_3$, eq. 131·10.

FR., PARALDÉHYDE; GER., PARALDEHYD; ITAL., PARALDEIDE; SPAN., PARALDEHIDO.

A colourless, transparent mobile liquid having a peculiar characteristic, not unpleasant ethereal odour, and a pungent and subsequently a cooling taste. A polymer of Acetaldehyde.

It should be kept in amber-coloured stoppered bottles, and in a cool atmosphere.

Paraldehyde not answering the official requirements can generally be brought up to the standard by washing with Water containing an excess of Sodium Bicarbonate to remove acidity, and then dehydrating over dried Potassium Carbonate. If the m.p. be very low it should first be redistilled and the first tenth rejected.

Solubility.—1 in 8½ of Water at 60° F., the solution becoming very turbid on warming. It is miscible, in all proportions, with Alcohol (90 p.c.) and with Ether.

Medicinal Properties.—Hypnotic. Produces quiet and refreshing sleep more speedily than Chloral; does not depress the heart's action. Has a marked action on the kidneys, increasing the flow of urine. It does not give rise to headache. Is a valuable remedy in the insomnia of cardiac disease, of mania, melancholia, and of other mental diseases.

Paraldehyde is given off by the lungs, and may be detected in the breath 12 or more hours after it has been taken.

30-minim doses every half or one hour in spasmodic asthma.—*B.M.J.* '93, i. 65; '96, i. 725; *L.* '99, i. 756.

In 1 to 1½ fl. drm. doses, one of the most potent remedies in spasmodic asthma.—*Scot. Med. and Surg. Jour.* '99, 418.

One of the best and safest drugs for use as a narcotic in the treatment of mental diseases.—*L.* '02, i. 1539.

Cases of habit have been recorded. Over-doses have occasionally produced epileptiform convulsions, but muscular relaxation and deep stupor are more frequent.—*L.* '03, i. 1023.

Sometimes useful in the sleeplessness of patients suffering from Bright's disease.—*Pr.* lxvii. 658.

Case of poisoning by 1 oz. of pure Paraldehyde given in mistake for a diluted preparation; recovery.—*L.* '02, ii. 673.

Has been successfully employed in the insomnia of tricuspid incompetency. —*M.P.* '04, ii. 515.

A very good hypnotic.—*B.M.J.* '05, ii. 1007. 1½ drm. may be given in 2 oz. of Water, the disagreeable taste being covered by Tincture and Syrup of Orange. It is particularly valuable when insomnia is associated with delirium or any mental aberration.

Of special service as a hypnotic in chronic alcoholism.—*B.M.J.* '05, ii. 250.

In severe bronchopneumonia and capillary bronchitis of infants, with Potassium Iodide and Liquorice.—*B.M.J.* '08 i. 258.

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c.

Ph. Ger. maximum single dose, 5·0 grammes; maximum daily dose, 10·0 grammes.

Prescribing Notes.—*May be taken dissolved in 1 to 2 fl. oz. of Water. A small dose repeated in an hour is more effective than a large dose. It is very pungent; when prescribed in mixture it should be diluted 1 to 16 of Water. The flavour is disagreeable and difficult to cover; Tincture of Orange and Cinnamon Water are the best for this purpose. When larger doses than will dissolve are required in mixtures, Compound Tragacanth Powder should be ordered to diffuse it. It is also prescribed in* **capsules.**

It has been stated (*P.J.* '01, i. 559) *that when Potassium Bromide and Paraldehyde are prescribed together in Water, that Potassium Bromate is formed, but we dissolved 3 grammes of Potassium Bromide and 4 grammes of Paraldehyde in 150 grammes of Distilled Water, and on keeping over a month the Bromide titrated its full strength.*

Not Official.—Metaldehyde, and Mistura Paraldehydi.

Foreign Pharmacopœias.—Official in Dan., Hung., Ger., Ital., Jap., Mex. (Paraldeida), Norw., Russ., Span., Swiss and U.S. Not in the others.

Tests.—Paraldehyde has a sp. gr. of 0·998 to 0·999. The *B.P.* gravity is 0·998. A carefully fractionated sample of Paraldehyde may have a sp. gr. of 0·999. The *U.S.P.* sp. gr. is 0·990 at 25° C. (77° F.). The *P.G.* states 0·995 to 0·998. A carefully fractionated sample boils at 125° to 126° C. (257° to 258·8° F.). The *B.P.* boiling point is 124° C. (255·2° F.). The *U.S.P.* gives 121° to 125° C. (249·8° to 257° F.) and the *P.G.* gives 123° to 125° C. (253·4° to 257° F.) as the boiling point. It solidifies to a crystalline mass when cooled to a temperature of about 0° C. (32° F.) and melts again at 10° C. (50° F.). The *B.P.* gives the m.p. as 10° C. (50° F.), the *U.S.P.* as 10·5° C. (51° F.), and the *P.G.* as 10·5° C. (51° F.), but not under 10° C. (50° F.). The m.p. of a carefully fractionated sample is from 12·2° to 12·8° C. (54° to 55° F.).

It is neutral or but faintly acid in reaction towards Litmus paper. When warmed with Silver Ammonio-nitrate Solution the silver is reduced and on standing forms a metallic mirror on the sides of the tube.

The more generally occurring impurities are Aldehyde, Sulphates, Chlorides, free acid and impurities derived from Fusel oil. The *B.P.* has a test for the absence of Aldehyde, requiring that no coloration shall be yielded when the Paraldehyde is mixed with Potassium Hydroxide Solution and allowed to stand for 2 hours. The Aldehyde reaction with Potassium Hydroxide Solution is an exceedingly delicate one, almost too delicate, very few samples remaining quite uncoloured for 2 hours. No similar test is included in the *U.S.P.* or the *P.G.* 1 c.c. of the specimen should form a clear solution with 10 times its volume of Water, which should be free from oily drops (absence of Amyl Alcohol); should yield no turbidity or precipitate with Barium Chloride Solution (absence of Sulphates); when acidified with Nitric Acid should yield no turbidity or precipitate with Silver Nitrate Solution (absence of Chlorides). The absence of any disagreeable odour when the Paraldehyde is carefully and completely evaporated indicates the absence of impurities derived from Fusel oil. The amount of free acid in the sample may be judged by the reaction towards Litmus. The *U.S.P.* and the *P.G.* both give a limit for free acid, the former requiring that a mixture of 8 c.c. of Paraldehyde and 8 c.c. of Alcohol (94·9 p.c.) should acquire a pink colour upon the addition of 0·5 c.c. of Normal Volumetric Potassium Hydroxide Solution, using Phenolphthalein Solution as an indicator of neutrality; the latter that a mixture of 1 c.c. each, of Paraldehyde and Alcohol (90 p.c.), shall not possess an acid reaction after the addition of 1 drop of Normal Volumetric Potassium Hydroxide Solution, but no indicator of neutrality is mentioned. Paraldehyde should be readily and completely volatilised at a temperature of a water-bath, and should leave no weighable residue.

Not Official.

MISTURA PARALDEHYDI.—Paraldehyde, 1 fl. drm.; Glycerin, 40 minims; Rectified Spirit, 2 fl. drm.; Cinnamon Water, to 1 fl. oz.

Metaldehyde, which is also a polymer of Ethylic Aldehyde, occurs in colourless acicular crystals, and was at one time said to be a hypnotic in doses of 2 to 8 grains, but this is doubtful.

PAREIRÆ RADIX.

PAREIRA ROOT.

The dried Root of *Chondrodendron tomentosum*, Ruiz and Pavon.

Under the title of **Cissampelos,** the dried Root of *Cissamapelos Pareira*, L., is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies; also **Decoctum Cissampeli** (1 in 8), dose $\frac{1}{2}$ to 2 fl. oz. = 14·2 to 56·8 c.c.; and **Extractum Cissampeli Fluidum** (1 in 1), dose 30 to 120 minims = 1·8 to 7·1 c.c.

Imported from Rio Janeiro in South Brazil. A spurious Pareira has lately been imported from Bahia in North Brazil, much inferior in alkaloid and extractive. The most marked chemical difference between the two is in the Petroleum Ether Extractive. In the genuine drug this amounts to over 8 p.c., and in the spurious to about 0·3 p.c.—*P.J.* (3) xxii. 703, 771.

A good deal of the stem, which closely resembles the root, is also imported, and is said to be much less efficacious. Several drugs have been sold at different times as Pareira Brava.

Medicinal Properties.—Astringent and mild diuretic in catarrhal affections of the genito-urinary tract, such as gonorrhœa and cystitis.

Official Preparation.—Extractum Pareiræ Liquidum.

Foreign Pharmacopœias.—Official in Mex. and Port. (Butua); U.S. Not in the others.

Descriptive Notes.—Although the Root only is official in the *B.P.*, the stem usually comes with it into commerce, often in the proportion of 3 parts to 1 of root. The root is of a black colour externally, longitudinally furrowed, and marked with transverse ridges. The bark is thin. Internally the root is brownish or yellowish-grey, with several more or less concentric zones having crenated edges, the porous woody wedges being separated by broad medullary rays; it has a waxy surface when cut. It has a bitter taste but no odour. The root is officially limited to pieces $\frac{3}{4}$ to 2 or more in. (2 to 5 cm.) in diameter. The stem is similar internally, but externally is of a pale greyish colour, with numerous warty, round lenticels. According to Moss the stem contains only three-fourths of the amount of active principle yielded by the root. The true Pareira comes into commerce with considerable irregularity, but its place is taken by inert or false roots all of which have narrower and more numerous zones, which have not, in any case, crenated edges.

Tests.—Pareira Root leaves from 3 to 4 p.c. of ash when ignited with free access of air, and the latter figure should not be exceeded. It has been stated [*P.J.* (3) xxii. 703, 771] to contain about 8 p.c. of fatty matter extractable by Petroleum Ether, but genuine Pareira root and Bahia root obtained from an authoritative source did not yield that amount of Petroleum Ether extract. Samples of Pareira root examined in the author's laboratory yielded on an average 0·5 p.c. w/w of Petroleum Ether extract.

Preparation.

EXTRACTUM PAREIRÆ LIQUIDUM. LIQUID EXTRACT OF PAREIRA.

Pareira Root exhausted with boiling Distilled Water, the liquid evaporated until it contains 33⅓ p.c. by weight of solid extract, then mixed with one-third of its volume of Alcohol (90 p.c.).

B.P. 1885 prepared the fluid extract from a solid extract.

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c.

Incompatibles.—Ferric salts, Lead salts, Tincture of Iodine.

Foreign Pharmacopœias.—Official in U.S., 1 in 1 with Glycerin. Not in the others.

Tests.—Liquid Extract of Pareira has a sp. gr. of 1·025 to 1·048; it contains from 12 to 22 p.c. w/v of total solids and about 22 p.c. w/v of Absolute Alcohol.

PEPSINUM.

PEPSIN.

FR., PEPSINE; GER., PEPSIN; ITAL., PEPSINA; SPAN., PEPSINA MEDICINAL.

A proteolytic ferment or enzyme obtained from the mucous lining or the glandular layer of the fresh stomach of the healthy pig, sheep, or calf. The *U.S.P.* admits only the fresh stomach of the hog.

A fine white or yellowish-white amorphous powder, or thin pale yellow or yellowish translucent grains or scales, without any offensive odour, and having a slightly saline taste, followed by a suggestion of bitterness. It should be kept in well-closed glass bottles, as it slowly absorbs moisture when exposed to the air.

B.P. requires it to dissolve 2500 times and *U.S.P.* not less than 3000 times its own weight of freshly coagulated and disintegrated egg albumen.

Solubility.—Soluble about 1 in 100 of Water, more soluble in Water acidulated with Hydrochloric Acid. Insoluble in Alcohol (90 p.c.).

B.P. states that Pepsin is soluble 1 in 100 of Alcohol (90 p.c.), but this can only apply to the 500-test Pepsin of *B.P.* '85, because it consists principally of Sugar of Milk and not Pepsin. It is not true of Pepsin, *B.P.* '98.

Medicinal Properties.—A digestive adjuvant; preferably given with dilute Hydrochloric Acid; used in chronic dyspepsia with deficiency of gastric juice, and in irritability of stomach associated with vomiting and gastralgia. It does not aid the digestion of carbohydrates and fats. It ought to be taken immediately after meals.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

Prescribing Notes.—*Given in* **powders,** *or in* **pills** *with 'Dispensing Syrup,' also in* **cachets, capsules,** *and compressed* **tablets.**

Official Preparation.—Glycerinum Pepsini.

Not Official.—Elixir Pepsini, Elixir Pepsini et Bismuthi, Elixir Pepsini et Bismuthi Compositum, Elixir Pepsini et Bismuthi cum Ferro, Elixir Pepsini et Bismuthi cum Podophyllino, Elixir Pepsini et Bismuthi cum Strychnina, Elixir Pepsini et Bismuthi et Strychninæ cum Ferro, Elixir Pepsini et Quininæ, Elixir Pepsini et Quininæ cum Ferro, Glycerole of Pepsin, Glycerinum Pepsini Fortius, Liquor Pepticus, Mistura Pepsini Composita, Mistura Pepsini cum Extracto Malti, Pepsinum Saccharatum, Vinum Pepsini.

The usual solvent for making fluid preparations of Pepsin is a weak Alcohol acidulated with Hydrochloric Acid, to which Glycerin is added.

Alcoholic media are stated to be unsuitable vehicles for pharmaceutical preparations of Pepsin, as even dilute Alcohol in time destroys its activity.—*L.* '02, i. 687; *P.J.* '02, i. 294.

Pepsin is one of the soluble ferments or enzymes of the gastric juice. It dissolves natural proteids, albumens, and fibrin, and converts them into syntonin and subsequently into albumose and Peptone. It is a conversion of the less soluble proteids into those that are more so, Peptone being the most soluble and diffusible of the proteids. Pepsin has no action on starch.

It acts only in acid solution, 0·2 p.c. of Hydrochloric Acid being the most favourable.

The action of Pepsin will continue almost indefinitely if the products of its action are removed by dialysis, or if the concentration of the products is reduced by acidified Water.

The gastric juice also contains another enzyme, 'rennin,' which curdles milk. The curd is formed in acid or neutral solutions in the presence of Calcium Phosphate. The casein is split up into a soluble and an insoluble proteid, the latter of which entangles the fat and forms a curd.

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

Tests.—Pepsin is required by the *B.P.* to dissolve 2500 times its weight of coagulated egg albumen and the following test is adopted for ascertaining that the sample possesses this degree of activity. A weighed quantity of 12·5 grammes of firm coagulated egg albumen prepared by boiling fresh eggs in Water for a quarter of an hour, chilling them in cold Water, separating and washing the whites free from pellicle or yolk, drying with a clean cloth and rubbing the coagulated Albumen through a sieve containing 12 meshes to a cm., is mixed with 125 c.c. of a 0·2 p.c. w/w Hydrochloric Acid Solution. A weighed quantity of 5 mg. of Pepsin is added and the whole digested for 6 hours at a temperature of 40·5° C. (105° F.), the mixture being shaken frequently. The coagulated egg albumen is officially required to dissolve to an almost clear solution leaving only a few small flakes. Care should be taken not to expose the coagulated white of egg to too long a contact with the atmosphere before starting the determination, as the product should be used before it has lost moisture. The above process has been subjected to severe and well-merited criticism; it has been objected that the quantity of 5 mg. is an absurdly small one for the test, and that the *U.S.P.* method of employing an aliquot portion of a solution of Pepsin of a known strength is preferable. The *U.S.P.* now allows the digestion to proceed for 2½ hours instead of for 6 hours, as in the 1890 edition, and give the exact directions as to the number of times and the method by which the liquid is to be agitated, but neither the *B.P.* nor the *U.S.P.* makes any allowance for the solvent action of the acid on the albumen. Allen shows that by only requiring the Pepsin to dissolve the albumen no distinction is drawn between its conversion into Syntonin and true peptonisation. The real digestive power of a Pepsin is measured by the amount of Peptone which it produces in a given time under certain conditions. The conditions of the *U.S.P.* method of experiment afford a determination of the solvent action of the Pepsin on the albumen, although the *U.S.P.* description states that when assayed by such process it shall be capable of digesting the albumen. Allen has worked out a process, which he claims to be an original one for the determination of the digestive power of a Pepsin, whereby the actual amount of Peptone or of mixed Peptones and Albumose produced by digestion is ascertained. The process may be roughly outlined as follows:—A weighed quantity of about 1 gramme of scale egg-albumen is powdered and treated with 20 c.c. of warm Water, and when dissolved is heated in a water-bath to coagulate the albumen and cooled to a temperature not exceeding 40° C. (104° F.); 0·1 of a gramme of a sample of Pepsin to be tested is added, followed by 25 c.c. of Tenth-normal Volumetric Hydrochloric Acid Solution, the mixture is warmed to 40° C. (104° F.) and maintained at this temperature for 3 hours. A volume of Tenth-normal Volumetric Sodium Carbonate Solution exactly equivalent to the Tenth-normal Volumetric Acid Solution previously used is then added and the liquid heated on a water-bath to 90° C. (194° F.) for 10 minutes, it is cooled, diluted with Water to 100 c.c. and passed through a dry filter; the precipitate contains Syntonin and any unaltered albumen, the filtrate containing the Albumose and Peptones. A measured quantity of 50 c.c. is saturated in the cold with Zinc Sulphate (about 60 grammes being required for 50 c.c.) and the mixture is allowed to stand for half an hour with intervals of occasional agitation and filtered, the precipitate washed with cold saturated Zinc Sulphate Solution, diluted with Water to 150 c.c., acidulated with Hydrochloric Acid and treated with Bromine Water, the precipitate is filtered and the Nitrogen determined by Kjeldahl's test, allowance being made for the Nitrogen contained in the Pepsin employed. The method is described in the *Analyst* '97, 258.

The *U.S.P.* Pepsin is required to 'digest' not less than 3000 times its own weight of freshly coagulated and disintegrated egg albumen, and a method of determination of which the following are the essential features is employed:—The coagulated albumen is prepared on somewhat similar lines to the *B.P.*, the coagulated albumen when separated from the pellicle and yolk being rubbed through a clean No. 40 sieve, the first portions passing through being rejected and a weighed quantity of 10 grammes of the succeeding portion transferred to a wide mouthed bottle of 100 c.c. capacity. A measured quantity of 9 c.c. of Diluted Hydrochloric Acid is mixed with 291 c.c. of Water, and in 150 c.c. of this acid liquid a weighed quantity of 1 dg. of Pepsin is dissolved. A measured quantity of 20 c.c. of the Diluted Hydrochloric Acid liquid is added to the 10 grammes of albumen in the bottle and the albumen completely disintegrated by rubbing with a rubber-tipped glass rod, the rod being rinsed with a further quantity of 15 c.c. of diluted acid liquid, and finally a measured quantity of 5 c.c. of the solution of Pepsin is added. After the bottle has been securely corked, it is inverted three times and maintained at a temperature of 52° C. (125·6° F.) for 2½ hours, the bottle being inverted once in 10 minutes. At the end of this time the source of heat is removed, 50 c.c. of cold Water added, the mixture transferred to a narrow graduated cylinder and allowed to remain at rest for half an hour. The *U.S.P.* requires that the precipitate of undissolved albumen should not measure more than 1 c.c. The relative proteolytic power of a stronger or weaker Pepsin may be determined by a series of experiments to ascertain the exact quantity of a Pepsin solution required on the lines prescribed above, to digest the 10 grammes of coagulated and disintegrated egg albumen; the quantity in c.c. of Pepsin Solution required divided into 15,000 gives the number of parts of egg albumen digested by one part of Pepsin.

The *P.G.* test is made on the following lines:—A weighed quantity of 10 grammes of disintegrated egg albumen, prepared from an egg which has been boiled for 10 minutes, and after separation of the yolk, the white has been reduced to a state of coarse powder by rubbing through a sieve, is mixed with 100 c.c. of warm Water of a temperature of 50° C. (122° F.), and a measured quantity of 0·5 c.c. of Hydrochloric Acid added, and finally a weighed quantity of 0·1 of a gramme of Pepsin, the mixture is allowed to stand for 1 hour at 45° C. (113° F.) with repeated intervals of shaking. The *P.G.* requires that, with the exception of a few yellowish-white particles, the albumen shall be completely dissolved.

A method based on the lines of the *U.S.P.* has been suggested (*P.J.* '04, ii. 376.): the solution of Pepsin was prepared by triturating 25 cg. of Pepsin, 1 gramme of Sodium Chloride, and adding acidulated Water very carefully at first, mixing well and transferring to 1000 c.c. flask; the containing vessels being rinsed out with acidulated Water and made up to 1000 c.c., the solution is allowed to stand for 24 hours and shaken at intervals. A measured quantity of 20 c.c. is placed in a stoppered bottle of about 250 c.c. capacity, and 12 grammes of coagulated egg albumen, which has been previously thoroughly reduced to uniform granules by trituration in a small mortar with 50 c.c. of acidulated Water, is added; the last traces of albumen being transferred to the flask with a further quantity of 50 c.c. of acidulated Water, the mixture is digested at a temperature of 45° C. (113° F.) for 6 hours, with intervals of vigorous shaking for 15 minutes.

Preparation.

GLYCERINUM PEPSINI.—GLYCERIN OF PEPSIN.

Hydrochloric Acid, 110 minims; Glycerin, 12 fl. oz.; Distilled Water, 6 fl. oz.; Pepsin, 800 grains; macerate for a week, filter and make up with Distilled Water to 20 fl. oz. (1 in 11)

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c., corresponding to 5 to 10 grains = 0·32 to 0·65 gramme of Pepsin.

The Pepsin should be dissolved in the Water, the Glycerin added in 3 or 4 portions, with agitation, then the Acid, and finally made up to volume with Water, and filtered.—*P.J.* '04, i. 84.

Not Official.

PEPSINUM SACCHARATUM.—Pepsin, 1; Sugar of Milk, recently dried and in No. 30 powder, 9.—*U.S.P.* 1890 and *Jap.*

ELIXIR DE PEPSINE.—Pepsin, 2; Distilled Water, 28; Vin de Lunel, 50; Glycerin, 20.—*Fr.*

ELIXIR PEPSINI.—Pepsin, 5; Alcohol, 15; Distilled Water, 45; Aromatic Elixir, *q.s.* to produce 100.—*B.P.C.*

* **ELIXIR PEPSINI ET BISMUTHI.** *Syn.* Bismuth and Pepsine Mixture.—Stronger Glycerin of Pepsin, 12·50; Bismuth and Ammonium Citrate, 3·50; Alcohol (60 p.c.), 5; Simple Elixir, *q.s.* to produce 100. Mix the Glycerin of Pepsin with 10 of the Simple Elixir, and neutralise the mixture carefully with a weak solution of Ammonia. Dissolve the Bismuth and Ammonium Citrate in 50 of the Simple Elixir, aiding solution if acid by neutralising with Ammonia. Finally mix the two solutions, add the Alcohol, make up the required volume with Simple Elixir, and filter. Dose.—½ to 1 fl. drm = 1·8 to 3·6 c.c.—*B.P.C.*

* **ELIXIR PEPSINI ET BISMUTHI COMPOSITUM.**—Stronger Glycerin of Pepsin, 12·50; Bismuth and Ammonium Citrate, 3·50; Morphine Acetate, 0·10; Diluted Acetic Acid, 0·20; Tincture of Nux Vomica, 4; Diluted Hydrocyanic Acid, 2; Alcohol (60 p.c.), 5; Solution of Cochineal, *q.s.*; Simple Elixir, *q.s.* to produce 100. Mix the Glycerin of Pepsin with 10 of the Simple Elixir, and neutralise the mixture carefully with a weak solution of Ammonia. Dissolve the Bismuth and Ammonium Citrate in 50 of Simple Elixir, aiding solution of acid by neutralising with Ammonia. Next mix the Acetic Acid, Alcohol, and 5 of the Simple Elixir, and dissolve the Morphine Acetate in the mixture. Mix the three solutions, add the tincture of Nux Vomica, then the Hydrocyanic Acid, and sufficient Simple Elixir to make up the required volume. Finally colour with the solution of Cochineal, and filter. Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.—*B.P.C.*

* **ELIXIR PEPSINI ET BISMUTHI CUM FERRO.**—Stronger Glycerin of Pepsin, 12·50; Bismuth and Ammonium Citrate, 3·50; Iron and Ammonium Citrate, 3·50; Alcohol (60 p.c.), 5; Simple Elixir, *q.s.* to produce 100.—*B.P.C.*

* **ELIXIR PEPSINI ET BISMUTHI CUM PODOPHYLLINO.**—Stronger Glycerin of Pepsin, 12·50; Bismuth and Ammonium Citrate, 3·50; Podophyllin Resin, 0·25; Aromatic Spirit of Ammonia, 5; Solution of Cochineal, *q.s.*; Simple Elixir, *q.s.* to produce 100.—*B.P.C.*

* **ELIXIR PEPSINI ET BISMUTHI CUM STRYCHNINA.**—Stronger Glycerin of Pepsin, 12·50; Bismuth and Ammonium Citrate, 3·50; Solution of Strychnine Hydrochloride, 2·50; Alcohol (60 p.c.), 5; Simple Elixir, *q.s.* to produce 100.—*B.P.C.*

* **ELIXIR PEPSINI ET BISMUTHI ET STRYCHNINÆ CUM FERRO.**—Stronger Glycerin of Pepsin, 12·50; Bismuth and Ammonium Citrate, 3·50; Solution of Strychnine Hydrochloride, 2·50; Iron and Ammonium Citrate, 2; Alcohol (60 p.c.), 5; Simple Elixir, *q.s.* to produce 100.—*B.P.C.*

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* These formulas closely resemble those previously published in *Armour's Formulary* (9th edit.).

* **ELIXIR PEPSINI ET QUININÆ.**—Stronger Glycerin of Pepsin, 12·50; Quinine Acid Hydrochloride, 1; Alcohol (60 p.c.), 5; Simple Elixir, *q.s.* to produce 100.—*B.P.C.*

* **ELIXIR PEPSINI ET QUININÆ CUM FERRO.**—Stronger Glycerin of Pepsin, 12·50; Iron and Quinine Citrate, 3·50; Alcohol (60 p.c.), 5; Simple Elixir, *q.s.* to produce 100.—*B.P.C.*

ELIXIR PEPSIN ET EUONYMIN. *See* p. 500.

GLYCEROLE OF PEPSIN.—Pepsin, 2 oz.; Diluted Hydrochloric Acid, 1 fl. oz.; Glycerin, 10 fl. oz.; Simple Elixir, 1 fl. oz.; Distilled Water, *q.s.* to produce 20 fl. oz.—*P.J.F.*

GLYCERINUM PEPSINI FORTIUS. *Syn.* Glycerol of Pepsin.—Pepsin, 15; Diluted Hydrochloric Acid, 5; Glycerin, 50; Simple Elixir, 5; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

* **LIQUOR PEPTICUS.**—Stronger Glycerin of Pepsin, 12·50; Diluted Hydrochloric Acid, 2·50; Alcohol, 10; Glycerin, 2·50; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

* **MISTURA PEPSINI COMPOSITA.**—Stronger Glycerin of Pepsin, 5; Solution of Strychnine Hydrochloride, 1·25; Diluted Nitro-Hydrochloric Acid, 3; Glycerin, 10; Tincture of Cudbear, 5; Distilled Water, *q.s.* to make 100.—*B.P.C.*

* **MISTURA PEPSINI CUM EXTRACTO MALTI.** *Syn.* Essence of Pepsin and Malt.—Stronger Glycerin of Pepsin, 5; Extract of Malt, by weight, 30; Alcohol (60 p.c.), *q.s.* to produce 100.—*B.P.C.*; altered in *B.P.C. Supp.*

* **Elixir Simplex.**—Tincture of Orange, 7·50; Syrup, 40; Distilled Water, *q.s.* to produce 100. Mix the Tincture with the Syrup, add sufficient Distilled Water to make up the required volume, and filter through Kaolin.—*B.P.C.*

* **Tinctura Persionis.** Tincture of Cudbear.—Cudbear, in fine powder, 12·50; Alcohol, 35; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

VINUM PEPSINI. Pepsin Wine.—Pepsin, 320 grains; Hydrochloric Acid, 2 fl. drm.; Glycerin, 1 fl. oz.; Sherry, *q.s.* to 20 fl. oz.—*B.P.C. Formulary* 1901, now incorporated in the *B.P.C.*, with 3½ p.c. of Pepsin and using Detannated Sherry, as follows:—

Pepsin, 3·50; Hydrochloric Acid, 1·25; Glycerin, 5; Detannated Sherry, *q.s.* to produce 100.

Official in Austr., Belg., Dutch, Ger. and Russ., about 1 in 40; Jap. about 1 in 20; Mex., 1 in 30; Span., 1 in 20.

Ingluvin.—An amorphous powder, prepared from the gizzard of the domestic fowl. Introduced as a substitute for Pepsin. A stomachic tonic for the relief of indigestion, flatulence and dyspepsia, and of special use in the vomiting of pregnancy.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

PHENACETINUM.

PHENACETIN.

$C_{10}H_{13}NO_2$, eq. 177·80.

FR., OXÉTHYLPARA-ACÉTANILIDE; GER., PHENACETIN; ITAL., FENACETINA; SPAN., FENACETINA.

A white, odourless, almost tasteless, crystalline powder, or white glistening crystalline scales. It is produced by the action of Glacial Acetic Acid upon Para-phenetidin.

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* These formulas closely resemble those previously published in *Armour's Formulary* (9th edit.).

Phenacetin is described in the *U.S.P.* under the title of Acetphenetidin and is stated to be a Phenol derivative, the product of the acetylisation of Para-amidophenetol.

Solubility.—1 in 1700 of Water; 1 in 50 of boiling Water; 1 in 21 of Alcohol (90 p.c.); 1 in 100 of Alcohol (60 p.c.).

Medicinal Properties.—Analgesic, antipyretic and nervine sedative. It does not produce nausea, and it depresses the heart very little, when used judiciously. It is an efficient synthetic analgesic for the relief of neuralgic, rheumatic, locomotor ataxial and other pains; and is the safest of the synthetic antipyretics, being the most free from toxic effects.

As the result of an inquiry as to the ill-effects of Phenacetin, by a Committee of the British Medical Association, it is stated that it appears to have a notable freedom from injurions action, and has great value, especially as an analgesic. Some observers recommend a commencing dose of 5 grains or less, others using doses of 8 to 10 grains.—*B.M.J.* '94, i. 89.

Two cases of temporary rash caused by Phenacetin without any other untoward result.—*L.* '95, i. 91; *C.D.* '95, i. 797.

Palpitation caused in an adult male by taking 3 15-grain powders in 3½ hours. —*Pr.* li. 241; palpitation caused in a female aged thirty-two by taking 5 to 8 cachets of 10 grains each in the 24 hours.—*Pr.* liii. 444.

Phenacetin and Antipyrine are the most trustworthy and valuable of this class of pain-relieving remedies, and if used with due care and judgment, ill-effects following the use of either are exceedingly rare, the principal precaution being to commence with a small dose, of Phenacetin 5 grains and of Antipyrine not more than 10 grains.—*Scot. Med. and Surg. Jour.* '98, ii. 436.

Recommended in influenza to relieve the headache and reduce temperature. —*B.M.J.* '91, i. 1282; '91, ii. 190; '94, ii. 1045.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

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

Prescribing Notes.—*It is given in* **cachets,** *or* **suspended** *in Water with Compound Powder of Tragacanth; in migraine it is usually given with Caffeine in* **effervescent granules.**

Not Official.—Phenacetinum cum Caffeina Effervescens, Amygdophenin, Eupyrine, Kryofin, Lactophenin, Malakin, Para-phenetidin Camphorates and Citrates, Phenosal, Triphenin, Phenocoll Hydrochloridum and Salocoll.

Foreign Pharmacopœias.—Official in Belg., Dan., Dutch, Ger., Jap., Norw., Russ., Swed. and Swiss (Phenacetinum); Austr. and U.S. (Acetphenetidinum); Fr. (Oxéthylpara-Acétanilide); Ital., Mex. and Span. (Fenacetina).

Tests.—Commercial Phenacetin melts at 133·79° C. (272·82° F.), the dried product at 134·26° C. (273·67° F.), and the purified product at 134·89° C. (274·80° F.). The *B.P.* m.p. is 135° C. (275° F.). The *U.S.P.* and *P.G.* m.p. is 134° to 135° C. (273·2° to 275° F.). It dissolves in Sulphuric Acid without change of colour. When 0·1 of a gramme is boiled for from half a minute to 1 minute with 1 or 2 c.c. of Hydrochloric Acid it yields a fluid which, when diluted with 10 times its volume of Water, yields on the addition of 3 or 4 drops of Chromic Acid Solution a deep red coloration. The *U.S.P.* states that it is coloured yellow by Nitric Acid, the colour persisting when heated.

The more generally occurring impurities are Acetanilide, unconverted Para-phenetidin, and mineral matter. The *B.P.* gives only one test for the detection of Acetanilide, requiring that a cold saturated aqueous solution of the sample should not be rendered turbid by the addition of Bromine Solution. This test is also given in the *P.G.* and *U.S.P.* The *U.S.P.* gives three separate tests for Acetanilide: the Potassium Hydroxide test, the Sodium Hydroxide and Chlorinated Soda test, and the Bromine test described in small type below. The Iso-nitrile test is not included; this latter test, when carried out according to the modification described under Acetanilide, is capable of detecting readily an addition of 2 p.c. of the latter substance. An admixture of Acetanilide also affects the m.p.; pure Phenacetin and pure Acetanilide did not begin to fuse at any temperature approaching 92° C. (197·6° F.), whereas mixtures containing from 1 to 95 p.c. of Acetanilide all commenced to fuse at this temperature. Unconverted Para-phenetidin, if present, may be detected by the reddish tint developed on the addition of Volumetric Iodine Solution. The *B.P.* and the *U.S.P.* require that a mixture of 0·3 of a gramme of Phenacetin with 1 c.c. of Alcohol when diluted with 3 times its volume of Water should not acquire a red coloration on boiling with 1 drop of Volumetric Iodine Solution. It may also be detected by the dark red colour produced on the addition of Ferric Chloride T.S. to the saturated aqueous solution of the sample.

Phenacetin when heated with free access of air should leave no weighable residue.

Bromine.—The solution obtained when 0·1 gramme is boiled with 10 c.c. of Water, cooled and filtered, should not be rendered turbid by the addition of a slight excess of Bromine Water, *P.G.* and *U.S.P.*

Potassium Hydroxide.—0·1 gramme, heated with 5 c.c. of a solution of Potassium Hydroxide (1 in 4), should not give off a perceptible odour of Aniline, *U.S.P.*

Sodium Hydroxide and Chlorinated Soda.—Boil 0·1 gramme for 1 minute with 3 c.c. of a solution of Sodium Hydroxide (1 in 2), cool, and agitate the solution with 5 c.c. of solution of Chlorinated Soda. A clear yellow liquid should be obtained, and not a purplish-red or brownish-red cloudy liquid or precipitate, *U.S.P.*

Not Official.

PHENACETINUM CUM CAFFEINA EFFERVESCENS.—Sodium Bicarbonate, 46; Tartaric Acid, 24; Citric Acid, 16; Refined Sugar, 16½; Phenacetin, 5; Caffeine Citrate, 2½; make into granules of a suitable size.—*B.P.C. Formulary* 1901. (about 5 in 100)

This has been incorporated in the *B.P.C.*, but the Caffeine is reduced to 1½ and the Sugar to 16; *B.P.C. Supp.* has altered the Citric Acid to 18, and the Sugar to 15½.

Dose.—60 to 120 grains = 4 to 8 grammes.

AMYGDOPHENIN (Para-phenetidin Amygdalate).—A greyish-white, voluminous, crystalline powder, very sparingly soluble in Water. Antirheumatic and antineuralgic, but of little value as an antipyretic.—*P.J.* '96, i. 139, 162; *B.M.J.E.* '95, ii. 99.

Dose.—8 to 15 grains = 0·52 to 1 gramme.

CITROPHEN (Para-phenetidin Citrate).—A white powder, with an acid reaction; soluble 1 in 165 of Water; 1 in 300 of Alcohol (90 p.c.); insoluble in Ether and in Chloroform. Antipyretic and analgesic, sometimes causing considerable sweating.

Useful in rheumatism of the joints and muscles, in the severe headache of influenza, and in acute tonsillitis.—*B.M.J.E.* '99, ii. 52.

Dose.—7½ to 15 grains = 0·5 to 1 gramme.

Tests.—Citrophen possesses a m.p. of about 181° C. (357·8° F.). A small quantity, when boiled with Hydrochloric Acid, cooled, and the solution diluted with Water, yields a liquid which acquires a deep reddish colour on the addition of Chromic Acid Solution. When ignited with free access of air it should leave no weighable residue.

Citrophen is dibasic, and Apolysin is monobasic, Para-phenetidin Citrate.

Apolysin forms yellowish-white crystals, or a crystalline powder, with an acid reaction; readily soluble in Water. Has been used as an antipyretic and analgesic.

EUPYRINE (Para-phenetidin-vanillin-ethyl Carbonate).—Pale, greenish-yellow crystals, insoluble in Water, readily soluble in Alcohol (90 p.c.), in Ether and in Chloroform. Introduced as an innocuous antipyretic.—*P.J.* '01, ii. 312; *C.D.* '01, i. 36.

Dose.—15 to 20 grains = 1 to 1·3 grammes.

KRYOFIN (Para-phenetidin Methylglycollate).—White, odourless, tasteless crystals, sparingly soluble in cold Water. Antipyretic and analgesic. Useful in neuralgia. Severe sweating sometimes follows its use.—*B.M.J.E.* '97, i. 83; '97, ii. 88; *L.* '97, ii. 728; *P.J.* '97, ii. 5.

Dose.—8 to 15 grains = 0·52 to 1 gramme.

LACTOPHENIN (Para-phenetidin Lactate).—A white, inodorous, bitter, crystalline powder, sparingly soluble in Water.

Medicinal Properties.—Antipyretic, analgesic and hypnotic. Used in migraine, erysipelas, nervous headache and the neuralgia of influenza.

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

Tests.—Lactophenin melts at about 118° C. (244·4° F.). 0·1 gramme boiled with 1 c.c. of Hydrochloric Acid, the solution cooled and diluted with 10 c.c. of Water and filtered yields, on the addition of 1 or 2 drops of Chromic Acid Solution, a deep red coloration. It dissolves in Sulphuric Acid without change of colour. When ignited with free access of air it should leave no weighable residue.

MALAKIN (Para-phenetidin Salicylate).—Occurs in pale yellow, silky needles, or a yellow, crystalline powder, insoluble in Water and strong Alcohol.

Antipyretic, analgesic and antirheumatic. Used in acute rheumatism, the fever of phthisis, migraine and neuralgia.—*M.P.* '94, i. 268; *B.M.J.E.* '93, ii. 92; '94, i. 84; '94, ii. 88; *T.G.* '95, 325; *Pr.* liii. 45; *Y.B.P.* '95, 89; *Y.B.T.* '95, 89; in every way inferior to Phenacetin and Antipyrine.—*B.M.J.* '98, ii. 1055.

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

PARA-PHENETIDIN CAMPHORATE.—A white, crystalline powder, insoluble in Water, soluble in Alcohol (90 p.c.). Introduced as an antipyretic.

PHENOSAL (Para-phenetidin Aceto-salicylate).—A white, odourless, crystalline powder, sparingly soluble in Water, in Alcohol (90 p.c.) and in Ether. It is stated to possess antipyretic and antineuralgic properties.—*P.J.* '99, ii. 11, 62.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

Triphenin.—A derivative of Para-phenetidin and Propionic Acid; dose, 8 to 15 grains. **Phesin,** a sulpho-derivative of Para-phenetidin, and **Pyrantin,** a derivative of Para-phenetidin and Succinic Acid, dose 5 to 10 grains, have been recommended as antipyretics. **Chinaphenin** (Para-phenetidin-quinine-ethyl Carbonate), dose 5 to 15 grains, and **Para-phenetidin Agarate** have been introduced as antipyretics.

PHENOCOLL HYDROCHLORIDUM.—A white, crystalline powder, soluble 1 in 16 of Water, sparingly soluble in Alcohol (90 p.c.). Obtained by the action of Glycocoll on Phenetidin.

Medicinal Properties.—Antipyretic, yielding good results in rheumatic fever.—*L.* '91, i. 1060; '92, ii. 438. As a substitute for Quinine in malaria, *B.M.J.E.* '93, ii. 104; *T.G.* '93, 334, 618; in acute rheumatism, typhoid, malaria, and as an intestinal antiseptic, *B.M.J.E.* '94, i. 79; '96, ii. 83; *L.* '97, i. 1227; *P.J.* '96, i. 178; used in 400 cases of influenza during an epidemic, and found to be a specific.—*P.J.* '99, ii. 216.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

Salocoll (Phenocoll Salicylate), recommended in rheumatism in doses of 15 to 30 grains = 1 to 2 grammes. It is not so soluble in Water as the Hydrochloride.

PHENAZONUM.

PHENAZONE.

$C_{11}H_{12}N_2O$, eq. 186·77.

FR., ANTIPYRINE; GER., PHENYLDIMETHYLPYRAZOLON; ITAL., ANTIPIRINA; SPAN., ANTIPIRINA.

Colourless, odourless, crystalline scales, or as a white, neutral, odourless powder, possessing a somewhat bitter taste.

B.P. states that 'Phenazone is commonly known as Antipyrine,' but it is not very clear from this note whether it is intended that Phenazone should be used when Antipyrine is ordered, or that Antipyrine should be used when Phenazone is ordered, or whether it is an incidental note having no meaning.

It appears in the *U.S.P.* under the title of Antipyrina, and is stated to be obtained by the condensation of Phenylhydrazine with Aceto-acetic Ether and subsequent methylation.

Solubility.—1 in 1¼ of Water; 3 in 4 of Alcohol (90 p.c.); about 5 in 6 of Chloroform; 1 in 40 of Ether.

Medicinal Properties.—Antipyretic and analgesic, nervine sedative. It will reduce temperature in all forms of febrile disease, but in weak subjects its depressant effect should be borne in mind.

As an analgesic it is used with great success in neuralgia, migraine, gout, rheumatism, locomotor ataxia and other painful affections, and is frequently given with Sodium Salicylate and Caffeine.

It is a good uterine sedative; it also relieves sea-sickness.

As a pain-relieving remedy Phenacetin is preferred by some, as it is less likely to produce toxic effects.

Of great value as a sedative in some of the nervous disturbances of childhood. —*Pr.* '07, i. 540.

10 p.c. solution locally in epistaxis.—*M.A.* '94, 253; *L.* '93, ii. 453. As a styptic and antiseptic.—*B.M.J.E.* '95, i. 28; *L.* '95, i. 1453. In Tannic Acid Solution as a styptic.—*B.M.J.E.* '95, ii. 90. One of the most pleasant and rapid remedies for influenza.—*Pr.* liv. 383. Discussion on its benefits and risks as an analgesic.—*B.M.J.* '98, ii. 1054; it is contra-indicated in cardiac weakness and cases of extreme exhaustion.—*T.G.* '89, 457.

As the result of an inquiry as to the ill-effects of Phenazone, by a Committee of the British Medical Association, it is stated that the commencing dose should not exceed 10 grains, and should not be repeated too frequently; there is a necessity for watching its action, but ill-effects are not of the frequency or importance ascribed to them by a widespread impression. The large majority of observers agree in stating that they are of no importance whatever, and that, with reasonable and judicious care, they limit in no way the general usefulness of the drug as a therapeutic agent.—*B.M.J.* '94, i. 88.

Toxic symptoms following the administration of 10 grains dissolved in 1 oz. of Water; recovery.—*B.M.J.* '99, ii. 85.

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

Swiss, maximum single dose, 2·0 grammes; maximum daily dose, 6·0 grammes.

Prescribing Notes.—*Given in* **solution** *with Tincture of Orange and Spirit of Chloroform or Chloroform Water; or in* **powders, cachets, capsules,** *or in the form of* **effervescent granules.**

Incompatibles.—Spiritus Ætheris Nitrosi, Tannic Acid in aqueous solutions, Extractum Cinchonæ Liquidum, and other astringent decoctions and infusions. Chloral Hydrate is not incompatible with Phenazone in moderately dilute aqueous solution. Sodium Salicylate is not incompatible with Phenazone in aqueous solution, but forms an oily liquid if the *solids* be mixed and exposed to the air.—*P.J.* (3) xx. 861.

The incompatibility of Antipyrine and Spiritus Ætheris Nitrosi may be overcome by prescribing them with Sodium Bicarbonate.—*A.J.P.* '94, 321; *C.D.* '98, i. 357.

Not Official.—Pulv. Phenobrom. Co., Phenazonum Effervescens, Acetopyrine, Ferripyrin, Hypnal, Iodopyrin, Migrainine, Pyramidon, Pyramidon Camphorates and Salicylate, Salipyrin, Tolypyrin, Tolysal and Tussol.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Hung., Ital., Jap., Mex., Norw., Russ., Span., Swed., Swiss and U.S. (Antipyrinum); Ger. (Pyrazolonum Phenyldimethylicum).

Chloroform extracts Antipyrine from alkaline solution, but imperfectly from acid solution.

Tests.—Commercial Phenazone melts at 109·12° C. (228·42° F.), dried Phenazone melts at 110·01° C. (230·02° F.), and purified Phenazone melts at 112·84° C. (235·11° F.). The *B.P.* states about 113° C. (235·4° F.); the *U.S.P.* and *P.G.* state that it melts at 113° C. (235·4° F.). The *Fr. Codex* gives 114° C. (237·2° F.) as the m.p. 5 c.c. of an aqueous 1 p.c. solution of Phenazone when mixed with 5 c.c. of Nitric Acid, develops a yellow colour which, on warming, changes to crimson. 12 c.c. of a solution of similar strength, when mixed with 1 decigramme of Sodium Nitrite, yields an almost colourless fluid which, on the addition of 1 c.c. of Diluted Sulphuric Acid, assumes a deep green colour. In the place of Sodium Nitrite, a few drops of Spiritus Ætheris Nitrosi may be used, and will answer the same purpose. A very dilute solution affords, with Ferric Chloride T.S., a deep red coloration, the colour being destroyed by an excess of diluted Sulphuric Acid. The *U.S.P* and *P.G.* recommend the use of 2 c.c. of a 1 in 1000 Phenazone solution and 1 drop of Ferric Chloride T.S. The *B.P.* states that the colour is nearly destroyed by excess of diluted Sulphuric Acid. The *U.S.P.* and *P.G.* that it is changed to light yellow on the addition of 10 drops of Sulphuric Acid. The aqueous solution affords with Tannic Acid an abundant white precipitate; the *B.P.* states that a 5 p.c. aqueous solution affords with Mercuric Chloride T.S. a white precipitate, disappearing on boiling but reappearing on cooling. 2 c.c. of a 1 p.c. aqueous solution yields on the addition of 2 drops of Fuming Nitric Acid a green coloration, changing to red on boiling. The test is common to the *B.P.* and the *P.G.*, but is not in the *U.S.P.* In an acidified aqueous solution it yields a precipitate with Mayer's reagent, and also with Iodo-potassium Iodide (Wagner's) Solution, in a similar way to an alkaloid. It may be extracted from alkaline solution by Chloroform, but is only imperfectly extracted from an acid solution. The *Fr. Codex* (1908) gives a method by which Antipyrine may be determined:—A weighed quantity of 0·5 of a gramme dissolved in 50 grammes of Water is mixed with 1·5 grammes of Sodium Acetate, and after having been brought to the boiling point is mixed with Iodo-potassium Iodide Solution (4 grammes of Iodine and 2 grammes of Potassium Iodide dissolved in 10 grammes of Water and diluted with Water to 100 grammes), until the boiling liquid just commences to become coloured; when cooled the crystallised Iodine compound is separated, dried and weighed; 1 gramme represents 0·7 of a gramme of Antipyrine. It should be free from acids and alkaloids, as indicated by the behaviour of its aqueous solution towards Litmus paper. Its aqueous solution should not be affected by Hydrogen Sulphide, and it should be free from Acetanilide. Neither the *B.P.* nor the *P.G.* includes a specific test for Acetanilide; the *U.S.P.* employs the Iso-nitrile test as described in the small type below. When ignited with free access of air it should leave no weighable residue.

Hydrogen Sulphide.—The aqueous solution should not be affected by T.S. of Hydrogen Sulphide, *B.P.* and *P.G.*

Iso-nitrile Test.—If 0·1 gramme be warmed with Sodium Hydroxide, Chloroform added and again warmed, the disagreeable odour of Phenyl-isocyanide should not be developed, *U.S.P.*

Not Official.

PULV. PHENOBROM. CO. (*Squire*).—A granular effervescent preparation, containing 5 grains of Phenazone, with Sodium Salicylate, Potassium Bromide, and Caffeine, in the tablespoonful dose.

PHENAZONUM EFFERVESCENS.—A granular effervescent preparation, containing 8 grains of Phenazone in 100.—*B.P.C. Formulary* 1901.

Dose.—60 to 120 grains = 4 to 8 grammes.

This has been incorporated in the *B.P.C.* under the title Antipyrina Effervescens; it also includes Antipyrina Effervescens cum Caffeina, containing, in addition, 1·5 grains in 100 of Caffeine Citrate.

The general composition is similar to that given under Phenacetin Effervescens.

ACETOPYRINE (Antipyrine Aceto-salicylate).—A white, crystalline powder, sparingly soluble in Water, readily soluble in Alcohol (90 p.c.), possessing antipyretic and analgesic properties; recommended in rheumatism and neuralgia, and as a good antipyretic having no injurious action on the heart.—*M.P.* '04, ii. 466.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

FERRIPYRIN.—A compound of Antipyrine and Ferric Chloride, containing about 64 p.c. Antipyrine. Occurring as an orange-red powder, soluble in Water. In 20 p.c. solution it has been found useful as a styptic. Useful in chlorosis and anæmia.—*B.M.J.* '95, i. 1382; *L.* '95, i. 1320; *B.M.J.E.* '95, i. 44; as analgesics, Ferripyrin, Tolypyrin and Pyramidon appear to be neither beneficial nor harmful, and are therefore of no therapeutic value for the relief of urgent pain.—*Scot. Med. and Surg. Jour.* '96, iii. 442.

Dose.—Usually 5 grains = 0·32 gramme.

HYPNAL.—Is a crystalline compound of Antipyrine with Chloral Hydrate, readily soluble in Water, has been recommended as a hypnotic; used in simple insomnia, delirium tremens and maniacal excitement.—*Pr.* l. 297; in the insomnia due to neuralgia or migraine, or the pyrexia of phthisis.—*M.P.* '94, i. 267.

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

It possesses the depressing action on the heart of both Antipyrine and Chloral Hydrate.

IODOPYRIN.—Colourless, glistening, prismatic needles, or as a white, crystalline powder, sparingly soluble in Water, soluble in Alcohol (90 p.c.). Antipyretic and antiseptic. Has been given in puerperal fever, and has been found useful in acute articular rheumatism.—*B.M.J.E.* '00, i. 12.

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

Bromopyrin has also been given in the same doses as an antipyretic.

MIGRAININE.—A registered name for a double Citrate of Caffeine and Antipyrine. A white, odourless powder, soluble in Water. Has been found useful in migraine and in neuralgia.—*C.D.* '95, i. 3; *P.J.* '97, ii. 18.

Dose.—7½ to 15 grains = 0·5 to 1 gramme.

Official in Austr. and Swiss, Antipyrinum Caffeina-citricum.

PYRAMIDON (Dimethyl-amido-antipyrin).—A yellowish-white, tasteless, crystalline powder, readily soluble in Water and in Alcohol (90 p.c.). It is official in *Fr. Codex* (1908) under the title of **Diméthylamino-antipyrine,** $C_{13}H_{17}N_3O$.

Dose.—As an analgesic, 10 grains = 0·65 gramme; as an antipyretic, 3 to 5 grains = 0·2 to 0·32 gramme.—*B.M.J.E.* '97, ii. 7, 84; '00, i. 56.

5 grains several times daily in asthma, especially when of reflex origin.—*P.J.* '03, i. 340.

In typhoid fever 5 to 6-grain doses regularly night and day, every 2 hours, until temperature keeps down without it; in severe cases 6 grains, in mild 3 grains.—*B.M.J.E.* '03, ii. 23.

4 grains repeated in half an hour caused marked reduction in temperature in typhoid fever.—*B.M.J.E.* '03, ii. 79.

In 10 to 15-grain doses 3 or 4 times daily is of great value (*B.M.J.E.* '05, i. 72; '07, ii. 3) in the treatment of typhoid when there is no contra-indication.

Tests.—Pyramidon melts at about 108° C. (226·4° F.), and this m.p. is given in *Fr. Codex.* The aqueous solution affords, on the addition of Ferric Chloride T.S., a bluish-violet coloration; and on the addition of Sodium Nitrite and diluted Sulphuric Acid, and also on the addition of Fuming Nitric Acid, it affords a fluorescent bluish-violet coloration. *Fr. Codex* requires that a weighed quantity of 0·5 gramme dissolved in 50 c.c. of Water should, if pure, neutralise 21·75 c.c. of Normal Volumetric Sulphuric Acid Solution, whilst a similar weight of the official salt should neutralise more than 20 c.c.; Methyl Orange Solution being used as an indicator of neutrality. The solution intended is evidently Deci-normal. When heated with free access of air it should leave no weighable residue.

Pyramidon Mono- and **Bi-Camphorate** and **-Salicylate.**—The two former are antipyretics and anhidrotics in doses of 5 to 10 grains; the latter has been found useful in subacute and chronic rheumatism, also in doses of 5 to 10 grains = 0·32 to 0·65 gramme. All occur as white crystalline powders. The urine of patients taking Pyramidon is stated (*P.J.* '05, i. 270) to contain a new acid—Rubazonic Acid—which forms crystalline needles insoluble in Water.

SALIPYRIN. Antipyrine Salicylate $C_{11}H_{12}N_2O\ C_7H_6O_3$, eq. 323·78.—Hexagonal crystals, or a white, crystalline, odourless powder; soluble 1 in 240 of Water, soluble 1 in 4 of Alcohol (90 p.c.).

In uterine hæmorrhage, *B.M.J.E.* '93, ii. 82; *L.* '95, i. 1005; *P.J.* '95, ii. 363; a specific for influenza, *Y.B.T.* '95, 454; *B.M.J.E.* '93, ii. 103; in peliosis rheumatica, *B.M.J.E.* '97, i. 44; analgesic in painful rheumatic conditions, *B.M.J.* '98, ii. 1055.

Dose.—10 to 30 grains = 0·65 to 2 grammes.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Jap., Russ., Swed. and Swiss.

Tests.—Antipyrine Salicylate melts at 92° C. (197·6° F.). The *P.G.* states 91° to 92° C. (195·8° to 197·6° F.), the *Fr. Codex* 91° C. (195·8° F.). A saturated aqueous solution affords, on the addition of a few drops of Fuming Nitric Acid, a green coloration, and with Tannic Acid Solution, a white precipitate; with Ferric Chloride T.S. a deep red coloration, changing, when largely diluted, to a reddish-violet colour. 0·5 of a gramme mixed in 15 c.c. of Water and heated with 1 c.c. of Hydrochloric Acid affords a clear, colourless solution, from which fine white needles separate on cooling, which, when separated, washed with Water and dried, possess the m.p. and conform to the tests given under Acidum Salicylicum. A saturated aqueous solution of the salt shall not be affected by Hydrogen Sulphide; when warmed with Sodium Hydroxide Solution, and again warmed after the addition of Chloroform, no disagreeable odour of Phenyl-isocyanide should be developed. It should leave no weighable residue when ignited with free access of air.

TOLYPYRIN.—A body allied to Antipyrine (Phenazone), readily soluble in Water, and in Alcohol (90 p.c.); insoluble in Ether.

Antipyretic and analgesic; has been given in acute rheumatism.—*L.* '94, ii. 991; *Pr.* l. 383. *See* also under 'Ferripyrin.'

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

Tolysal (Tolypyrin Salicylate), sparingly soluble in Water, has been given in similar doses.

Tussol (Antipyrine Amygdalate).—In white granular crystals. Dose, for whooping-cough in young children, 1 to 2 grains; older children may take as much as 7 grains. It should not be taken with Milk.—*L.* '95, i. 1452; *P.J.* (3) xxv. 912, 958.

PHENOL.

See ACIDUM CARBOLICUM.

Not Official.

PHENOLPHTHALEÏN.

DI-HYDROXY-DIPHENYL-PHTHALIDE. DIHYDROXY-PHTHALOPHENONE.

$C_{20}H_{14}O_4$, eq. 315·72.

In small, odourless crystals, or as a pale yellowish-white powder, almost insoluble in Water, readily soluble in Alcohol (90 p.c.). For a long time it has been used as an indicator of neutrality in volumetric analysis, and is of interest from the magnificent pink coloration which its solution acquires by the action of alkalis. The weakest acids, on the other hand, destroy the colour. In recent years it has been found to possess a distinct aperient action, and has been introduced as an aperient under various names, Purgen, Aperione, etc. It may be administered in tablet form in doses of from 1 to 5 grains, and as a lozenge with chocolate basis containing 2 grains. If given to patients who suffer from hæmorrhoids a few doses have been shown (*B.M.J.* '05, i. 302) to produce an attack, and if the piles are troublesome at the time, they are aggravated, and often bleed freely.

Tests.—Phenolphthaleïn melts at from 250° to 253° C. (482° to 487·4° F.). It dissolves readily in Alcohol with the formation of a colourless solution, which is neutral in reaction. The addition of Potassium or Sodium Hydroxide Solution to an alcoholic solution affords a magnificent pink coloration, which is destroyed on the addition of a slight excess of acid. The pink coloration produced with Sodium or Potassium Hydroxide Solution is permanent until the alkali Hydroxide is converted into a neutral salt and the neutralising acid preponderates; it is therefore employed largely as an indicator of neutrality, and is the most trustworthy indicator for the determination of organic acids. The pink coloration produced by an alkali Hydroxide is destroyed by boiling with powdered Zinc; it is also destroyed by moist Carbonic Anhydride. Ammonia affords at first a pink coloration, but the colour is by no means permanent, and the substance does not therefore accurately indicate the point of neutralisation of Ammonia with an acid. 0·5 of a gramme when ignited with free access of air should leave no weighable residue.

NOSOPHEN (Tetra-iodophenolphthaleïn).—A yellow, odourless powder, insoluble in Water, soluble in Ether and in Chloroform. Intestinal antiseptic. Introduced as a substitute for Iodoform.

Dose.—5 grains = 0·32 gramme.

ANTINOSIN (Sodium Tetra-iodophenolphthaleïn).—Blue prismatic crystals or blue amorphous powder, soluble in Water and in Alcohol (90 p.c.). Antiseptic. A substitute for Iodoform.

Dose.—5 grains = 0·32 gramme.

EUDOXIN (Bismuth Tetra-iodophenolphthaleïn).—A reddish-brown, odourless powder, insoluble in Water. Introduced as a gastric and intestinal antiseptic.

Dose.—3 to 8 grains = 0·2 to 0·52 gramme.

Not Official.

PHLORIDZIN.

$C_{21}H_{24}O_{10}, 2H_2O$, eq. 468·67.

A glucoside, obtained from various Rosaceous trees.

A light, crystalline powder, whitish, or pale yellow, slightly soluble in Water, 1 in 4 of Alcohol (90 p.c.).

A crystalline principle obtained from the bark of the stem and the root of the Cherry and some other allied trees.

It possesses the remarkable property of inducing artificial glycosuria in man and animals to which it is administered (*B.M.J.* '04, ii. 890), and is of value as a test of renal inadequacy; but it is, of course, necessary to determine whether Glucose is already present in the urine, as if it is the test is inapplicable. The test consists in injecting subcutaneously 5 mg. of Phloridzin dissolved, by the aid of Sodium Carbonate, in 20 to 80 minims of Water, immediately after the patient has emptied the bladder. If the kidneys are adequate, Glucose should appear in the urine in half an hour, when the amount may be estimated by Fehling's or by Pavy's method.

Dose.—5 to 15 grains = 0·32 to 1 gramme, in **mixtures**, or in **pills** with 'Diluted Glucose.'

Official in Mex. (Floridcina).

Tests.—Phloridzin loses at 100° C. (212° F.) its Water of crystallisation, which is theoretically equivalent to 7·6 p.c. According to Von Hager it melts at 107° C. (224·6° F.), again solidifies at 130° C. (266° F.), and again melts at 170° C. (338° F.), assuming at 200° C. (293° F.) a red colour, being decomposed with the formation of Rufin. When heated with dilute mineral acids it is decomposed, and the neutralised solution affords with Potassio-cupric Tartrate Solution a red precipitate. It dissolves in concentrated Sulphuric Acid, with the production of a yellow colour, changing to red at a temperature between 25° and 50° C. (77° and 122° F.). When dissolved in an excess of Ammonia Solution and kept in contact with the air it gradually develops a violet or blue coloration. When heated with free access of air it should leave no weighable residue.

PHOSPHORUS.

PHOSPHORUS.

P, eq. 30·80.

FR., PHOSPHORE BLANC; GER., PHOSPHOR; ITAL., FOSFORO;
SPAN., FOSFORO.

A colourless, or pale yellowish, almost translucent, waxy solid, having a characteristic, disagreeable odour. It rapidly oxidises on exposure to the air, and should be preserved under the surface of Water in well-stoppered bottles, away from the light and in a cool place. In the air it is luminous in the dark.

Solubility.—Slightly soluble in Absolute Alcohol; 1 in 200 of Ether; 1 in 25 of Chloroform; 2 in 1 of Carbon Bisulphide; about 1 in 60 of Olive Oil; 1 in 60 of Oil of Turpentine; also in melted fats. Insoluble in Water.

Medicinal Properties.—Given, but with doubtful success, as a nervine tonic, as an aphrodisiac, in rickets and in osteomalacia. Its prolonged use affects the structure of bones, causing them to become more dense; it also affects the liver and kidneys, leading to fatty degeneration. The preparations are **Oleum** and **Pilula**, and it has been combined with Cod-Liver Oil and other menstrua; should be given with caution, as gastritis may be set up.

Sodium and Calcium Hypophosphites are forms of giving loosely-combined Phosphorus.

Dose, *in pill or solution.*—$\frac{1}{100}$ to $\frac{1}{20}$ grain = 0·0006 to 0·0013 gramme.

Ph. Ger. maximum single dose, 0·001 gramme; maximum daily dose, 0·003 gramme.

Prescribing Notes.—*Generally given in pill form, to which may be added other tonics, such as Iron, Quinine and Strychnine; also dissolved in Almond Oil and Cod-Liver Oil.*

It should always be handled with caution, and be cut under Water.

Official Preparations.—Oleum Phosphoratum and Pilula Phosphori. Used in the preparation of Acidum Phosphoricum Concentratum and Calcii Hypophosphis.

Not Official.—Elixir Phosphori, Elixir Phosphori Compositum, Pilula Phosphori cum Sevo, Pilulæ Phosphori Compositae, Pilulæ Phosphori cum Quinina, Sevum Phosphoratum, Spiritus Phosphori, and Tinctura Phosphori Composita.

Antidotes.—Stomach-tube, emetics. Copper Sulphate is both emetic and antidote: 3 grains dissolved in Water every 5 minutes till vomiting is induced, then continue it in 1 grain doses every quarter of an hour, with 10 drops of Solution of Morphine if rejected; also 30 drops of old or French Oil of Turpentine every half-hour. Half an oz. of Epsom Salts as a purgative. Demulcent drinks, but avoid oils and fats.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Dutch, Fr., Ger., Ital., Jap., Mex. (Fosforo), Norw., Port., Russ., Span., Swed., Swiss and U.S. Not in Hung.

Tests.—Phosphorus melts under Water at 44° to 45° C. (111·2° to 113° F.); the *B.P.* states that it melts at 43·3° C. (110° F.). The

U.S.P., *Fr. Codex* and *P.G.* state 44° C. (111·2° F.). Its sp. gr. is given in the *B.P.* as 1·77, presumably at 15·5° C. (60° F.), the *U.S.P.* as 1·830 at 10° C. (50° F.) and 1·820 at 25° C. (77° F.), and the *Fr. Codex* as 1·83. When warmed in the air to a temperature a little over its m.p., it takes fire and burns, producing dense white fumes which, when dissolved in Water, afford a solution possessing an acid reaction, which yields with Ammonium Molybdate Solution and Nitric Acid a lemon-yellow precipitate soluble in Ammonia Solution, and reprecipitated as a white crystalline precipitate on the addition of Magnesium Ammonio-sulphate Solution. When oxidised with Nitric Acid it produces a solution yielding a similar precipitate to the above with similar reagents. When dissolved in Carbon Bisulphide and poured on to a strip of filter paper, the latter, on the evaporation of the solvent, is instantly ignited. It is required by the *U.S.P.* to contain not less than 99·5 p.c. of pure Phosphorus, but no method by which this percentage may be ensured is given.

The two chief impurities are Arsenic and Sulphur, which are tested for after the oxidation of the Phosphorus by means of Nitric Acid. The *B.P.* effects the oxidation by boiling 1 or 2 grammes of Phosphorus with 5 or 10 c.c. of Nitric Acid, mixed with an equal volume of Water. The *U.S.P.* employs 1 gramme of Phosphorus, and digests it at a gentle heat on a water-bath with a mixture of 10 c.c. of Nitric Acid and 10 c.c. of Water, a current of Carbonic Acid gas being passed over the surface of the liquid whilst solution is being effected. The *B.P.* requires that the resulting solution should yield no characteristic reaction with the tests for Arsenic, and only the slightest reactions with the tests for Sulphates. The *U.S.P.* requirements are a good deal more definite; the solution, after the oxidation of the Phosphorus, is evaporated until no further nitrous vapours are evolved, and diluted with Water to 100 c.c., 1 c.c. of which solution should not respond to the modified Gutzeit's test for Arsenic, the presence of the latter much in excess of 1 in 100,000, is manifested by the formation of a distinct yellow-orange spot. The addition of Barium Chloride T.S. to the remainder of the liquid is required to afford not more than a slight opalescence. Phosphorus should dissolve readily and completely in Carbon Bisulphide Solution to form a clear solution, but the greatest caution is necessary in handling such solution, as the dissipation of the solvent is followed by immediate ignition.

Preparations.

OLEUM PHOSPHORATUM.—Phosphorated Oil.

1 of dry Phosphorus dissolved in 99 (by weight) of Almond Oil at 180° F. (82·2° C.). The Oil must first have been heated to 300° F. (149° C.) for 15 minutes, cooled and filtered. (about 1 in 100)

Dose.—1 to 5 minims = 0·06 to 0·3 c.c.

Foreign Pharmacopœias.—Official in Austr., 1 in 1000 Almond Oil; Belg. and Span., 1 in 100 Almond Oil; Ital., 1 in 100 Olive Oil; Fr. and Swed., 1 in 100 Almond Oil and Ether; Mex. (Aceite fosforado), 1 in 100 Sesame Oil;

Swiss, Phosphorus 1, Almond Oil 96, Alcohol (99 p.c.) 3, Natrum Sulfuricum Siccum 5. Not in the others.

PILULA PHOSPHORI.—PHOSPHORUS PILL.

Dissolve 10 grains of Phosphorus in about 33 minims of Carbon Bisulphide, and add it to a mixture of 125 grains of melted White Beeswax and 125 grains of Lard cooled to a cream-like consistence; mix thoroughly, adding also 115 grains of Kaolin.

The pill mass should be kept under Water in a light-proof stoppered bottle and, when required, it should be made into pills with one-third of its weight of powdered Gum Acacia and varnished.

The finished pill is now 1 in 50, which is twice the strength of *B.P.* 1885.

Dose.—1 to 2 grains = 0·06 to 0·13 gramme.

Foreign Pharmacopœias.—Official in U.S., about $\frac{1}{100}$ grain of Phosphorus in each pill. Not in the others.

Not Official.

ELIXIR PHOSPHORI.—Compound Tincture of Phosphorus 1; Glycerin 4; should be preserved from the light. Each fl. drm. contains $\frac{1}{50}$ grain = 0·0013 gramme of Phosphorus.—*B.P.C. Formulary* 1901.

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

This has been incorporated in the *B.P.C.* with the *synonym* **Syrupus Phosphori;** Syrup of Phosphorus.

It should be freshly prepared as required.

ELIXIR PHOSPHORI.—Spirit of Phosphorus (*N.F.*), 21; Oil of Anise, 0·2; Glycerin, 56; Aromatic Elixir (*U.S.P.*), *q.s.* to make 100.—*U.S.N.F.*

Elixir Phosphori Compositum. *Syn.* Syrupus Phosphori Composita.—Compound Tincture of Phosphorus, 20; Oil of Anise, 0·20; Glycerin, 50; Aromatic Elixir, *q.s.* to produce 100.—*B.P.C.*

Spiritus Phosphori. *Syn.* Tincture of Phosphorus.—Phosphorus, 1·2; Absolute Alcohol (*U.S.P.*), *q.s.* to make 1000.—*U.S.N.F.*

PILULA PHOSPHORI CUM SEVO.—(1) Phosphorus, 10 grains; Mutton Suet, 90 grains; Purified Carbon Bisulphide, 40 minims. Dissolve the Phosphorus in the Carbon Bisulphide, and incorporate with the Suet, previously rubbed into a smooth paste. (2) Starch, 60 grains; Powdered Liquorice Root, 60 grains; Powdered Soap, 40 grains; Powdered Tragacanth, 12 grains; Glycerin, 48 minims. Make into a pill mass.

No. 1 should be kept in a stoppered bottle, and incorporated with No. 2 as required for dispensing. 1 part of No. 1 with 8 parts of No. 2.

They should be freshly prepared as required.

Each 3-grain pill will contain $\frac{1}{30}$ grain of Phosphorus.

PILULÆ PHOSPHORI COMPOSITÆ.—Phosphorated Suet, 5; Quinine Sulphate, 12·50; Reduced Iron, 75; Strychnine, 0·50; Chloroform, 10; Compound Powder of Tragacanth, 5; Mucilage of Acacia, *q.s.* in 100 parts.—*B.P.C.*

This formula closely resembles that previously published in *Martindale*, except that 2 of these pills represent 1 of Martindale's.

PILULÆ PHOSPHORI CUM QUININA.—Phosphorated Suet, 10; Quinine Sulphate, 50; Chloroform, 20; Compound Powder of Tragacanth, 10; Mucilage of Acacia, *q.s.* in 100 parts.—*B.P.C.*

This formula closely resembles that previously published in *Martindale*.

SEVUM PHOSPHORATUM (10 p.c.).—Phosphorus, 1; Pure Carbon Bisulphide, 5; Dissolve, and add Prepared Suet, 9. Add a little of the Suet at first, mix quickly; add the remainder, mix thoroughly, and allow the Bisulphide to evaporate.—*Martindale*.

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

TINCTURA PHOSPHORI COMPOSITA.—Dissolve 12 grains Phosphorus in 2½ fl. oz. Chloroform by the aid of a gentle heat; add the solution to

12½ fl. oz. Ethylic Alcohol and shake well. Should be preserved in well-stoppered bottles and kept from the light.

10 minims contain $\frac{1}{60}$ grain of Phosphorus.

Dose.—3 to 12 minims = 0·18 to 0·71 c.c.

B.P.C. Formulary 1901, incorporated in the *B.P.C.* with a slight increase in strength, as follows:—

Phosphorus, 0·20; Chloroform, 17; Absolute Alcohol, *q.s.* to produce 100.

PHYSOSTIGMATIS SEMINA.

CALABAR BEAN.

Fr., Fève du Calabar; Ger., Kalabarbohne; Ital., Fava del Calabar; Span., Haba del Calabar.

The ripe Seeds of *Physostigma venenosum*, Balfour.

The Seeds official in the *B.P.* are not required to yield any definite percentage of alkaloids. The *U.S.P.* Seeds are required to yield not less than 0·15 p.c. of Ether-soluble alkaloids. The Seeds are not official in the *P.G.*

Indigenous to Western Africa.

The chief constituent is a poisonous crystalline alkaloid, **Physostigmine** or **Eserine.**

Medicinal Properties.—Myotic, antispasmodic. It increases the flow of saliva and most of the other secretions. Used in tetanus; but its principal use is in ophthalmic work. *See* 'Physostigminæ Sulphas.'

Official Preparation.—Extractum Physostigmatis. Used to prepare Physostigminæ Sulphas.

Not Official.—Tinctura Physostigmatis.

Foreign Pharmacopœias.—Official in Belg. (Semen Calabariense); Jap. (Semen Physostigmatis); Mex. (Haba de Calabar); Port. (Favo do Calabar); Span. (Haba del Calabar); Swed. (Semina Calabar); U.S. (Physostigma). Not in the others.

Descriptive Notes.—Calabar Beans as recently imported are rather smaller and browner in colour than formerly. Formerly the seeds were almost black in colour and about 1⅜ in. (34 mm.) long, ¾ in. (19 mm.) broad, and ½ to ⅝ in. (12·5 to 15 mm.) in thickness, but the dimensions given in the official description are 'usually about 1 in. long (25 mm.), ¾ in. (18 mm.) broad, and ½ in. (12 mm.) thick.' The hilum extends nearly the whole length of the curved margin of the seed, which is elongate reniform in outline. The seed coat is hard, dark reddish-brown, and slightly rough. The two starchy cotyledons have a cavity between them. The seed has neither taste nor odour. At one time a seed of a different species, nearly cylindrical and scarcely curved, but about the same size, was offered in London as Calabar Bean. It has been referred to *Physostigma cylindrospermum*, Holmes. Other seeds quite different in shape and size from Calabar Bean have been offered as substitutes in the drug market, but none of these could be mistaken for the genuine drug.

Tests.—Calabar Bean is assayed in the *U.S.P.* by the following process:—A weighed quantity of 20 grammes is introduced into an Erlenmeyer flask of about 250 c.c. capacity and shaken well during 10 minutes with 200 c.c. of Ether, 10 c.c. of a 1 in 20 aqueous Sodium Bicarbonate Solution is added and the mixture shaken vigorously during 4 hours. A measured quantity of 100 c.c. (= 10 grammes of Calabar Bean) of the Ether solution is decanted into a separator after the powder has been allowed to settle. Sufficient Normal Volumetric Sulphuric Acid Solution and is added to render the liquid acid, and 10 c.c. of Water. The extraction is repeated first with a mixture of 2 c.c. of Normal Volumetric Sulphuric Acid Solution and 8 c.c. of Distilled Water, and then with a mixture of 1 c.c. of Normal Volumetric Sulphuric Acid Solution and 9 c.c. of Water. The acid liquids are in each case separated and transferred to another separator. Sufficient of a 1 in 20 aqueous Sodium Bicarbonate Solution is added to the combined acid liquids in the separator to render them alkaline to red Litmus paper, and the liberated alkaloids are extracted by shaking with 3 successive quantities each of 25 c.c., 20 c.c., and 15 c.c. of Ether, the ethereal solutions being separated in each instance, mixed, transferred to a flask, and carefully evaporated on a water-bath. The residue when dry is dissolved in 5 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution, 20 c.c. of absolutely neutral Ether added, and the mixture transferred to a stoppered bottle, rinsing the flask with 80 c.c. of Water. The excess of Tenth-normal Volumetric Acid Solution is titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution, 5 drops of Iodeosin T.S. being used as an indicator of neutrality. The number of c.c. of Fiftieth-normal volumetric alkali solution required divided by 5, the quotient subtracted from 5, the difference multiplied first by 0·0273 and then by 10, gives the percentage of Ether-soluble alkaloids contained in the Calabar Beans.

Preparation.

EXTRACTUM PHYSOSTIGMATIS.—Extract of Calabar Bean.

16 of Calabar Bean treated with 80 of Alcohol (90 p.c.); the liquid evaporated to a soft extract and mixed with 3 times its weight of Milk Sugar to form a firm extract.

It is about one-fourth the strength of *B.P.* 1885, and of the Foreign Pharmacopœias.

Dose.—$\frac{1}{4}$ to 1 grain = 0·016 to 0·032 gramme.

As it does not form a clear solution with Water, such solution should be filtered.

Foreign Pharmacopœias.—Official in Jap., Port. and U.S. Not in the others.

28 lb. of Calabar Beans, treated with Alcohol (90 p.c.), yielded 2·07 p.c. of extract; this extract yielded 5·74 p.c. of alkaloids, which is equal to nearly 0·12 p.c. of alkaloids in the Beans.

The same powder treated with boiling Alcohol (90 p.c.) in an exhaustion apparatus yielded 4·66 p.c. of extract; which extract yielded 3·2 p.c. of alkaloids, which is equal to nearly 0·15 p.c. of alkaloids in the Beans.

The extract of Calabar Bean official in the *B.P.* is not a standardised preparation. The *U.S.P.* extract is required to contain 2 p.c. of Ether-soluble alkaloids; the extract is not official in the *P.G.*

Tests.—The *U.S.P.* employs a process for the assay of the extract of which the following contains the essential features:—A weighed quantity of 1 gramme of the extract is transferred to a small porcelain evaporating basin and digested for 5 minutes at a temperature below the boiling point of boiling Water with 5 c.c. of Alcohol (48·9 p.c.). After the addition of 5 grammes of very clean fine sand the mixture is evaporated to dryness on a water-bath and triturated thoroughly to ensure a uniform mixture, the contents of the dish are transferred as soon as dry to an Erlenmeyer flask (using a little more clean sand to transfer the residue to the flask) and shaken with 100 c.c. of Ether, a measured quantity of 10 c.c. of a 1 in 20 aqueous Sodium Bicarbonate Solution is added and the contents vigorously shaken at intervals for 1 hour. When the powder has settled, 50 c.c. of the Ether solution is decanted into a separator, and sufficient Normal Volumetric Sulphuric Acid Solution to render the liquid acid in reaction towards blue Litmus paper, and 10 c.c. of Distilled Water are added and the liquid shaken, the shaking being repeated with 2 successive quantities each of 2 c.c. of Normal Volumetric Sulphuric Acid solution and 8 c.c. of Distilled Water, and 1 c.c. of Normal Volumetric Sulphuric Acid Solution and 9 c.c. of Distilled Water, the acid liquids being in each case separated and transferred to a second separator. Sufficient of a 1 in 20 aqueous Sodium Bicarbonate Solution is added to the mixed acid liquids to render them alkaline in reaction towards red Litmus paper, and the liberated alkaloids are extracted by agitation with 3 successive quantities each of 25 c.c., 20 c.c., and 15 c.c. of Ether; the ethereal solution being in each instance separated and transferred to a flask. They are mixed, evaporated on a water-bath, and when dry the residue is dissolved in 2 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution, and when dissolved is transferred to a 200 c.c. flask, washing the flask with Water and adding enough Water to bring the volume to about 90 c.c. 25 c.c. of Ether is added and the excess of Tenth-normal Volumetric Acid Solution is titrated with Fiftieth-normal Volumetric Potassium Hydroxide Solution, using 5 drops of Iodeosin T.S. as an indicator of neutrality. The number of c.c. of Fiftieth-normal Volumetric Potassium Hydroxide Solution required divided by 5, the quotient subtracted from 2, and the difference multiplied first by 0·0273 and then by 200, yields the percentage of Ether-soluble alkaloids present in the sample operated on.

Not Official.

TINCTURA PHYSOSTIGMATIS.—Calabar Bean, 1; Alcohol (90 p.c.), 5.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.
B.P.C. Formulary 1901, is incorporated in the *B.P.C.*

Foreign Pharmacopœias.—Official in U.S., 1 in 10. Not in the others. The *U.S.P.* tincture is required to contain 0·014 p.c. w/v of Ether-soluble alkaloids. Neither the *B.P.* nor the *P.G.* includes a Tincture of Physostigmine.

Tests.—A measured quantity of 100 c.c. of the tincture is evaporated to dryness on a water-bath, and the proportion of Ether-soluble alkaloids from Physostigmine in the extract so obtained is determined by the *U.S.P.* process given under Extractum Physostigmatis; and when calculating the result of the volumetric determination into terms of Ether-soluble alkaloids the product should be multiplied by 2 instead of 200, that is to say, the number of c.c. of Fiftieth-normal Volumetric Potassium Hydroxide Solution required to neutralise the excess of Tenth-normal Volumetric Acid Solution divided by 5, the quotient subtracted from 2, the difference multiplied first by 0·0273 and then by 2, yields the percentage w/v of Ether-soluble alkaloids in the sample operated on.

PHYSOSTIGMINÆ SULPHAS.

PHYSOSTIGMINE SULPHATE.

B.P.Syn.—ESERINE SULPHATE.

$(C_{15}H_{21}N_3O_2)_2$, H_2SO_4, eq. 643·80.

FR., SULFATE D'ESERINE; GER., PHYSOSTIGMINSULFAT; ITAL., ESERINA SOLFATO; SPAN., SULFATO DE ESERINA.

A whitish or yellowish-white, very deliquescent micro-crystalline powder, possessing a bitter taste. It should be carefully preserved in small, well-stoppered glass bottles of a dark amber tint, or in sealed tubes protected from the light.

It is the Sulphate of an alkaloid obtained from Calabar Bean. The Sulphate alone is official in the *B.P.* The *P.G.* and the *U.S.P.* include both the Sulphate and the Salicylate. The *Fr. Codex* only includes the Salicylate. The Pharmacopœia formula for the Sulphate is given as $x H_2O$. The *U.S.P.* gives the formula for the anhydrous salt. *P.G.* does not include formulas.

Solubility.—4 in 1 of Water; 2½ in 1 of Alcohol (90 p.c.).

Medicinal Properties.—It is used to contract the pupil in ciliary paralysis due, *e.g.*, to diphtheria; to reduce intra-ocular tension in glaucoma, etc.; to prevent or reduce prolapse of the iris after corneal wounds; to diminish the amount of light in painful affections of the eye; to break down adhesions due to iritis, its use being alternated with that of Atropine; and to remove the prolonged dilatation and paralysis produced by the latter. In tetanus it is to be given fearlessly, $\frac{1}{30}$ grain hypodermically frequently repeated, the patient being carefully watched. An antidote in Strychnine poisoning.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain = 0·0011 to 0·0032 gramme.

Dutch maximum single dose, 0·001 gramme; maximum daily dose, 0·003 gramme.

Prescribing Notes.—*The salts of Physostigmine as well as the solutions are liable to become pink by oxidation. They should be kept in yellow non-actinic glass bottles, and as much as possible preserved from the air.*

If desirable the coloration of the solutions may be prevented by the addition of a trace of Hypophosphorous Acid or Sulphurous Acid.

Official Preparation.—Lamellæ Physostigminæ.

Not Official.—Guttæ Physostigminæ, Guttæ Physostigminæ cum Cocaina, Physostigmina, Unguentum Physostigminæ, Physostigminæ Hydrobromidum, and Physostigminæ Salicylas.

Foreign Pharmacopœias.—Official in Dutch, Ger., Jap., Mex. (Sulfato de Eserina), Span., and U.S. Not in the others.

Tests.—Physostigmine Sulphate is stated by the *U.S.P.* to soften at 130° C. (266° F.), and to melt at 140° C. (284° F.); neither the *B.P.* nor the *P.G.* makes any reference to the m.p. It dissolves readily in Water, yielding a solution which is neutral in reaction towards Litmus paper. The *U.S.P.* states that it possesses an acid reaction towards blue Litmus paper. The addition of Potassium or Sodium Hydroxide Solution causes a white precipitate of the alkaloid which quickly turns pink, and the precipitate itself dissolves in an excess of the Hydroxide Solution, with the production of a pinkish or red coloured solution; when evaporated to dryness with Ammonia Solution a bluish coloured residue remains, and if this residue be dissolved in very dilute acid the solution assumes a red coloration by reflected light, and a blue coloration by transmitted light. A trace of the salt dissolved in Fuming Nitric Acid yields a yellow solution, which, when evaporated to dryness on a water-bath, yields a residue of a green colour. The *U.S.P.* states that 5 mg. of the salt yield a yellow coloured solution when dissolved in Nitric Acid, on heating this solution the colour changes from orange to blood-red, and leaves on evaporation to dryness a green-coloured residue. The residue on exposure to the fumes of Nitric Acid yields a violet-blue colour, and on the addition of a drop of Nitric Acid a reddish-violet coloured solution changing rapidly to blood-red, and on standing, or on dilution, a greenish-yellow. The most distinctive test for Eserine is the marked mydriasis which it produces on the pupil of the eye; a highly diluted aqueous solution applied to the conjunctiva causes almost immediate contraction of the pupil. Sulphuric Acid yields only a faint yellow colour with the salt. Sulphuric Acid containing a crystal of Potassium Iodate yields a pale purple coloration rapidly changing to yellowish-red. The aqueous solution, with or without acidification with Hydrochloric Acid, yields with Barium Chloride Solution a white precipitate insoluble in Hydrochloric Acid. The Sulphate may be distinguished from the Salicylate by yielding when dissolved in Water a yellowish-white precipitate with Platinic Chloride Solution, and by the non-production of a violet colour on the addition of Ferric Chloide T.S. When ignited with free access of air it should leave no weighable residue.

Preparation.

LAMELLÆ PHYSOSTIGMINÆ. Discs of Physostigmine. Gelatin discs, containing $\frac{1}{1000}$ grain of Physostigmine Sulphate.

Now made with Physostigmine Sulphate instead of Physostigmine.

Foreign Pharmacopœias.—Official in Ital., Dischi Oftalmici con Eserina, each disc containing about 0·0001 gramme Eserine Salicylate. Not in the others.

Hypodermic lamels containing $\frac{1}{100}$ grain.—*Bartholomew's.*

Not Official.

GUTTÆ PHYSOSTIGMINÆ.—Physostigmine Sulphate, ½, 1, 2, or 4 grains; Water, 1 fl. oz.—*London Ophthalmic.*

GUTTÆ PHYSOSTIGMINÆ CUM COCAINA.—Physostigmine

Sulphate, 1 grain; Cocaine Hydrochloride, 4 grains; Water, 1 fl. oz.—*London Ophthalmic.*

PHYSOSTIGMINA. Eserine. $C_{15}H_{21}N_3O_2$, eq. 273·23.—Colourless or pale pink glistening crystals, very slightly soluble in Water, readily soluble in Alcohol (90 p.c.), Ether and Chloroform. It should be kept in well-stoppered glass bottles of a dark amber tint and protected as far as possible from contact with the air and light.

It was official in *B.P.* '85, but deleted from *B.P.* '98, the Sulphate being made official.

Unguentum Physostigminæ (Unguentum Eserinæ). Physostigmine, 1 grain; Soft Paraffin, 1 oz., is given in *London Ophthalmic.*

Tests.—Physostigmine melts at 102° to 103° C. (215·6° to 217·4° F.). Petit and Polonovski give 105° to 106° C. (221° to 222·8° F.). It dissolves very slightly in Water; it is readily soluble in Alcohol and Ether, the solutions in these solvents being strongly lævogyrate. The aqueous solution is alkaline in reaction towards red Litmus paper, and precipitates Ferric Hydroxide from Ferric Chloride Solution, provided the latter is not too acid; it answers the tests characteristic of Eserine given under Physostigminæ Sulphas.

PHYSOSTIGMINÆ HYDROBROMIDUM.—In colourless crystals, very soluble in Water.

PHYSOSTIGMINÆ SALICYLAS. *Syn.* Eserinæ Salicylas. $C_{15}H_{21}N_3O_2C_7H_6O_3$, eq. 410·24.—Colourless or faintly yellowish acicular crystals, becoming coloured on exposure to light and air. Soluble 1 in 130 of Water; 1 in 15 of Alcohol (90 p.c.). The Salicylate of the *Fr. Codex* contains 66·59 p.c. of Eserine and 33·41 p.c. of Salicylic Acid.

It is the Salicylate of Physostigmine, an alkaloid obtained from Calabar Bean. It should be kept in well-stoppered glass bottles of a dark amber tint and protected as far as possible from contact with the light and air, as it rapidly acquires a reddish tint on exposure to their combined influence.

A sterilised solution containing 0·2 gramme of Eserine Salicylate in 40 grammes of Olive Oil is stated (*P.J.* '05, i. 589) to keep indefinitely and to produce immediate and painless action upon the eye.

The theory that the formation of Rubeserine is due to the absorption of atmospheric Ammonia by the solution is stated (*C.D.* '05, ii. 515) to be inadmissible. Conjunctivitis has occasionally been traced to the use of oxidised solutions of Eserine. A reference is again made to the use of oily solutions of the alkaloid or of the Salicylate.

Ph. Ger. maximum single dose, 0·001 gramme; maximum daily dose, 0·003 gramme.

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

Tests.—Physostigmine Salicylate melts at about 179° C. (354·2° F.). The *U.S.P.* states that it softens and assumes a slightly yellow colour at 160° C. (320° F.) and melts at 178·9° C. (354° F.). *Fr. Codex* gives 182° C. (359·6° F.). It dissolves in Water, forming a clear solution, which is faintly acid in reaction towards blue Litmus paper. It should answer the tests characteristic of Physostigmine given under Physostigminæ Sulphas. Sulphuric Acid, containing a drop of Formaldehyde Solution in each c.c., produces a bright pink colour. Sulphuric Acid, with a few crystals of Cane Sugar, produces a yellow colour changing to brownish-purple and ultimately to greenish-black. An aqueous solution of the salt affords with Ferric Chloride T.S. a deep violet coloration. The addition of Bromine Water, if present in excess, produces an intense red coloration in the salt or its solution. It may be distinguished from the Sulphate by not yielding a precipitate on the addition of Platinic Chloride Solution, and by the production of a violet coloration with Ferric Chloride T.S. It should leave no weighable residue when ignited with free access of air.

Not Official.

PHYTOLACCA.

Both the **Fruit** (Poke fruit) and the **Root** (Poke root) of *Phytolacca decandra*, L., are official in U.S. The Root is official in Jap.

The Fluid Extract has been recommended for inflamed and painful mammæ, internally and as a local application.—*B.M.J.* '87, ii. 844. It has also been used in orchitis.—*T.G.* '85, 622. In large doses it is emetic, purgative, and slightly narcotic.

FLUIDEXTRACTUM PHYTOLACCÆ RADICIS (*U.S.*).—1 fl. oz. is equal to 1 oz. of root.

Dose.—As an alterative, 1 to 5 minims = 0·06 to 0·03 c.c.

Official in Jap.

TINCTURA PHYTOLACCÆ.—Poke Root, 1; Alcohol (45 p.c.), 10. Dose.—3 to 10 minims = 0·18 to 0·6 c.c.—*Martindale.*

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

PHYTOLACCIN.—An eclectic remedy used in rheumatic and syphilitic conditions. In pill as a cholagogue and alterative, $\frac{1}{4}$ to $\frac{1}{2}$ grain = 0·016 to 0·032 gramme; purgative, 2 to 4 grains = 0·13 to 0·26 gramme.

Not Official.

PICRORHIZA.

The dried Rhizome of *Picrorhiza Kurroa*, Royle, dose in powder, as a tonic, 10 to 20 grains = 0·65 to 1·3 grammes; as an antiperiodic, 40 to 50 grains = 2·6 to 3·2 grammes, is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies; also **Extractum Picrorhizæ Liquidum,** 1 in 1 Fluid Extract made with Alcohol (60 p.c.), dose, 20 to 60 minims = 1·2 to 3·6 c.c.; and **Tinctura Picrorhizæ,** Picrorhiza 1, Alcohol (45 p.c.) 8, by maceration, dose, $\frac{1}{2}$ to 1 fl. drm. = 1·8 to 3·6 c.c.

PICROTOXINUM.

PICROTOXIN.

Colourless, shining, prismatic crystals, or micro-crystalline powder permanent in the air, possessing an intensely bitter taste. It is the neutral principle obtained from 'Cocculus Indicus' described in *B.P.* as the Fruits of *Anamirta paniculata*, Colebr.

Picrotoxin is stated to be not a simple body but a compound, containing 34 p.c. of Picrotin and 66 p.c. of Picrotoxinin, but its composition cannot be considered as definitely settled.

Solubility.—1 in 334 of Water; 1 in 13$\frac{1}{2}$ of Alcohol (90 p.c.).

Medicinal Properties.—Anhidrotic; $\frac{1}{60}$ grain at bedtime has been given as a remedy against immoderate sweating in phthisis.

Externally used with caution as an **ointment** (8 grains to 1 oz.) for pediculi.

Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain = 0·0006 to 0·0024 gramme.

Antidotes.—Stomach-tube, or emetic; Chloral, and Potassium Bromide.

Foreign Pharmacopœias.—Official in Fr. and Mex. Not in the others.

Tests.—Pure Picrotoxin melts at 199° to 200° C. (390·2° to 392° F.), the *B.P.* melting at 192·2° C. (378° F.), the *Fr. Codex* at 200° C. (392° F.). It is officially stated to be soluble in 10 parts of

Potassium Hydroxide Solution, the liquid so formed producing a red precipitate with Potassio-cupric Tartrate (Fehling's solution). The test may also be applied to a cold saturated aqueous solution, 5 c.c. of which will give a distinct reaction; if a similar quantity of Pavy's solution be added and the liquid boiled the blue colour will completely disappear. It dissolves in Sulphuric Acid with the production of a bright yellow coloured solution, changing to orange-red on warming, and very gradually to reddish-brown. It dissolves in Nitric Acid, and the liquid on evaporation leaves a reddish-yellow residue, becoming bright red when moistened with Potassium Hydroxide Solution. It may be distinguished from alkaloids by not yielding when dissolved in Water precipitates with Platinic Chloride, Potassio-mercuric Iodide, Mercuric Chloride, Tannic Acid, Potassium Ferrocyanide and Ferricyanide Solutions, and most of the general reagents for alkaloids. When ignited with free access of air it should leave no weighable residue.

PILOCARPINÆ NITRAS.

PILOCARPINE NITRATE.

$C_{11}H_{16}N_2O_2$, HNO_3, eq. 269·23.

FR., AZOTATE DE PILOCARPINE; GER., PILOCARPINITRAT;
ITAL., PILOCARPINA NITRATO.

It is the Nitrate of Pilocarpine, an alkaloid obtained from Jaborandi Leaves. A synthetic Pilocarpine has also been produced.

Pilocarpine Nitrate occurs as white distinct crystals. Jowett states that the Nitrate is the most convenient to use in medicine, on account of its stability in the air, the Hydrochloride being hygroscopic in moist air, It should be kept in well-stoppered glass bottles of a dark amber tint and in a cool atmosphere.

Solubility.—1 in 8 of Water; 1 in 50 of Alcohol (90 p.c.); almost insoluble in Ether and in Chloroform.

Medicinal Properties.—A powerful diaphoretic and sialagogue. Is useful in the dropsy and thirst of Bright's disease, in uræmia, and to remove pleural and peritoneal effusion. It should be used with caution, if at all, in cardiac dropsy. It contracts the pupil, and has been used in detachment of the retina, glaucoma and intra-ocular hæmorrhage; it has been given in bronchitis and asthma; and in chronic poisoning by lead, arsenic or mercury. Useful in deafness due to disease of the auditory nerve. A good antidote in Belladonna poisoning.

It has been used to increase the growth of the hair as a **Lotion** containing 1 or 2 grains to 1 fl. oz., and as an Ointment containing 4 to 8 grains to 1 fl. oz.

In pneumonia, $\frac{1}{10}$ to $\frac{1}{3}$ grain hypodermically.—*L.* '03, i. 1369; '03, ii. 342; *B.M.J.* '03, ii. 788. $\frac{1}{6}$ to $\frac{1}{4}$ grain by the mouth.—*L.* '03, i. 823.

In detachment of the retina, 1 cg. of the Nitrate injected in a 2 p.c. solution. —*B.M.J.E.* '99, ii. 68.

$\frac{1}{8}$ grain injected subcutaneously in severe uræmia of Bright's disease.—*Pr.* lxvii. 657.

Objection taken to the *B.P.* dose, $\frac{1}{20}$ to $\frac{1}{2}$ grain, when given by the mouth as being too high. In one case $\frac{1}{40}$ grain caused vomiting every time it was taken; in another $\frac{1}{80}$ grain caused profuse sweating and exhaustion lasting some hours. Probably $\frac{1}{20}$ grain is the highest initial dose that should be given.—*B.M.J.* '02, ii. 1104.

Its use in puerperal eclampsia has been abandoned at the Rotunda Hospital, Dublin.—*L.* '05, ii. 749.

Of great value in all forms of pruritus, but especially that of the vulva; $\frac{1}{8}$ to $\frac{1}{4}$ grain by mouth only when itching manifests itself; the addition of $\frac{1}{120}$ grain Atropine may sometimes be necessary to prevent sweating.—*M.R.* '07, i. 858.

While the most powerful of the internal diaphoretics, it must be used cautiously owing to its tendency to depress the heart.—*B.M.J.* '06, ii. 1450.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain = 0·0032 to 0·032 gramme.

Prescribing Notes.—*Most frequently used by hypodermic injection; also given in solution, and in pills with Milk Sugar, and Glucose.*

Supplied also in hypodermic tablets, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$ *and* $\frac{1}{3}$ *grain.*

The nearly equal solubility of the Pilocarpine Nitrate and Pilocarpidine Nitrate allows them to crystallise together. With the Hydrochlorides the difference in solubility is much more marked, so that a Pilocarpine Hydrochloride can be obtained containing very little Pilocarpidine.

The **Pilocarpine Hydrochloride** is preferred in all other countries, *see* below, and in London is more frequently prescribed than the Nitrate; but it is incompatible with Silver salts, with which Pilocarpine is sometimes used.

Not Official.—Guttæ Pilocarpinæ, Injectio Pilocarpinæ Nitratis, Pilocarpine, Pilocarpinæ Hydrochloridum, Pilocarpinæ Phenas, and Pilocarpinæ Salicylas.

Foreign Pharmacopœias.—Official in Fr., Mex. and U.S. Not in the others. Fr. and Mex. have Pilocarpine.

Antidote.—Belladonna by the mouth, or Atropine hypodermically.

Tests.—Pilocarpine Nitrate is required by the *B.P.* to form with strong Sulphuric Acid a yellowish solution, which on the addition of Potassium Bichromate gradually assumes an emerald-green colour; the *U.S.P.* states that with Sulphuric Acid a colourless solution is produced. A characteristic reaction is the mydriasis produced by a dilute aqueous solution of the salt. The *B.P.* does not include a m.p.; the *U.S.P.* states that it melts at 170·9° C. (339·7° F.). Pure Pilocarpine Nitrate, according to Jowett, melts at 173° to 178° C. (343·4° to 352·4° F.); according to Petit and Polonovski at 177° to 178° C. (350·6° to 352·4° F.).; the *Fr. Codex* (1908) gives 177° C. (350·6° F.). It has a specific rotation of +80° to +83°. *Fr. Codex* +82° 2′ at 18° C. The addition of an excess of Ammonia Solution to an aqueous solution of the salt should not afford a precipitate; the addition of Sodium Hydroxide Solution to dilute aqueous solutions of the salt affords no precipitate, but if the solutions be sufficiently concentrated, a white turbidity is produced. The separated alkaloid should answer the tests distinctive of Pilocarpine given under that heading. As an additional test Jowett has suggested the formation of a crystalline Picrate which should melt sharply at 147° C. (296·6° F.). When dissolved in Water it affords a clear colourless solution, which should possess a faint acid reaction towards blue Litmus paper, and which, when kept cool and mixed with an equal volume of Sulphuric Acid, affords a brown ring at the junction of the two liquids when a solution of Ferrous Sulphate is carefully poured on the surface of the mixture. Pilocarpine Nitrate may be distinguished from the Hydrochloride by rubbing the salt with an equal weight of Mercurous Chloride: in the case of the Nitrate no black coloration is produced; in the case of the Hydrochloride the Mercurous Chloride is reduced with the formation of metallic Mercury, a blackening in colour simultaneously occurring. According to the *U.S.P.* it may be distinguished from other alkaloids by dissolving 10 to 20 mg. of the salt in 2 c.c. of Water, and adding 2 c.c. of a slightly acidified Hydrogen Peroxide Solution, and pouring upon the surface of the liquid a layer of Benzene. On the addition of 3 or 4 drops of a 1 in 300 Potassium Bichromate Solution the Benzene layer will acquire a violet colour if the mixture be gently shaken, the aqueous layer remaining yellow. The *U.S.P.* states that if more than 20 mg. be taken the Benzene turns blue, and the reaction is no longer characteristic. The *B.P.* and the *U.S.P.* require that when ignited with free access of air it shall leave no residue.

Not Official.

GUTTÆ PILOCARPINÆ.—Pilocarpine Nitrate, 2 grains; Distilled Water, 1 fl. oz.—*London Ophthalmic.*

INJECTIO PILOCARPINÆ NITRATIS.—Pilocarpine Nitrate, 1; Water, 20. Dose, 2 to 6 minims.—*London Ophthalmic.*

Pilocarpine Nitrate, 1 grain; Distilled Water, 12 minims. Dose, 1 to 4 minims.—*Guy's.*

To prepare the patient for the injection, remove the nightshirt, wrap him closely in a warm blanket, and cover him with two more blankets. Put hot-water bottles to his feet, and give him hot drinks freely. After the sweating has ceased, remove the blankets gradually, dry the skin thoroughly, and leave him between warm dry blankets.—*Guy's.*

PILOCARPINE ($C_{11}H_{16}N_2O_2$, eq. 206·65).—It is the principal alkaloid contained in Jaborandi Leaves, and may also be produced synthetically. It forms a colourless and odourless thick syrup, which becomes thinner on warming. It is readily soluble in Water, Alcohol (90 p.c.), and Chloroform. The solutions are dextrogyrate. It gives no colour reaction with strong Sulphuric or Nitric Acid; with Sulphuric Acid and Potassium Bichromate it gives a dark green coloration. When triturated with an excess of Calomel the latter is reduced to metallic Mercury, a darkening in colour resulting. It is precipitated by the usual alkaloidal reagents, such as Potassio-mercuric Iodide (Mayer's) Solution, Iodo-potassium Iodide (Wagner's) Solution, Tannic Acid, etc. It is stated by Allen to give no reaction with Picric Acid, but Jowett (*Y.B.P.* '99, 436) states that the alkaloid affords a yellow precipitate which dissolves on warming, again separating out in needles when the solution cools. It may be determined by titration with Tenth-normal Volumetric Sulphuric or Hydrochloric Acid Solution, using Iodeosin Solution as an indicator of neutrality. 1 c.c. of Tenth-normal Volumetric Acid Solution is equivalent to 0·02066 gramme of pure Pilocarpine.

PILOCARPINÆ HYDROCHLORIDUM. Pilocarpine Hydrochloride. $C_{11}H_{16}N_2O_2$ HCl, eq. 242·84.—Colourless or white cubical crystals, deliquescent in moist air; soluble in less than its own weight of Water; 1 in 10 by weight of Ethyl Alcohol; almost insoluble in Ether or Chloroform.

A more definite salt than the Nitrate, being more easily separated from accompanying Hydrochlorides of the other bases, but deliquescent in moist air.

It should be kept in well-stoppered glass bottles of a dark amber tint and in a cool atmosphere; it should also be kept as far as possible from contact with a moist atmosphere.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain = 0·0032 to 0·032 gramme.

Ph. Ger. maximum single dose, 0·02 gramme; maximum daily dose, 0·04 gramme.

Incompatibles.—Alkalis, and Alkaline Carbonates, Lead, Mercurous and Silver salts.

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

Tests.—Pure Pilocarpine Hydrochloride melts when anhydrous, according to Petit and Polonovski, at 200° C. (392° F.), and this m.p. is that officially adopted in the *Fr. Codex* (1908). The *U.S.P.* gives the m.p. of the salt after drying for several hours at 100° C. (212° F.) as 195·9° C. (384·5° F.). *P.G.* gives the m.p. as 193° to 195° C. (379·4° to 383° F.). Jowett states (*Y.B.P.* '99, 441) that when the salt dried at 100° C. (212° F.) is heated in a capillary tube it melts at 200° to 204° C. (392° to 399·2° F.). Solutions of the salt are dextrogyrate, the specific rotatory power of the aqueous solution being + 80° to + 92°. *Fr. Codex* gives + 91° at 18° C. for the 2 p.c. w/v aqueous solution. When dissolved in Water it forms a clear colourless solution which should have a neutral or at the most but faintly acid reaction towards Litmus paper. It should dissolve in Sulphuric Acid to form an almost colourless liquid, Hydrochloric Acid gas being simultaneously evolved. On the addition of a tiny crystal of Potassium Bichromate a bright emerald-green coloration is produced. Ammonia Solution should not produce a precipitate when added to a concentrated aqueous solution of the salt, and Sodium or Potassium Hydroxide Solution added to a similar solution should produce but a few oily drops, which quickly redissolve. The separated alkaloid should answer the tests characteristic of Pilocarpine given under that heading. The aqueous solution should yield when acidified with Nitric Acid, and on the addition of Silver Nitrate Solution, a white curdy precipitate insoluble in Nitric Acid, soluble in Ammonia Solution or in Potassium Cyanide Solution. It may be distinguished from the Nitrate by yielding a black coloration when rubbed with an equal quantity of Mercurous Chloride. Pilocarpine Nitrate under similar conditions yields no black coloration. It may be distinguished from other alkaloids by the Ammonia test given above or by dissolving 10 to 20 mg. of the salt in 2 c.c. of Water, mixing the solution with 2 c.c. of a slightly acidified Hydrogen Peroxide Solution, carefully adding sufficient Benzene to form a small layer on the surface of the liquid, and adding 3 or 4 drops of a 1 in 300 Potassium Bichromate Solution; on gently shaking the mixture the Benzene layer will acquire a violet colour, the aqueous layer remaining yellow.

The *U.S.P.* states that if more than 20 mg. be used the Benzene turns blue and the reaction is no longer characteristic.

When ignited with free access of air it should leave no residue.

It is official in 15 out of the 17 Foreign Pharmacopœias.

PILOCARPINÆ PHENAS.—A colourless, oily liquid, soluble in Water and in Alcohol, has been recommended in phthisis and intermittent fevers, 1 fl. drm. of a solution of 1 grain in 10 fl. oz. of 2$\frac{3}{4}$ p.c. Carbolic Acid Solution (**Aseptoline**) injected into the abdominal wall.—*P.J.* '96, ii. 379; '98, i. 84.

PILOCARPINÆ SALICYLAS.—Colourless crystals, or as a white crystalline powder, soluble in Water, less soluble in Alcohol (90 p.c.). Employed for purposes similar to those of the Nitrate or Hydrochloride.

It should be kept in well-stoppered glass bottles of a dark amber tint.

Tests.—Pilocarpine Salicylate melts at about 120° C. (248° F.); it dissolves readily in Water, forming a solution which is faintly acid in reaction towards blue Litmus paper. It dissolves in concentrated Sulphuric Acid without change of colour, but in Fuming Nitric Acid it forms a yellowish-brown solution. The aqueous solution should yield a whitish amorphous precipitate with Potassio-mercuric Iodide (Mayer's) Solution, and with Iodo-potassium Iodide (Wagner's) reagent a brownish precipitate. The addition of Sodium Hydroxide Solution to a concentrated aqueous solution of the salt causes a whitish turbidity settling out into oily drops soon dissolving in an excess of the Hydroxide Solution. The addition of Ammonia Solution to the concentrated aqueous solution of the salt should cause no precipitate; when dissolved in Water it yields on the addition of Ferric Chloride T.S. a deep violet coloration; the Salicylic Acid separated from the salt should possess the m.p. and answer the tests characteristic of Salicylic Acid given under that heading. When ignited with free access of air it should leave no weighable residue.

PILULÆ.

PILLS.

FR., PILULES; GER., PILLEN; ITAL., PILLOLE; SPAN., PILDORAS.

This class of medicine, so convenient and portable, was introduced in the earliest Pharmacopœias, and some of the formulas remain almost unchanged. The Pilula Rufi (Pilula Aloes et Myrrhæ) has for at least two hundred years maintained practically the same composition, but in *B.P.* '98 the Saffron is omitted.

Excipients for pills are of two kinds: (1) those which are more or less fluid, and employed to bind together powders, or to impart the necessary moisture to adhesive substances; (2) those, generally in powder, which are intended to absorb moisture and give solidity to the mass. Of the former, 'Dispensing Syrup' (equal volumes of Alcohol (90 p.c.), Glycerin, Syrup and Mucilage) and 'Diluted Glucose' (Glucose 3, Syrup 1), are most in request; Alcohol (60 p.c.) also is very useful. Glycerin by itself is distinctly inferior to the foregoing. Glycerin of Tragacanth is much employed, but in the majority of cases where it would be used Glucose or 'Diluted Glucose' is preferable. Of the powders, that of Liquorice root is most useful when moisture is to be absorbed and no binding power is required. An unexpected exception is the case of Carbolic Acid, which makes a very good plastic mass with twice its weight of Liquorice powder (when well worked together the result is very satisfactory). When more plasticity is required the absorbent powder is supplemented by Compound Tragacanth Powder or powdered Gum Acacia. For essential Oils this condition is best obtained by the use of powdered Curd Soap; as a rule, 1 minim of the Oil will require half a grain of the Soap and 2 grains of the Liquorice. A good powder to mix with small doses of powerful medicines is the **'Diluting Mixture'** (Sugar of Milk 3, and Compound Tragacanth Powder 1), which will make a good pill with 'Diluted Glucose' *q.s.* A mixture of Paraffins (Massa Paraffini), or with Kaolin (Massa Kaolini), is used for substances which are readily reduced by organic matter, such as the Permanganates and the salts of Gold and Silver. It 'goes without saying' that an excipient must not be chemically incompatible with the other ingredients, but there is not much opportunity for such an occurrence with those above selected.

Coatings.—Pills have been finished in various ways: rolled in Flour, Starch, Magnesia, Liquoric powder, and in Lycopodium, or a mixture of these; enveloped in Silver or Gold Leaf; coated with Ether-alcoholic solution of Tolu, or better with **Sandarach Varnish** (Ether 2, Absolute Alcohol 6, Sandarach 3), or with Gelatin or French Chalk. A good mucilage for applying the white coating to pills is: Powdered Tragacanth, 1; Powdered Gum Acacia, 4; Diluted Acetic Acid, 8; Distilled Water, 40; or it can be made with Chloroform Water in place of Distilled Water, omitting the Acetic Acid. Another protective coating is **Salol Varnish** (Salol 1, Sandarach Varnish 5). Pills containing substances exceedingly soluble in Alcohol should not be varnished, as the varnish may dissolve some part of the pill.

When pills are intended to pass through the stomach, and to be disintegrated in the intestine, they are coated with a solution of Keratine, *see* p. 710.

PIMENTA.

PIMENTO.

FR., PIMENT DE LA JAMAIQUE; GER., ENGLISCHES GEWÜRZ; ITAL., PIMENTI; SPAN., PIMIENTA DE LA JAMAICA.

The dried, full-grown, unripe Fruit of *Pimenta officinalis*, Lindley.

From the West Indies.

Medicinal Properties.—A warm, aromatic stimulant and carminative, like Cloves; used as an adjuvant to tonics and purgatives.

Dose.—10 to 30 grains = 0·65 to 2 grammes, in powder.

Prescribing Notes.—*The* **Oil** *may be given on* **sugar,** *or in* **pill** *with Liquorice Powder and Soap*, see p. 897.

Official Preparations.—Aqua Pimentæ and Oleum Pimentæ.

Foreign Pharmacopœias.—Official in Mex. (Pimienta Gorda); Port. (Pimenta da Jamaica); Span. (Pimienta de la Jamaica); U.S. Not in the others.

Descriptive Notes.—The official fruit is known in commerce as Allspice or Jamaica Pepper; its resemblance in shape to Pepper is also indicated by the German name, Clove Pepper (Nelkenpfeffer). Pimienta being the Spanish for Pepper, the corrupted name Pimento was applied to it in the West Indies, and the same application of the name is made in France, where Allspice is termed Piment des Anglais, and the Capsicum or Guinea Pepper, Piment des Jardins.

The fruit is dried before it ripens, since it loses much of its essential Oil when ripe. It varies in size from about $\frac{1}{10}$ to $\frac{3}{10}$ in. (2·5 to 7·5 mm.) in diameter ($\frac{1}{5}$ to $\frac{1}{3}$ in., 5 to 8 mm., *B.P.*; 5 to 7 mm., *U.S.P.*). The remains of a four-toothed calyx crown the apex of the fruit, which is two-celled, each cell containing a reniform seed with a large, spirally-coiled embryo. Both pericarp and seed contain oil cells, but they are most numerous in the former. Pimento is produced by *Pimenta officinalis*, Lindl. The fruit of the allied *P. acris*, Wight (*Myrcia acris*, DC.), is similar in appearance and sometimes occurs in commerce, but has five calyx teeth. The leaves of this species are used in the manufacture of Bay Rum, but have a flavour different from Allspice; the leaves are known in commerce as 'Bay Leaves.' A better term would be West Indian Bay Leaves, since the term Bay Leaves properly pertains to those of *Laurus nobilis*, L. The fruits of Tobago or Mexican Allspice (*Eugenia Tabasco*, G. Don) are liable to be mistaken for the official article. They are but rarely met with, but are larger, paler brown and less aromatic.

The distinctive microscopical characters of the powdered fruit are the cluster crystals and rhomboidal crystals of Calcium Oxalate; small, thick-walled cells containing Resin; short, thick-walled, simple, tapering hairs; sclerenchymatous cells with branching pores; compound small starch grains; and spherical oil cells.

Powdered Pimento is stated by Möller (*Lehrb. Pharmacognosie*, p. 144) to have been adulterated with Pear stalks and Clove stalks, and he gives the methods for detecting these adulterations.

Tests.—Pimento yields from 3 to 4 p.c. of ash, and should not exceed 5 p.c. It contains 3 to 4½ p.c. of volatile Oil and some quantity of Tannin.

Preparations.

AQUA PIMENTÆ.—PIMENTO WATER.

Pimento, bruised, 4; Water, 160; distil one half. (1 in 20)

Now 1 in 20 instead of 1 in 11½.

Dose.—1 to 2 fl. oz. = 28·4 to 56·8 c.c.

OLEUM PIMENTÆ.—OIL OF PIMENTO.

A pale yellow, or yellowish-brown, oily liquid, heavier than Water, having a pleasant, clove-like odour and pungent spicy taste, distilled from Pimento. Yield about 3 to 4½ p.c.

On exposure to the air the colour darkens and the oil becomes thicker. It should therefore be kept in well-stoppered bottles of a dark amber tint and protected from the light. It contains a large percentage of Eugenol and a sesquiterpene.

Solubility.—In all proportions of Alcohol (90 p.c.).; about 1 in 50 of Alcohol (60 p.c.).

Dose.—½ to 3 minims = 0·03 to 0·18 c.c.

Not Official.—Spiritus Myrciæ, Spiritus Pimentæ.

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

Tests.—Oil of Pimento has a sp. gr. of 1·030 to 1·050. The *B.P.* states not below 1·040, the *U.S.P.* from 1·033 to 1·048 at 25° C. (77° F.). It is officially required to form a semi-solid mass when shaken with an equal volume of strong Ammonia Solution. The *U.S.P.* requires that it shall form a semi-solid mass when mixed with an equal volume of concentrated Sodium Hydroxide Solution, that it shall be miscible in all proportions with Alcohol (90 p.c.) and also soluble 1 in 2 of Alcohol (70 p.c.). 1 minim dissolved in 60 minims of Alcohol (90 p.c.) and treated with 1 minim of very dilute Ferric Chloride Solution assumes a fine indigo colour. Oil of Cloves, which Oil of Pimento very much resembles in chemical constitution, also conforms to this test. It has been recommended that the Oil be required to indicate 65 p.c. of Eugenol by the Potassium Hydroxide method. The *U.S.P.* Oil is required to contain not less than 65 p.c. by volume of Eugenol as determined by measuring the portion undissolved when a measured quantity of 10 c.c. of the Oil is shaken for 5 minutes with 100 c.c. of Potassium Hydroxide T.S., the liquids being allowed to separate, sufficient Potassium Hydroxide T.S. added to raise the lower limit of the oily layer to the zero mark on the scale; a volume of not more than 3·5 c.c. should remain unabsorbed.

Not Official.

SPIRITUS MYRCIÆ. Bay Rhum.—Oil of Myrcia, 0·8; Oil of Orange Peel, 0·05; Oil of Pimenta, 0·05; Alcohol (95 p.c.), 61; Water, *q.s.* to make 100.—*U.S.P.* 1890.

Spiritus Pimentæ. *Syn.* Spiritus Myrciæ. Bay Rhum.—Oil of Pimento Leaves, 0·75; Oil of Orange Peel, 0·05; Oil of Pimento, 0·05; Alcohol (90 p.c.), 64; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

PINI OLEUM.

OIL OF PINE.

Colourless, or pale yellow, limpid oily liquid, possessing an agreeable characteristic pine odour. It is distilled from the fresh leaves of *Pinus Pumilio*, Haenke.

It should be kept in well-closed glass bottles preferably of a dark amber tint.

Pine Oil contains Pinene, Lævo-phellandrene, Sylvestrene, Bornyl Acetate, Dipentene, and Cadinene.

'Pinol' and 'Pumiline' are commercial varieties of this Oil.

Solubility.—About $\frac{4}{5}$ dissolves 1 in 5 of Alcohol (90 p.c.), but the remaining $\frac{1}{5}$ is much less soluble.

Medicinal Properties.—The vapour or spray is a stimulating disinfectant expectorant in chronic catarrhal affections of the respiratory passages. The Oil is applied externally in rheumatism. Internally, as a disinfecting expectorant, the dose is 1 to 5 minims taken on **sugar**, or in the form of **jujube** or **pastil.**

Dose.—1 to 5 minims = 0·06 to 0·3 c.c.

Not Official.—Extractum Pini Pumilionis, Linctus Pini Terpin et Heroin, Elixir Pini et Terpini et Acetomorphinæ, Syrupus Pini Pumilionis and Vapor Olei Pini.

Foreign Pharmacopœias.—Official in Austr. and Swiss. Not in the others.

Tests.—Pine Oil has a sp. gr. of from 0·865 to 0·875; the *B.P.* gives 0·865 to 0·870. It is lævogyrate, the optical rotation being from −5° to −9°; the *B.P.* states −5° to −10° at 15·5° C. (60° F.). The *B.P.* requires that not more than 10 p.c. should distil below 165° C. (329° F.).

Not Official.

EXTRACTUM PINI PUMILIONIS.—A liquid extract, of a brown colour, prepared from the young shoots of the *Pinus Pumilio*. It is soluble in Water, and is used in baths.

LINCTUS PINI TERPIN ET HEROIN. *Syn.* Elixir of Pine Terpine and Heroin.—Pine Oil, 1 fl. oz.; Alcohol (90 p.c.), 5 fl. oz.; Terpine Hydrate, 40 grains; Glycerin, 5 fl. oz.; Light Magnesium Carbonate, 3 oz.; Saffron Tincture, 5 drm.; Heroin Hydrochloride, 3⅓ grains; Syrup, *q.s.* to make 20 fl. oz. —*Martindale.*

Dissolve the Terpine Hydrate in the Alcohol, and Heroin Hydrochloride in the Syrup, and proceed as in preparing Syrupus Pini Pumilionis.

Elixir Pini et Terpini et Acetomorphinæ. *Syn.* Linctus Pini et Terpini et Acetomorphinæ.—Oil of Pine, 5; Terpin Hydrate, 0·50; Acetomorphinæ Hydrochloride, 0·05; Alcohol, 25; Tincture of Saffron, 3; Glycerin, 25; Light Magnesium Carbonate, 15; Syrup, *q.s.* to produce 100.—*B.P.C.*

SYRUPUS PINI PUMILIONIS.—Pine Oil, 1 oz.; Alcohol (90 p.c.), 5 oz.; Saffron Tincture, 5 drm.; Glycerin, 5 oz.; Syrup, *q.s.* to make 20 fl. oz. Rub the Pine Oil with 3 oz. Light Magnesium Carbonate, then add the Alcohol, Glycerin, and Syrup, in parts, filter. Dose.—1 drm. (3·5 c.c.).—*Martindale.*

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

VAPOR OLEI PINI.—Oil of Pine, 10; Magnesium Carbonate (light), 5; Distilled Water, *q.s.* to produce 100.—*B.P.C.*

A similar inhalation appears below under the title Vapor Olei Pini Sylvestris.

Not Official.

PINI SYLVESTRIS OLEUM.

Under this name several varieties of Pine-needle Oil are supplied.

A colourless, or nearly colourless, limpid oily liquid with an agreeable odour, distilled from the fresh Leaves of various species of *Pinus*. The Oil distilled from the leaves of *Pinus sylvestris*, L., is not now obtainable in commerce.

Solubility.—1 in 5 to 10 of Alcohol (90 p.c.), depending on the variety; in all proportions of Absolute Alcohol.

Medicinal Properties.—Similar to those of Oil of Turpentine. It is also used externally in rheumatism, and as an inhalation or spray with hot Water in chronic laryngitis, bronchitis and phthisis.

Foreign Pharmacopœias.—Official in Hung., sp. gr. 0·872; Russ. (Oleum Pini Foliorum), sp. gr. 0·870 to 0·880. Not in the others.

Tests.—The Oil should have a sp. gr. of not below 0·880. Rotation varies with the time of year at which the Oil is collected, climate and locality. Not more than 15 p.c. should distil below 170° C. (338° F.). Many Oils sold as Pinus Sylvestris yield on fractionation 60 to 70 p.c., boiling below 167° C. (332·6° F.).

VAPOR OLEI PINI SYLVESTRIS.—Oil of Scotch Pine, 40 minims; Light Magnesium Carbonate, 20 grains; Water, *q.s.* to produce 1 fl. oz.—*Throat.*

1 fl. drm. in 20 fl. oz. of Water at 140° F. for each inhalation.

PIPER NIGRUM.

BLACK PEPPER.

FR., POIVRE NOIR; GER., SCHWARZER PFEFFER; ITAL., PEPE NERO; SPAN., PIMIENTA NEGRA.

The dried unripe Fruit of *Piper nigrum*, L.

The ash of genuine Black Pepper varies from 4 to 6 p.c.
Chiefly from the East Indies.

Medicinal Properties.—Carminative and stomachic. Chiefly used to assist gastric digestion and relieve colic and flatulence. Useful in hæmorrhoids and in urethritis.

Official Preparation.—Confectio Piperis. Contained in Pulvis Opii Compositus.

Not Official.—Oleoresina Piperis, Piperina, Piperidine, Piperidine Guaiacolate, Piperidine Acid Tartrate.

Foreign Pharmacopœias.—Official in Austr., Belg., Jap., Mex. (Pimienta Negra), Port. (Pimenta), U.S. Not in the others.

Descriptive Notes.—Black Pepper consists of the dried unripe fruits of *Piper nigrum*. The fruits are black, nearly spherical, about ⅕ in. (5 mm.) in diameter, wrinkled, slightly pointed below from the remains of a very short pedicel, and showing traces at the apex of a 3 to 4 lobed stigma. The single seed fills the fruit and contains a small cavity at the apex where the embryo should be developed in the ripe fruit. The albumen is horny externally and starchy inside. The taste is pungent and the flavour and odour characteristic. It is largely imported from Singapore, Malabar, (Tellicherry and Aleppy), Ceylon, Siam, and Mangalore. The last named is large and has a flavour resembling Bay Leaves. Penang Pepper is preferred for its strength and Sumatra Pepper (Acheen and Lampong) for its colour. The heavy or shot Pepper of Tellicherry and Ceylon is preferred for grinding. Black Pepper is collected as soon as the lowest fruits on the spikes turn red, since its loses some of its pungency as it ripens, although it improves in flavour. White Pepper consists of the ripe fruit with the pericarp removed by soaking in Water and rubbing. The Tellicherry and Ceylon kinds of White Pepper are considered to be the best. The Black Pepper of the *B.P.* is described as ⅕ in. (5 mm.) in diameter and almost black in colour; that of the *U.S.P.* should be greyish-black, and 4 to 5 mm. in diameter.

The distinctive microscopical characteristics of Black Pepper are sclerenchymatous cells with brown contents more or less surrounded by thin-walled parenchymatous cells, and the sclerenchymatous cells of the inner layer of the pericarp, which have larger cavities that are clear, and unequally thickened walls; the small starch grains (0·002 mm. *U.S.P.*), and the oil cells.

Whole Pepper is rarely adulterated. Ground Pepper has been adulterated with Rice which has a distinctive Starch; ground Olive stones, which become yellow when boiled with Solution of Aniline in Acetic Acid; and, according to Möller, with Palm kernels, Cake, Millet, and other farinaceous substances, some illustrations of which are given in his *Lehrbuch der Pharm.* 1889, pp. 136–7.

Tests.—Black Pepper leaves on ignition from 4 to 6 p.c. of ash, and should not leave more than 7 p.c. The *U.S.P.* ash limit is 7 p.c.

It has been recommended that the characters of the powder should be given together with an ash and possibly an Oleo-resin standard. The matter soluble in hot Alcohol amounts to about 7 p.c.

Preparation.

CONFECTIO PIPERIS. Confection of Pepper.

Black Pepper, 2; Caraway fruit, 3; Clarified Honey (by weight), 15. (1 in 10)

Dose.—60 to 120 grains = 4 to 8 grammes.

Not Official.

OLEORESINA PIPERIS (*U.S.*).—Obtained from Pepper by exhaustion with Acetone, evaporation of the solution, and finally separation of the crystals of Piperine by straining the Oleo-resin through Cotton-Wool.

Average Dose.—½ grain = 0·032 gramme.

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

PIPERINA. Piperine $C_{17}H_{19}NO_3$, eq. 283·05.—It is described in the *U.S.P.* as a feebly basic substance obtained from Pepper and other plants of the Piperaceæ. Allen describes it as an alkaloid existing in various plants belonging to the Piperaceæ, and as the characteristic principle of both black and long Pepper. It forms colourless or pale yellow four-sided monoclinic prisms, odourless, and at first tasteless, but subsequently developing a sharp biting taste. Insoluble in cold Water, very slightly soluble in boiling Water, is sparingly soluble in Ether, but dissolves readily in Chloroform and Benzene.

It possesses antipyretic properties, but it is not the active principle of Pepper.

Official in Mex.

Average Dose.—3 grains = 0·2 gramme.

Tests.—Piperine melts at 128° to 129° C. (262·4° to 264·2° F.). The *U.S.P.* states at 130° C. (266° F.). It dissolves in Alcohol, the alcoholic solution being neutral in reaction towards Litmus paper and optically inactive. It dissolves in Sulphuric Acid with the formation of an orange-red coloration, becoming brown on warming or standing and disappearing on dilution with Water. On the addition of Nitric Acid it acquires an orange-red coloration, which is turned to a blood-red colour by the addition of an excess of Potassium Hydroxide Solution. Sulphuric Acid containing about half its volume of Formaldehyde Solution produces a permanent green solution. When mixed with Sulphuric Acid containing a crystal of Potassium Bichromate a purple coloration is immediately developed, changing on stirring to a reddish-brown solution, which becomes greenish on the addition of Water. On the addition of Iodo-potassium Iodide Solution to a hot alcoholic solution acidified with Hydrochloric Acid an Iodo-compound is formed, which separates on cooling into fine steel-blue needles. When boiled with Potassium or Sodium Hydroxide Solution, Piperine undergoes saponification, being converted into Sodium Piperinate and Piperidine. Piperinic Acid melts at about 215° C. (419° F.). When ignited with free access of air Piperine should leave no weighable residue.

PIPERIDINE ($C_5H_{11}N$, eq. 84·49).—A colourless limpid liquid. Possessing a strongly alkaline reaction and a strong odour resembling Pepper. It is a powerful base, produced by the hydrolysis of Piperine, the alkaloid occurring in Pepper, or synthetically by the reduction of Pyridine by nascent Hydrogen.

Tests.—It boils at 106° C. (222·8° F.), and distils unchanged at that temperature. It dissolves readily in Water and Alcohol, the solution possessing a strongly alkaline reaction towards blue Litmus paper. It may be determined by titration with Normal or Tenth-normal Volumetric Hydrochloric or Sulphuric Acid Solution, using either Litmus or Methyl Orange Solution as an indicator of neutrality. 1 c.c. of Normal Volumetric Acid Solution is equivalent to 0·08449 gramme of Piperidine. It rapidly absorbs Carbon Dioxide from the air.

PIPERIDINE GUAIACOLATE (Guaiaperol).—A compound of Piperidine and Guaiacol. A yellowish-white crystalline body, having a faint odour of Guaiacol. Soluble in Water. Mineral acids and alkalis decompose it into its constituents. Recommended in phthisis.—*B.M.J.* '97, i. 136; *J.C.S. Trans.* '98, 145.

Dose.—5 to 30 grains = 0·32 to 2 grammes.

PIPERIDINE ACID TARTRATE.—A white crystalline powder possessing a faint odour. Readily soluble in Water. Introduced as a solvent for gouty deposits, Uric Acid gravel and calculi. It increases the solvent power of serum for Sodium Biurate to a much larger extent than Piperazine, Lysidine or Urotropine.—*L.* '98, ii. 198, 280, 345, 433, 507.

Dose.—10 to 15 grains = 0·65 to 1 gramme.

Calcusol is stated to be a mixture of Piperidine Para-Sulphamine Benzoate and Potassium Bicarbonate.

Not Official.

PIPERAZINE.

HEXAHYDROPYRAZINE.

$(C_2H_4NH)_2$, eq. 85·52.

Colourless deliquescent crystals, readily soluble in Water.

Piperazine (Diethylene-diamine) is produced by action of Ammonia on Ethylene Bromide or Chloride. Or by reducing Ethyleneoxamide by Zinc dust or metallic Sodium.

Medicinal Properties.—It has in the laboratory a powerful solvent action on Uric Acid, the Piperazine Urate being about seven times more soluble than Lithium Urate, but whether it has a similar action in the body is doubtful. Recommended for gouty conditions, rheumatoid arthritis, and renal calculus and colic.—*T.G.* '93, 19; '94, 192; '95, 99; *B.M.J.* '94, i. 1291; *B.M.J.E.* '93, ii. 20; *Pr.* li. 134; liii. 265.

Little or no effect in gouty states.—(Sir Wm. Roberts and Bohland) *Pr.* liii. 50; in diabetes.—*B.M.J.E.* '93, ii. 72; action as a Uric Acid solvent.—*B.M.J.* '96, ii. 1901.

Piperazine did not delay the conversion of gelatinous Sodium Biurate into the crystalline variety, and the conversion when once started was but slightly slowed by the presence of this substance.—*B.M.J.* '00, i. 836; *L.* '00, i. 931. 0·05 gramme dissolved in 0·5 c.c. Water, injected in gouty tophi.—*B.M.J.E.* '99, ii. 56.

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

Prescribing Notes.—*Usually given in* **mixture,** *also in aerated Water, or as a* **granular effervescent** *preparation, containing* 2½, 5, *and* 10 *grains respectively in each* 60 *grains.*

Foreign Pharmacopœias.—Official in Fr.

Tests.—Piperazine melts when anhydrous at 104° to 107° C. (219·2° to 224·6° F.); *Fr. Codex* gives 104° C. (219·2° F.). It boils at 145° C. (293° F.); *Fr. Codex* gives between 145° and 146° C. (293° and 294·8° F.). It mixes readily in Water, the aqueous solution having a strongly alkaline reaction towards red Litmus paper. On the addition of Potassium Bismuth Iodide Solution to a dilute slightly acid solution a pomegranate-red precipitate is thrown down. On the addition of Picric Acid Solution a yellow crystalline precipitate exhibiting a characteristic microscopical appearance is thrown down. A glass rod moistened with Hydrochloric Acid gives off dense white clouds when held over a crystal of Piperazine. The aqueous solution affords with Potassio-mercuric Iodide (Mayer's) Solution a white precipitate; with Mercuric Chloride Solution a white precipitate; with Tannic Acid Solution an amorphous precipitate soluble in hot Water. The aqueous solution when acidified with Hydrochloric Acid yields with Platinic Chloride Solution a reddish-yellow precipitate, and if the solution be not too dilute Gold Chloride Solution throws down a crystalline double salt soluble in hot Water. Piperazine is not altered by aqueous Chromic Acid Solution, but Potassium Permanganate oxidises it quickly in the cold. Piperazine absorbs Carbonic Acid rapidly from the air, being converted into the Carbonate which melts at 162° to 165° C. (323·6° to 329° F.). It should yield no brown or reddish-brown coloration with Alkaline Potassio-mercuric Iodide (Nessler's) Solution, indicating the absence of Ammonium salts. When acidified with Nitric Acid the aqueous solution should yield neither a turbidity nor precipitate with either Silver Nitrate Solution or Barium Nitrate Solution, indicating the absence of Chlorides and Sulphates. When strongly heated it should completely sublime without leaving a weighable residue indicating the absence of mineral impurities.

LYCETOL (Dimethylpiperazine Tartrate).—A white powder readily soluble in Water, possessing an acid taste. Recommended in chronic gout and rheumatism.

Dose.—5 to 10 grains = 0·32 to 0·65 gramme.

LYSIDINE (Ethylene-ethenyl-diamine).—A reddish-white, crystalline substance, very hygroscopic, with a peculiar odour. Commercially it is sold in the form of a 50 p.c. solution.

A diuretic, recommended in gout and as a solvent of Uric Acid deposits.—*B.M.J.* '96, ii. 901.

It has an influence in increasing the solvent power of serum for Sodium Biurate and of urine for uratic deposit.—*L.* '98, ii. 203.

Though it delayed the conversion of the gelatinous Sodium Biurate into the crystalline form, yet when the conversion was once started it had practically no effect in slowing it.—*L.* '00, i. 931; *B.M.J.* '00, i. 836.

Dose (of the liquid).—30 to 60 minims = 1·8 to 3·6 c.c., well diluted with Water or aerated Water.

Lysidine Acid Tartrate.—A white powder soluble in Water.

Dose.—15 to 30 grains = 1 to 2 grammes.

Piperazine Quinate or **Kinate** (Sidonal).—A white granular powder, readily soluble in Water, the solution having a pleasant slightly acid taste. Recommended as a solvent of Uric Acid and gouty deposits.—*B.M.J.* '01, i. 1408.

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

New Sidonal (Quinic Anhydride).—A white, crystalline powder, readily soluble in Water. Introduced for the treatment of gout.

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

Not Official.

PISCIDIA.

Syn.—JAMAICA DOGWOOD.

The Root-bark of *Piscidia erythrina*, Lam.

The shrub is a native of South America and the West Indies, where it has been used for stupefying fish.

Medicinal Properties.—A sedative in nervous irritability and in irritant cough; an antispasmodic in asthma.

Has been used in neuralgia and toothache.—*P.J.* (3) xvi. 1014.

Official in Mex. (Colorin de peces).

EXTRACTUM PISCIDIÆ LIQUIDUM.—1 fl. oz. is equal to 1 oz. of the root.

Dose.—30 to 120 minims = 1·8 to 7·1 c.c.

Extractum Piscidiæ.—The above evaporated to an extract for pills. Dose, 1 to 5 grains = 0·06 to 0·32 gramme.

PIX BURGUNDICA.

BURGUNDY PITCH.

Fr., Poix de Bourgogne; Ger., Fichtenharz; Ital., Pece di Borgogna; Span., Pez de Borgona.

An opaque or translucent yellowish- or reddish-brown brittle solid, possessing a terebinthinate odour. Imported from Germany. The prepared resinous exudation obtained from the stem of *Picea excelsa*, Link.

It is the Thus or Frankincense of Lond. and Dub. Pharmacopœias. It exudes from the spruce fir, and when melted and strained is called Burgundy Pitch.

Solubility.—Almost entirely dissolves 1 in 20 of Alcohol (90 p.c.); the greater part dissolves 1 in 1½ of Glacial Acetic Acid.

Medicinal Properties.—The plaster is applied to the chest in chronic pulmonary complaints, to the loins in lumbago, to the joints in chronic articular affections, and to other parts to relieve local pain of a rheumatic character. It acts as a counter-irritant.

Official Preparation.—Emplastrum Picis.

Foreign Pharmacopœias.—Official in Belg. (Pix Burgundica); Fr. (Poix de Bourgogne); Hung. (Resina Pini Burgundica); Ital. (Pece di Borgogna); Mex. and Span. (Pez de Borgona); Port. (Pez de Borgonha); Swiss (Resina Pini). Not in Austr., Dan., Dutch, Ger., Jap., Norw. or Russ.

Descriptive Notes.—True Burgundy Pitch is rarely met with in English commerce, its place being taken by a factitious article made with ordinary Resin, Turpentine and Palm Oil, and sold in bladders. The genuine article is produced in Finland and the Black Forest and, as described by Hanbury, has an agreeable aromatic odour, but when old it recalls that of Castoreum. It is opaque, yellowish-brown, brittle and hard, but gradually takes the form of the vessel in which it is kept; has a clean conchoidal fracture and gives off an aromatic odour when heated; it does not exhibit a crystalline structure. The fat present in the factitious article will not dissolve in Glacial Acetic Acid; the taste should be sweet, aromatic and without bitterness.

Tests.—Burgundy Pitch is officially required to be readily soluble in Glacial Acetic Acid.

Preparation.

EMPLASTRUM PICIS.—Pitch Plaster.

Burgundy Pitch, 26; Frankincense, 13; Resin, 4½; Yellow Beeswax, 4½; Olive Oil (by weight), 2; Distilled Water, 2; melt and evaporate to the consistence of a plaster.

The Expressed Oil of Nutmeg is omitted in *B.P.* 1898.

Foreign Pharmacopœias.—Official in Fr., Port. and Span. Yellow Wax 1, Burgundy Pitch 3; Ital. (Empiastro Adesivo), Yellow Wax 3, Burgundy Pitch 7, Diachylon Plaster 40; Mex. (Emplasto Aglutinante), Pitch 74, Elemi 10, Sesame Oil 6, Yellow Wax 10. Not in the others.

PIX CARBONIS PRÆPARATA.

PREPARED COAL TAR.

Prepared from commercial Coal Tar by dissipating all constituents volatile below 120° F. (48·9° C.), by keeping it at that temperature for 1 hour in a shallow vessel.

The **solution** is used in chronic eczema as a Lotion, 1 to 20 or more of Water, or as an Ointment 1 to 8. It is frequently prescribed with the Liquor or the Glycerole of Lead.

Official Preparation.—Liquor Picis Carbonis.

Not Official.—Liquor Carbonis Detergens, Lotio Plumbi et Picis, Plâtre coaltaré (Vet.), Unguentum Picis Carbonis, Unguentum Picis Carbonis Compositum, Unguentum Petrolati Compositum.

Foreign Pharmacopœias.—Official in Dutch and Swiss (Pix Lithanthrasis); Fr. (Goudron de Houille). Not in the others.

Preparation.

LIQUOR PICIS CARBONIS.—Solution of Coal Tar.

Digest for 2 days at 120° F. (48·9° C.) 1 (by weight) of Prepared Coal Tar in 5 of a Tincture of Quillaia (1 in 10, Alcohol 90 p.c.); decant or filter when cold. (1 in 5)

Foreign Pharmacopœias.—Liquor Picis Lithanthracis:—Pix Lithanthracis 1, Alcohol (90 p.c.) 1.—*Dutch.*

Not Official.

LIQUOR CARBONIS DETERGENS.—An Alcoholic solution of Coal Tar. It is almost black, smells strongly of Naphthalene, and is of light sp. gr. Used externally in chronic scaly skin diseases diluted about 1 in 20 of Water.

Coal Tar in dermatological practice.—*B.M.J.E.* '94, ii. 88.

LOTIO PLUMBI ET PICIS.—Strong solution of Lead Acetate, 10 minims; Solution of Coal Tar, 20 minims; Water, to 1 fl. oz.—*London.*

PLÂTRE COALTARÉ (Vet.).—Coal Tar, 1; Calcium Sulphate (Moulder's Plaster), 20.—*Fr.*

UNGUENTUM PICIS CARBONIS.—Solution of Coal Tar, ½ fl. drm.; Soft Paraffin, yellow, to 1 oz.—*St. Thomas's.*

Solution of Coal Tar, by weight, 6; Soft Paraffin, yellow, *q.s.* to produce 100.—*B.P.C.*

UNGUENTUM PICIS CARBONIS COMPOSITUM.—Solution of Coal Tar, ½ fl. drm.; Ammoniated Mercury, 15 grains; Soft Paraffin, yellow, to 1 oz.—*St. Thomas's.*

Solution of Coal Tar, by weight, 6; Ammoniated Mercury, 3; Soft Paraffin, yellow, *q.s.* to produce 100.—*B.P.C.*

Unguentum Petrolati Compositum.—Solution of Coal Tar, ½ drm.; Ammoniated Mercury, 10 grains; Soft Paraffin, to 1 oz.—*St. John's.*

PIX LIQUIDA.

TAR.

FR., GOUDRON VÉGÉTAL; GER., HOLZTHEER; ITAL., CATRAME VEGETALE;
SPAN., BREA.

A thick, dark brown or brownish-black, bituminous fluid or semi-fluid, having a strong, peculiar, empyreumatic terebinthinate odour. Obtained by destructive distillation from the wood of *Pinus sylvestris* and other species of *Pinus*; *U.S.P.* says *Pinus palustris*. Known commercially as Stockholm Tar.

Wood Tar contains Guaiacol and Cresol. Coal Tar yields Phenol and Cresol.

Solubility.—In less than its own bulk of Alcohol (90 p.c.) or Chloroform, and separates on the addition of Water; soluble 1 in 3 of Solution of Sodium Hydroxide (4 p.c.); slightly soluble in Olive Oil or Oil of Turpentine.

Medicinal Properties.—Similar to Turpentine. May be used as a disinfectant expectorant in chronic bronchitis and winter cough, taken internally or inhaled from steaming Water. The ointment is used in leprosy, pruritus, and also for some chronic skin diseases, such as eczema and psoriasis.

Dose.—5 to 10 minims = 0·3 to 0·6 c.c.; but the dose may be increased gradually.

Prescribing Notes.—*Best given in* **capsules.** *Tar varies slightly in consistence, and is very difficult to form into pills of a convenient size; it requires so much excipient, that a 5-grain pill will contain very little Tar. Powdered Liquorice Root and Lycopodium have been recommended for the purpose, but neither of them alone yields a satisfactory mass. Equal weights of Tar, Curd Soap, Powdered Liquorice Root, and Powdered Gum Acacia, make a good plastic pill; the quantity of Tar which can be worked up with this mixture will vary according to the consistence of the Tar.*

Official Preparation.—Unguentum Picis Liquidæ.

Not Official.—Unguentum Picis Molle, Aqua Picis, Capsulæ Picis, Oleum Picis Liquidæ, Oleum Picis Rectificatum, Pigmentum Picis Liquidæ, Pilulæ Picis, Syrupus Picis Liquidæ, Sirupus Picis cum Codeino, Vasolimentum Picis, Parogenum Picis, Black Pitch.

Foreign Pharmacopœias.—Official in all; Dan., Norw. and Swed. (Pyroleum Pini); Fr. (Goudron végétal), obtained from *Pinus maritima;* Ital. (Catrame vegetale); Mex. (Alquitran); Port. (Alcatrao); Span. (Brea); Russ. has Pix Solida also.

Descriptive Notes.—Official Tar is commonly known in commerce as Wood Tar, Archangel or Stockholm Tar, to distinguish it from Coal Tar. It is obtained by destructive distillation of the stumps and roots, chiefly of *Pinus sylvestris*, L., and *Abies Sibirica*, Ledeb., in Northern Europe. Some varieties exhibit colourless crystals of Pyrocatechin, to which it owes its occasionally granular appearance. The Pix Liquida of the *U.S.P.* is derived from *Pinus palustris*, Miller, and other species.

Tests.—Tar is required by the *B.P.* to have a sp. gr. of 1·02 to 1·15; the *P.G.* and *U.S.P.* state that it is heavier than Water. When shaken with Water the aqueous solution acquires a light brown colour and a sharp and empyreumatic taste. The aqueous liquid has an acid reaction towards blue Litmus paper and affords, with dilute Ferric Chloride T.S., a red coloration. According to the *P.G.*, 20 c.c. of Water which has been shaken with Tar assumes a greenish-brown coloration on the addition of 2 drops of Ferric Chloride T.S. The *P.G.* states that a mixture of equal volumes of Lime Water in which Tar has been shaken and Lime Water assumes a dark brown colour. When ignited with free access of air it should leave no weighable residue.

Preparation.

UNGUENTUM PICIS LIQUIDÆ.—TAR OINTMENT.
Tar (by weight), 5; Yellow Beeswax, 2.

This ointment is too hard for use. A proper consistence is obtained by replacing half of the Yellow Beeswax with Almond Oil (*see* Ung. Picis Molle).

Foreign Pharmacopœias.—Official in Dan., Pitch 9, Lard 6, Potassium Carbonate 3, Water 2; Dutch (Ung. Picis), Pix Solida 3, Colophonium 3, Yellow Wax 2, Sesame Oil 12; also Ung. Picis Co.; Fr. (Pommade de Goudron), and Port., Tar 1, Lard 9; Jap., Wood Tar 10, Yellow Wax 4; Span., Tar 3, Lard 17; U.S., Tar 50, Yellow Wax 15, Lard 35. Not in the others.

Not Official.

UNGUENTUM PICIS MOLLE.—Tar (by weight), 5; Yellow Beeswax, 1; Almond Oil, 1; melt together and stir till cold.

AQUA PICIS (TAR WATER, AQUA PYROLEI PINI, ACQUA DI CATRAME, EAU DE GOUDRON).—Tar, 1; finely powdered, washed and dried Pumice, 3; Distilled Water, 200; agitate for 15 minutes, and filter.

Dose.—From 1 to 2 pints daily, or may be used as a wash for ulcers and wounds.

The *B.P.C.* adopts the strength given in *Ph. Ger.*, Tar 1, Water 10.

Foreign Pharmacopœias.—Official in Dutch, Tar 1, Pumice 3, Water 20; Fr. (Eau de Goudron), Tar 1, Calcined Sand 3; Water 200; Ger., Jap. and Swiss, Tar 1, Pumice 3, Water 10; Norw. (Aqua Pyrolei Pini), 1 in 10; Mex. (Aqua de Alquitran), Tar 5, Pumice 15, Water 1000; Port. (Agua de Alcatrao), and Ital. (Acqua di Catrame), 1 in 40; Span. (Agua de Brea), 1 in 33, also (Solucion de Brea Alcalina), Bicarbonate of Soda 20, Tar 40, Distilled Water 85; Russ., Birch Tar 1, Water 30. Not in Austr., Hung., or U.S.

CAPSULÆ PICIS.—Capsules containing 5 minims = 0·3 c.c.

Dose.—1 or 2 capsules.

OLEUM PICIS LIQUIDÆ (Oil of Tar).—This volatile Oil, distilled from Tar, is official in U.S. as an almost colourless liquid when first distilled, but becoming dark reddish-brown on keeping; sp. gr. about 0·892 at 25° C. (77 F.).

OLEUM PICIS RECTIFICATUM (Light Oil of Tar).—Colourless when first distilled, becoming brown on keeping; sp. gr. 0·840 to 0·870.

PIGMENTUM PICIS LIQUIDÆ.—Tar, 1; Alcohol (90 p.c.), 1.

Used as a stimulant in psoriasis and chronic dry eczema. Its use in eczema demands caution.

PILULÆ PICIS.—Tar, Curd Soap, powdered Liquorice Root, and powdered Gum Acacia, equal weights mixed, and made into 5-grain pills.

Dose.—2 or 3 pills thrice daily.

They are sometimes made of Black Pitch, and have been taken to relieve hæmorrhoids.

SYRUPUS PICIS LIQUIDÆ.—Tar, 0·5; Alcohol (95 p.c.), 5; Magnesium Carbonate, 1; Sugar, 85; Water, *q.s.* to produce 100.—Mix the tar intimately in a mortar with 1 of clean white Sand, add 10 of Water, and after kneading the mass thoroughly with the pestle pour off the Water and throw it away. Treat the residue with the Alcohol, and when the Tar is dissolved add the Magnesium Carbonate and 5 of Sugar, and after thorough trituration add 40 of Water, stir occasionally during 2 hours and filter, dissolve the remainder of the Sugar in the clear filtrate by gentle heat, strain and add sufficient Water to make the product 100.—*U.S.P.*

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

Dose.—1 to 2 fl. drm. = 3·6 to 7·1 c.c.

Sometimes prescribed with Syrup of Wild Cherry Bark, and also with Codeine.

Foreign Pharmacopœias.—Official in Fr. (Sirop de Goudron), Tar 10, Calcined and washed Sandstone 15, Distilled Water 1000; Sugar in proportion of 18 to 10 of the liquid; Span., Solucion de Brea Alcalina 12, Tar Water 24, Saccharum 64.

SIRUPUS PICIS CUM CODEINO.—Codeine 0·1, Proof Spirit *q.s.*; Syrup Picis Liquidæ to make 100. Dose.—½ to 2 fl. drm.—*Swiss* 1893.

Tar Water, 324; Sugar, 505; Glycerin, 150; Codeia, 1; Diluted Spirit (Alcohol 60 p.c.), 20.—*Swiss* 1907.

VASOLIMENTUM PICIS.—Tar, 25; dissolved in Alcoholic Ammonia, 25; Simple Vasoliment, 75; mixed, evaporated on a water-bath to 100, and filtered —*Y.B.P.* 1901, 212, and *Hager*.

Parogenum Picis. *Syn.* Tar Vasoliment.—Tar, 25; Parogen, *q.s.* to produce 100.—*B.P.C.*

BLACK PITCH.—There are three kinds, Archangel, Swedish, and that obtained from Gas Tar; the latter is without odour.

Not Official.

PLUMBUM.

LEAD.

Pb, eq. 205·35.

Lead occurs in nature as an Oxide, and as a Sulphide called *Galena*; also in saline combination, forming the native Lead Sulphate, Phosphate, Carbonate, Chromate, Molybdate, Tungstate, and Arsenate. The native Oxide is rare, but Galena, the ore from which nearly all the Lead of commerce is extracted, is exceedingly abundant.

Fr., Plomb; Ital., Piombi; Mex. and Span., Plomo; Port., Chumbo.

Incompatibles.
Antidotes. Are given after Plumbi Subacetatis Liquor Fortis, p. 919.

Tests.—Lead has a sp. gr. of 11·3, it fuses at 325° C. (617° F.). It is not affected in the cold by Sulphuric Acid, but, when heated, it dissolves with the evolution of Sulphur Dioxide. When heated in the air it is converted into Lead Oxide. It dissolves readily in diluted Nitric Acid, forming a solution which affords, with Sulphuric Acid, a white precipitate, soluble in boiling Water, reprecipitating as the solution cools. The almost neutralised solution affords, with Hydrogen Sulphide, a black precipitate, insoluble in Hydrochloric Acid, insoluble in Potassium Hydroxide Solution, and in solution of Ammonium Hydrosulphide, the black precipitate is decomposed by boiling with diluted Nitric Acid. Diluted Sulphuric Acid affords a white precipitate almost insoluble in Water and dilute Sulphuric Acid, insoluble in Alcohol (90 p.c.), but soluble in Ammonium Acetate Solution. Potassium Chromate Solution affords a yellow precipitate readily soluble in Potassium Hydroxide Solution, and in strong, hot Nitric Acid, sparingly soluble in diluted Nitric Acid, insoluble in Acetic Acid. Potassium Hydroxide Solution yields a white precipitate, soluble in excess of the reagent, insoluble in Ammonia Solution. A neutral solution affords, with

Potassium Iodide Solution, a yellow crystalline precipitate, soluble on boiling, and depositing again in brilliant golden crystals as the solution cools.

Lead salts are distinguished when in solution from those of any other metals by giving white precipitates with soluble Chlorides and Sulphates, insoluble in any dilute acid, yellow precipitates with Chromates and Iodides; a black precipitate with Hydrogen Sulphide from an acid solution. All these precipitates (except the Sulphides) are soluble in excess of hot Potassium or Sodium Hydroxide Solution.

PLUMBI ACETAS.

LEAD ACETATE.

$Pb(C_2H_3O_2)_2, 3H_2O$, eq. 376·15.

Fr., Acetate Neutre de Plomb; Ger., Bleiacetat; Ital., Acetato di Piombo; Span., Acetato Plumbico.

Colourless, translucent prismatic crystals, or as masses of white monoclinic prisms possessing a faint odour of Acetic Acid and a sweet metallic and astringent taste.

It should be kept in well-closed bottles and in a cool atmosphere, as it is slightly efflorescent and liable to absorb Carbon Dioxide on exposure to the air.

Solubility.—1 in 2 of Water; 6 in 1 of boiling Water; 1 in 20 of Alcohol (90 p.c.); 1 in 2 of Glycerin.

Medicinal Properties.—In small doses it is sedative and astringent, lessening morbid mucous discharges and hæmorrhages in the gastro-intestinal and genito-urinary tracts, and even diminishing natural secretions; hence it is useful in gastric ulcer, diarrhœa, dysentery, cholera, and in tubercular and typhoid ulceration. Used in phthisis to check excessive expectoration and to allay hæmorrhage, in bronchitis to abate profuse secretion. Its prolonged use requires caution, otherwise chronic Lead poisoning may be induced. It is often accompanied or followed by a small dose of Acetic Acid, as excess of Acid makes it less injurious to the system. Externally it is sedative, desiccant, and astringent, diminishing profuse discharges of ulcers; used for injection in gonorrhœa and other chronic inflammatory discharges.

Along with Opium, or better, as Lotio Plumbi Evaporans cum Morphina, it is a favourite application for sprains and bruises. The compound Lead suppositories are used for painful and bleeding piles.

A solution of this salt with a little sublimed Sulphur is stated (*B.M.J.* '04, ii. 1749) to form an excellent test for tinea versicolor. A little of the lotion is applied to the part, and after the lapse of a short time, the tinea will appear clearly marked out in blackened patches.

In intestinal hæmorrhage 5 grains every hour.—*T.G.* '07, 324.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

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

Prescribing Notes.—*May be given in* **pills** *with ⅙ to ⅛ of its weight of Compound Tragacanth Powder, and massing with 'Diluted Glucose' or Dispensing Syrup, q.s. in* **solution,** *with excess of Acetic Acid; with Opium in the official Pill, and Suppository.*

Incompatibles.—Sulphuric and Tannic Acids, and their salts; Chlorides, Iodides, and Phosphates.

Official Preparations.—Pilula Plumbi cum Opio, Suppositoria Plumbi Composita, and Unguentum Plumbi Acetatis. Used in the preparation of Glycerinum Plumbi Subacetatis, Liquor Plumbi Subacetatis Fortis.

Not Official.—Lotio Plumbi Acetatis.

Antidotes.—Same as under Plumbi Subacetatis Liquor.

Foreign Pharmacopœias.—Official in all; Austr., Ger. and Swiss (Plumbum Aceticum); Hung and Russ. (Plumbum Aceticum Depuratum); Dan., Dutch, Norw. and Swed. (Acetas Plumbicus); Belg. (Acetas Plumbi); Fr. (Acétate Neutre de Plomb); Ital. (Acetato di Piombo); Mex. (Acetato de Plomo); Port. (Acetato de Chumbo); Span. (Acetato Plumbico).

Tests.—Lead Acetate loses its Water of crystallisation when heated to 40° C. (104° F.), suffering a loss of weight of 14·26 p.c. It dissolves in Water to form a clear solution, which should be only slightly acid in reaction towards blue Litmus paper, and which should only be slightly opalescent, the opalescence disappearing on the addition of a drop or two of Acetic Acid. The *U.S.P.* states that the aqueous solution has a neutral or slightly alkaline reaction. The *P.G.* states that the cold saturated aqueous solution of the salt has an alkaline reaction towards red Litmus paper, and on dilution a faintly acid reaction towards blue Litmus paper. The aqueous solution should answer the tests distinctive of Lead given under Plumbum. When mixed with Sulphuric Acid it evolves a strong acetous odour; when mixed with Sulphuric Acid and warmed with a small quantity of Alcohol (90 p.c.) it evolves the distinctive odour of Ethyl Acetate. It is officially required to contain 99·8 p.c. of pure crystallised Lead Acetate, as determined by precipitating 1 gramme of the salt dissolved in Water with Tenth-normal Volumetric Sulphuric Acid Solution. It should require for complete precipitation 53·1 c.c. The *U.S.P.* requires it to contain not less than 99·5 p.c. of pure Lead Acetate, but does not give a method by which this percentage can be assured. The *P.G.* gives neither a requisite percentage of pure Acetate nor a method of determination. The use of Normal Volumetric Oxalic Acid Solution in the place of Normal Volumetric Sulphuric Acid Solution has been recommended (*P.J.* '98, ii. 531) as a more useful method of determining the amount of pure Lead Acetate present. The excess of Normal Volumetric Oxalic Acid Solution may be titrated by Tenth-normal Volumetric Potassium Permanganate Solution. This volumetric process has been adopted by the *U.S.P.* for the assay of the Lead Subacetate Solution.

The more generally occurring impurities are Copper, Iron, Zinc, Calcium, Magnesium, and salts of the alkali metals and Carbonates. The formation of a clear solution when the salt is dissolved in Water precludes the presence of Carbonates. The Potassium Ferrocyanide test described below indicates Iron and Copper if present. A test for the presence of Zinc, and an additional test for Iron, is afforded by Hydrogen Sulphide and Ammonia Water; the test is described below. Calcium, Magnesium, and the salts of the alkali metals, if present, may be detected in the filtrate from this test.

Potassium Ferrocyanide.—Lead Acetate should give a clear, or at most only faintly opalescent, solution with 10 parts of Water (which has been recently boiled, *U.S.P.*) and this solution should yield, with Potassium Ferrocyanide, a pure white precipitate, *P.G.* and *U.S.P.*

Hydrogen Sulphide and Ammonia Water.—If the Lead be precipitated from an aqueous solution of the salt, first by Hydrochloric Acid until precipitation ceases, then filtering and adding Hydrogen Sulphide and filtering again, a portion of the second filtrate should not be affected by the addition of a slight excess of Ammonia Water.—*U.S.P.*

Residue.—Another portion of this second filtrate as above, when evaporated to dryness, should leave no residue.—*U.S.P.*

Preparations.

PILULA PLUMBI CUM OPIO. Pill of Lead with Opium. Lead Acetate, 12; Opium, 2; Syrup of Glucose, about 1.

Dose.—2 to 4 grains = 0·13 to 0·26 gramme.

A 4-grain pill contains about 3 grains of Plumbi Acetas and ½ grain of Pulvis Opii.

Foreign Pharmacopœias.—Official in Port., Lead Acetate, 5; Extract of Opium, 1; Extract of Liquorice, 14. Not in the others.

SUPPOSITORIA PLUMBI COMPOSITA. Compound Lead Suppositories.

3 grains of Lead Acetate, and 1 grain of Opium, in each with Oil of Theobroma.

UNGUENTUM PLUMBI ACETATIS. Lead Acetate Ointment.

Lead Acetate, in fine powder, 20 grains; Paraffin Ointment, white, 480 grains. (1 in 25)

Foreign Pharmacopœias.—Official in Austr., Lead Acetate 1, Water 9, Wool Fat 45, Vaseline 45; Hung., Lead Acetate 3, Lard 150, White Wax 50, Water 10; Dan., Lead Acetate 1, Benzoated Lard 9; Norw., Lead Acetate 1, Olive Oil 14, Yellow Wax 5. Not in the others.

Not Official.

LOTIO PLUMBI ACETATIS.—Lead Acetate, in powder, 2 grains; Diluted Acetic Acid, 2 minims; Distilled Water, up to 1 fl. oz.—*London Ophthalmic* 1887, omitted in 1901.

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

PLUMBI CARBONAS.

LEAD CARBONATE.

$2PbCO_3, Pb(OH)_2$, eq. 768·91.

Fr., Carbonate de Plomb; Ger., Cerussa; Ital., Cerussa;
Span., Albayalde o Cerusa.

An odourless and tasteless heavy white opaque powder, or in readily pulverisable masses.

Solubility.—Insoluble in Water; soluble, with effervescence, in Diluted Nitric Acid and in Diluted Acetic Acid.

Medicinal Properties.—Employed externally as an astringent and sedative, or as an ointment for ulcers and inflamed and excoriated surfaces.

Official Preparation.—Unguentum Plumbi Carbonatis.

Foreign Pharmacopœias.—Official in Austr., Hung. and Jap. (Plumbum Carbonicum); Ger. and Swiss (Cerussa); Dan., Norw. and Swed. (Hydratocarbonas Plumbicus); Dutch (Carbonas Plumbicus); Mex. (Carbonato de Plomo); Port. (Alvaiade); Russ. (Plumbum Carbonicum Basicum); Span. (Albayalde Cerusa). Not in the others.

Tests.—Lead Carbonate is officially required to be completely soluble in diluted Acetic Acid, Carbon Oxide gas being simultaneously evolved. This gas when passed into Lime Water affords a precipitate soluble in a sufficient excess of the gas, and also redissolving in dilute mineral acid. The solution answers the tests distinctive of Lead given under Plumbum. It is official in the *P.G.*, but not in the *U.S.P.* The *P.G.* requires that it shall leave not less than 85 p.c. of Lead Oxide when ignited at a dull red heat. It may also contain Copper, Iron and matter insoluble in diluted Nitric Acid, such as siliceous material, Barium Sulphate, etc., in addition to Calcium, Magnesium or Zinc. Calcium, Magnesium and Zinc may be detected, if present, by applying the usual tests for these metals after the separation of the Lead from the acidified solution by Hydrogen Sulphide. Copper and Iron may be detected by the Potassium Ferrocyanide test described below. Siliceous matter may be detected by the residue remaining insoluble in a mixture of Nitric Acid and Water as described below.

Residue.—The solution of the salt in Acetic Acid, after removal of the Lead by Hydrogen Sulphide gives a filtrate which, on evaporation to dryness, should not leave a weighable residue, *P.G.*

If 1 gramme of the salt be dissolved in 2 c.c. of Nitric Acid with the addition of 4 c.c. of Water, not more than 0·01 gramme should be insoluble, *P.G.*

Potassium Ferrocyanide.—Sodium Hydroxide T.S. produces in the above solution a precipitate soluble in excess of the reagent. This alkaline solution, with excess of Sulphuric Acid and filtering, gives a filtrate which should not be affected by T.S. of Potassium Ferrocyanide, *P.G.*

Preparation.

UNGUENTUM PLUMBI CARBONATIS. Lead Carbonate Ointment.

Lead Carbonate, 1; Paraffin Ointment, white, 9.

Foreign Pharmacopœias.—Official in Austr., 3 in 10; Hung., Norw., Russ. and Swed., 1 in 3; Dutch (Unguentum Carbonatis Plumbici Camphoratum) Camphor 5, Sesame Oil 5, Lead Carbonate 20, Lard 70; Mex. (Unguento Blanco simple) and Port., 1 in 5; Ger. (Emplastrum Cerussæ), Powdered Lead Carbonate 7, Olive Oil 2, Lead Plaster 12.

PLUMBI IODIDUM.

LEAD IODIDE.

PbI_2, eq. 457·15.

FR., IODURE DE PLOMB; GER., BLEIJODID; ITAL., JODURO DI PIOMBO;
SPAN., YODURO PLUMBICO.

A golden yellow, odourless heavy crystalline powder. Prepared by precipitating a soluble Lead salt with Potassium Iodide solution.

The *U.S.P.* requires it to contain not less than 99 p.c. of pure Lead Iodide. It should be kept in well-closed bottles of a dark amber tint and protected as far as possible from the light.

Solubility.—Sparingly soluble in cold Water; more soluble in boiling Water; soluble also in solutions of Acetates, and of Ammonium Chloride.

Medicinal Properties.—Used externally to reduce chronic inflammatory gland and joint enlargements; also in the form of pessaries.

In 'dispersible' tumours of the mamma.—*B.M.J.* '94, ii. 972.

Official Preparations.—Emplastrum Plumbi Iodidi, and Unguentum Plumbi Iodidi.

Not Official.—Pessus Plumbi Iodidi, Pessus Plumbi Iodidi et Atropinæ, and Pessus Plumbi Iodidi et Opii.

Foreign Pharmacopœias.—Official in Austr. (Plumbum Iodatum); Fr. (Iodure de Plomb); Ital. (Ioduro di Piombo); Mex. (Yoduro de Plombo); Port. (Iodato de Chumbo); Swiss (Plumbum Iodatum); Span. (Ioduro Plumbico), and U.S. Not in the others.

Tests.—Lead Iodide dissolves in boiling Water, and the solution should answer the tests distinctive of Lead given under Plumbum. When strongly heated it evolves violet vapour. The hot aqueous solution affords with Silver Nitrate Solution a curdy yellow precipitate insoluble in Nitric Acid, almost insoluble in Ammonia Solution, soluble in Potassium Cyanide Solution. No method of determining the amount of pure Lead Iodide present in the sample is given in either the *B.P.* or *U.S.P.*

The more generally occurring impurities are Lead Chromate, insoluble foreign salts, Acetate, Nitrate and soluble matter of a foreign nature. The *U.S.P.* includes a test for the absence of Acetate as described below with Hydrogen Sulphide and Ferric Chloride, and a test for the limit of Nitrate with Potassium Hydroxide Solution and Aluminium wire, which is also described in small type below. Lead Chromate and insoluble foreign salts, if present, may be detected by the Ammonium Chloride test. Soluble foreign salts, if present, may be detected by evaporating to dryness a portion of the filtrate after separation of the Lead by Hydrogen Sulphide, no residue should remain.

Ammonium Chloride.—On triturating 1 gramme of the salt with 2 grammes of Ammonium Chloride and 2 c.c. of Water, a nearly white mixture will result, which, when heated in a test-tube on a water-bath for a few minutes, should give a clear and almost colourless solution, and if the above solution be cooled a solid mass of nearly colourless fine silky crystals will be produced, and, on adding Water or diluted Sulphuric Acid to this mass, Yellow Lead Iodide will separate, *U.S.P.*

Potassium Hydroxide Solution and Aluminium Wire.—Add 0·1 gramme of the salt to 5 c.c. of Water, boil the mixture, cool and filter into a test-tube of about 40 c.c. capacity, then add 5 c.c. of Potassium Hydroxide T.S. and about 0·2 gramme of Aluminium wire, insert in the upper portion of the test-tube a pledget of purified Cotton and over the mouth place a piece of moistened red Litmus paper; then, if the tube be heated on a water-bath for 15 minutes, no blue coloration of the paper should be discernible, *U.S.P.*

Hydrogen Sulphide Ammonia and Ferric Chloride.—Boil 1 gramme of the salt with 20 c.c. of Water, cool and filter, remove the Lead from the filtrate by Hydrogen Sulphide and again filter. A portion of the second filtrate after boiling and carefully neutralising with Ammonia Water should not be coloured red by a drop of T.S. of Ferric Chloride, *U.S.P.*

Preparations.

EMPLASTRUM PLUMBI IODIDI. LEAD IODIDE PLASTER.
Lead Iodide, 1; Lead Plaster, 8; Resin, 1. (1 in 10)

UNGUENTUM PLUMBI IODIDI. LEAD IODIDE OINTMENT.
Lead Iodide, in fine powder, 1; Paraffin Ointment, yellow, 9. (1 in 10)

Foreign Pharmacopœias.—Official in Fr., Mex., Port., Span. and Swiss, 1 in 10. Not in the others.

An Ointment of **Cadmium Iodide** of the same strength has been recommended as a substitute; it is said not to stain the skin.

Not Official.

PESSUS PLUMBI IODIDI.—Lead Iodide, 5 grains; Oil of Theobroma, *q.s.* for one pessary.

PESSUS PLUMBI IODIDI ET ATROPINÆ.—Lead Iodide, 10 grains; Atropine Sulphate, $\frac{1}{18}$ grain; (Gelatin) Basis, 60 grains.

PESSUS PLUMBI IODIDI ET OPII.—Lead Iodide, 5 grains; Opium, in powder, 2 grains; Oil of Theobroma, 12 grains.

PLUMBI OXIDUM.

LEAD OXIDE.

B.P.Syn.—LITHARGE.

PbO, eq. 221·23.

FR., OXYDE DE PLOMB FONDU; GER., BLEIGLÄTTE; ITAL., PROTOSSIDO DI PIOMBO; SPAN., LITARGIRIO.

In odourless and tasteless, heavy yellow or reddish-yellow scales or powder, prepared by the atmospheric oxidation of molten metallic Lead.

It should be kept in well-closed vessels. The *U.S.P.* requires that it should contain not less than 96 p.c. of pure Lead Oxide. Neither the *B.P.* nor the *P.G.* states a requisite percentage of pure Oxide.

Official Preparation.—Emplastrum Plumbi. Used in the preparation of Liquor Plumbi Subacetatis Fortis, Plumbi Acetas, and Glycerinum Plumbi

Subacetatis. **Lead Plaster** is contained in Emplastrum Hydrargyri, Emplastrum Plumbi Iodidi, Emplastrum Resinæ, and Emplastrum Saponis.

Not Official.—Emplastrum Lithargyri Compositum, Ung. Diachylon Hebræ, Ung. Diachylon Carbolisatum, Dr. Pearson's Cerate, and Plumbi Oleas.

Foreign Pharmacopœias.—Official in Austr., Hung., Russ. and Swiss (Plumbum Oxydatum); Belg. and Ger. (Lythargyrum); Dan., Norw. and Swed. (Oxydum Plumbicum); Dutch (Oxydum Plumbicum Semivitreum); Fr. (Oxyde de Plomb Fondu); Ital. (Protossido di Piombo); Jap., Mex. (Oxido de Plomo); Port. (Oxydo de Chumbo); Span. (Litargirio); U.S. (Plumbi Oxidum),

Tests.—Lead Oxide dissolves in Acetic Acid or in Diluted Nitric Acid, and the resulting solution answers the tests distinctive of Lead given under Plumbum. When heated it becomes brownish-red fusing at a red heat, and when heated with reducing substances it leaves a residue of metallic Lead. Although a content of pure Oxide is specified in the *U.S.P.*, neither this Pharmacopœia nor the *B.P.* nor *P.G.* includes a method of determination.

The more generally occurring impurities are Copper, Iron and metallic Lead, Carbonates, Silicates, Barium Sulphate, impurities insoluble and soluble in Acetic Acid, excess of moisture. The presence of Copper and Iron may be detected by the Ammonia test given below. Metallic Lead, if present, is indicated by the formation of nitrous fumes when the sample is dissolved in Diluted Nitric Acid; the presence of Carbonates by effervescence during solution. Silica, Silicates, and Barium Sulphate, if present, remain insoluble.

In testing for impurities insoluble in Acetic Acid, both the *U.S.P.* and *P.G.* treat 5 grammes of the Oxide with 5 c.c. of Water, 20 c.c. of Acetic Acid (*U.S.P.*, 36 p.c. w/w, *P.G.*, 30 p.c. w/w), boiling the mixture for a few minutes and filtering from the insoluble residue, which, when well washed and dried, should amount to not more than 4 p.c. according to the *U.S.P.*, and not more than 0·1 p.c. according to the *P.G.* In continuation of the *U.S.P.* test the mixed filtrate and washings from the insoluble matter are mixed with Hydrochloric Acid until a precipitate is no longer formed, the balance of the Lead is removed by Hydrogen Sulphide and the liquid filtered; the filtrate, when evaporated to dryness, should not leave more than 0·05 of a gramme, indicating not more than 0·1 p.c. of impurities soluble in Acetic Acid. When heated to a dull red heat in a porcelain crucible the sample, according to the *U.S.P.*, should lose not more than 4 p.c., according to the *P.G.* 1 p.c. at the most, indicating the limit of moisture and Carbonate allowed by the respective Pharmacopœias.

Ammonia.—The solution of Lead Oxide in Nitric Acid after the addition of excess of Sulphuric Acid and filtration gives a filtrate which, when supersaturated with Ammonia Water, should only assume a slight bluish tint and yield only traces of a reddish-brown precipitate, *P.G.* and *U.S.P.*

Preparation.

EMPLASTRUM PLUMBI. LEAD PLASTER. *N.O.Syn.*—DIACHYLON PLASTER.

Lead Oleate with mechanically included Glycerin, obtained by boiling together Lead Oxide, Olive Oil, and Distilled Water.

Equal weights of Lead Plaster and Soap Plaster melted together form an excellent plaster for corns.

Foreign Pharmacopœias.—Official in Austr., Litharge 1, Sesame Oil 1, Lard 1; Belg., Litharge 2, Olive Oil 2, Water 1, Lard 2; Dan., Litharge 5, Olive Oil 10, Water 1; Dutch, Port. and Russ., Litharge 1, Lard 1, Olive Oil 1, Water *q.s.*; Fr., Litharge 1, Lard 1, Olive Oil 1, Water 2; Ger. and Jap., Litharge 5, Olive Oil 5, Lard 5, Water 1; Hung., Litharge 1, Lard 2; Ital., Litharge 1, Water 1, Olive Oil 2; Mex. (Emplasto Simple), Litharge 2, Lard 4, Water 3; Norw. and Swed., Litharge 1, Olive Oil 2, Water *q.s.*; Span., Litharge 1, Olive Oil 2, Water 2; Swiss, Litharge 16, Olive Oil 30, Water *q.s.*; U.S., Lead Acetate 60, Soap 100, Water *q.s.*

Not Official.

EMPLASTRUM LITHARGYRI COMPOSITUM (*Ger.*).—Lead Plaster 12, Yellow Wax 1½, Gum Ammoniacum 1, Galbanum 1, Turpentine 1.

Foreign Pharmacopœias.—Official in Belg. (Emplastrum Diachylon Gummosum), Lead Plaster 72, Yellow Wax 7, Gum Ammoniacum 7, Galbanum 7, Turpentine 7; Fr. (Emplâtre Brun), Olive Oil 10, Lard 5, Butter 5, Yellow Wax 5, Litharge 5, Purified Mutton Suet 5, Purified Black Pitch 1; also Emplâtre Diachylon Gommé, Litharge 62, Lard 62, Olive Oil 62, Water 125, Yellow Wax 12, Purified Burgundy Pitch 12, Venice Turpentine 12, Purified Ammoniacum 10, Purified Galbanum 10, Oil of Turpentine 6; Ger. (Emplastrum Fuscum Camphoratum), Red Lead or Vermilion 30, Olive Oil Commune 60, Yellow Wax 15, Camphor 1, Olive Oil 1. Ital. (Empiastro Diachilon Gommoresinoso), Lead Plaster 12, Yellow Wax 1, Gum Ammoniacum 1, Galbanum 1, Turpentine 1, Alcohol (60 p.c.) *q.s.*; Jap., Lead Plaster 12, Yellow Wax 1½, Gum Ammoniacum 1, Galbanum 1, Turpentine 1; Span. (Emplasto de Plomo Gomado), Turpentine 60, Yellow Wax 85, Galbanum 85, Gum Ammoniacum 85, Lead Plaster 735; Swiss. (Emplastrum Plumbi Compositum), Lead Plaster 72, Yellow Wax 9, Ammoniacum 6, Galbanum 6, Turpentine 7, Water *q.s.*

UNG. DIACHYLON HEBRÆ (modified by Professor Kaposi).—Simple Lead Plaster 1, Soft Paraffin 1; melt with heat.

Unguentum Diachylon (*Hebræ*) according to Hager, Hebra's original formula for this ointment was equal parts of Lead Plaster and Linseed Oil, and this formula is given in Charing Cross Hospital Pharm. (1884); but the majority of the Hospital Formulas, including Charing Cross (1904), are made with Soft Paraffin or a mixture of Hard and Soft Paraffin, whilst some employ Olive Oil. It is also known as **Unguentum Plumbi Oleatis.**

Foreign Pharmacopœias.—Official in Austr. (Unguentum Plumbi Oxydati), Litharge 20, Sesame Oil 40, Lard 40; to make Unguentum Diachylon Hebræ add 2 p.c. of Lavender Oil; Dan. (Unguentum Oxydi Plumbici), and Swed. (Unguentum Diachylon), Lead Plaster 13, Liquid Paraffin 7; Dutch (Unguentum Diachylon), Lead Plaster 1, Sesame Oil 1; Ger. and Russ. (Unguentum Diachylon), Lead Plaster 1, Olive Oil 1; Jap. (Unguentum Hebræ), Lead Plaster 1, Olive Oil 1; Mex. (Unguentum Encarnativo), Red Oxide of Lead 6, Lard 50; Swiss (Unguentum Hebræ), Lead Plaster 50, White Vaseline 43, Glycerin 7, Ethereal Tincture of Benzoin 5; U.S., Lead Plaster 50, Olive Oil 49, Lavender Oil 1.

UNGUENTUM DIACHYLON CARBOLISATUM.—Liquid Carbolic Acid 1, Diachylon Ointment 49.

DR. PEARSON'S CERATE.—Lead Plaster 4, Yellow Beeswax 1, Oil of Almonds 3. Melt and mix.

PLUMBI OLEAS.—Lead Acetate, 280 grains; dissolve in Distilled Water, 40 fl. oz.; add slowly Solution of Sodium Oleate (1 Castile Soap in 20), 20 fl. oz.; warm gently, wash by decantation, collect and dry.

Melted with equal parts of Lard, and Lard Oil or Olive Oil, to form an **ointment.**

PLUMBI SUBACETATIS LIQUOR FORTIS.

STRONG SOLUTION OF LEAD SUBACETATE.

B.P.Syn.—GOULARD'S EXTRACT.

FR., ACETATE BASIQUE DE PLOMB DISSOUS; GER., BLEIESSIG; ITAL., ACETATO BASICO DI PIOMBO; SPAN., ACETATO PLUMBICO LIQUIDO.

A clear colourless heavy liquid, having a sweet astringent taste. It is a solution of Lead Subacetate, $Pb_2O(C_2H_3O_2)_2$, eq. 543·74 in Water, and is prepared by boiling 5 of Lead Acetate, and 3½ of powdered Lead Oxide in 20 of distilled Water for 30 minutes, maintaining the volume of the liquid by addition of Distilled Water, filtering and making up to 20 with Distilled Water.

Medicinal Properties.—When largely diluted, as in Lotio Plumbi Evaporans or as Lotio Plumbi Evaporans cum Morphina, it is used externally as an astringent and sedative for inflammation arising from sprains, bruises, etc. Sometimes used as an astringent **gargle** (½ fl. drm. to 6 fl. oz. of Rose Water). A good astringent application to external piles is:—Strong Solution of Lead Subacetate, 2 to 3 fl. drm.; Solution of Morphine Acetate, 3 fl. drm.; Distilled Water, to 6 fl. oz.

Incompatibles.—Hard Water, mineral Acids, vegetable Acids, Alkalis, Chlorides, Iodides, all astringents, preparations of Opium, and Mucilage of Acacia.

Official Preparations.—Glycerinum Plumbi Subacetatis, Liquor Plumbi Subacetatis Dilutus, and Unguentum Glycerini Plumbi Subacetatis.

Not Official.—Ceratum Plumbi Compositum, Cremor Lithargyri, Lotio Plumbi, Lotio Plumbi cum Opio, Lotio Plumbi Evaporans, Lotio Plumbi Evaporans cum Morphina, Lotio Plumbi Lactatis, and Unguentum Plumbi Tannici.

Antidotes.—Wash out the stomach or give an emetic; Sodium or Magnesium Sulphate; liberal libations of Milk, or White of Egg mixed with Water; Opium or Belladonna in Lead colic.

A course of Potassium Iodide is useful in eliminating Lead from the system.

L. '81, ii. 779 gives an unusual source of Lead poisoning, viz., shot found in a bottle full of Port Wine; an appreciable quantity of Lead was found in solution.

Foreign Pharmacopœias.—Official in all; U.S., sp. gr. about 1·235 at 25° C. (77° F.). (Plumbum Aceticum Basicum Solutum).—Austr. and Hung., sp. gr. 1·230 to 1·240; Russ., sp. gr. 1·235 to 1·242; Belg., (Subacetas Plumbi Liquidus), sp. gr. 1·240; Dan., Norw. and Swed. (Solutio Subacetatis Plumbici), sp. gr. 1·165 to 1·170; Dutch (Solutio Acetatis Plumbici Basici), sp. gr. 1·235 to 1·240; Fr. (Acetate Basique de Plomb Dissous), sp. gr. 1·320; Ger. (Liquor Plumbi Subacetici), sp. gr. 1·235 to 1·240; Ital. (Acetato Basico di Piombo), sp. gr. 1·32; Jap., sp. gr. 1·23 to 1·24; Mex. (Acetato de Plomo Liquido), sp. gr. not given; Port. (Soluto de Subacetato de Chumbo), sp. gr. 1·260; Span. (Acetato (sub) Plumbico Liquido), sp. gr. 1·32; Swiss (Plumbum Subaceticum Solutum), sp. gr. 1·235 to 1·240.

Tests.—Strong Lead Subacetate Solution when freshly prepared has a sp. gr. of 1·277. It is officially required to possess a gravity of 1·275. The Liquor official in the *P.G.* has a sp. gr. from 1·235 to 1·240, that of the *U.S.P.* about 1·235 at 25° C. (77° F.). It possesses an alkaline reaction towards red Litmus paper; the *P.G.* states that it does not redden Phenolphthalein Solution. The *B.P.* states that it forms an opaque white jelly with Gum Acacia Mucilage; the *U.S.P.* that it affords a dense white precipitate when added to Acacia Solution. It answers the tests distinctive of Lead given under Plumbum. When treated with Sulphuric Acid it evolves a strong acetous odour, and when warmed with Acetic Acid and Alcohol (90 p.c.) a characteristic odour of Ethyl Acetate is evolved. It is officially required to indicate 23·1 p.c. w/w of pure Lead Subacetate as determined by the process indicated below. The *U.S.P.* requires that it shall contain in solution not less than 25 p.c. w/w of Lead Subacetate as volumetrically determined by the process indicated below. The Liquor should naturally be free from the impurities given under Lead Acetate and Lead Oxide. The Subacetate may be distinguished from the Normal Acetate by the test with Acacia Mucilage above.

The *P.G.* includes a test for Iron as given below with Potassium Ferrocyanide Solution. As the Liquor has a tendency to absorb Carbon Dioxide from the air, it should be kept in well-closed glass bottles and exposed as little as possible.

Potassium Ferrocyanide.—After the addition of Acetic Acid, solution of Lead Subacetate should give, with Potassium Ferrocyanide T.S., a pure white precipitate, *P.G.*

Volumetric Determination.—Dilute 10 grammes of the solution to 100 c.c. with previously boiled and cooled Distilled Water, take 13·6 (13·594) c.c. of this and add it to 35 c.c. of Tenth-normal Volumetric Oxalic Acid Solution in a graduated cylinder, shake thoroughly and dilute the mixture to 50 c.c. with Distilled Water, and again shake. After the precipitate has settled, 10 c.c. of the clear solution diluted with about 50 c.c. of Water and 5 c.c. of Sulphuric Acid added, should require not more than 2 c.c. of Tenth-normal Volumetric Potassium Permanganate Solution to produce a permanent pink tint, *U.S.P.* 17 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution should be required to completely precipitate 1 gramme of the Strong Lead Subacetate Solution, *B.P.*

Preparations.

GLYCERINUM PLUMBI SUBACETATIS. GLYCERIN OF LEAD SUBACETATE.

Lead Acetate, 5; Lead Oxide, in powder, 3½; Glycerin, 20; Distilled Water, 12. Mix. Boil for a quarter of an hour; filter; evaporate at a temperature not exceeding 222° F. (105·5° C.) until the product weighs 32¾, and has a sp. gr. of 1·48.

This is more conveniently made with half the quantity of the Distilled Water.

Foreign Pharmacopœias.—Official in Port., Solution 1, Glycerin 9. Not in the others.

Glycerin Lead Subacetate has a sp. gr. of 1·480 to 1·485. The *B.P.* figure 1·48.

LIQUOR PLUMBI SUBACETATIS DILUTUS. DILUTED SOLUTION OF LEAD SUBACETATE. *B.P.Syn.*—GOULARD'S LOTION; GOULARD WATER. *N.O.Syn.*—AQUA VEGETO-MINERALIS GOULARDI, AQUA SATURNINA, AQUA DE VEGETO.

Strong Solution of Lead Subacetate, 2 fl. drm.; Alcohol (90 p.c.), 2 fl. drm.; Distilled Water, *q.s.* to make 20 fl. oz. (1 in 80)

As the diluted Liquor is liable to absorb Carbon Dioxide from the air, it should be kept in well-closed bottles and exposed as little as possible. The *B.P.* solution is not specifically required to contain any definite percentage of Lead Subacetate, the *U.S.P.* must contain about 1 p.c. The *P.G.* does not include a dilute Liquor.

Foreign Pharmacopœias.—Official in Austr. (Aqua Goulardi), Solution 2, Spirit of Wine (60 p.c.) 5, Water 93, also (Aqua Plumbica), Solution 1, Water 49; Dan. and Norw. (Aqua Saturnin), Dutch (Aqua Plumbi Goulardi) and Swed. (Solutio Subacetatis Plumbici Diluta), Solution 2, Diluted Alcohol 8, Water 90; Fr. (Lotion à l'Acetate de Plomb), Solution 1, Water 50; Ger. and Swiss (Aqua Plumbi), Solution 1, Water 49; Ital. (Aqua Saturnina), Solution 1, Water 50; Hung. (Aqua Goulardi), Solution 2, Alcohol (70 p.c.) 5, Water 100, also (Aqua Plumbica), Solution 1, Water 50; Jap. (Liquor Plumbi Subacetici Dilutus), Solution 2, Water 98; Mex. (Agua de Vegeto), Solution 3, Eau de Cologne 5, Water 92; Port. (Aqua Saturnina Alcoolisida), Solution 2, Alcohol (85 p.c.) 8, Water 90, also (Aqua Saturnina), Solution 1, Water 50; Russ. (Aqua Plumbi Spirituosa), Solution 2, Water 98, also (Aqua Plumbi), Solution 1, Water 49; Span. (Agua Vegeto-Mineral), Solution 1, Alcohol (95 p.c.) 2, Distilled Water 97; U.S., Solution 4, Water to make 100.

Tests.—Diluted Lead Subacetate has a sp. gr. of 1·002. No official method is given for determining the amount of Lead Subacetate present.

UNGUENTUM GLYCERINI PLUMBI SUBACETATIS. Lead Subacetate Ointment.

Glycerin of Lead Subacetate (by weight), 1; Paraffin Ointment, white, 5.

Foreign Pharmacopœias.—Official in Belg. (Unguent. Subacetatis Plumbi), 3 in 10; Dutch (Ung. Plumbici Basici), 1 in 4; Ital. (Pomata con Acetato di Piombe); Ger. and Swiss (Unguentum Plumbi), 1 in 10; Russ. (Ung. Plumbi Acetici), 1 in 12; Swed. (Ung. Subacetatis Plumbici), 3 in 20; U.S. (Ceratum Plumbi Subacetatis), 1 in 5. Not in the others.

Not Official.

CERATUM PLUMBI COMPOSITUM.—Solution of Diacetate of Lead, 6 fl. oz.; Beeswax, 8 oz.; Olive Oil, 20 fl. oz.; Camphor, 1 drm.—*P.L.*

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

Camphor, 0·5; Yellow Beeswax, 23·5; Olive Oil, 58·5; Solution of Lead Subacetate, 17·5.

CREMOR LITHARGYRI.—Solution of Lead Subacetate, 1; Cream, 7. Mix. Useful in eczema.

LOTIO PLUMBI.—Strong Solution of Lead Subacetate, 2 fl. drm.; Water, *q.s.* to make 20 fl. oz.—*St. Thomas's.*

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

LOTIO PLUMBI CUM OPIO.—Tincture of Opium, 20 minims; Lead Lotion, to 1 oz.—*Lock.*

Tincture of Opium, 5; Lead Lotion, to 100.—*B.P.C.*

LOTIO PLUMBI EVAPORANS.—Strong Solution of Lead Acetate, 2 fl. drm.; Rectified Spirit, 1½ fl. oz.; Rose Water, to 8 oz.—*Squire.*

Strong Solution of Lead Subacetate, 2 fl. drm.; Alcohol (90 p.c.), 4 fl. oz.; Water, *q.s.* to make 20 fl. oz.—*St. Thomas's.*

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

LOTIO PLUMBI EVAPORANS CUM MORPHINA.—The Solution given above, 7 fl. oz.; Solution of Morphine Acetate, 1 fl. oz.—*Squire.*

This is an improvement on the old Lead and Opium Solution, with its coloured deposit of Lead Meconate.

LOTIO PLUMBI LACTATIS.—Solution of Lead Subacetate, 1 fl. drm.; Salicylic Acid, 2 grains; Milk, to 2 fl. oz.—*Middlesex.*

UNGUENTUM PLUMBI TANNICI. — *Ger.*, Tannic Acid 1, Liquor Plumbi 2, Lard 17.

Hung. and *Swiss*, Tannic Acid 1, Liquor Plumbi 2, Vaseline 17.

Russ., Tannic Acid 1, Glycerin 3, Liquor Plumbi 6, Ung. Cerei 24.

Swed., Tannic Acid 1, Subacetate of Lead Solution 3; Wool Fat 3, Vaseline 3.

PODOPHYLLI RHIZOMA.

PODOPHYLLUM RHIZOME.

B.P.Syn.—PODOPHYLLUM ROOT.

FR., PODOPHYLLE; GER., PODOPHYLLIN; ITAL., PODOFILLO; SPAN., PODOFILO.

The dried Rhizome and Roots of *Podophyllum peltatum*, L. Imported from North America.

The dried Rhizome and Roots of *Podophyllum Emodi*, L., and the **Resin** extracted from the same, dose $\frac{1}{4}$ to 1 grain = 0·016 to 0·06 gramme, are official in in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

The Resin obtained from *P. Emodi* is as valuable a purgative as that obtained from *P. peltatum.*

Medicinal Properties.—The **Resin** is an active cholagogue and, in large doses, purgative; in doses of $\frac{1}{8}$ to $\frac{1}{4}$ grain it is a common ingredient of pills for habitual constipation associated with liver disorder.

Prescribing Notes.—*The Resin is given in pills, combined generally with Extract of Henbane or Belladonna to prevent griping, and associated with a purgative such as Aloes or Colocynth; sometimes $\frac{1}{2}$ grain of Capsicum is added to each pill. In mixtures, the addition of Aromatic Spirit of Ammonia is useful, as in Tinctura Podophylli Ammoniata, since Water does not precipitate the Resin from this, while it does so from the ordinary Tincture.*

Official Preparations.—Podophylli Resina and Tinctura Podophylli.

Not Official.—Of the **Resin** Pilula Podophylli Composita, Pilulæ Aloes et Podophylli Compositæ, Pilulæ Podophyllini et Belladonnæ et Nucis Vomicæ, Pilulæ Aloini et Podophylli Compositæ, Pilulæ Podophylli Belladonnæ et Capsici, Pilules de Podophylline Belladonée, Tinctura Podophylli Ammoniata.

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

Descriptive Notes.—Podophyllum Rhizome as met with in commerce occurs in cylindrical pieces, 1 to 6 or 8 in. in length, and 2 to 4 lines in diameter (5 to 8 mm., *B.P.*), of a chocolate or reddish-brown colour; marked on the upper surface, at intervals of 2 or 3 in., with the circular scars of former stems, and on the under surface near the nodes, with little rootlets about half a line thick, which are frequently more or less broken off. If shrunken, wrinkled, and flattened, the Rhizomes are of inferior quality. The fracture is short, normally mealy, but horny if overheated in drying; it exhibits a thin bark, a pith 2 lines in diameter in the larger pieces, and a thin circle of 20–40 vascular bundles. It has an acrid, bitter taste and a characteristic odour.

The Rhizome of *Podophyllum Emodi* has been used as a source of

Podophylli Resina. It is quite different in appearance from that of *Podophyllum peltatum*, consisting of a compressed knotty Rhizome about $\frac{1}{2}$ in. broad (12 mm.), and $\frac{1}{3}$ in. (8 mm.) thick, the upper surface covered with contiguous circular stem scars, the whole under surface having brown or blackish simple roots about $\frac{1}{12}$ to $\frac{1}{8}$ in. (2 to 3 mm.) thick, with short branches.

Tests.—Podophyllum Root contains from 3 to 4 p.c. of ash, and should not contain more than 5 p.c. A standard of not less than 5·0 p.c. of Resin soluble in Alcohol (90 p.c.) has been suggested (*Y.B.P.* '03, 247; *P.J.* '02, ii. 496). American Podophyllum Rhizome may contain from 4 to 6 p.c. of Podophyllum Resin, the Indian Rhizome from 10 to 12 p.c. Seven samples of the root examined (*P.J.* '03, i. 164) yielded percentages of Resin varying from 1·6 to 3·86, an average of 2·19 p.c.

Preparations.

PODOPHYLLI RESINA. PODOPHYLLUM RESIN. *N.O.Syn.*—PODOPHYLLIN.

The Resin is extracted by Alcohol (60 p.c.), the solution concentrated in a still, and the residue poured into acidulated Water to precipitate the Resin, which is washed and finally dried at a temperature not exceeding 100° F. (37·7° C.).

A yellow, greenish-yellow, or yellowish-brown, amorphous powder, or amorphous masses readily reduced to powder. It has a faint, peculiar odour, and a bitter taste.

The variations in colour appear to depend upon the heat applied during its preparation; by distilling quickly and drying at a low temperature the lightest tints are obtained.

It should be kept in well-closed glass receptacles of a dark amber tint in a cool atmosphere and protected as far as possible from contact with the air and light.

The *B.P.* Resin is obtained from the dried Rhizome and Roots of *Podophyllum peltatum*, the Resin obtained from the dried Rhizome and Roots of *Podophyllum Emodi* is official in the *Ind.* and *Col. Add.* The *U.S.P.* and the *P.G.* only admit the Resin obtained from *Podophyllum peltatum*.

Dose.—$\frac{1}{4}$ to 1 grain = 0·016 to 0·06 gramme.

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

Not Official.—*See* Podophylli Rhizoma.

Foreign Pharmacopœias.—Official in Austr., Belg., Dan., Ger., Hung., Russ. and Swiss (Podophyllinum); Dutch, Jap., Norw., Port., Swed. and U.S. (Resina Podophylli); U.S. has also a Fluid Extract; Fr. (Resine de Podophylle); Ital. (Podofillina); Mex. and Span. (Podofilina).

Tests.—Podophyllum Resin darkens in colour when heated or when exposed to the light. It is required by the *U.S.P.* to be soluble or nearly so in Alcohol (90 p.c.) and in Ammonia Solution; to be reprecipitated from its solution in Alcohol (90 p.c.) by Water, and from its solution in Ammonia Solution on acidification. It is also officially required to be partly soluble in Ether. It is difficult to find a commercial sample perfectly soluble in cold Alcohol (90 p.c.), and many will not give clear solutions even with the addition of Ammonia; the amount of matter insoluble in Alcohol (90 p.c.) should, however, not exceed 5 p.c. The *U.S.P.* states that not less than 99 p.c. of Resin should be soluble in Alcohol (94·9 p.c.), and this statement appears to be based upon the results of some experiments by Gordin and Merrell recorded (*Proc. Amer. Pharm. Assoc.* '02, 348). Gravell and Sage [*P.J.* (3) xxiv. 421] also state that a good sample should dissolve almost completely in Rectified Spirit, *B.P.* 1885. The *P.G.* states that it is soluble in 10 parts by weight of Alcohol (90 p.c.) to a brown fluid which is precipitated by the addition of Water. A good sample of the *Peltatum* Resin should dissolve almost completely in Ammonia, and not more than 5 p.c. should remain insoluble.

The *Emodi* Resin is stated to gelatinise with Ammonia Solution, the gelatinisation being stated (*C.D.* '03, i. 630) to be due to the fact that *Podophyllum Emodi* contains from 1½ to 3 times as much Podophyllotoxin as the *Podophyllum peltatum.*

Dott (*P.J.* '06, ii. 431; *Proc. Amer. Pharm. Assoc.* '07, 681) gives an Ammonia test for Podophyllin, and he applies the test by treating 0·5 of a gramme of the Resin with 30 c.c. of equal volumes of Liquor Ammoniæ and Water, stirring and bringing well into contact for 5 minutes, filtering the liquor through a counterpoised filter, washing with Water until the washings are practically colourless, drying till constant, then weighing. He finds the *Emodi* Resin remains practically insoluble, whilst the residue from *Peltatum* should not amount to more than 15 p.c. of its original weight. The Report of the Committee of Reference in Pharmacy states that the Committee does not know a satisfactory test to distinguish the *Podophyllum Emodi* from *Podophyllum peltatum.* The solubility in Ammonia Solution is not considered (*P.J.* '02, ii. 368) of much value. The *U.S.P.* does not include a statement relating to its solubility in Ammonia Solution. The *P.G.* states that Podophyllin should dissolve in 100 parts of Ammonia Solution to a yellowish-brown fluid which is miscible with Water, but which is again precipitated as a brown flocculent precipitate on the neutralisation of the Ammonia. The *U.S.P.* states that not less than 75 p.c. should be soluble in Ether, the *P.G.* that it is only partly soluble in Ether. The *U.S.P.* limit of 75 p.c. soluble in Ether seems very high, the usual amount averaging about 60 p.c. The *B.P.* makes no reference to the solubility in Chloroform. The *U.S.P.* requires that not less than 65 p.c. should be soluble in Chloroform. The *P.G.* does not refer to the Chloroform solubility. More than half the weight of the Resin should dissolve in cold Chloroform, the residue being generally reckoned as medicinally inert; if the Chloroform solution be evaporated to a small bulk and poured into an excess of Ether, another inert body (Podophyllic Acid) is precipitated. If the Ether-chloroform Solution be now added to a large excess of Petroleum Ether there is precipitated a compound called Podophyllotoxin, supposed to contain the whole medicinal elements of the Resin.

From the results recorded (*P.J.* '02, ii. 368) of the examination of a number of specimens of the Resin it is concluded that the limit of 50 p.c. soluble in Chloroform given by Squire is a good criterion of the quality of the sample. It is also suggested in the same reference that at least 40 p.c. of of the original Resin should be precipitated from the chloroformic solution by Petroleum Ether. A method of determining the crude Picro-podophyllin has been suggested (*Proc. Amer. Pharm. Assoc.* '02, 346), it consists in treating 5 grammes of Podophyllin Resin, in a strong round bottle holding about 200 c.c., with 10 grammes of freshly prepared Calcium Hydrate, the bottle is closed with a good cork and the whole weighed, it is uncorked, transferred to a water-bath heated to 60° to 65° C. (140° to 149° F.) for a few minutes and 15 c.c. of Alcohol poured in, the bottle stoppered, well shaken, replaced in the water-bath and retained there stoppered for 8 hours, shaking at first every few minutes to prevent the formation of a hard lump; after half an hour it is only necessary to shake the mixture about every quarter of an hour. The bottle is then cooled, about 7 c.c. of Chloroform added, it is placed on the balance and sufficient of a mixture of 2 parts by volume of Alcohol (94·9 p.c.) and 1 part by volume of Chloroform poured into the bottle to make the whole liquid added weigh 130 grammes. The bottle is shaken for a few minutes, set aside until the supernatant liquid becomes perfectly clear, and 65 grammes of the clear liquid are drawn off into a tared vessel, evaporated to dryness, the residue dried till constant in weight, and weighed. The percentage of crude Picro-podophyllin found varied from 15 to 22 p.c., averaging 20 p.c.

The *U.S.P.* states that not more than 25 p.c. should be dissolved in boiling Water. Neither the *B.P.* nor the *P.G.* makes any reference to the Water solubility. The *U.S.P.* also states that the hot aqueous solution deposits most of its content on cooling, and after the cooled liquid be filtered, the filtrate has a bitter taste and yields on the addition of a few drops of Ferric Chloride T.S. a brown coloration. It is soluble in Potassium or Sodium Hydroxide T.S. with the production of a deep yellow liquid which gradually becomes darker on standing. On neutralisation of the Potassium or Sodium Hydroxide the Resin is reprecipitated. The behaviour with Liquor Potassæ is stated to form a useful test for differentiating the *Peltatum* and *Emodi* Resin. 6 grains of the Resin should be mixed with 1 fl. drm. of diluted Alcohol and 8 or 10 drops of Liquor Potassæ. The *Peltatum* Resin should form a clear deep yellow liquid on shaking; the *Emodi* Resin becomes a semi-solid gelatinous mass. The alcoholic solution of the Resin should be only faintly acid in reaction towards blue Litmus paper. It is officially required to yield not more than 1 p.c. of ash when ignited with free access of air. Badly adulterated specimens are frequently detected by high percentage of ash, it may be as low as ¼ p.c. and should not exceed 1 p.c. The *U.S.P.* states that it should not yield more than 1 p.c. of ash. The *P.G.* does not give an ash limit. The *B.P.* limit of 1 p.c. is generally considered a suitable one.

TINCTURA PODOPHYLLI.—TINCTURE OF PODOPHYLLUM. Podophyllum Resin, 320 grains; Alcohol (90 p.c.), *q.s.* to yield 20 fl. oz. of filtered product.

Dose.—5 to 15 minims = 0·3 to 0·9 c.c.

15 minims equals ½ grain of Podophyllum Resin. It is twice the strength of *B.P.* '85.

A corresponding preparation, **Tinctura Podophylli Indicæ** (1 in 30), dose 5 to 15 minims = 0·3 to 0·9 c.c., is official in the *Ind.* and *Col. Add.* for India and the Eastern Colonies.

Tests.—Tincture of Podophyllum has a sp. gr. of 0·840 to 0·850; it contains about 3·5 p.c. of w/v total solids and about 87 p.c. w/v of Absolute Alcohol. A standard of 3·6 p.c. has been suggested.

Not Official.

PILULA PODOPHYLLI COMPOSITA.—Podophyllum Resin, 1/12 grain; Quinine Sulphate, 1 grain; Alcoholic Extract of Belladonna, ⅙ grain; Extract of Socotrine Aloes, 1 grain.—*University.*

This has been incorporated in the *B.P.C.* under the title Poore's pill.

Podophyllum Resin, ¼ grain; Mercurous Chloride, 1 grain; Alcoholic Extract of Belladonna, ⅙ grain.—*St. Thomas's.*

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

PILULÆ ALOES ET PODOPHYLLI COMPOSITÆ. *Syn.* Janeway's Pills.—Purified Aloes, 1 grain; Resin of Podophyllum, ½ grain; Extract of Belladonna Leaves, ¼ grain; Extract of Nux Vomica, ¼ grain in each pill.—*U.S.N.F.*

Pilulæ Podophyllini et Belladonnæ et Nucis Vomicæ.—Podophyllum Resin, ⅓ grain; Alcoholic Extract of Belladonna, ⅓ grain; Extract of Nux Vomica, ⅓ grain; Extract of Barbados Aloes, 1 grain in 1 pill.—*B.P.C.*

Pilulæ Aloini et Podophylli Compositæ.—Aloin, 4 grains; Oleo-Resin Capsicum, 2 grains; Jalap Resin, 4 grains; Podophyllum Resin, 6 grains; Extract of Nux Vomica, 2 grains; Green Extract of Hyoscyamus, 2 grains; to make 40 pills.—*B.P.C.*

PILULÆ PODOPHYLLI, BELLADONNÆ ET CAPSICI.—Resin of Podophyllum, 1·6; Extract of Belladonna Leaves, 0·8; Capsicum, 3·2; Sugar of Milk, 6·5; Acacia, 1·6; Glycerin, Syrup, each a sufficient quantity to make 100.—*U.S.P.*

PILULES DE PODOPHYLLINE BELLADONÉES.—Podophyllin, 0·3 gramme; Extract of Belladonna, 0·1 gramme; Medicinal Soap, 0·3 gramme; make into 10 pilules.—*Fr.*

TINCTURA PODOPHYLLI AMMONIATA.—Podophyllum Resin, 24 grains; Alcohol (90 p.c.), 2 fl. oz.; Solution of Ammonia, 1 fl. oz.; dissolve.

Tests.—Ammoniated Tincture of Podophyllin has a sp. gr. of 0·906; contains about 1·5 p.c. w/v of total solids and about 56 p.c. w/v of Absolute Alcohol.

As the Resin does not separate on the addition of Water, this tincture is miscible with Water.

Dose.—10 to 30 minims = 0·6 to 1·8 c.c. 1 fl. drm. contains 1 grain of the Resin.

Podophyllin, 1; Aromatic Spirit of Ammonia, 50; dissolve, and after standing decant.—*Martindale.*

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

* * *

Not Official.

POTASSIUM.

POTASSIUM.

K, eq. 38·83.

Potassium was discovered by Sir Humphry Davy in 1807. It is a soft metal, cutting like Wax, of a silver-white colour, but tarnishes the instant it is cut, and assumes a leaden colour.

Tests.—Potassium has a sp. gr. of 0·865. When freshly cut has a silver-white lustre, but rapidly absorbs Oxygen from the air and assumes a leaden colour. When a pellet is thrown upon Water, Hydrogen is set free, the heat developed during the action being so great that the evolved Hydrogen is ignited. The resulting solution possesses a strongly alkaline reaction towards red Litmus paper. A trace of a Potassium salt, when moistened with Hydrochloric Acid and inserted into a non-luminous flame, imparts to it a distinctive violet coloration, which has a reddish-violet tinge when viewed through blue glass; the yellow colour imparted to the flame by Sodium compound is obscured by blue glass. A solution of a Potassium salt, preferably a Chloride or one in which Hydrochloric Acid is present, affords if sufficiently concentrated a yellow crystalline precipitate with Platinic Chloride Solution, yielding upon ignition a residue of metallic Platinum and Potassium Chloride. If the residue be dissolved in a little Water, acidified slightly with Nitric Acid the solution yields on the addition of Silver Nitrate a white curdy precipitate, insoluble in Nitric Acid, soluble in Ammonia Solution. The aqueous solution, if sufficiently concentrated, yields on the addition of Tartaric Acid a white crystalline precipitate of Potassium Hydrogen Tartrate; Acetic Acid or Sodium Acetate is added when the Potassium is combined with a mineral acid. The best general reagent for Potassium salts is probably a saturated solution of Picric Acid; a 1 p.c. solution of Potassium Nitrate yields a crystalline precipitate after a few seconds' shaking, whereas with Tartaric Acid no reaction is obtainable in 4 hours. Potassium salts may be distinguished from Ammonium salts by the behaviour with Platinic Chloride Solution; the precipitate from a solution of a Potassium salt yielding on ignition, as above stated, a residue of Potassium Chloride and metallic Platinum, a precipitate from an Ammonium salt yielding on ignition a residue of metallic Platinum only. Potassium salts may be distinguished from Sodium salts by the latter not yielding a precipitate with Platinic Chloride Solution, and by the violet colour imparted to the flame by the former, whereas the latter impart a strong yellow colour; also solutions of Sodium salts yield no crystalline precipitate with Tartaric Acid.

The prolonged use of Potassium salts is apt to lead to a depressant effect on muscular tissue, including that of the heart; in people with weakness of that organ this should be borne in mind.

POTASSA CAUSTICA.

POTASSIUM HYDROXIDE.

B.P.Syn.—CAUSTIC POTASH; POTASSIUM HYDRATE.
HYDRATE OF POTASSIUM, *B.P.* '85.

FR., HYDROXYDE DE POTASSIUM OFFICINAL; GER., KALIUMHYDROXYD;
ITAL., POTASSA CAUSTICA; SPAN., HIDRATO POTASICO.

White, deliquescent sticks or pencils, or in hard, white, or nearly white, deliquescent cakes, officially stated to consist of Potassium Hydroxide, KOH, eq. 55·71, with not more than 10 p.c. of combined Water and impurities.

On account of its intense causticity and strong action on organic tissues great caution should be used in handling it. As it rapidly absorbs both Carbon

Dioxide and moisture, it should be preserved from the air in well-closed, hard glass bottles.

Commercial Caustic Potash as a rule contains 1 or 2 p.c. of Chloride derived from the Carbonate used in its preparation. When required *pure* it is dissolved in Absolute Alcohol, and the solution evaporated as far as practicable without access of air to avoid absorption of Carbonic Acid. No commercial samples, however, are quite free from Carbonate.

Solubility.—2 in 1 of Water; 1 in 3½ of Alcohol (90 p.c.); 1 in 3 of Glycerin; 1 in 4 of Alcohol (60 p.c.) (if stronger than this the Alcohol separates).

Medicinal Properties.—A powerful caustic. Has been used for the destruction of tumours and to stimulate ulcers.

Prescribing Notes.—*It has a great tendency to diffuse and attack the surrounding tissues; its action should be carefully circumscribed by means of Vaseline or Sticking Plaster. When mixed with Lime, as in 'Vienna Paste' (see p. 931), it is more easily controlled.*

Official Preparation.—Liquor Potassæ; used in the preparation of Potasii Permanganas.

Not Official.—Brandish's Alkaline Solution, and Potassa cum Calce (Vienna Paste).

Foreign Pharmacopœias.—Official in Austr. and Hung. (Kalium Hydro-oxydatum); Belg. (Potassa Caustica Fusa); Dan., Dutch, Norw. and Swed. (Hydras Kalicus); Fr. (Hydroxyde de Potassium Officinal, also Hydroxyde de Potassium Ordinaire); Ger. and Russ. (Kali Causticum Fusum); Ital., (Potassa Caustica); Jap. (Kali Causticum); Mex. (Oxido de Potasio); Port. (Hydrato de Potassa); Span. (Hidrato Potasico), also (Potassa Caustica por la Cal); Swiss (Kalium Hydricum); U.S. (Potasii Hydroxidum).

Tests.—Potassium Hydroxide fuses when strongly heated; the *U.S.P.* states when heated to a temperature of about 530° C. (986° F.). When dissolved in Water and neutralised with Hydrochloric Acid it affords the tests distinctive of Potassium given under that heading. Its aqueous solution possesses a strong alkaline reaction towards red Litmus paper, produces a fine pink tint with Phenolphthalein Solution, and has an alkaline reaction towards Methyl Orange. It is officially required to contain at least 89·7 p.c. of pure Potassium Hydroxide, as determined by titration with Volumetric Sulphuric Acid Solution as indicated below. Few commercial samples approach this figure, although the standard is easy of attainment; the general range found in the author's laboratory is between 78 and 85 p.c. The *U.S.P.* requires that it should contain not less than 85 p.c. of pure anhydrous Potassium Hydroxide, as determined by titration with Normal Volumetric Sulphuric Acid Solution, using, as shown below, Methyl Orange T.S. as an indicator of neutrality. The *P.G.* requires that it shall contain at least 90 p.c. of pure Potassium Hydroxide, as determined by titrating an aliquot portion of a solution containing the molecular equivalent of Potassium Hydroxide with Normal Volumetric Hydrochloric Acid Solution as described below.

The more generally occurring impurities are Arsenic, Copper, Lead, Carbonate, Chloride, Sulphate, and Nitrate. It should not yield any reaction for Arsenic when examined by the modified Gutzeit's test. An aqueous solution slightly acidified with Hydrochloric Acid should not be darkened in colour nor yield a precipitate with Hydrogen Sulphide Solution. No effervescence should occur on the addition of diluted Sulphuric Acid to a 10 p.c. aqueous solution. Commercial Potash as a rule contains 1 or 2 p.c. of Chloride derived from the Carbonate used in its preparation. The presence of Chloride, Sulphate, and Nitrate may be determined by the Silver Nitrate, Barium Nitrate, and Ferrous Sulphate tests described below. In addition to these impurities it may also contain Aluminium, Calcium, and Silica. When neutralised with Hydrochloric Acid it should yield no white flocculent precipitate on the addition of Ammonia Solution, when the solution is boiled. If the liquid be filtered it should yield no distinct turbidity or a precipitate with Ammonium Oxalate Solution; when dissolved in Water, an excess of Hydrochloric Acid added, and evaporated to dryness, the residue should be completely soluble in Water.

Water or Alcohol (90 p.c.).—An aqueous solution (1–20) should be perfectly clear and colourless, *U.S.P.* 1 gramme dissolved in 2 c.c. of Water, then mixed with 10 c.c. of Alcohol, should leave only a very insignificant residue on standing, *P.G.* 1 gramme dissolved in Water or Alcohol should leave only a trace of sediment, *B.P.*

Sulphuric Acid.—10 c.c. of an aqueous solution (1–10) should show no distinct effervescence on the addition of an excess of diluted Sulphuric Acid, *U.S.P.*

Lime Water and Nitric Acid.—If a solution of 1 gramme of Potassium Hydroxide in 10 c.c. of Water be boiled with 15 c.c. of Lime Water and filtered, the filtrate with excess of Nitric Acid added to it should not evolve gas bubbles, *P.G.*

Sulphuric Acid and Ferrous Sulphate.—If 2 c.c. of a solution (1–20) prepared with diluted Sulphuric Acid be mixed with 2 c.c. of Sulphuric Acid, and 1 c.c. of Ferrous Sulphate T.S. poured over it, no coloured zone should appear, *P.G.*

Barium Nitrate.—A solution (1–50) saturated with Nitric Acid should not be immediately affected by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—A solution (1–50) saturated with Nitric Acid should not become more than opalescent with T.S. of Silver Nitrate, *P.G.*

Time-limit Test.—An aqueous solution (1–20) slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Volumetric Determination.—16·1 c.c. of Normal Volumetric Sulphuric Acid Solution should be necessary for the neutralisation of a solution of 1 gramme of Caustic Potash in Water or Alcohol (90 p.c.) *B.P.*; 9 c.c. of Normal Volumetric Hydrochloric Acid Solution should be necessary to neutralise 10 c.c. of a solution of 5·6 grammes of Potassium Hydroxide in 100 c.c. of Water, *P.G.*; weigh accurately in a stoppered weighing bottle about 1 gramme of Potassium Hydroxide, dissolve in about 50 c.c. of Water and titrate the solution with Normal Volumetric Sulphuric Acid Solution, using Methyl Orange T.S. as indicator, *U.S.P.*

Preparation.

LIQUOR POTASSÆ. Solution of Potash.

A clear, colourless or almost colourless, strongly alkaline solution.

Liquor Potassæ *B.P.* contains 6·19 p.c. w/v of pure Potassium Hydroxide, corresponding to 6·2 grains in 110 minims or 27 grains in 1 fl. oz. The *U.S.P.* Liquor contains about 5 p.c. w/w of Potassium

Hydroxide, corresponding to 5·23 p.c. w/v, about 5¼ grains per 110 minims or 23 grains per fl. oz. The *P.G.* Liquor contains 15 p.c. w/w of pure Potassium Hydroxide, equivalent to 5·23 p.c. w/v, 17·1 grains per 110 minims or 75 grains per fl. oz.

It should be preserved in well-stoppered glass bottles of a dark amber shade, and the stoppers may be smeared with mineral Oil to prevent fixation.

Medicinal Properties.—Caustic. When diluted it is antacid and antilithic. Occasionally employed as an antacid in dyspepsia, accompanied by acidity and gastralgia. It is apt to irritate the stomach, and so, to obtain all the best internal effects of Potash, the Bicarbonate and Citrate are much to be preferred. Externally as an escharotic against the bite of rabid or venomous animals; diluted, it relieves itching.

It acts powerfully on all organic matter, converting flannel into a kind of soft jelly after immersion for 5 or 6 hours.

Dose.—10 to 30 minims = 0·6 to 1·8 c.c., freely diluted.

Incompatibles.—Acids, acid salts, metallic and alkaloidal salts, the preparations of Ammonium, Belladonna, Henbane, and Stramonium.

Antidotes.—Diluted Acetic Acid, Citric Acid, Lemon Juice, or any vegetable acids, fixed oils and demulcents; stimulants; Morphine for pain; neither stomach-tube nor emetics are to be used.

Foreign Pharmacopœias.—Official in U.S., sp. gr. about 1·046 at 25° C. (77° F.) (5 p.c.); Austr. (Kalium Hydroxydatum Solutum), sp. gr. 1·325 to 1·332; Dutch (Solutio Hydratis Kalici), sp. gr. 1·180; Fr. (Hydroxyde de Potassium dissous), sp. gr. 1·080; Ger. (Liquor Kali Caustici), sp. gr. 1·138 to 1·140 (15 p.c.); Russ. (Kali Causticum Solutum), sp. gr. 1·126 to 1·130 (15 p.c.); Swed. (Solutio Hydratis Kalici), sp. gr. 1·225 to 1·235 (25 p.c.); Swiss (Kalium Hydricum Solutum), sp. gr. 1·33. Not in the others.

Tests.—Liquor Potassæ is officially required to have a sp. gr. of 1·058. The *U.S.P.* gravity is 1·046 at 25° C. (77° F.). The *P.G.* 1·138 to 1·140. It possesses a strong alkaline reaction towards blue Litmus paper and towards Phenolphthalein and Methyl Orange Solutions. It answers the tests distinctive of Potassium given under that heading. It is officially required to contain 6·19 p.c. w/v, equivalent to 5·85 p.c. w/w of pure Potassium Hydroxide as volumetrically determined by titration with Volumetric Sulphuric Acid Solution as described below. The *U.S.P.* requires that it shall contain about 5 p.c. w/w, equivalent to 5·23 p.c. w/v of Potassium Hydroxide as volumetrically determined by the process given below, using Methyl Orange Solution as an indicator of neutrality. The *P.G.* requires that it shall contain about 15 p.c. w/w, equivalent to 17·1 p.c. w/v of Potassium Hydroxide, but does not indicate a method by which this requisite percentage can be assured. The Liquor should be free from the more generally occurring impurities mentioned under Potassa Caustica. It is also officially required to be free from Ammonia, Magnesium, Iron or Sodium. Why Potassium Hydroxide should be required to yield no characteristic reaction with the tests for Arsenic, Copper and Lead only, whilst the solution made therefrom should be required not to yield any characteristic reaction with the tests for Aluminium, Ammonium, Arsenic, Calcium, Copper, Iron, Lead, Magnesium and Sodium, as well as to be free from more than traces of Carbonates, Chlorides or Sulphates, is not quite apparent. The *U.S.P.* more consistently remarks that it should conform to the reactions and tests for an aqueous Potassium Hydroxide Solution given under Potassii Hydroxidum. The aqueous solution should not evolve ammoniacal odours when boiled, nor should the issuing vapour have an alkaline reaction towards red Litmus paper. The aqueous solution acidified with Hydrochloric Acid treated with Ammonia in slight excess, and boiled and filtered, treated with Ammonium Oxalate Solution and again filtered, should yield no distinct turbidity nor a precipitate on the addition of Sodium Phosphate Solution. When freshly made, Potassium Hydroxide Solution usually contains a little Lime, but as it absorbs Carbon Dioxide the Lime is thrown out.

Lime Water and Nitric Acid.—The solution, when boiled with 4 parts of Lime Water and filtered, gives a filtrate which does not evolve gas bubbles with excess of Nitric Acid, *P.G.*

Barium Nitrate.—Diluted with 5 parts of Water and supersaturated with Nitric Acid, it should not become more than opalescent with T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—A similar solution should not become more than opalescent with T.S. of Silver Nitrate, *P.G.*

Sulphuric Acid and Ferrous Sulphate.—If 2 c.c. of Potassium Hydroxide be neutralised with diluted Sulphuric Acid, then mixed with 2 c.c. of Sulphuric Acid and 1 c.c. of Ferrous Sulphate T.S. poured on as a layer, no coloured zone should be produced, *P.G.*

Ammonia.—After supersaturating solution of Potassium Hydroxide with Hydrochloric Acid, it should not become more than opalescent with Ammonia T.S. even after standing, *P.G.*

Volumetric Determination.—10 c.c. of Normal Volumetric Sulphuric Acid Solution neutralises 9 c.c. of Solution of Potash, *B.P.;* 25 c.c. of Normal Volumetric Sulphuric Acid Solution should be necessary to neutralise 28 (27·87) grammes of solution of Potassium Hydroxide, using Methyl Orange T.S. as indicator, *U.S.P.*

Not Official.

BRANDISH'S ALKALINE SOLUTION.—American Pearl-ash, 6 lbs.; freshly prepared Quicklime, 2 lbs.; Wood-ashes, 2 lbs.; boiling Water, 6 gallons: or 6, 2, 2, and 60 parts; add first the Lime, then the Pearl-ash, and lastly the Wood-ashes to the boiling Water, stir well together, let it stand 24 hours and decant the clear liquor.

Dose.—½ to 2 fl. drm. = 1·8 to 7·1 c.c. in Milk. Given for scrofulous conditions.

POTASSA CUM CALCE (Vienna Paste).—Potassium Hydroxide and Calcium Oxide, equal weights; powder and mix; it is made into a paste with Alcohol (90 p.c.).

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

The paste is spread on the part to be cauterised, and is allowed to remain for 10 to 15 minutes, while the surrounding skin is protected by adhesive plaster. It is also used in the treatment of lupus. It is not so likely to diffuse as Caustic Potash alone.

Foreign Pharmacopœias.—Official in Fr. and Ital., Potassium Hydroxide 5, Lime 6; Mex. (Pasta de Viena), Potassium Hydroxide 1, Lime 1; Span. (Caustico de Viena), Potassium Hydroxide 50, Lime 60.

Potassa cum Calce **in cylinders**, consisting of 2 parts of Potassa and 1 of Lime for the use of gynæcologists.

POTASSA SULPHURATA.

SULPHURATED POTASH.

B.P.Syn.—LIVER OF SULPHUR.

N.O.Syn.—HEPAR SULPHURIS.

FR., SULFURE DE POTASSE; GER., SCHWEFELLEBER; ITAL., SOLFURO DI POTASSIO; SPAN., SULFURO (TRI) POTASICO.

Liver-brown, deliquescent, irregular pieces, which gradually absorb moisture and Carbon Dioxide, the colour changing to greenish-yellow. It has a disagreeable odour of Hydrogen Sulphide when slightly moist, and an alkaline reaction. It is a mixture of various Potassium salts, chiefly Sulphides.

As it is deliquescent and liable to oxidation on exposure to the air it should be kept in well-closed glass bottles of a dark amber tint and protected as far as possible from contact with the air; it should also be kept in a cool atmosphere.

Solubility.—1 in 2 of Water.

Medicinal Properties.—Similar to those of Sulphur, but more energetic. Externally, as a bath or in ointment form, it is a good remedy for scabies and other parasitic cutaneous diseases; used also for chronic eruptions, especially psoriasis and acne. Internally it is occasionally used for chronic rheumatism and chronic skin diseases.

A hot bath of Sulphurated Potash relieves the itching of jaundice.—*L.* '85, ii. 1220.

Dose.—1 to 5 grains = 0·06 to 0·32 gramme.

Not Official.—Unguentum Potassæ Sulphuratæ, Pommade Sulfureuse, Balneum Sulphuretum, Bain Sulfuré, Bain Sulfuré Liquide.

Foreign Pharmacopœias.—Official in Austr., Ger., Jap., Russ. and Swiss (Kalium Sulfuratum); Austr. and Hung. have (Kalium Sulfuratum pro Balneo); Belg. (Sulphuretum Potassii Officiale); Dan., Norw., and Swed. (Hepar Sulphuris); Dutch (Trisulphuretum Kalicum); Fr. (Sulfure de Potasse); Ital. (Solfuro di Potassio); Mex. (Sulfuro de Potasio); Port. (Potassa Sulfurada); Span. (Sulfuro (tri) Potasico). Not in U.S.

Tests.—Potassium Sulphide dissolves readily in Water, forming a yellow solution possessing an odour of Hydrogen Sulphide and an alkaline reaction towards red Litmus paper. On the addition of an excess of Hydrochloric Acid it evolves the distinctive odour of Hydrogen Sulphide, and the issuing gas produces a black stain on paper moistened with Lead Acetate Solution; a deposit of Sulphur simultaneously appears in the liquid. When freed from Hydrogen Sulphide by boiling until the vapours no longer cause a discoloration of Lead Acetate paper, and filtering, the filtrate yields the tests distinctive of Potassium given under that heading. A portion of the filtrate also yields with Barium Chloride Solution a white precipitate insoluble in Hydrochloric Acid. The *B.P.* requires that about 50 p.c. of the substance should be soluble in Alcohol (90 p.c.). When well made it contains from 50 to 60 p.c. of Potassium Sulphide.

Not Official.

UNGUENTUM POTASSÆ SULPHURATÆ.—Sulphurated Potash, 30 grains; Hard Paraffin, ¼ oz.; Soft Paraffin, ¾ oz. This ointment should be freshly prepared.—*B.P.* 1885.

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

POMMADE SULFUREUSE (*Vet.*).—Sulphurated Potash (powdered very finely), 1; Vaseline, 30. Mix to form a homogeneous pomade.—*Fr.*

BALNEUM SULPHURETUM.—Sulphurated Potash, 4 oz.; Water, 30 gallons; dissolve.

Used in psoriasis, etc.

This is not quite so agreeable as the Barèges waters, which may be made artificially as follows:—Sodium Sulphide, Sodium Carbonate, and Sodium Chloride, of each 20 grains to 1 gallon. But a much stronger solution is often used.

BAIN SULFURÉ.—100 grammes of Sulphurated Potash (broken up) are placed in well-closed bottle. When required for use, it is dissolved in a litre of warm water and the solution is poured into the water-bath. The bath should be non-metallic or made of zinc.—*Fr.*

BAIN SULFURÉ LIQUIDE.—Sulphurated Potash, 1; Water, 2. Dissolve, filter and preserve in a well-closed bottle to be added to a bath when required.—*Fr.*

POTASSII ACETAS.

POTASSIUM ACETATE.

$KC_2H_3O_2$, eq. 97·41.

FR., ACETATE DE POTASSIUM; GER., KALIUMACETAT; ITAL., ACETATO DI POTASSIO; SPAN., ACETATO POTASICO.

White, almost odourless, deliquescent crystals, or crystalline satin-like masses, or as a white, deliquescent, coarse granular powder.

It should be kept in well-closed vessels and protected as far as possible from contact with the air.

It may be prepared by neutralising Potassium Carbonate with Acetic Acid, evaporating and fusing the product. It has been stated that the formula given in the *B.P.* does not represent the substance actually in use, which cannot be rendered anhydrous on a technical scale without decomposition. An allowance of 10 p.c. of Water on drying at 110° C. (230° F.) would be reasonable.

Solubility.—2 in 1 of Water; 1 in 2 of Alcohol (90 p.c.).

Medicinal Properties.—Used as a diuretic in dropsy, chiefly renal, and in febrile diseases; as an antilithic in gout and the uric acid diathesis; valuable in sub-acute rheumatism.

Dose.—10 to 60 grains = 0·65 to 4 grammes.

Prescribing Notes.—*Best administered in simple solution, with a little Syrup if necessary.*

Foreign Pharmacopœias.—Official in all except Austr., Ger., Jap. and Swiss; Austr., contains a *solution*, sp. gr. 1·200; Ger., Hung., Ital., Jap. and Russ. have also a solution, sp. gr. 1·176 to 1·180 (about 33 p.c.); Swiss has Liquor, sp. gr. 1·17 to 1·18.

Tests.—Potassium Acetate fuses when strongly heated, the *U.S.P.* states at a temperature of 292° C. (557·6° F.). At a still higher temperature it chars, and when ignited it should leave a white residue completely soluble in Water. The salt dissolves readily in Water, forming a clear solution which is alkaline in reaction towards red Litmus paper, but which does not produce a pink coloration with Phenolphthalein Solution. It yields the tests distinctive of Potassium given under that heading. The aqueous solution when mixed with Sulphuric Acid and boiled evolves a distinctive acetous odour. When warmed with Sulphuric Acid and a few drops of Alcohol (90 p.c.) a distinctive odour of Ethyl Acetate is evolved. An aqueous solution yields with Ferric Chloride T.S. a deep red coloration, and on boiling a brown flocculent precipitate is thrown out. The *B.P.* does not require it to contain any definite percentage of pure Potassium Acetate, nor is a method given by which it can be assayed. The *U.S.P.* requires that it should contain when thoroughly dry not less than 98 p.c. of pure Potassium Acetate as volumetrically determined by titration of the solution of the residue left on ignition with Semi-normal Volumetric Sulphuric Acid Solution as indicated below, using Methyl Orange Solution as an indicator of neutrality.

The more generally occurring impurities are Aluminium, Arsenic, Calcium, Copper, Iron, Lead and Magnesium; the *B.P.* requiring that the usual 'no characteristic reaction' should be yielded with the tests for these impurities, and also for Carbonates or Sulphides. Chlorides and Sulphates may also be present; the official directions are that only the slightest reactions with the tests for these substances shall be yielded. Arsenic, if present, may be detected by the alliaceous odour evolved during the cautious ignition of the sample. It may also be determined by the Hydrogen Sulphide test given below, and by the Gutzeit's test also described below. Copper, Iron and Lead, if present, may be recognised by the Hydrogen Sulphide test either in acid or alkaline solution. No flocculent precipitate nor a turbidity should be produced by the addition of Ammonia Solution on boiling. The filtrate should not yield a turbidity nor a precipitate with Ammonium Oxalate Solution. If the liquid be again filtered, the filtrate should neither yield a turbidity nor a precipitate with Sodium Phosphate Solution. Chlorides and Sulphates, if present, are indicated by Silver Nitrate and Barium Chloride Solutions.

Time-limit Test.—An aqueous solution (1–20) slightly acidulated with Acetic Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Gutzeit's Test.—5 c.c. of an aqueous solution of the salt (1–10) should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Volumetric Determination.—Thoroughly carbonise 1 gramme of dry Potassium Acetate at a temperature not exceeding red heat, extract the residue with boiling Distilled Water until the washings cease to react with Methyl Orange T.S. The mixed filtrate and washings should require for complete neutralisation not less than 20·1 c.c. of Semi-normal Volumetric Sulphuric Acid Solution, using Methyl Orange Solution as indicator, *U.S.P.*

Not Official.

POTASSII BENZOAS.

$KC_7H_5O_2\,3H_2O$, eq. 212·60.

A white crystalline powder; soluble 1 in 1½ of Water; 1 in 18 of Alcohol (90 p.c.). Useful in cystitis of gouty or rheumatic origin.

It should be kept in well-stoppered glass bottles and in a cool atmosphere.

Dose.—15 to 20 grains = 1 to 1·3 grammes.

Tests.—Potassium Benzoate dissolves readily in Water, yielding a solution which is slightly alkaline in reaction towards red Litmus paper, and which affords, if sufficiently concentrated, on the addition of diluted Sulphuric Acid Solution, a copious white crystalline precipitate. If this precipitate be separated, washed and carefully dried, it should possess the m.p. and answer the tests distinctive of Benzoic Acid given under Acidum Benzoicum. The filtrate from the precipitate yields the tests distinctive of Potassium given under that heading. An aqueous solution of the salt affords with Ferric Chloride T.S. a buff coloured precipitate. The percentage of pure Potassium Benzoate may be determined by dissolving 1 gramme in Water, adding sufficient Ether to dissolve the Benzoic Acid and titrating with Tenth-normal Volumetric Hydrochloric Acid Solution, using Methyl Orange Solution as an indicator of neutrality. 1 c.c. of Tenth-normal Volumetric Hydrochloric Acid Solution corresponds to 0·02126 gramme of pure Potassium Benzoate.

It may also be assayed by igniting the Benzoate and titrating the filtered solution of the residual Potassium Carbonate with Tenth-normal Volumetric Hydrochloric Acid Solution, using Methyl Orange Solution as an indicator of neutrality.

POTASSII BICARBONAS.

POTASSIUM BICARBONATE.

B.P.Syn.—POTASSIUM HYDROGEN CARBONATE.

$KHCO_3$, eq. 99·38.

FR., CARBONATE ACIDE DE POTASSIUM; GER., KALIUMBICARBONAT;
ITAL., BICARBONATO DI POTASSIO; SPAN., BICARBONATO POTASICO.

Colourless, transparent, monoclinic prisms, or as a white crystalline powder, odourless and having a saline and slightly alkaline taste. It is permanent in the air.

It may be obtained by saturating a strong aqueous Potassium Carbonate solution with Carbonic Anhydride.

It should be kept in well-closed vessels and in a cool atmosphere.

Solubility.—1 in 3·2 of Water. Insoluble in Alcohol (90 p.c.).

Medicinal Properties.—Antacid, antilithic, and diuretic. Used in dyspepsia as an antacid, and in gout to increase the alkalinity of the blood and excretion of urates; in the acute or inflammatory stage of gonorrhœa there is no better remedy, as it renders the urine alkaline and unirritating. In bronchitis and pneumonia it renders the secretion less tenacious; in influenza it has been given with success. *See also* Sodium Bicarbonate, which is generally preferred in dyspepsia.

20 grains are prescribed in effervescence with 15 grains of Citric Acid.

Closely resembles the Carbonate, but without its irritant qualities.

Potassium salts delay the conversion of gelatinous Sodium Biurate into the crystalline variety, and when the conversion is once started it is slowed by the presence by these salts. Potassium salts exercise most influence.—*L.* '00, i. 931.

Given in the treatment of gleet in order to artificially produce phosphaturia. —*L.* '08, i. 424.

Dose.—5 to 30 grains = 0·32 to 2 grammes.

Foreign Pharmacopœias.—Official in U.S.; Belg. (Bicarbonas Potassæ); Fr. (Carbonate Acide de Potassium); Norw. and Swed. (Bicarbonas Kalicus); Ger., Jap., Russ. and Swiss (Kalium Bicarbonicum); Mex. (Carbonato de Potasio acido); Port. (Bicarbonato de Potassa); Span. (Bicarbonato Potasico). Not in Austr., Dan., Dutch, Hung., or Ital.

20 parts by weight of Potassium Bicarbonate are neutralised by 14 parts of Citric Acid, and by 15 parts of Tartaric Acid.

Tests.—Potassium Bicarbonate loses Carbonic Anhydride when exposed to a temperature of about 100° C. (212° F.) and at a dull red heat is completely converted into Potassium Carbonate. It dissolves in Water, forming a clear solution which is alkaline in reaction towards red Litmus paper, but neutral in reaction towards Phenolphthalein Solution. It answers the tests distinctive of Potassium given under that heading, it dissolves with effervescence in diluted Sulphuric Acid, the evolved gas yielding, when passed into Lime Water, a white precipitate soluble in a sufficient excess of gas. It is officially required to contain 99·4 p.c. of pure Potassium Bicarbonate as determined, first, gravimetrically by the weight of residue left on ignition, and, secondly, volumetrically by the titration of that residue with Volumetric Sulphuric Acid Solution as described below. The *U.S.P.* requires that it shall contain not less than 99 p.c. of pure Potassium Bicarbonate as volumetrically determined by direct titration with Semi-normal Volumetric Sulphuric Acid Solution, Methyl Orange T.S. being employed as an indicator of neutrality. The *P.G.* requires that it shall contain 100 p.c. of pure Potassium Bicarbonate, first, as volumetrically determined by direct titration with Normal Volumetric Hydrochloric Acid Solution, secondly, as gravimetrically determined by the weight of residue left on ignition. Both the *U.S.P.* volumetric determination method and the volumetric and gravimetric methods of the *P.G.* are described in the small type below.

The more generally occurring impurities are Arsenic, Calcium, Copper, Iron and Lead; Carbonates, Chlorides, Nitrates and Sulphates. The *B.P.* requires that in addition to these it shall yield no characteristic reaction with the tests for Aluminium, Magnesium and Sodium and Sulphides. Arsenic, if present, may be detected by the modified Gutzeit's test using the Hydrochloric Acid solution of the salt, and also by the Hydrogen Sulphide test described below, which also detects, if present, Copper and Lead. A standard has been suggested (*C.D.* '08, i. 796) of 5 parts per million for Lead and 2 parts per million for Arsenic, and for Chlorides a standard of 0·1 p.c. calculated as KCl. The *P.G.* includes a separate test for Iron with Potassium Ferrocyanide, see below. Calcium, if present, may be detected by a turbidity or precipitate produced on adding Ammonium Oxalate Solution to an aqueous solution of the salt rendered slightly acid with Acetic Acid. Magnesium, if present, may be detected in the filtrate from the Ammonium Oxalate Solution. Aluminium and Sodium are unlikely impurities. Chlorides and Sulphates, if present, may be detected by the Barium Nitrate and Silver Nitrate test described below. Nitrates may be detected by the Ferrous Sulphate and Sulphuric Acid test. The *U.S.P.* uses the Phenolphthalein test described below to detect the presence of Carbonate.

Phenolphthalein.—A concentrated aqueous solution is neutral to T.S. of Phenolphthalein, *U.S.P.* Dissolve 1 gramme of the salt without agitation in 20 c.c. of Water at a temperature not above 15° C. (59° F.), add 0·2 c.c. of Normal Volumetric Hydrochloric Acid Solution and 2 drops of Phenolphthalein T.S. A red tint should not appear immediately, *U.S.P.*

Barium Nitrate.—An aqueous solution (1–20) after saturation with Acetic Acid should not be affected by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—A solution as above, after the addition of Nitric Acid, should not become more than opalescent with T.S. of Silver Nitrate, *P.G.*

Hydrogen Sulphide.—An aqueous solution (1–20) after saturation with Acetic Acid should not be affected by T.S. of Hydrogen Sulphide, *P.G.*; a (1–20) aqueous solution slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution (1–20) saturated with Hydrochloric Acid should not become blue with 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

Gravimetric Determination.—1 gramme when heated at a low red heat leaves 0·69 gramme of a white residue, *B.P.*; 100 parts by weight of the salt when ignited to a dull red heat shall leave 69 parts by weight of residue, *P.G.*

Volumetric Determination.—The 0·69 gramme of white residue obtained by igniting 1 gramme of the salt at a dull red heat shall require 10 c.c. of Volumetric Sulphuric Acid Solution for neutralisation, *B.P.* 1 gramme should require for neutralisation 10 c.c. of Normal Volumetric Solution of Hydrochloric Acid, *P.G.* 1 gramme should require for neutralisation not less than 19·9 c.c. of Semi-normal Volumetric Solution of Sulphuric Acid, using Methyl Orange as indicator, *U.S.P.*

POTASSII BICHROMAS.

POTASSIUM BICHROMATE.

B.P.Syn.—POTASSIUM DICHROMATE; RED CHROMATE OF POTASSIUM.

$K_2Cr_2O_7$, eq. 292·30.

FR., CHROMATE ACIDE DE POTASSIUM; GER., KALIUMDICHROMAT;
ITAL., BICROMATO DI POTASSIO; SPAN., BICROMATO POTASICO.

Large, orange-red, odourless, translucent, prismatic crystals, having a bitter taste. Permanent in the air.

It should be kept in well-stoppered glass bottles of a dark amber tint in a cool place.

Solubility.—1 in 10 of Water; 5 in 6 of boiling Water.

Medicinal Properties.—A powerful irritant poison in overdoses, rarely used in medicine, but extensively in the arts.

Highly recommended by Fraser in dyspepsia and gastric ulcer (*L.* '94, i. 923), and by Bradbury.—*L.* '95, ii. 671.

Dose.—$\frac{1}{10}$ to $\frac{1}{5}$ of a grain = 0·006 to 0·013 gramme, in pills with 'Massa Kaolin.'

Official Preparation.—Used in the preparation of Acidum Chromicum.

Antidotes.—Stomach-tube or emetics, Magnesium Carbonate or Chalk, albuminous and demulcent drinks.

Foreign Pharmacopœias.—Official in Fr., Ger., Port., Russ., Span., Swed., Swiss and U.S. Not in the others.

Tests.—Potassium Bichromate fuses below a red heat, and at a considerably higher temperature is decomposed, evolving Oxygen and leaving a residue of neutral yellow Chromate and green Chromium Oxide. The salt dissolves in Water with the formation of a reddish-yellow solution, which has a slightly acid reaction towards blue Litmus paper. When warmed with Sulphuric Acid and Ethylic Alcohol the yellow aqueous solution assumes a green colour, at the same time evolving a distinctive odour of Acetaldehyde. The experiment requires to be carefully conducted, as the reaction is very energetic. An aqueous solution yields, with Barium Chloride, a reddish precipitate soluble in Hydrochloric Acid. With Silver Nitrate Solution it yields a dark purple-red precipitate soluble in Nitric Acid and in Ammonia Solution. If sufficient Barium Chloride Solution or Silver Nitrate Solution be added to an aqueous solution of the salt to precipitate the whole of the Chromium as Chromate, the filtrate from these precipitates answers the test distinctive of Potassium given under that heading. It is officially required to contain 99·8 p.c. of pure Potassium Bichromate as volumetrically determined by the process described in the small type below. The *U.S.P.* requires that it should contain not less than 99 p.c. of pure Potassium Bichromate, but does not give a method of determination by which this requisite percentage may be assured. The *P.G.* gives neither a percentage nor a method of determination.

The more generally occurring impurities are Calcium, Chlorides and Sulphates. Chlorides and Sulphates, if present, may be detected by the Barium Chloride and Silver Nitrate tests in acid solution; Calcium, if present, by the Ammonium Oxalate test described below.

Barium Chloride or Nitrate.—The yellowish-white precipitate obtained on adding Barium Chloride T.S. to an aqueous solution of the salt should be entirely soluble in diluted Nitric Acid, *B.P.*; the *P.G.* states that an aqueous solution (1–100) strongly acidulated with Nitric Acid and warmed should not be affected by Barium Nitrate T.S.

Silver Nitrate.—The purplish-red precipitate obtained on adding Silver Nitrate to an aqueous solution of the salt should be entirely soluble in Nitric Acid, *B.P.*; the *P.G.* states that an aqueous solution as in the previous test should not be affected by T.S. of Silver Nitrate.

Ammonium Oxalate.—An aqueous solution (1–100) of the salt after the addition of Ammonia T.S. should not become turbid with T.S. of Ammonium Oxalate, *P.G.*

Volumetric Determination.—To effect the oxidation of the Iron from the Ferrous to the Ferric condition a solution of 5·66 grammes of Ferrous Sulphate in Water acidulated with Sulphuric Acid should require the addition of a solution containing 1 gramme of Potassium Bichromate, *B.P.*

POTASSII BROMIDUM.

POTASSIUM BROMIDE.

N.O.Syn.—BROMURETUM KALICI.

KBr, eq. 118·18.

FR., BROMURE DE POTASSIUM; GER., KALIUMBROMID; ITAL., BROMURO DI POTASSIO; SPAN., BROMURO POTASICO.

Colourless or white, odourless, cubical crystals, possessing a strong, characteristic, saline taste. They are permanent in the air.

It should be kept in well-closed bottles and protected as far as possible from the light.

Solubility.—10 in 17 of Water, and measures 20; 1 in 1 of boiling Water; 1 in 95 of Alcohol (90 p.c.); 1 in 17 of boiling Alcohol (90 p.c.).

Medicinal Properties.—Sedative, hypnotic, anaphrodisiac. Very successful in epilepsy, in hysteria, and in convulsions generally. Used in insomnia, due not to pain but to worry or overwork or the climacteric, sea-sickness and the sickness of pregnancy, also in nervous head-ache, nightmare and the night-screaming of children, in migraine and in neuralgia. Useful in spermatorrhœa and nymphomania, and with chloral in delirium tremens. Relieves in some cases of whooping-cough and spasmodic asthma, both in children and adults. In enormous doses sometimes successful in tetanus.

Bromides still the most potent agents for the treatment of idiopathic epilepsy. No special advantage noticed in giving the mixed Potassium, Sodium and Ammonium Bromides. Potassium salt usually given, but when it appears to cause undue depression, the Ammonium or Sodium salt is substituted. In nocturnal epilepsy, a single dose should be given an hour before bed-time, and two hours before an attack is due when the fits recur about the same time in the day. As a rule, better to increase the single dose than to give the same amount in divided doses several times a day.—*L.* '03, i. 440; *B.M.J.* '03, i. 371.

Bromide rash treated by use of arsenical waters, milk diet and a poultice containing Boric Acid applied locally.—*T.G.* '99, 593.

On its use combined with Sodium Salicylate in headache.—(Brunton) *Pr.* lii. 101.

By combining it with Arsenic in small doses, the unpleasant effects known as 'Bromism' may be prevented or reduced.

Butter-milk as a local application to the acne-like eruption produced by administration of Bromides.—*L.* '02, ii. 1724.

Dose.—5 to 30 grains = 0·32 to 2 grammes.

Incompatibles.—Any oxidising agents are liable to set free the Bromine; Spiritus Ætheris Nitrosi.

Official Preparation.—Used in the preparation of Acidum Hydrobromicum Dilutum.

Not Official.—Sal Bromatum Effervescens.

Foreign Pharmacopœias.—Official in Austr., Ger., Hung., Jap., Russ. and Swiss (Kalium Bromatum); Belg. (Bromuretum Potassii); Dan., Dutch, Norw. and Swed. (Brometum Kalicum); Fr. (Bromure de Potassium); Ital. (Bromuro di Potassio); Mex. (Bromuro de Potasio); Port. (Brometo de Potassio); Span. (Bromuro Potasico); U.S. (Potassii Bromidum).

Tests.—Potassium Bromide when heated decrepitates, and when strongly heated fuses. It dissolves readily in Water, forming a clear solution which should be neutral in reaction towards Litmus paper. It answers the tests distinctive of Potassium given under that heading. The aqueous solution, when treated with a little Chlorine Water, assumes a brown or reddish-brown coloration, and when shaken with Chloroform the colour passes into the chloroformic solution. On the addition of Silver Nitrate Solution the aqueous solution affords a yellowish, curdy precipitate, practically insoluble in Ammonia Solution, insoluble in Nitric Acid, readily soluble in Potassium Cyanide Solution. A small quantity of the salt heated with Manganese Dioxide and Sulphuric Acid evolves the characteristic irritating vapours of Bromine, which communicates an orange-yellow colour to filter paper soaked in Starch Mucilage. It is officially required to yield not less than 98·9 p.c. nor more than 100·9 p.c. of pure Potassium Bromide as volumetrically determined by direct titration of the salt with Volumetric Silver Nitrate Solution as indicated below. The *U.S.P.* requires that it should contain not less than 97 p.c. of pure Potassium Bromide as volumetrically determined by direct titration of the well-dried salt with Tenth-normal Volumetric Silver Nitrate Solution as described below, using Potassium Chromate Solution as an indicator. The *P.G.* requires that it shall contain not more than 100·8 p.c. of pure Potassium Bromide as determined by titrating an aliquot portion of a solution of 3 grammes of the salt dried at 100° C. (212° F.) dissolved in 100 c.c. of Water, as described in small type below, using Potassium Chromate Solution as an indicator. If the figures required by the official Silver Nitrate titration be calculated into KBr they would indicate a percentage of 98·91 to 100·92. As 100 p.c. KBr requires 84·62 c.c.; the excess over the theoretical figure would be due to KCl, which may be present from 0·1 p.c. to 6 p.c. This cannot give a definite Chloride figure unless all impurities unaffected by Silver Nitrate are known to be absent; the only interfering impurity, however, which may be expected to be present is Water, so that if *B.P.* had directed the dried salt to be used for titration, the percentage of Chloride might be arrived at by subtracting 84·62 from the number of c.c. used and dividing the result by 0·5. Some English samples of the salt contain less than ¼ p.c. of Chloride, but some American samples contain nearly 6 p.c.

The more generally occurring impurities are Arsenic, Copper, Iron, Lead and Zinc, Barium and Calcium, Bromates, Iodides and Iodates, Chlorides and Sulphates. In addition to the usual official statement that it should yield 'no characteristic reaction' for the tests for Aluminium, or only the slightest reaction with the tests for these substances, the *B.P.* also includes similar requirements with regard to Ammonium, Magnesium, Sodium, and gives a specific and definite test for absence of Thiocyanates. Arsenic, if present, may be detected by the Gutzeit's test. It may also, together with Copper, Iron, Lead and Zinc, if present, be detected by the Hydrogen Sulphide test described below; Arsenic, Copper and Lead in slightly acid solution; Iron and Zinc in alkaline solution. Barium, if present, may be detected by the Potassium Sulphate test described below. Calcium, if present, by the addition of Ammonium Oxalate to the aqueous solution slightly acidified with Acetic Acid. Bromates, if present, may be detected by the Sulphuric Acid test given below. The Barium Nitrate test serves to detect Sulphates if present. The Chlorine Water and Chloroform test described below serves to detect the presence of Iodides. Any excessive proportion of Chloride may be detected by the increase in the titration figure as indicated above. The *P.G.* includes a separate test for Iron with Potassium Ferrocyanide Solution. The *U.S.P.* includes a test for limit of alkali, which is given under the Phenolphthalein test in small type below.

The *B.P.* requires that the cold aqueous solution should not assume a red coloration on the addition of Ferric Chloride T.S. It has been suggested (*P.J.* '01, i. 460) that this Thiocyanate test requires modification, the colour produced by Ferric Chloride in an aqueous solution of Potassium Bromide largely depending on the quantity of Potassium Bromide present, the colour being masked by an excess of Potassium Bromide. The modification proposed is that 2 drops of Ferric Chloride T.S. should give a yellow, and not a red or reddish-brown, coloration when added to a solution of 0·1 gramme of Potassium Bromide dissolved in 10 c.c. of Water. The test is stated to indicate the absence of more than 0·1 p.c. of Ammonium Thiocyanate.

Litmus.—An aqueous solution (1–20) is neutral or has only a scarcely perceptible reaction on Litmus, *U.S.P.* Powdered Potassium Bromide should not immediately colour moistened red Litmus paper violet-blue, *P.G.*

Phenolphthalein.—A solution of 1 gramme of the salt in 10 c.c. of Water with 0·1 c.c. Tenth-normal Volumetric Sulphuric Acid Solution added should not give any coloration on the subsequent addition of a drop of T.S. of Phenolphthalein, *U.S.P.*

Diluted Sulphuric Acid.—Crushed Potassium Bromide spread out on white porcelain should not immediately turn yellow on the addition of diluted Sulphuric Acid, *P.G.* Such a mixture, when shaken with 1 c.c. of Chloroform, should not impart to the latter a yellowish-brown colour, *U.S.P.*

Hydrogen Sulphide.—An aqueous solution (1–20) of the salt should not be affected by T.S. of Hydrogen Sulphide, *P.G.* A solution of similar strength acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Barium Nitrate.—An aqueous solution of the salt (1–20) should not be affected by T.S. of Barium Nitrate, *P.G.*

Potassium Sulphate or Diluted Sulphuric Acid.—An aqueous solution of the salt (1–20) should not be affected by diluted Sulphuric Acid, *P.G.*; 10 c.c. of an aqueous solution (1–20) acidulated with Hydrochloric Acid should not be rendered turbid by the addition of 1 c.c. of T.S. of Potassium Sulphate, *U.S.P.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution (1–20) should not be rendered blue by 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

Diluted Chlorine Water and Chloroform.—Add 1 c.c. of Chloroform to 10 c.c. of an aqueous solution of the salt (1–20) and then introduce cautiously drop by drop with constant agitation a mixture of equal volumes of Chlorine Water and Water. The liberated Bromine will dissolve in the Chloroform, imparting to it a yellow to orange colour free from any violet tint, *U.S.P.*

Volumetric Determination.—A solution of 1 gramme of the salt in Water should require for complete precipitation not less than 83·7 nor more than 85·4 c.c. of Volumetric Solution of Silver Nitrate, *B.P.*; 10 c.c. of an aqueous solution (3 grammes in 100 c.c.) of Potassium Bromide which has been dried at 100° C. (212° F.) should after the addition of a few drops of Potassium Chromate T.S. require not more than 25·4 c.c. of Tenth-normal Volumetric Solution of Silver Nitrate to produce a permanent reddening, *P.G.*; 0·3 gramme of the well dried salt dissolved in about 50 c.c. of Water and 2 or 3 drops of Potassium Chromate T.S. added should require not less than 24·6 c.c. nor more than 25·85 c.c. of Tenth-normal Silver Nitrate Volumetric Solution to produce a permanent red colour, *U.S.P.*

Not Official.

SAL BROMATUM EFFERVESCENS.—An effervescent preparation containing about 8 of Potassium Bromide, 8 of Sodium Bromide and 4 of Ammonium Bromide in 60.

CALCIUM BROMIDE.—A white, very deliquescent salt, readily soluble in Water and Alcohol (90 p.c.), which has been introduced as a substitute for Potassium Bromide, but which is not much prescribed.

Dose.—15 to 30 grains = 1 to 2 grammes.

Official in U.S.

POTASSII CARBONAS.

POTASSIUM CARBONATE.

B.P.Syn.—Salt of Tartar.

Fr., Carbonate Neutre de Potassium; Ger., Kaliumcarbonat;
Ital., Carbonato di Potassio; Span., Carbonato Potasico.

A white, deliquescent, crystalline, or granular powder, K_2CO_3, eq. 137·21, officially stated to be associated with either 1 or 2 molecules of Water. It is present in the ashes of plants.

Should be preserved in well-closed bottles.

The *B.P.* Carbonate is associated with either 1 or 2 molecules of Water of crystallisation. The *U.S.P.* Carbonate is required to contain when thoroughly dry not less than 98 p.c. of pure Potassium Carbonate. The *P.G.* requires it to contain at least 95 p.c. of pure Potassium Carbonate.

It has been stated that the article as met with in commerce is not a definite crystalline compound with 1 or 2 molecules of Water, but a mixture containing about 16 p.c. of combined Water. Six samples obtained from leading manufacturers examined in the author's laboratory lost from 16·4 to 19·8 p.c. after exposure to a red heat, the loss averaged 17·4 p.c. The percentage of Chloride present varied between 0·052 and 0·3 p.c., with an average of 0·123 p.c.

Solubility.—4 in 3 of Water, and measures 4½. Insoluble in Absolute Alcohol.

Medicinal Properties.—Similar to those of the Bicarbonate, but rarely used internally on account of its irritant properties. Externally it is used as a lotion in eczema and urticaria.

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

Official Preparations.—Contained in Decoctum Aloes Compositum, Liquor Arsenicalis, Mistura Ferri Composita, Unguentum Potassii Iodidi. Used in the preparation of Iodoform, Liquor Bismuthi et Ammonii Citratis, Potassa Caustica, Potassa Sulphurata, Potassii Acetas, Potassii Bicarbonas, Potassii Citras and Potassii Tartras.

Foreign Pharmacopœias.—Official in all; Austr., Belg., Ger., Hung., Jap. and Russ. (Kalium Carbonicum); Dan., Dutch, Norw. and Swed. (Carbonas Kalicus); Fr. (Carbonate Neutre de Potassium); Ital. (Carbonato di Potassio); Mex. (Carbonato de Potasio Neutro); Port. (Carbonato de Potassa); Span. (Carbonato Potasico); Swiss has (Kalium Carbonicum Depuratum) and (Kalium Carbonicum Purum); U.S. (Potassii Carbonas); Austr., Dutch, Ger., Jap., Russ. and Swed., include a **crude** Carbonate; Ger., a 33⅓ p.c. Liquor; Swed., a solution, 20 p.c.

Tests.—Potassium Carbonate, *B.P.*, when heated at a red heat loses from 15·0 to 17·0 p.c., and leaves between 83·0 to 85·0 p.c. of anhydrous Potassium Carbonate. The *U.S.P.* states that when heated to 130° C. (266° F.) the salt loses all the Water which it may have retained or absorbed. It dissolves readily in Water, forming a clear solution which has a strong alkaline reaction towards red Litmus paper, which, when neutralised with Hydrochloric Acid, yields the tests distinctive of Potassium given under that heading, and which, on the addition of diluted acids, effervesces, evolving a colourless and odourless gas, which, when passed into Lime Water, yields a white precipitate soluble in a sufficient excess of the gas and redissolving with effervescence in diluted acids. It is officially required to contain 81·6 p.c. of pure Potassium Carbonate as determined volumetrically by direct titration with Volumetric Sulphuric Acid Solution as indicated below. The *U.S.P.* requires that it shall contain not less than 98 p.c. of pure Potassium Carbonate as volumetrically determined by direct titration, using Methyl Orange T.S. as an indicator of neutrality; the process is given below. The *P.G.* requires that it shall contain at least 95 p.c. of pure Potassium Carbonate as volumetrically determined by direct titration as given below.

The more generally occurring impurities are Arsenic, Calcium, Copper, Iron, Lead and Zinc, Aluminium and Magnesium, Chlorides, Nitrates and Sulphates. The *B.P.* also includes Sodium, Cyanides, Sulphides and Thiosulphates. When acidified with Hydrochloric Acid the aqueous solution should yield no reaction with the modified Gutzeit's test. It should yield no reaction with the Hydrogen Sulphide test described below. It should give no flocculent precipitate nor a turbidity when made slightly alkaline with Ammonia Solution and boiled, indicating the absence of Aluminium. The filtrate from this treatment should neither yield a marked turbidity nor a precipitate with Ammonium Oxalate Solution, indicating the absence of more than traces of Calcium. If this liquid be again filtered it should neither yield a pronounced turbidity nor a precipitate with Sodium Phosphate Solution, indicating the absence of more than traces of Magnesium. The aqueous solution, when acidified with Nitric Acid, should yield only a slight turbidity with Silver Nitrate Solution, indicating the absence of more than traces of Chlorides. It should answer the tests for freedom from Nitrate with Ferrous Sulphate and Sulphuric Acid given below; and also the test with Barium Nitrate Solution. When moistened with Hydrochloric Acid and inserted on a platinum loop into a non-luminous flame it should communicate to the flame at most but a transient yellow coloration. On the addition of Sulphuric Acid in slight excess it should not evolve an odour of Hydrocyanic Acid, nor should the issuing gas cause a piece of filter paper moistened with Lead Acetate Solution to darken in colour when suspended in the gas, indicating the absence of Sulphides. Neither should the issuing gas possess an odour of Sulphur Dioxide nor bleach a piece of blue Litmus paper suspended therein; the liquid, after the addition of slight excess of Hydrochloric Acid, should remain clear, indicating the absence of Thiosulphate. The *U.S.P.* gives a test for earthy impurities, requiring that no residue should remain when 1 gramme of the salt is dissolved in 20 c.c. of Water.

Hydrogen Sulphide.—An aqueous solution (1-20) should not be affected by T.S. of Hydrogen Sulphide, either before or after acidification with Acetic Acid, *P.G.*; an aqueous solution (1-20) slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Silver Nitrate.—1 volume of a (1-20) aqueous solution should give with 10 volumes of Tenth-normal Volumetric Silver Nitrate Solution a yellowish-white precipitate, which on gently warming does not become darker in colour, *P.G.*; a (1-20) aqueous solution saturated with diluted Nitric Acid should not be rendered more than opalescent after 2 minutes by T.S. of Silver Nitrate, *P.G.*

Barium Nitrate.—An aqueous solution (1-20) saturated with Acetic Acid should not be affected by T.S. of Barium Nitrate, *P.G.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution (1-20) over-neutralised with Hydrochloric Acid should not be rendered blue by 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

Ferrous Sulphate and Ferric Chloride.—The 1-20 aqueous solution of the salt when mixed and gently warmed with a little Ferrous Sulphate T.S. and Ferric Chloride T.S. should not develop a blue colour on the addition of an excess of Hydrochloric Acid, *P.G.*; indicating the absence of Cyanide.

Ferrous Sulphate and Sulphuric Acid.—2 c.c. of a solution of the salt in diluted Sulphuric Acid mixed with 2 c.c. of Sulphuric Acid and 1 c.c. of Ferrous Sulphate T.S. poured upon it as a layer should not give any coloured zone, *P.G.*; 3 c.c. of Ferrous Sulphate T.S. carefully poured upon 5 c.c. of a cold aqueous (1-20) solution of the salt mixed with 5 c.c. of Sulphuric Acid should not develop a brown colour at the junction of the two liquids, *U.S.P.*

Volumetric Determination.—Not less than 11·9 c.c. of Volumetric Sulphuric Acid Solution should be necessary to neutralise 1 gramme of the salt, *B.P.*; 1 gramme of the salt should require for neutralisation not less than 13·7 c.c. of Normal Volumetric Solution of Hydrochloric Acid, *P.G.*; 1 gramme of the salt thoroughly dried at 130° C. (266° F.) dissolved in 50 c.c. of Water should require not less than 14·3 (14·28) of Normal Sulphuric Acid Volumetric Solution for neutralisation, using Methyl Orange T.S. as indicator, *U.S.P.*

POTASSII CHLORAS.

POTASSIUM CHLORATE.

$KClO_3$, eq. 121·66.

FR., CHLORATE DE POTASSIUM; GER., KALIUMCHLORAT; ITAL., CLORATO DI POTASSIO; SPAN., CLORATO POTASICO.

Colourless, glistening, translucent, monoclinic prisms or plates, or as a white, odourless powder, possessing a cooling saline taste. It should be kept in well-stoppered bottles.

On account of the ready manner in which it evolves Oxygen, it should be handled with caution, great care being taken to avoid friction or any sudden percussion when mixing it with readily oxidisable or inflammable substances. When triturated with certain substances, *e.g.*, Sulphur, Sugar, Tannic Acid and Antimony Sulphide, it forms explosive mixtures. It has also been known to explode whilst being compressed into tablets.

Solubility.—1 in 16 of cold Water; 1 in 2 of boiling Water; 1 in 1700 of Alcohol (90 p.c.); 1 in 152 of Alcohol (60 p.c.).

Medicinal Properties.—A local stimulant. A strong solution, 1 or 2 in 40 of Water, is the best **wash** for the mouth when the gums are spongy, inflamed and irritable, and for ulcerative stomatitis; it relieves the tenderness and induces a firmness of the gums; it is also an excellent **gargle** in tonsillitis. The powder is applied to aphthæ in the mouth. Internally it is given to prevent the tendency to miscarriage, and to fœtal death. In young people it should be used with great care and in small doses, if given at all.

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

10 grains 3 times daily for 6 months with no ill effects, in habitual death of the fœtus in the later months of pregnancy.—*L.* '02, ii. 459.

Hyperplasia of the fœtal thyroid in cases where the mother had been given Potassium Chlorate.—*B.M.J.* '03 i. 657, 874.

As a galactagogue, *T.G* '93, 322; internally 7 drm. taken by mistake caused death.—*L.* '79, i. 206.

40 to 60 grains each of this salt and Carbolic Acid in 8 oz. of Water will be found a pleasant and efficacious solution with which to brush the teeth and wash out the mouth and throat as a preliminary treatment in neurasthenia. —*B.M.J.* '06, i. 493.

Incompatibles.—Charcoal, Sulphur and Ferrous salts. Hydrochloric Acid causes the evolution of Chlorine; other mineral acids, of various chlorous-smelling oxy-compounds; organic acids the same but much more slowly.

Official Preparation.—Trochiscus Potassii Chloratis; used in the preparation of Potassii Permanganas.

Not Official.—Gargarisma Potassii Chloratis, Gargarisme au Chlorate de Potassium, Mistura Potassii Chloratis, Pulvis Potassii Chloratis Compositus and Sodii Chloras.

Foreign Pharmacopœias.—Official in Austr., Belg., Ger., Hung., Jap., Russ. and Swiss (Kalicum Chloricum); Dan., Dutch, Norw. and Swed. (Chloras Kalicus); Fr. (Chlorate de Potassium); Ital. (Clorato di Potassio); Mex. (Clorato de Potasio); Port. (Chlorato de Potassa); Span. (Clorato Potasico); U.S.

Tests.—Potassium Chlorate fuses when strongly heated, evolving a colourless and odourless gas; if the glowing end of a splinter of wood be inserted into the containing vessel it immediately ignites. When heated till no further gas is evolved it leaves a white residue, and if this residue be dissolved in Water a solution is yielded which, on the addition of Silver Nitrate Solution, affords a white precipitate, insoluble in Nitric Acid, readily soluble in Ammonia Solution and in Potassium Cyanide Solution. The aqueous solution of this residue also affords the tests distinctive of Potassium given under that heading. The *U.S.P.* states that it fuses at 334° C. (633·2° F.) and decomposes above 352° C. (665·6° F.), the whole of the Oxygen being evolved above 400° C. (752° F.). It also states that the amount of residue left amounts to 60·8 p.c. of the pure Chlorate employed. The salt, when treated with Hydrochloric Acid and warmed, evolves a yellow gas possessing a strong chlorinous odour and stated by the *B.P.* to be a mixture of Chlorine and Chloric Oxide. It dissolves in Water, the resulting solution having a neutral reaction towards Litmus paper.

The more generally occurring impurities are Aluminium, Calcium, Copper, Iron, Lead, Magnesium and Sodium, Chlorides, Nitrates and Sulphates. The aqueous solution should neither yield a turbidity nor a flocculent precipitate when boiled with Ammonia Solution. An aqueous solution of the salt should yield neither a turbidity nor a precipitate with Ammonium Oxalate Solution. It should not be affected by the Hydrogen Sulphide or Ammonium Sulphide test described below. A standard has been suggested (*C.D.* '08, i. 796) of 10 parts per million for Lead and 2 parts per million for Arsenic. If the liquid, to which Ammonium Oxalate Solution is added, be filtered it should yield neither a turbidity nor a precipitate on the addition of Sodium Phosphate Solution. A crystal of the salt when moistened with Hydrochloric Acid and inserted into a non-luminous flame on a loop of platinum wire should not afford a distinct or permanent yellow coloration to the flame. The aqueous solution should not afford more than a faint turbidity on the addition of Silver Nitrate or Barium Chloride Solution. It is officially required to yield no characteristic reaction with the tests for Nitrates; but in this instance the usual tests for Nitrates, unless carried out with considerable modification, are of no avail. In testing for Nitrates the *U.S.P.* employs Potassium Hydroxide T.S. and Aluminium wire. The *P.G.* employs a solution of Sodium Hydroxide with a mixture of Zinc filings and powdered Iron as described below.

Hydrogen Sulphide or Ammonium Sulphide.—An aqueous solution of the salt (1-20) should not be affected by T.S. of Hydrogen Sulphide, *P.G.*; should not become discoloured by T.S. of Ammonium Sulphide, *U.S.P.*

Ammonium Oxalate.—An aqueous solution of the salt (1-20) should not be affected by T.S. of Ammonium Oxalate, *P.G.*

Barium Nitrate.—An aqueous solution of the salt (1-20) should not be affected by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—An aqueous solution of the salt (1-20) should not be affected by T.S. of Silver Nitrate, *P.G.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution of the salt (1-20) should not be rendered blue by T.S. of Potassium Ferrocyanide, *P.G.*

Sodium Hydroxide, Zinc and Iron Filings.—1 gramme of Potassium Chlorate warmed with 5 c.c. Sodium Hydroxide T.S. and a mixture of 0·5 gramme of Zinc filings and powdered Iron should not evolve Ammonia, *P.G.*

Potassium Hydroxide and Aluminium Wire.—If to 1 gramme of the salt contained in a test-tube of about 40 c.c. capacity, 5 c.c. of Water, 5 c.c. of Potassium Hydroxide T.S., and about 0·2 gramme of Aluminium wire be added, and if in the upper portion of the test-tube a pledget of purified cotton be inserted, and over the mouth there be placed a piece of moistened red Litmus paper, then if the tube be heated upon a water-bath for 15 minutes, no blue coloration of the paper should be discernible, *U.S.P.*

Preparation.

TROCHISCUS POTASSII CHLORATIS. Potassium Chlorate Lozenge.

3 grains of Potassium Chlorate in each, with Rose Basis.

Dose.—1 to 6 lozenges.

Potassium Chlorate is supplied in **tablets** or **compressed discs,** also combined with Borax and with Cocaine.

Foreign Pharmacopœias.—Official in Belg. (Tabellæ), 1½ grains; Dutch, 1½ grains; Fr. (Tablettes), 1½ grains; Ital. (Pastiglia), 1½ grains; Jap. (Pastilli), 1½ grains; Mex. (Pastillas), 1½ grains; Port. (Pastilhas), 1½ grains; Span. (Tabletas), 1½ grains; Swiss (Pastilli), 1½ grains; U.S., about 2¼ grains in each lozenge.

Not Official.

GARGARISMA POTASSII CHLORATIS.—Potassium Chlorate, 1 drm.; Glycerin, ½ fl. oz.; Water, to 6 fl. oz.

Potassium Chlorate, 200 grains; Diluted Hydrochloric Acid, 100 minims; Water, to 20 fl. oz.—*St. Thomas's.*

This has been incorporated in the *B.P.C.* as follows:—Potassium Chlorate, 2; Diluted Hydrochloric Acid, 1; Water, to produce 100.—*B.P.C.*

See also Gargarisma Chlori, p. 371.

GARGARISME AU CHLORATE DE POTASSIUM.—Potassium Chlorate, 1; Distilled Water, 25; Syrup of Mulberries, 5; all by weight.—*Fr.*

MISTURA POTASSII CHLORATIS.—Potassium Chlorate, 10 grains; Diluted Hydrochloric Acid, 5 minims; Distilled Water, to 1 fl. oz.—*St. Thomas's.* This has been incorporated in the *B.P.C.*

PULVIS POTASSII CHLORATIS COMPOSITUS. — Potassium Chlorate, 1; Borax, 1; Sodium Bicarbonate, 1; White Sugar, 2; all in powder. Mix. A measured teaspoonful to be dissolved in half a tumbler (5 fl. oz.) of tepid Water; half the solution to be injected with a syringe along the floor of each nostril night and morning. After use blow nose freely.—*Central Throat.*

SODII CHLORAS.—Colourless, translucent crystals, or a white crystalline powder. Soluble in about its own weight of Water, and in 5 times its weight of Glycerin.

The same remarks with regard to caution in its use apply to this as to the Potassium salt.

Official in Fr., Mex., Span. and U.S.

POTASSII CITRAS.

POTASSIUM CITRATE.

$K_3C_6H_5O_7 \cdot H_2O$, eq. 321·99.

Fr., Potion Gazeuse; Ger., River'scher Trank; Ital., Citrato di Potassio; Span., Citrato Potasico.

Translucent, prismatic crystals, or as a white, granular, deliquescent powder, possessing a cooling saline taste. It should be preserved in well-stoppered bottles.

The *B.P.* formula for this salt omits the molecule of Water of crystallisation. The *U.S.P.* gives the formula with 1 molecule of Water. The salt is not official in the *P.G.*

Solubility.—10 in 6 of Water, and measures 11; 1 in 2 of Glycerin; 1 in 9 of Alcohol (60 p.c.), but if more of the salt is added the Alcohol separates from the watery solution.

Medicinal Properties.—Antacid, mild diaphoretic and diuretic, also alkalises the urine, and its free administration in acute nephritis is strongly advocated by Fothergill and others. Useful in gout and rheumatism, and in bronchitis with viscid, scanty expectoration. Given as a drink in scurvy.

Free administration combined with Colchicum in the treatment of gout.—*L.* '99, ii. 1362.

Milder cases of bacterial cystitis, pyelitis, and incontinence of urine in children do well with full doses of this combined with sedatives of the Belladonna group.—*L.* '08, i. 79.

In 45-grain doses in diabetic acetonuria, because it is not neutralised by the gastric juice and becomes Bicarbonate in the blood.—*Pr.* '07, ii. 120.

Dose.—10 to 40 grains = 0·65 to 2·6 grammes.

Not Official.—Mistura Potassii Citras Effervescens.

Foreign Pharmacopœias.—Official in Port. and U.S. U.S. has also Potassii Citras Effervescens. Not in the others.

Various solutions of Potassium Citrate occur as follows: Belg., Dutch, Hung. and Russ. (Potio Riverii), Fr. (Potion Gazeuse), Ger. (Potio Riveri made with Sodium Carbonate and Citric Acid), Dan. and Norw. (Julapium Salinum), Port. (Soluto de Citrato de Potassa), Swiss (Potio Effervescens), U.S. (Liquor Potassæ Citratis).

Tests.—Potassium Citrate when heated above 100° C. (212° F.) loses Water, and at 200° C. (392° F.), according to the *U.S.P.*, the Water of crystallisation is completely lost, the loss amounting to 5·55 p.c. When heated to a still higher temparature it chars, and when ignited to a dull red heat leaves a mixture of Potassium Carbonate and Carbon. It dissolves very readily in Water, forming a solution which has an alkaline reaction towards red Litmus paper, but is neutral to Phenolphthalein Solution. The aqueous solution, when acidified with Hydrochloric Acid, yields the tests of Potassium given under that heading. It yields when boiled with an excess of Calcium Chloride Solution a white precipitate insoluble in Potassium Hydroxide Solution, but soluble in Ammonium Chloride Solution and in solutions of alkali Citrates; it yields with Silver Nitrate Solution a white precipitate soluble in Ammonia Solution, but in contradistinction to the precipitate yielded by Tartrates does not yield a mirror when the ammoniacal solution is warmed. It is officially required to contain at least 98·3 p.c. of Potassium Citrate of the pharmacopœial formula, as volumetrically determined by titrating the solution of the residue left on ignition with Volumetric Sulphuric Acid Solution as shown below. It has been found that the volumetric requirements do not correspond to the formula given, and should be altered. The *U.S.P.* requires that it should contain not less that 99 p.c. of pure Potassium Citrate as volumetrically determined by titrating the solution of the residue left on ignition with Semi-normal Volumetric Hydrochloric Acid Solution, using Methyl Orange T.S. as an indicator of neutrality. The method is given in small type below.

The more generally occurring impurities are Calcium, Iron, Lead, Magnesium and Sodium, Carbonates and Tartrates, Chlorides and Sulphates. The aqueous solution should afford no reaction with the Hydrogen Sulphide test described below. A standard has been suggested (*C.D.* '08, i. 796) of 5 parts per million for Lead and 1 part per million for Arsenic. It should afford neither a turbidity nor a precipitate with Ammonium Oxalate Solution, and the filtrate from the Ammonium Oxalate should afford neither a turbidity nor a precipitate with Sodium Phosphate Solution. A crystal of the salt when moistened with Hydrochloric Acid and brought into the non-luminous flame on a loop of platinum wire should at the most afford only a transient yellow coloration to the flame. The addition of diluted Hydrochloric Acid Solution should not cause effervescence in the concentrated aqueous solution. It should yield no reaction with the Acetic Acid test described below. The aqueous solution when acidified with diluted Nitric Acid should yield at the most a faint turbidity on the addition of Silver Nitrate or Barium Chloride Solution.

Hydrogen Sulphide.—An aqueous solution of the salt (1–20) slightly acidulated with Acetic Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Acetic Acid.—1 gramme of the salt dissolved in 1 c.c. of Water should not deposit any precipitate on the addition of 1 c.c. of Acetic Acid, indicating absence of Tartrate, *U.S.P.*

Volumetric Determination.—The filtered aqueous solution obtained by dissolving and filtering the residue left on igniting 1 gramme of dry salt at a red heat, should require for neutralisation not less than 9·7 c.c. of Volumetric Solution of Sulphuric Acid, *B.P.* If 1 gramme of the salt be treated as described under Potassium Acetate it should require for neutralisation not less than 18·4 c.c. of Semi-normal Volumetric Hydrochloric Acid Solution, using Methyl Orange T.S. as indicator, *U.S.P.*

Not Official.

MISTURA POTASSII CITRAS EFFERVESCENS.—Potassium Bicarbonate, 20 grains; Water, to 1 fl. oz. (Alkaline Solution). Citric Acid, 15 grains; Water, to ½ fl. oz. (Acid Solution). Mix the two solutions and drink during effervescence.—*St. Thomas's.*

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

Not Official.

POTASSII CYANIDUM.

KCN, eq. 64·68.

Fr., Cyanure de Potassium; Ger., Kaliumcyanid; Ital., Cianuro di Potassio; Span., Cianuro Potasico.

White, opaque, deliquescent masses, or as a white, granular, deliquescent powder, having the odour of Hydrocyanic Acid. The pure salt can be obtained in white cubical crystals. It is intensely poisonous.

It should be kept in well-stoppered bottles.

The commercial salt containing at least 90 p.c. of Potassium Cyanide is official in the Appendix to the *B.P.*

Solubility.—1 in 2¼ of Water; almost entirely 1 in 100 of Alcohol (90 p.c.).

Ordinary fused Cyanide only contains about 40 p.c. of real Cyanide, but there is no difficulty in obtaining it from 95 to 99 p.c.

It is useful to remove the black stains on the skin caused by Silver Nitrate. Entomologists use it with gypsum to make poison bottles for killing insects without injuring their delicate structure; for this purpose dissolve 1 of the Cyanide in 1½ of Water, and add 2 of Plaster of Paris. This mixture stirred and poured whilst liquid into a wide-mouthed bottle, forms a hard floor, which is constantly giving off vapour.

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

Tests.—Potassium Cyanide fuses at a low red heat; it dissolves readily in Water, forming a clear solution which has a strongly alkaline reaction towards red Litmus paper. When treated with a slight excess of diluted Hydrochloric Acid it evolves a highly poisonous and characteristic odour of Hydrocyanic Acid; the resulting solution affords the tests characteristic of Potassium given under that heading. The aqueous solution yields with Silver Nitrate T.S. a white, curdy precipitate soluble in excess of Potassium Cyanide Solution, in Solution of Ammonia and in concentrated Nitric Acid. When shaken with a few drops of a mixture of Ferrous Sulphate T.S. and Ferric Chloride T.S. it yields, on the addition of a slight excess of Hydrochloric Acid, a blue precipitate. No method of determination is given in the *B.P.* The *U.S.P.* requires that it shall yield not less than 95 p.c. of pure Potassium Cyanide as volumetrically determined by dissolving 1 gramme of the salt in sufficient Water to measure 100 c.c., mixing 64·7 c.c. of this solution with 5 c.c. of Ammonia and 3 drops of 20 p.c. w/v Potassium Iodide Solution and titrating the mixture with Tenth-normal Volumetric Silver Nitrate Solution, not less than 47·5 c.c. should be required to produce a permanent precipitate. 1 c.c. of Tenth-normal Volumetric Silver Nitrate Solution is equivalent to 2 p.c. of pure Potassium Cyanide.

The more generally occurring impurities are Carbonate, Ferrocyanide and Sulphocyanide. The addition of diluted Hydrochloric Acid in slight excess to a 5 p.c. solution of the salt should not yield more than a slight effervescence, and the addition of 1 drop of Ferric Chloride T.S. to this liquid should neither produce a blue nor a red coloration.

Not Official.

POTASSII FERROCYANIDUM.

Syn.—Yellow Prussiate of Potash.

$K_4FeC_6N_6, 3H_2O$, eq. 419·66.

Large, translucent, lemon-yellow, soft, table-shaped crystals or groups of crystals. Slightly efflorescent in dry air.

It is officially described as a yellow crystalline salt prepared by fusing together Potassium Carbonate, nitrogenous organic matter and Iron.

It should be kept in well-stoppered glass bottles of a dark amber tint and exposed as little as possible to the air.

Solubility.—1 in 4 of Water; insoluble in Alcohol (90 p.c.).

Foreign Pharmacopœias.—Official in Mex., Port., Span. and U.S. Not in the others.

Tests.—Potassium Ferrocyanide loses its Water of crystallisation when heated, and is converted into an anhydrous salt at a temperature of 100° C. (212° F.), it dissolves readily in Water, forming a clear solution which is neutral in reaction towards Litmus paper. A concentrated solution yields with Sodium Bitartrate Solution a white crystalline precipitate. Lead Acetate Solution, Zinc Sulphate Solution and Silver Nitrate Solution yield white precipitates. Copper Sulphate Solution yields a reddish-brown precipitate; Ferric Chloride T.S. produces a dark blue precipitate. It may contain Carbonate or Ferricyanide. A concentrated solution of the salt should yield no effervescence on the addition of diluted Sulphuric Acid. The addition of Silver Nitrate Solution to an aqueous solution acidified with Nitric Acid should yield a white precipitate free from a red tint.

Not Official.

POTASSII HYPOPHOSPHIS.

Potassium Hypophosphite.

KPH_2O_2, eq. 103·39.

White, opaque crystals, or in crystalline masses, or as a white, granular deliquescent powder, possessing a pungent and saline taste.

It should be kept in well-closed glass bottles in a cool atmosphere and protected as far as possible from contact with the air, as it is very deliquescent. It should be handled with great caution, as it is readily oxidised, and when brought into contact with substances which readily part with Oxygen the temperature rises so rapidly that an explosion often results.

Solubility.—10 in 6 of Water, 1 in 7 of Alcohol (90 p.c.), 3 in 1 of boiling Water; 1 in 375 of Ether; insoluble in Chloroform.

Tests.—Potassium Hypophosphite when heated in a dry tube loses moisture, and when more strongly heated evolves spontaneously inflammable Hydrogen Phosphide gas, which burns with a bright yellow flame. It dissolves readily in Water, yielding a clear solution which is neutral towards Litmus paper, or only faintly alkaline towards red Litmus paper. It yields the tests distinctive of Potassium given under that heading. The diluted aqueous solution slightly acidulated with diluted Sulphuric Acid yields, on the addition of Silver Nitrate Solution, a white precipitate rapidly becoming brown or black, owing to its reduction to metallic Silver. The aqueous solution when gently warmed with Copper Sulphate Solution yields a reddish-brown precipitate. The aqueous solution of the salt, when acidulated with Hydrochloric Acid and added drop by drop to an excess of Mercuric Chloride Solution, yields a white precipitate of Mercurous Chloride, and on the further addition of an excess of the solution of the salt the white precipitate becomes grey, owing to its reduction to metallic Mercury. Its aqueous solution readily reduces Potassium Permanganate, the purple colour of a Permanganate Solution being rapidly discharged. It is required by the *U.S.P.* to contain not less than 98 p.c. of pure Potassium Hypophosphite, but no method of determination is given. The percentage of absolute Potassium Hypophosphite present may be readily ascertained by the method given under Calcii Hypophosphis.

The more generally occurring impurities are Arsenic, Copper, Lead, Iron and Zinc, Calcium, Chlorides and Sulphates, Phosphates and Phosphites. Arsenic, if present, may be detected by the modified Gutzeit's test, treating 5 c.c. of a 10 p.c. aqueous solution of the salt with 3 c.c. of Nitric Acid diluted with about 10 c.c. of water, evaporating the mixture to dryness on the water-bath, and performing the test on the residue. Copper, Lead, Iron and Zinc, if present, may be detected by Hydrogen Sulphide, either in a solution rendered faintly acid with Hydrochloric Acid, or in a solution made alkaline with Ammonia Solution. The aqueous solution of the salt should not afford a distinct turbidity with Ammonium Oxalate Solution after the addition of a little Ammonium Chloride Solution, indicating the absence of Calcium. If the mixture be allowed to stand for some time and filtered, it should yield little or no turbidity with Sodium Phosphate Solution, indicating the absence of Magnesium. When acidified with diluted Nitric Acid the aqueous solution should not afford a pronounced turbidity or precipitate with either Silver Nitrate Solution or Barium Chloride Solution, indicating the absence of more than traces of Chlorides and Sulphates. It should not yield a very pronounced turbidity or precipitate on the addition of Lead Acetate Solution, indicating a limit of Phosphates and Phosphites. Remarks on the Lead Acetate test will be found under Calcii Hypophosphis and under Sodii Hypophosphis. A 5 p.c. aqueous solution of the salt should not effervesce on the addition of an acid, indicating the absence of Carbonate.

POTASSII IODIDUM.

POTASSIUM IODIDE.

KI, eq. 164·73.

Fr., Iodure de Potassium; Ger., Kaliumjodid; Ital., Joduro di Potassio; Span., Yoduro Potasico.

Colourless translucent, or white opaque, cubical crystals, permanent in dry air. It has a characteristic saline, subsequently somewhat bitter, metallic taste, and a faintly alkaline reaction.

It should be preserved from air and light in well-stoppered bottles and kept in a cool place.

Solubility.—4 in 3 of Water, and measures 4; 1 in 10 of Alcohol (90 p.c.); 1 in 3 of Glycerin.

Medicinal Properties.—Alterative, diuretic, expectorant. It is useful in cases where Iodine is indicated, and being less irritating is much preferred for internal administration. Useful especially in secondary and in tertiary syphilis and in all diseases associated with syphilis, such for example as locomotor ataxy. For secondary symptoms 60 grains in solution may be given in the 24 hours. It reduces chronic inflammatory swellings, effusions and glandular enlargements, and is useful in goître and obesity; also in chronic Bright's disease, bronchitis and bronchitic asthma, aortic disease, endocarditis, internal aneurism, angina pectoris (the pain of which it also relieves), and in established arterio-sclerosis; chronic rheumatism and gout; lumbago, sciatica, psoriasis and, in large doses (*see* below), actinomycosis. May be given with Quinine dissolved by Sulphuric or Phosphoric Acid, but not with Nitro-hydrochloric Acid, as the eliminated Chlorine decomposes it and makes an unsightly mixture. Combined with Nux Vomica the system bears it better. It is useful in the elimination of Lead in cases of chronic lead poisoning; also in treating chronic mercurial poisoning. *See* also under 'Iodum.'

(*B.M.J.* '04, ii. 1063) its efficacious use in rheumatism which was frequently the cause of ovarian pain. Its use in actinomycosis yields little improvement under a dose of less than 20 grains thrice daily (*L.* '04, ii. 1225); and in some instances 1-drm. doses thrice daily have been recommended, but these should be given with large quantities of Water. Sodium Iodide is preferable on account of depression caused by the Potassium salt. It has been recommended (*B.M.J.* '04, ii. 1206) in the internal treatment of non-suppurative middle-ear disease. In large doses (*B.M.J.* '04, ii. 1209), to check the ossifying process in the early stages of oto-sclerosis.

Should always be given in solution well diluted, and if possible never on an empty stomach. Milk is the best diluent. The drug should never be given in phthisis.—*B.M.J.E.* '05, ii. 15.

Where rigid arteries were a cause of insomnia the use of massage and the administration of this salt were of especial value.—*B.M.J.* '05, ii. 249.

The best routine treatment for ordinary cases of Yaws (frambœsia), in large doses.—*L.* '07, ii. 1459.

In cretinism.—*L.* '93, ii. 1545.

Sodium or Potassium Iodide when given to man by the stomach in ordinary doses has no depressing effect on the action of the heart, or on the blood pressure in the arteries.—*B.M.J.* '01, ii. 1524.

The opinion is expressed that Iodides are of no value in the treatment of aneurism, and that they are even hurtful in arterio-sclerosis, but the great bulk of medical opinion and experience is directly contrary to this.—*B.M.J.* '01, ii. 1522.

Productive of good results when arterio-sclerosis is established, but absolutely contra-indicated in the pre-sclerosis stage.—*B.M.J.E.* '07, i. 83.

Its regular use in small doses, with the occasional exhibition of Strophanthus, often gives considerable relief in cardio-arterial disease.—*B.M.J.* '01, ii. 1057.

60 to 80 grains 3 times daily, successful in thoracic aneurisms.—*L.* '03, ii. 528.

Good results from its prolonged administration combined with one of the guaiacol preparations in acute rheumatoid arthritis.—*B.M.J.* '01, ii. 1039.

Cases where congenital goitre followed the administration of Potassium Iodide to the mother during pregnancy.—*L.* '07, i. 1714.

Case of Iodine rash after administration of 3 doses of 10 grains each.—*L.* '04. i. 421.

Dose.—5 to 20 grains = 0·32 to 1·3 grammes; this dose is often greatly exceeded, especially in syphilis of the nervous system.

Prescribing Notes.—*Best given with Tincture of Orange and Spirit of Chloroform, in Water, or with Tincture of Cinchona. It is also given with Fowler's Solution to prevent the rash sometimes produced. Tablets cause gastric pain. Solutions of Ferric salts, when acid, set free Iodine from Potassium Iodide.*

It is better borne when given with Potassium Acetate, or when administered alternately with Ferrous Iodide.—*L.* '88, i. 1019.

Incompatibles.—Spiritus Ætheris Nitrosi, Bismuthi Subnitras.

Official Preparations.—Linimentum Potassii Iodidi cum Sapone and Unguentum Potassii Iodidi; contained in Liquor Iodi Fortis, Tinctura Iodi and Unguentum Iodi. Used in the preparation of Hydrargyri Iodidum Rubrum and Plumbi Iodidum.

Not Official.—Linimentum Potassii Iodidi, Linimentum Potassii Iodidi cum Sapone (*B.P.* '67), Mistura Potassii Iodidi, Mistura Potassii Iodidi Alkalina, Mistura Potassii Iodidi et Stramonii, Pilulæ Kalii Iodati, Pomada de Yoduro Potasico con Extracto de Cicuta.

Foreign Pharmacopœias.—Official in Austr., Belg., Ger., Hung., Jap., Russ. and Swiss, (Kalium Iodatum); Dan., Dutch, Norw. and Swed., (Iodetum Kalicum); Fr., (Iodure de Potassium); Ital., (Ioduro di Potassio); Mex., (Yoduro de Potasio); Port., (Iodeto de Potassio); Span., (Yoduro Potasico); U.S.

Tests.—Potassium Iodide when heated decrepitates, and when strongly heated fuses. It dissolves readily in Water, forming a clear solution which possesses a faintly alkaline reaction towards red Litmus paper, and which yields the tests distinctive of Potassium given under that substance. It produces with Silver Nitrate Solution a yellow, curdy precipitate insoluble in Nitric Acid, insoluble in Ammonia Solution, but soluble in Potassium Cyanide Solution. With Mercuric Chloride Solution it yields a brilliant scarlet precipitate slightly soluble in excess of the reagent and readily soluble in the Iodide Solution. With Lead Acetate it yields a yellow crystalline precipitate soluble in diluted Nitric Acid and also in boiling Water; it is deposited, as the solution cools, in brilliant golden crystalline scales. When cautiously mixed with a little Chlorine Water or Bromine Solution it yields a brown or reddish-brown coloration, and on the addition of Starch Mucilage an intense blue colour; if the brown coloured solution be shaken with Carbon Bisulphide, the Bisulphide Solution assumes a deep violet colour. It is officially required to contain not less than 98·0 p.c. nor more than 101·9 p.c. of pure Potassium Iodide as volumetrically determined by direct titration of the salt with Volumetric Silver Nitrate Solution. The *U.S.P.* requires that the salt should contain at least 99·0 p.c. of pure Potassium Iodide as volumetrically determined by the direct titration of a solution of a well-dried salt in Water as indicated below. The *P.G.* does not give a requisite percentage of pure Potassium Iodide nor a method of determination.

The more generally occurring impurities are Arsenic, Aluminium, Calcium, Copper, Iron, Lead, Magnesium and Sodium, Bromates and Bromides, Carbonates, Chlorides, Cyanides, Iodates, Nitrates or Sulphates. The *B.P.* requires that it shall yield only the slightest reactions with the tests for Bromides, Carbonates, Chlorides or Sulphates, and no characteristic reaction for the remaining substances. The *U.S.P.* includes a test for limit of alkali, 'less soluble salts,' Barium and Thiosulphates. Arsenic, Copper, Lead and Iron may be detected, if present, by the Hydrogen Sulphide test described below, either before or after the addition of Ammonia. Neither a turbidity nor a flocculent precipitate should be produced when an aqueous solution of the salt is boiled with Ammonia Water. Ammonium Oxalate Solution should produce neither a turbidity nor a precipitate, nor should the addition of Sodium Phosphate Solution to the filtrate from the Ammonium Oxalate Solution cause any alteration. A crystal of the salt when moistened with Hydrochloric Acid and introduced into a non-luminous flame on a loop of platinum wire should not impart a persistent yellow coloration to the flame. When boiled with Liquor Potassæ an aqueous solution should not evolve an odour of Ammonia, nor should the issuing gas produce an alkaline reaction towards red Litmus paper. The aqueous solution should not afford an immediate yellow coloration when mixed with a little diluted Sulphuric Acid; when mixed with Chlorine Water the aqueous solution should afford when shaken with Carbon Bisulphide a distinct violet and not a brown coloration. A solution of the salt should not yield a pink coloration on the addition of Phenolphthalein Solution. Chlorides, if present, may be detected by shaking the precipitate produced on the addition of an excess of Silver Nitrate Solution, with Ammonia Solution, the filtrate should yield no decided turbidity nor a precipitate on acidification with diluted Nitric Acid.

The Ferrous Sulphate and Potassium Hydroxide test described below may be employed for the detection of Cyanides. In testing for Nitrates the *U.S.P.* employs the Potassium Hydroxide and Aluminium wire test described in small type below. The *P.G.* the Sodium Hydroxide Solution, Zinc filings and powdered Iron test. Chlorides, Bromides and Thiosulphates, if present, may be detected by the test with Volumetric Silver Nitrate Solution mentioned in small type. Barium, if present, may be detected by the Potassium Sulphate test described below.

A method has been described (*P.J.* '00 ii. 58) by which the Iodine only, in a mixture of Chloride, Bromide and Iodide of Potassium, may be determined. The process depends upon the liberation of Iodine alone from the mixture by the interaction of 5 p.c. Potassium Bichromate Solution and 10 p.c. Sulphuric Acid Solution. A weighed quantity of 0·5 of a gramme of a mixture of the salts is dissolved in 20 c.c. of Water, and 10 c.c. of a 5 p.c. Potassium Bichromate Solution is introduced, together with 10 c.c. of a 10 p.c. Sulphuric Acid Solution, the mixture is allowed to stand for a few minutes, shaking vigorously with 60 c.c. of Toluol. After separation the lower stratum is removed, the Toluol washed by agitation with small quantities of Water, adding the washings to the first portion separated. The mixed washings are again extracted with Toluol, which, if it be coloured violet, is added to that already separated. The mixed Toluol Solutions are then shaken with 35 c.c. of Tenth-normal Volumetric Sodium Thiosulphate Solution, the Thiosulphate Solution removed, the Toluol washed, the washings mixed with the Thiosulphate Solution, and the excess of Tenth-normal Volumetric Sodium Thiosulphate Solution titrated with Tenth-normal Volumetric Iodine Solution; from the amount of Tenth-normal Volumetric Sodium Thiosulphate Solution absorbed, the amount of Potassium Iodide may be readily calculated.

Litmus.—Crushed Potassium Iodide brought in contact with moistened red Litmus paper should not immediately colour it violet-blue, *P.G.* The aqueous solution is neutral or has a slightly alkaline reaction upon Litmus paper *U.S.P.*

Phenolphthalein.—A solution of 1 gramme of the salt in 10 c.c. of Water with 0·1 c.c. of Tenth-normal Volumetric Sulphuric Acid Solution added should yield no coloration on the subsequent addition of a drop of Phenolphthalein T.S., even after heating, *U.S.P.*

Sulphuric Acid.—A solution of 0·5 gramme of the salt in 10 c.c. of previously boiled and cooled Distilled Water, with the addition of 2 drops of diluted Sulphuric Acid (free from Sulphurous and Nitrous Acids) should show no distinct yellow colour within half a minute, *U.S.P.* The boiled and cooled (1–20) aqueous solution should not be immediately coloured on the addition of Starch Solution and diluted Sulphuric Acid.

Hydrogen Sulphide.—The aqueous solution (1–20) should not be affected by T.S. of Hydrogen Sulphide, *P.G.*; slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Barium Nitrate.—An aqueous solution (1–20) should not be affected by T.S. of Barium Nitrate, *P.G.*

Potassium Sulphate.—10 c.c. of an aqueous solution (1–20) acidulated with Hydrochloric Acid should not be rendered turbid by 1 c.c. of T.S. of Potassium Sulphate, *U.S.P.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution (1–20) acidulated with a few drops of Hydrochloric Acid should not be rendered blue by 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

Ferrous Sulphate and Potassium or Sodium Hydroxide.—If an aqueous solution (1–20) be gently warmed with a crystal of Ferrous Sulphate and 1 drop of Ferric Chloride T.S. after the addition of Sodium Hydroxide T.S., it should not be coloured blue when saturated with Hydrochloric Acid, *P.G.* The *U.S.P.* directs that 5 c.c. of the aqueous solution be gently heated with 1 drop of Ferrous Sulphate T.S. and 0·5 c.c. of T.S. of Potassium Hydroxide, no blue colour should appear when the mixture is acidulated with Hydrochloric Acid.

Aluminium Wire and Potassium Hydroxide; or Zinc, Iron and Sodium Hydroxide.—If 1 gramme of the salt be treated as described under Potassium Chlorate with Potassium Hydroxide T.S. and Aluminium wire the Litmus paper should show no blue coloration, *U.S.P.* 1 gramme of the salt warmed with 5 c.c. of Sodium Hydroxide T.S. and a mixture of 0·5 gramme of Zinc filings and powdered Iron should not evolve Ammonia, *P.G.*

Volumetric Silver Nitrate and Ammonia Solution.—If 0·2 gramme of the salt dissolved in 2 c.c. of Ammonia T.S. (10 p.c. *U.S.P.*) be mixed with 13 c.c. of Tenth-normal Silver Nitrate Volumetric Solution the mixture agitated and filtered, the filtrate after acidulation with Nitric Acid should not become opaque (more than slightly turbid, *U.S.P.*) nor should there be any darkening in colour within 10 minutes, *P.G.* and *U.S.P.*

Volumetric Determination.—Not less than 59·5 and not more than 61·9 c.c. of Silver Nitrate Volumetric Solution should be necessary to completely precipitate 1 gramme of the salt, *B.P*; 0·5 gramme of the well-dried salt dissolved in 10 c.c. of Distilled Water and 3 drops of Potassium Chromate T.S. added should require not more than 30·8 c.c. and not less than 30 c.c. of Tenth-normal Silver Nitrate Volumetric Solution to produce a permanent red colour, *U.S.P.*

Preparations.

LINIMENTUM POTASSII IODIDI CUM SAPONE. Liniment of Potassium Iodide with Soap.

Curd Soap, recently prepared and in shavings, 2 oz.; Potassium Iodide, 1½ oz.; Glycerin, 1 fl. oz.; Oil of Lemon, 1 fl. drm.; Distilled Water, 10 fl. oz. Dissolve the Soap and the Glycerin in the Water by the heat of a water-bath and pour the solution on to the powdered Potassium Iodide in a mortar, rub them together until the mixture is cold; after half an hour thoroughly mix in the Oil of Lemon. There will be a variable loss of Water in dissolving the Soap, and it should be made up to a weight when taken off the water-bath.

When first prepared it is very bulky, but after it has been made some time it occupies a much smaller space, and this is apt to cause trouble with patients. The difference is due to the quantity of air incorporated in it by the trituration, and is so great that it would be quite possible at different times for the same weight of Liniment to fill a 1 oz. pot and a 4 oz. pot.

The advantages of this Liniment are that it does not stain nor does it irritate when rubbed on the skin; it is employed in enlargement of the joints, and in indurated glands, especially the cervical glands.

Foreign Pharmacopœias.—Official in Swiss (Opodeldoc Iodatum), Lard or Butter, 50; Alcohol (95 p.c.), 25; Solution of Caustic Soda, 25; saponify and dissolve in Alcohol, 825; Sodium Iodide, 50; Water, 25; Oil of Lemon, 10. Swiss has also Opodeldoc Iodatum Liquidum. Not in the others.

Linimentum Saponato-Camphoratum cum Kalio Iodato.—Stearic Soap, 75; Venetian Soap, 75; Spirits of Wine, 600; Water, 98; Glycerin, 50; Potassium Iodide, 100; Lavender Oil, 2.—Austr.

UNGUENTUM POTASSII IODIDI. Potassium Iodide Ointment.

Potassium Iodide, 50; Potassium Carbonate, 3; Distilled Water (by weight), 47; Benzoated Lard, 400. Add the solution to the Lard in a slightly warmed mortar. (1 in 10)

Foreign Pharmacopœias.—Official in Dutch, Fr., Ger., Hung., Ital. Norw., Port., Russ., Span., Swiss and U.S., 1 in 10; Austr., Ger., Jap. and Russ., with Sodium Thiosulphate; Mex., (Pomada de Yoduro de Potasio) Potassium Iodide, 8; Benzoinated Lard, 60; Water, *q.s.* Not in Belg. or Dan.

Not Official.

LINIMENTUM POTASSII IODIDI.—Soft Soap, 2 oz.; Potassium Iodide, 1½ oz.; Glycerin, 1 fl. oz.; Oil of Lemon, 1 fl. drm.; Alcohol (60 p.c.), 10 fl. oz.—*Y.B.P.* '04, 510.

These quantities correspond to those of the official Liniment, but Soft Soap and Alcohol (60 p.c.) are used in place of Curd Soap and Distilled Water.

It contains twice as much Soap as Linimentum Saponis.

Soft Soap, 13·50; Potassium Iodide, 10; Glycerin, 7; Oil of Lemon, 1; Alcohol (60 p.c.), *q.s.* to produce 100.—*B.P.C.*

LINIMENTUM POTASSII IODIDI C. SAPONE (*B.P.* 1867).—Hard Soap, 1¼ oz.; Potassium Iodide, 1½ oz.; Glycerin, 1 fl. oz.; Oil of Lemon, 1 fl. drm.; Water, 10 fl. oz. 'Put the Glycerin, Iodide, and 3 fl. oz. of Water in a clean 20-oz. wide-mouthed bottle; then dissolve the Soap (in shavings) in the 7 fl. oz. of Water in a jar by the heat of a water-bath; strain the solution whilst hot through muslin into the bottle containing the Iodide, etc.; allow to stand for 2 or 3 minutes, until the bottom of the Soap Solution is a little opaque, then mix by agitation; lastly add the Oil of Lemon, shaking briskly, and, after agitating at intervals for 2 hours or more, a liniment in the form of a soft white jelly will result, and remain so; if it should not, a small addition of Water will generally perfect it.'

This formula is that of *B.P.* '67, but the manipulation has been modified; when made properly it gives satisfaction.

MISTURA POTASSII IODIDI.—Potassium Iodide, 10 grains; Potassium Bicarbonate, 5 grains; Pimento Water to 1 fl. oz.—*Brompton.*

MISTURA POTASSII IODIDI ALKALINA.—Potassium Bicarbonate, 15 grains; Ammonium Carbonate, 3 grains; Potassium Iodide, 3 grains; Camphor Water to 1 fl. oz.—*Brompton.* Potassium Iodide, 3 grains; Potassium Bicarbonate, 10 grains; Ammonium Carbonate, 3 grains; Camphor Water, to 1 fl. oz.—*St. Thomas's.*

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

MISTURA POTASSII IODIDI ET STRAMONII.—Extract of Stramonium, ¼ grain; Extract of Liquorice, 2 grains; Potassium Iodide, 3 grains; Chloric Ether, 5 minims; Water to 1 fl. oz.—*Brompton.* Potassium Iodide, 3 grains; Tincture of Stramonium, 5 minims; Liquid Extract of Liquorice, 10 minims; Emulsion of Chloroform, 10 minims; Water, to 1 fl. oz.—*St. Thomas's.*

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

PILULÆ KALII IODATI.—Potassium Iodide, 20; Powdered Starch, 5; Simple Syrup, *q.s.*—*Belg.*

POMADA DE YODURO POTASICO CON EXTRACTO DE CICUTA.—Potassium Iodide Ointment, 80; Extract of Conium, 10; Distilled Water, *q.s.*—*Span.*

POTASSII NITRAS.

POTASSIUM NITRATE.

B.P.Syn.—NITRE, SALTPETRE.

N.O.Syn.—AZOTATE DE POTASSE.

KNO_3, eq. 100·41.

FR., AZOTATE DE POTASSIUM: GER., KALIUMNITRAT; ITAL., NITRATO DI POTASSIO; SPAN., NITRATO POTASICO.

Colourless, transparent, rhombic prisms, or a white odourless, crystalline powder, having a cooling saline taste. It is obtained by purifying Crude Nitre, or from Sodium Nitrate.

It should be kept in well-stoppered glass bottles, as it has a slight tendency to deliquesce in moist air.

Solubility.—1 in 4 of cold Water; 2½ in 1 of boiling Water; sparingly in Alcohol (90 p.c.).

Medicinal Properties.—Sometimes given as a diuretic and diaphoretic, but the Acetate and Citrate are much to be preferred.

Useful as a gargle in relaxed sore throat. Potassium Nitrate 5 grains, Potassium Bicarbonate 20 grains, taken, during effervescence, with Citric Acid 15 grains, in a small tumbler of cold Water, is a pleasant cooling draught in febrile conditions. A common ingredient of asthma inhalation powders. Charta Nitrata is used in spasmodic asthma.

15 grains of Potassium Nitrate with ½ grain Sodium Nitrite useful for lessening high arterial tension and arresting epistaxis; 15 grains of Potassium Nitrate along with Potassium Bicarbonate and ½ grain of Sodium Nitrite; useful for the same purpose in gouty subjects.—*L.* '02, ii. 331; *B.M.J.* '02, ii. 504.

Used for its slight antiseptic effect to assist in preserving canned meat, and to give it a red colour. Amount should be restricted to 2 grains per pound. —*Roy. Army Med. Corps Jour.* '08, i. 124.

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

Official Preparations.—Contained in Argenti Nitras Induratus and Argenti Nitras Mitigatus. Used in the preparation of Acidum Nitricum.

Not Official.—Mistura Salina, Mistura Salina Anodyna, Sal Prunella, Charta Nitrata, Charta Nitrata et Chlorata.

Foreign Pharmacopœias.—Official in all; Austr., Belg., Ger., Hung., Jap.,, Russ. and Swiss (Kalicum Nitricum); Dan., Dutch, Norw. and Swed. (Nitras Kalicus); Fr. (Azotate de Potassium); Ital. (Nitrato di Potassio); Mex. (Nitrato de Potasio); Port. (Azotato de Potassa); Span. (Nitrato Potasico); U.S. (Potassii Nitras).

Tests.—Potassium Nitrate when heated fuses. The *U.S.P.* states at a temperature of 353° C. (667·4° F.), when still more strongly heated it is decomposed, giving off Oxygen and leaving a residue of Potassium Nitrate, Nitrite and Oxide. It dissolves readily in Water, forming a clear solution which is neutral in reaction towards Litmus paper, and which yields the tests given under Potassium. An aqueous solution when cautiously mixed with Sulphuric Acid, keeping the mixture cool, affords when a solution of Ferrous Sulphate is carefully poured on to the surface of the mixture a dark brown ring at the junction of the two fluids. 1 or 2 drops of a Diphenylamine Solution (prepared by dissolving 0·1 of a gramme of Diphenylamine in 50 c.c. of Diluted Sulphuric Acid) when mixed with an aqueous solution affords a deep blue colour at the point of contact of the two liquids when Sulphuric Acid is carefully poured into the liquid, so as to form a separate layer. An aqueous solution acidified with Sulphuric Acid immediately discharges the colour of indigo solution; when warmed with Sulphuric Acid and Copper foil an evolution of nitrous fumes ensues. The *U.S.P.* states that the salt shall contain not less than 99 p.c. of pure Potassium Nitrate, but gives no method of determination. Neither the *B.P.* nor the *P.G.* states a requisite percentage nor includes a method of determination.

The more generally occurring impurities are Aluminium, Ammonium, Calcium, Copper, Iron, Lead, Magnesium, Sodium, Zinc, Chlorides, Iodides and Sulphates. The *U.S.P.* includes tests for Chlorate and Perchlorate. The aqueous solution of the salt should afford neither a turbidity nor a precipitate when boiled with Ammonia Solution. It should yield no reaction for Arsenic, Copper, Iron, Lead or Zinc when examined by the Hydrogen Sulphide test described in small type below. It should not yield a reaction for Calcium or Magnesium when examined by the Ammonium Oxalate and Sodium Phosphate tests described below, nor for Chloride, Sulphate, Iodide, Chloride or Perchlorate when examined by the tests under Silver Nitrate, Barium Nitrate, Chlorine and Chloroform, and Sulphuric Acid given in the small type below. The *P.G.* includes a separate test for Iron with Potassium Ferrocyanide Solution.

Flame.—Heated on Platinum wire it colours the flame violet, only a transitory yellow colour appearing, *P.G.*

Hydrogen Sulphide.—The aqueous solution (1–20) should not be affected by T.S. of Hydrogen Sulphide, either before or after the addition of Ammonia Water, *P.G.*; when slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals, *U.S.P.*

Ammonium Oxalate.—An aqueous solution (1–20) after the addition of Ammonia T.S. should not be affected by T.S. of Ammonium Oxalate, *P.G.*

Sodium Phosphate.—An aqueous solution (1–20) after the addition of Ammonia T.S. should not be affected by T.S. of Sodium Phosphate, *P.G.*

Barium Nitrate.—An aqueous solution (1–20) should not be affected by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—An aqueous solution (1–20) should not be affected by T.S. of Silver Nitrate, *P.G.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution (1–20) should not be rendered blue by 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

Chlorine and Chloroform.—If to 10 c.c. of the aqueous solution (1–20) of the salt 1 c.c. of Chloroform be added and Chlorine Water introduced drop by drop with agitation, the Chloroform should not acquire a violet tint, *U.S.P.*

Sulphuric Acid.—If 0·1 gramme of the salt be sprinkled upon 1 c.c. of Sulphuric Acid the latter should not become coloured, *P.G.*; no yellow colour should appear, *U.S.P.*

Not Official.

MISTURA SALINA.—Potassium Nitrate, 5 grains; Spirit of Nitrous Ether, 20 minims; Burnt Sugar, 5 minims; Camphor Water, to ½ fl. oz.—*Central Throat.*

Potassium Nitrate, 10 grains; Solution of Ammonium Acetate, 3 fl. drm.; Spirit of Nitrous Ether, 30 minims; Water. to 1 fl. oz.—*St. Thomas's.*

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

Potassium Citrate, ½ drm.; Spirit of Nitrous Ether, 30 minims; Solution of Acetate of Ammonium, 1 fl. drm.; Camphor Water, to 1 fl. oz.—*St. Mary's.*

Potassium Nitrate, 10 grains; Solution of Ammonium Acetate, 3 fl. drm.; Spirit of Nitrous Ether, 30 minims; Water, to ½ fl. oz.—*London.*

MISTURA SALINA ANODYNA.—Tincture of Opium, 10 minims; Saline Mixture, to 1 fl. oz.—*St. Thomas's.*

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

SAL PRUNELLA.—Potassium Nitrate fused and moulded into balls.

CHARTA NITRATA (Austr., Belg., Dan., Fr., Ger., Ital., Norw., Port., Swed. and Swiss).—Soak porous paper in a saturated solution of Nitre, and dry. Roll it up and burn in a candlestick. Used in asthma.

The paper is sometimes impregnated also with Compound Tincture of Benzoin, Spirit of Camphor, Oils of Cassia, Cinnamon and Santal, and Tincture of Sumbul.

CHARTA NITRATA ET CHLORATA.—Soak porous paper in a saturated solution of Potassium Nitrate and Potassium Chlorate, and dry. Used in asthma.

POTASSII PERMANGANAS.

POTASSIUM PERMANGANATE.

N.O.Syn.—KALIUM HYPERMANGANICUM.

$K_2Mn_2O_8$, eq. 313·74.

FR., PERMANGANATE DE POTASSIUM; GER., KALIUMPERMANGANAT;
ITAL., PERMANGANATO DI POTASSIO; SPAN., PERMANGANATO POTASICO.

Slender, dark, purple, odourless, prismatic crystals, possessing a purplish-blue metallic lustre, and a peculiar characteristic taste, at first sweet and afterwards unpleasant and somewhat astringent.

It should be kept in well-stoppered bottles and protected as far as possible from the light and from dust. When pure it is a permanent salt.

It should be handled with caution as when brought into contact with easily oxidisable substances, *e.g.*, Alcohol, Gallic and Tannic Acid, Glycerin, essential Oils, etc., it readily parts with its Oxygen, the action being very violent and frequently attended by explosion. Its solutions when mixed with Hydrogen Peroxide evolve nascent Oxygen.

Solubility.—1 in 18 of Water; 1 in 3 of boiling Water.

Medicinal Properties.—A powerful deodorant, a weak antiseptic. Useful internally in amenorrhœa. Externally, as a wash for foul ulcers and chancres and in ozœna; as an antiseptic gargle in throat affections.

In snake bites, Lauder Brunton recommends that the wound be scraped with a clean knife, and then powdered crystals of Potassium Permanganate rubbed into the wound.

Weak solution (1 in 2000) injected in gonorrhœa.—*B.M.J.E.* '95, i. 60; *M.P.* '95, i. 431; *B.M.J.E.* '89, ii. 88.

A 1 in 2000 solution as a douche in vulvo-vaginitis in children.—*Pr.* lxxiv. 225.

Case of poisoning by repeated small doses (about 2 grains). Recovery.—*L.* '99, ii. 1468.

Found always a valuable remedy in snake bites if given in time.—*L.* '02, ii. 1711; '03, i. 133; *P.J.* '03, i. 13; *L.* '05, ii. 609.

In certain forms of menstrual suffering. Striking and permanent results obtained by its use.—*L.* '02. ii. 1757.

In asylum dysentery, the lower bowel washed out night and morning with a weak solution (2 to 4 grains to the pint).—*L.* '02, i. 588.

In lupus, painting with a saturated solution, or dusting with powdered Permanganate.—*B.M.J.E.* '02, i. 55; *B.M.J.* '03, ii. 194.

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

Prescribing Notes.—*It can be made into a* **pill** *with Massa Paraffini. It is not given in solution on account of its disagreeable taste.*

It is the practice to coat Permanganate pills with Sandarach varnish, but the Alcohol contained in the varnish is liable to be oxidised at the expense of the Permanganate.

Incompatibles.—Animal or vegetable matters, and any reducing agent. It is an antidote to Morphine.

Official Preparation.—Liquor Potassii Permanganatis.

Not Official.—Gargarisma Potassii Permanganatis, Calcii Permanganas and Sodii Permanganas.

Foreign Pharmacopœias.—Official in U.S.; Austr. (Kalium Hypermanganicum crystallisatum); Belg. (Kalium Permanganicum); Dan., Norw. and Swed. (Hypermanganas Kalicus); Dutch (Permanganas Kalicus); Fr. (Permanganate de Potassium); Ger. and Jap. (Kalium Permanganicum); Hung., Russ. and Swiss (Kalium Hypermanganicum); Ital. (Permanganato di Potassio); Mex. (Permanganato de Potasio); Port. (Permanganato de Potassa); Span. (Permanganato Potasico); Ital. has also a crude salt for disinfecting purposes.

Tests.—Potassium Permanganate when heated decrepitates, and when more strongly heated it decomposes, with the evolution of Oxygen, leaving a residue of Potassium Manganate and Manganese Dioxide. It dissolves in Water, forming a deep purple coloured solution which is neutral in reaction towards Litmus paper. The aqueous solution of the residue obtained on strongly heating the salt is alkaline in reaction towards red Litmus paper. When heated with a mixture of Alcohol, Water and Sulphuric Acid it evolves an odour of Acetaldehyde, the purple-coloured solution becoming colourless, and it then affords the tests distinctive of Potassium given under that heading. The addition of Oxalic Acid Solution, Ferrous Sulphate Solution or Hydrogen Dioxide Solution to an acidified aqueous solution immediately decolorises it. It is officially required to yield 97·9 p.c. of pure Potassium Permanganate, as volumetrically determined by titration with Normal Volumetric Oxalic Acid Solution as described in the small type below. The *U.S.P.* requires that it should contain not less than 99 p.c. of pure Potassium Permanganate as volumetrically determined by titration with Tenth-normal Volumetric Oxalic Acid Solution as described below. The *P.G.* does not include a method of determination.

The more generally occurring impurities are Aluminium, Ammonium, Calcium, Iron, Lead, Magnesium and Sodium, Carbonates, Chlorides, Nitrates and Sulphates. In testing for these impurities a solution of the salt should be treated with sufficient Alcohol to cause complete decolorisation and the liquid filtered, a portion of the filtered liquid should neither afford a turbidity nor a flocculent precipitate when boiled with Ammonia Solution; it should not evolve an odour of Ammonia when boiled with Potassium Hydroxide Solution; when acidified with diluted Hydrochloric Acid it should afford no darkening in colour on the addition of Hydrogen Sulphide Solution. When treated with Ammonium Chloride Solution and Sodium Phosphate Solution it should afford neither a distinct turbidity nor a precipitate. A solution of the salt should not possess a decidedly alkaline reaction to red Litmus paper. A portion of the solution decolorised by Alcohol should afford no reaction when examined by the Silver Nitrate, Barium Chloride or Diphenylamine and Sulphuric Acid tests described below. In testing for Nitrates the *P.G.* decolorises the Potassium Permanganate with Oxalic Acid and examines the filtrate with the Sulphuric Acid and Ferrous Sulphate test described in the small type paragraph.

Litmus.—An aqueous solution is neutral to Litmus, *P.G.* and *U.S.P.*

For applying tests of purity the *P.G.* and *U.S.P.* direct the preparation of a solution as follows:—0·5 gramme of the salt is boiled with 2 c.c. of Alcohol and 25 c.c. of Water and the liquid filtered. The *U.S.P.* directs 4 c.c. of Alcohol, 20 c.c. of Water, and boiling until the salt is completely decomposed. The filtrate is clear and colourless.

Barium Chloride or Nitrate.—5 c.c. of the above filtrate acidulated with Nitric Acid should not be rendered more than very slightly turbid by T.S. of Barium Chloride, *U.S.P.*; not more than opalescent by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—Another portion of the filtrate acidulated with Nitric Acid should give with Silver Nitrate T.S. no precipitate or cloudiness, *U.S.P.*; should not be rendered more than opalescent, *P.G.*

Diphenylamine and Sulphuric Acid.—If to another portion of 5 c.c. of the filtrate 1 drop of Diphenylamine T.S. be added, and then 1 c.c. of Sulphuric Acid be introduced so as to form a layer beneath, no blue colour should appear at the line of contact, *U.S.P.*

Oxalic Acid, Sulphuric Acid and Ferrous Sulphate.—If Oxalic Acid be gradually added to a solution of 0·5 gramme of the salt in 5 c.c. of hot Water until decolorisation occurs and then filtered, 2 c.c. of the filtrate mixed with 2 c.c. of Sulphuric Acid and 1 c.c. of Ferrous Sulphate T.S. poured on as a layer should not give any coloured zone, *P.G.*

Volumetric Determination.—1 gramme of the salt dissolved in Water, and mixed with 5 c.c. of diluted Sulphuric Acid should require 31·2 c.c. of Normal Oxalic Acid Volumetric Solution for complete decolorisation, *B.P.* The *U.S.P.* directs 0·1 gramme of the salt to be dissolved in 100 c.c. of Water to which 1 c.c. of Sulphuric Acid and 35 c.c. of Tenth-normal Volumetric Solution of Oxalic Acid have been previously added, when not more than 3·5 c.c. of Tenth-normal Volumetric Potassium Permanganate Solution should be required to impart a permanent pink tint.

Preparation.

LIQUOR POTASSII PERMANGANATIS. SOLUTION OF POTASSIUM PERMANGANATE.

Dissolve 87½ grains of Potassium Permanganate in Distilled Water, *q.s.* to yield 20 fl. oz. (1 in 100)

Dose.—2 to 4 fl. drm. = 7·1 to 14·2 c.c.

110 minims contain 1 grain.

If it needs filtration, glass-wool is best for the purpose.

Diluted with 40 to 80 parts of Water, is useful as a **gargle**, or as a cleansing **wash** for foul ulcers, etc.

Foreign Pharmacopœias.—Official in Mex., 1 in 500. Not in the others.

Not Official.

GARGARISMA POTASSII PERMANGANATIS.—Solution of Potassium Permanganate, 12 minims; Water, to 1 fl. oz.—*St. Mary's*, *University* and *Westminster*.

Solution of Potassium Permanganate, ½ fl. oz.; Water, *q.s.* to make 20 fl. oz. —*St. Thomas's.*

The deodorant and disinfectant properties of this gargle may be increased by the addition of 2 minims of diluted Sulphuric Acid per fl. oz.—*St. Thomas's.*

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

Solution of Potassium Permanganate, 10 minims; Water, to 1 fl. oz.—*London.*

Potassium Permanganate, ⅛ grain; Water, to 1 fl. oz.—*Throat.*

CALCII PERMANGANAS.—Purplish-red, crystalline masses, deliquescent and very soluble in Water. It is a powerful disinfectant and deodorant. It is stated to be less nauseous than the Potassium salt, but there is not much difference between them, in this respect.

Strychnine Sulphate and Hydrochloride, Morphine, and Aconitine have been shown to yield an innocuous product when treated with a 5 p.c. solution of this salt.—*J.C.S.* 1905, *Abs.* i. 107.

Sodii Permanganas in solution is used as a disinfectant. It is so soluble in Water that it is difficult to crystallise.

POTASSII SULPHAS.

POTASSIUM SULPHATE.

K_2SO_4, eq. 173·00.

FR., SULFATE NEUTRE DE POTASSIUM; GER., KALIUMSULFAT;
ITAL., SOLFATO DI POTASSIO; SPAN., SULFATO POTASICO.

Hard, transparent, colourless, six-sided, rhombic prisms, terminated by pyramids, or a white, odourless powder, having a somewhat bitter saline taste. Permanent in the air.

Potassium Sulphate was long known as **Sal Polychrestum**, and the Bisulphate (the residue from making Nitric Acid) as **Sal Enixum.**

In Scotland, Sal Polychrestum means Sulphas Potassæ c. Sulphure.—*Ph. Edinburgh.*

Solubility.—1 in 10 of cold Water, 1 in 4 of boiling Water. Insoluble in Alcohol (90 p.c.).

Medicinal Properties.—Mild, saline cathartic, usually operating without irritation if given well diluted. Generally given in combination with Rhubarb. A useful purgative in hepatic sluggishness.

Dose.—10 to 40 grains = 0·65 to 2·6 grammes.

Official Preparations.—Used in the preparation of Pilula Colocynthidis Composita and Pulvis Ipecacuanhæ Compositus. Contained in Pilula Colocynthidis et Hyoscyami, and Pilula Ipecacuanhæ cum Scilla.

Foreign Pharmacopœias.—Official in U.S.; Dan., Dutch, Norw. and Swed. (Sulphas Kalicus); Fr. (Sulfate Neutre de Potassium); Belg., Ger., Hung., Jap., Russ. and Swiss (Kalium Sulfuricum); Mex. (Sulfato de Potasio); Port. (Sulfato de Potassa); Span. (Sulfato Potasico). Not in Austr.

Tests.—Potassium Sulphate when heated decrepitates and fuses at a bright red heat. It dissolves in Water, forming a clear solution which should be neutral in reaction towards Litmus paper and which should yield the tests distinctive of Potassium given under that heading, and which should yield with Barium Chloride Solution a white precipitate insoluble in Hydrochloric Acid. It is officially required to yield 99·9 p.c. of pure Potassium Sulphate as gravimetrically determined by precipitation as Barium Sulphate; the washed and dried precipitate from a solution of 1 gramme of the salt in Water, acidulated with Hydrochloric Acid, is required to weigh 1·339 grammes. The *U.S.P.* states that it should contain not less than 99 p.c. of pure Potassium Sulphate, but gives no method of determination. The *P.G.* gives neither a requisite percentage of Sulphate nor a method of determination.

The more generally occurring impurities are Arsenic, Calcium, Copper, Iron, Lead, Magnesium, Sodium and Zinc. The *B.P.* includes also Aluminium and Ammonium. Chlorides and Nitrates are also likely impurities, as also Acid Potassium Sulphate. Arsenic, if present, may be detected by the modified Gutzeit's test. Iron, Copper, Lead and Zinc, if present, are indicated by the Hydrogen Sulphide test described below; the *P.G.* includes a separate test for Iron with Potassium Ferrocyanide Solution; Calcium and Magnesium by the Ammonium Oxalate and Sodium Phosphate tests described in small type. Aluminium may be detected by the turbidity or flocculent precipitate produced on boiling the solution with Ammonia Solution. Ammonium salts by the evolution of Ammonia gas when a solution of the sample is boiled with Liquor Potassæ. Chlorides, if present, may be detected by the Silver Nitrate test described in small type. Acid Potassium Sulphate, if present, is indicated by the behaviour of the aqueous solution of the specimen towards Litmus paper, solutions of the Acid Sulphate have a decidedly acid reaction towards blue Litmus paper. A solution of the salt, when carefully mixed with Sulphuric Acid, the mixture being kept cool, should afford no brown ring at the junction of the two liquids when a Solution of Ferrous Sulphate is carefully poured upon its surface.

Hydrogen Sulphide.—The aqueous solution (1–20) should not be affected by T.S. of Hydrogen Sulphide, *P.G.*; slightly acidulated with Hydrochloric Acid should not respond to the time-limit test for heavy metals.—*U.S.P.*

Gutzeit's Test.—5 c.c. of an aqueous solution of the salt (1–10) should not respond to the modified Gutzeit's test for Arsenic, *U.S.P.*

Ammonium Oxalate.—The aqueous solution (1–20) of the salt should not be affected by T.S. of Ammonium Oxalate, *P.G.*

Silver Nitrate.—The aqueous solution (1–20) of the salt should not be affected by T.S. of Silver Nitrate, *P.G.*

Sodium Phosphate.—The aqueous solution (1–20) of the salt should not be affected by T.S. of Sodium Phosphate, *P.G.*

Potassium Ferrocyanide.—20 c.c. of an aqueous (1–20) solution of the salt should not be rendered blue by 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

POTASSII TARTRAS.

POTASSIUM TARTRATE.

$K_2C_4H_4O_6, H_2O$, eq. 242·46.

FR., TARTRATE DE POTASSE NEUTRE; GER., KALIUMTARTRAT; ITAL., TARTRATO NEUTRO DI POTASSIO; SPAN., TARTRATO POTASICO NEUTRO.

Colourless, translucent, prismatic crystals, or as a white, crystalline, slightly deliquescent powder, having a saline and bitter taste. It may be obtained by neutralising the Acid Tartrate with Potassium Carbonate.

Solubility.—10 in 6 of Water. Insoluble in Alcohol (90 p.c.).

Medicinal Properties.—A mild, saline purgative, operating without much pain, and producing watery stools. In smaller doses, antacid, diuretic and alterative.

Dose.—30 to 240 grains = 2 to 16 grammes.

Foreign Pharmacopœias.—Official in Dan. and Norw. (Tartras Kalicus); Ger., Hung., Jap. and Russ. (Kalium Tartaricum); Ital. (Tartrato Neutro di Potassio); Mex. (Tartrato de Potasio Neutro); Port. (Tartarato de Potassa); Span. (Tartrato Potasico Neutro). Not in Austr., Belg., Dutch, Fr., Swiss or U.S.

Tests.—Potassium Tartrate when heated decomposes, evolving an odour of burnt sugar and leaving behind a black residue, the aqueous solution of which possesses an alkaline reaction towards red Litmus paper. It dissolves readily in Water, forming a solution which has a slightly alkaline reaction towards red Litmus paper. When acidified with Hydrochloric Acid it should yield the tests distinctive of Potassium given under that heading. The aqueous solution yields on the addition of Calcium Chloride Solution in excess a white granular precipitate soluble when freshly precipitated in cold, moderately concentrated Potassium Hydroxide Solution, re-precipitated on boiling, it is soluble also in diluted acids. Silver Nitrate Solution affords a white precipitate soluble in diluted Nitric Acid and in Ammonia Solution; the solution obtained by the use of the latter reagent, when boiled in a perfectly clean test-tube, deposits a mirror of metallic Silver on the sides of the tube. When mixed with Ferrous Sulphate Solution, a few drops of Hydrogen Peroxide Solution and an excess of Potassium Hydroxide Solution, a purple or violet coloration is produced. It is officially required to contain 101·8 p.c. of pure Potassium Tartrate as volumetrically determined by the direct titration of the solution of the residue left on ignition of the dried salt, with Volumetric Sulphuric Acid Solution, the inaccuracy being due to the incorrectness of the official formula. The salt is official in the *P.G.*, but no requisite percentage of pure Tartrate is indicated, nor is a method of determination given.

The more generally occurring impurities are Calcium, Copper, Iron and Lead, Magnesium, Sodium, Chlorides, Sulphates and Acid Potassium Tartrate. Calcium, if present, may be detected by Ammonium Oxalate test after separation of the greater portion of the Potassium Tartrate as insoluble Acid Tartrate of Potash by precipitation with diluted Acetic Acid. Copper, Lead, and Iron may be detected by the Hydrogen Sulphide test described below; the *P.G.* includes a separate test for Iron with Potassium Ferrocyanide Solution; Magnesium by Sodium Phosphate Solution; Chlorides and Sulphates may be detected by the Barium Nitrate and Silver Nitrate tests described in the small type paragraphs. Potassium Acid Tartrate, if present, may be detected by the behaviour of the aqueous solution towards blue Litmus paper, Acid Potassium Tartrate having a decidedly acid reaction. The salt should not evolve an odour of Ammonia when warmed with Sodium Hydroxide Solution; when acidified with Hydrochloric Acid and inserted on a loop of platinum wire into a non-luminous flame it should not colour the flame a distinct or permanent yellow colour.

Acetic Acid and Ammonium Oxalate.—If 1 gramme of Potassium Tartrate be dissolved in 10 c.c. of Water and the solution agitated with 5 c.c. of Diluted Acetic Acid a crystalline separation occurs. The liquid poured off and diluted with an equal part of Water should not be affected by 8 drops of Ammonium Oxalate T.S. within 1 minute, *P.G.*

Hydrogen Sulphide.—The aqueous solution (1-20) should not be affected by T.S. of Hydrogen Sulphide, *P.G.*

Barium Nitrate.—The aqueous solution (1-20), after the addition of Nitric

Acid and the removal of the crystalline precipitate formed, should not be affected by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—Another portion of an aqueous solution treated as above should not be rendered more than opalescent by T.S. of Silver Nitrate, *P.G.*

Potassium Ferrocyanide.—20 c.c. of an aqueous solution (1–20) should not be rendered blue by 0·5 c.c. of T.S. of Potassium Ferrocyanide, *P.G.*

Volumetric Determination.—The filtered aqueous solution obtained by dissolving in Water, the alkaline residue left on exposing 1 gramme of the salt to a red heat should neutralise 8·4 c.c. of Volumetric Sulphuric Acid Solution, *B.P.*

POTASSII TARTRAS ACIDUS.

ACID POTASSIUM TARTRATE.

B.P.Syn.—BITARTRATE OF POTASSIUM; PURIFIED CREAM OF TARTAR.

N.O.Syn.—TARTARUS DEPURATUS. KALIUM HYDROTARTARICUM.

$KC_4H_5O_6$, eq. 186·75.

FR., TARTRATE ACIDE DE POTASSIUM; GER., WEINSTEIN; ITAL., TARTRATO ACIDO DI POTASSIO; SPAN., BITARTRATO POTASICO.

Colourless or slightly opaque rhombic crystals, or masses of crystals, or as a white, crystalline, gritty powder, permanent in the air. Its chief source is the crude Cream of Tartar or Argol, deposited during vinous fermentation.

It should be kept in well-stoppered glass bottles.

Solubility.—1 in 200 of cold Water, 1 in 16 of boiling Water. Insoluble in Alcohol (90 p.c.).

Medicinal Properties.—Cathartic, diuretic and refrigerant. Much used in febrile and dropsical affections; in chronic cardiac and hepatic diseases; combined with Sulphur it is a useful laxative in hæmorrhoids.

'Imperial Drink' for patients suffering from the thirst accompanying chronic Bright's disease, Acid Tartrate, 1 drm.; Saccharin, 1 grain; Lemon Oil, 3 minims; boiling Water, to 1 pint.—*Pr.* lxvii. 656.

Dose.—20 to 60 grains = 1·3 to 4 grammes.

Official Preparations.—Contained in Confectio Sulphuris, Trochiscus Sulphuris, and Pulvis Jalapæ Compositus. Used in the preparation of Acidum Tartaricum, Antimonium Tartaratum, Ferrum Tartaratum, Potassii Tartras, and Soda Tartarata.

Not Official.—Soluble Cream of Tartar.

Foreign Pharmacopœias.—Official in all; Austr. and Hung. (Kalium hydrotartaricum); Belg. (Bitartras Potassæ depuratus); Dan., Norw. and Swed. (Bitartras Kalicus); Dutch (Tartras Kalicus Acidus); Fr. (Tartrate Acide de Potassium); Ger. and Swiss (Tartarus depuratus); Ital. (Tartrato Acido di Potassio); Jap. (Kalium Bitartaricum); Mex. (Tartrato de Potasio Acido); Port. (Bitartrato de Potassa); Russ. (Kalium Bitartaricum depuratum and Purum; Span. (Bitartrato Potasico); U.S. (Potassii Bitartras).

Tests.—Potassium Acid Tartrate when strongly heated chars and emits inflammable vapours. When still more strongly heated it leaves a blackish residue, which, when dissolved in Water, filtered and neutralised with Hydrochloric Acid, affords the tests distinctive of Potassium given under that heading. When neutralised with Potassium or Sodium Hydroxide Solution it yields, on the addition of Calcium Chloride Solution in excess, a white granular precipitate soluble when freshly precipitated in cold, moderately concentrated Potassium Hydroxide Solution, reprecipitated on boiling. In a similar solution Silver Nitrate Solution yields a white precipitate soluble in Nitric Acid and in Ammonia Solution; its solution in the latter reagent, when boiled in a perfectly clean test-tube, affords a mirror of metallic Silver on the sides of the tube. It is slightly soluble in Water, the solution being acid in reaction towards blue Litmus paper. It is officially required to contain 97·1 p.c. of pure Potassium Hydrogen Tartrate as volumetrically determined by direct titration of the salt with Volumetric Sodium Hydroxide Solution as indicated below. The direct titration of a sample should be supplemented by a determination of the alkalinity of the soluble ash. A sample containing a judicious proportion of Potassium Acid Sulphate might pass the direct titration test, but would show a reduced alkalinity of the ash. In a pure sample the amount of Volumetric Sodium Hydroxide Solution required by direct titration should be equal to the amount of Volumetric Acid Solution required to neutralise the soluble ash, working on the same weight of substance in each case. The *U.S.P.* requires the salt to contain not less than 99 p.c. of pure Potassium Bitartrate as volumetrically determined by titrating with Semi-normal Volumetric Sulphuric Acid Solution, the solution obtained by extracting the residue left after ignition with Water, using Methyl Orange Solution as an indicator.

The more generally occurring impurities are Copper and Iron, with the tests for which it is officially required to show no characteristic reaction; Calcium, Magnesium, Sodium, Chlorides or Sulphates, with the tests for which it it officially required to show only the slightest reaction. The term 'slightest reaction' in this instance appears to be defined by the total limit of 2½ p.c. on the dried salt, the official requirement being that this amount of impurity should not be exceeded. Lead, Copper and Iron, if present, are shown by the Hydrogen Sulphide test described below; Calcium by the Ammonium Oxalate test; Magnesium by the addition of Sodium Phosphate Solution to the filtrate from the Ammonium Oxalate. A standard has been suggested (*C.D.* '08, i. 796) of 5 parts per million for Lead and 2 parts per million for Arsenic. Chlorides and Sulphates, if present, are indicated by the Silver Nitrate and Barium Chloride tests given below. In addition to the above-named impurities, Starch, Kaolin, Calcium Phosphate and other insoluble matter, Ammonium salts, Aluminium and Phosphates may be present, and the *U.S.P.* includes tests for these impurities. The undermentioned test with Ammonia Water serves as a test for Starch, Kaolin, Calcium Phosphate and other insoluble matter. The presence of Ammonium salts is indicated by the behaviour of the solution when examined by the tests with Potassium or Sodium

Hydroxide Solution, Aluminium by the Potassium Hydroxide test after ignition, and Phosphate by the Ammonium Molybdate test given below. A method for the exhaustive examination of Cream of Tartar is given (*Analyst*, '96, 174).

Ammonia.—A solution of 0·5 gramme of the salt in 3 c.c. of Ammonia T.S. should leave no insoluble residue, *U.S.P.*

Barium Nitrate.—5 grammes of the salt agitated with 100 c.c. of Water and filtered, should give a filtrate which, after the addition of Nitric Acid, should not be affected by T.S. of Barium Nitrate, *P.G.*

Silver Nitrate.—A filtrate obtained as above should not be rendered more than faintly opalescent with T.S. of Silver Nitrate after the addition of Nitric Acid, *P.G.*

Hydrogen Sulphide.—The solution of 1 gramme of the salt in Ammonia T.S. should not be affected by T.S. of Hydrogen Sulphide, *P.G.* The *U.S.P.* requires that the aqueous solution of the salt, slightly acidulated with Hydrochloric Acid, should not respond to the time-limit test for heavy metals.

Potassium or Sodium Hydroxide.—If the salt be warmed with Sodium Hydroxide T.S. (15 p.c.) it should not evolve Ammonia, *P.G.* The *U.S.P.* uses Potassium Hydroxide T.S.

Ammonium Oxalate.—If a mixture of 1 gramme of the salt with 5 c.c. of diluted Acetic Acid be allowed to stand for half an hour with frequent agitation and then mixed with 25 c.c. of Water, the clear liquid poured off from the deposit should show no alteration within 1 minute on the addition of 8 drops of T.S. of Ammonium Oxalate, *P.G.*

Potassium Hydroxide Solution after Ignition.—If 1 gramme of Potassium Bitartrate be well triturated with about 1 gramme of Potassium Carbonate and 0·5 gramme of Potassium Nitrate, and the mixture heated gradually to dull redness in a porcelain crucible, and if, upon cooling, the resulting mass be treated with a slight excess of diluted Hydrochloric Acid and filtered, the filtrate, upon being made slightly alkaline with Potassium Hydroxide T.S., should not yield a gelatinous precipitate soluble in excess of the reagent (absence of Alum), *U.S.P.*

Ammonium Molybdate Solution.—If a precipitate be produced which is insoluble it should be collected and thoroughly washed with hot Distilled Water, and dissolved in hot diluted Nitric Acid; the addition of an excess of Ammonium Molybdate T.S. to this solution should not produce a yellow precipitate (absence of Phosphates), *U.S.P.*

Volumetric Determination.—Not less than 5·2 c.c. of Sodium Hydroxide Volumetric Solution should be necessary to neutralise 1 gramme of the salt, *B.P.* The *U.S.P.* directs that 1 gramme of the salt be thoroughly carbonised at a temperature not exceeding red heat, and the residue extracted with boiling Distilled Water until the washings cease to react with Methyl Orange T.S. The mixed filtrate or washings should require for complete neutralisation not less than 10·6 c.c. of Semi-normal Volumetric Sulphuric Acid Solution, Methyl Orange T.S. being used as indicator.

Not Official

TARTARUS BORAXATUS. TARTRATE BORICO-POTASSIQUE. SOLUBLE CREAM OF TARTAR.—Soluble Cream of Tartar is a white, amorphous powder soluble in its own weight of Water. The proportions are:—Dan., Norw. and Swed., Potassium Tartrate 2, Borax 1; Dutch and Ger., Potassium Acid Tartrate 5, Borax 2; dissolve the Borax and the Acid Tartrate in Water by the aid of heat, and evaporate to dryness; Ital. (Tartrato Borico-Potassico), proportions not given; Span., Potassium Acid Tartrate 4, Boric Acid 1; Fr. (Borotartrate de Potassium), and Mex. (Tartrato borico-potasico), Potassium Bicarbonate 10, Tartaric Acid 10, Boric Acid 5; Port., with Boric Acid and Potassium Acid Tartrate, but no quantities given.

PRUNI VIRGINIANÆ CORTEX.

VIRGINIAN PRUNE BARK.

WILD CHERRY.—*U.S.P.*

The Bark of *Prunus serotina*, Ehrh.; it is believed to be stronger in the autumn than in the spring, and is required to be collected in the autumn both by *B.P.* and *U.S.P.*

In addition to astringent Tannins, this bark contains **Amygdalin** and **Emulsin**, which on treatment with Water develop Hydrocyanic Acid (in a manner similar to the Cherry-Laurel), to which the sedative effects of its preparations are probably due.

Medicinal Properties.—Sedative. Highly useful in full doses for resultless hacking cough in phthisis and chronic bronchitis. The Syrup is also useful as a flavouring vehicle for nauseous medicines.

Official Preparations.—Syrupus Pruni Virginianæ, and Tinctura Prun Virginianæ.

Not Official.—Fluidextractum Pruni Virginianæ, Infusum Pruni Virginianæ.

Foreign Pharmacopœias.—Official in U.S. Not in the others. U.S. has also an **Infusum** and **Fluid Extract.**

Descriptive Notes.—This bark was formerly supposed to be derived from *Prunus Virginiana*, Mill., whence the official name; it is now officially referred to *Prunus serotina*, Ehrh. The bark varies much in appearance, according to the age of the tree, the young bark being thin, with a reddish external thin papery layer $\frac{1}{20}$ to $\frac{1}{10}$ in. (1·5 to 2·5 mm.) in thickness, with an underlying greenish layer marked with transverse lenticular growths, but in older bark the surface is rough and darker brown and thicker; in both the fracture is short and granular, and the under surface exhibits a minute porous network with small fissures. It has an astringent, bitter taste, and a slight almond flavour when chewed. The young bark is richer in Hydrocyanic Acid, but the *B.P.* does not exclude old bark. Both the *B.P.* and *U.S.P.* state that the bark should be collected in autumn, but the *U.S.P.* describes only the young bark, in curved pieces 3 to 7 cm. long and 0·5 to 4·0 mm. in thickness. Young bark about $\frac{1}{12}$ in. (2 mm.) is the best; when $\frac{1}{8}$ to $\frac{1}{6}$ in. (3 to 4 mm.) in thickness it is likely to be less active. The bark is apt to deteriorate if kept long. The bark of other species of Prunus is sometimes substituted for that of *Prunus serotina.* One of these, described by Finnemore, has a fibrous fracture and gives a darker coloured syrup and is devoid of the characteristic odour and taste. Under the microscope the leading features of the powder are the irregularly shaped stone cells, the brown medullary rays 4 cells broad, large rhomboidal raphides near the stone cells, and smaller ones in the pith; sphæraphides occur in rows in the soft bast and are coloured brown by solution of Caustic Potash. The tissue also contains an abundance of small Starch grains and brown particles of a kind of Tannin which turn black with Ferric salts. In the false bark long bast fibres are present, but no stone cells of irregular shape.

Tests.—Virginian Prune Bark contains from 3 to 4 p.c. of ash, and should not exceed 6 p.c.

Preparations.

SYRUPUS PRUNI VIRGINIANÆ. SYRUP OF VIRGINIAN PRUNE.

Percolate 3 of Virginian Prune Bark, in No. 20 powder, with Distilled Water to yield 9; Refined Sugar, in coarse powder, 15; Glycerin, 1¼. Dissolve 15 of Refined Sugar in the liquid, by agitation, without heat; add 1¼ of Glycerin; strain; pour Distilled Water over the strainer to make up to 20.

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Foreign Pharmacopœias.—Official in U.S., Wild Cherry 15, Sugar 70, Glycerin 15, Water to make 100.

Tests.—Syrup of Virginian Prune has a sp. gr. of 1·300 to 1·310.

TINCTURA PRUNI VIRGINIANÆ. TINCTURE OF VIRGINIAN PRUNE.

Macerate 4 of Virginian Prune Bark, in No. 20 powder, with 7½ of Distilled Water for 24 hours; add 12½ of Alcohol (90 p.c.) and continue the maceration for 7 days.

Dose.—½ to 1 fl. drm. = 1·8 to 3·6 c.c.

Tests.—Tincture of Virginian Prune has a sp. gr. of 0·935 to 0·940; contains about 3 p.c. w/v of total solids and about 54 p.c. w/v of Absolute Alcohol.

Not Official.

FLUIDEXTRACTUM PRUNI VIRGINIANÆ.—Wild Cherry, in No. 30 powder, 100, is percolated with a mixture of Glycerin 20, Alcohol (95 p.c.) 20, and Water 60; and then percolation is continued with a mixture of 20 of Alcohol (95 p.c.) and 80 of Water, until the product measures 100. **Dose.**—½ to 1 fl. drm. (1·8 to 3·75 c.c.).—*U.S.P.*

This has been incorporated in the *B.P.C.*, but whereas the *U.S.P.* continue the percolation to produce 100, the *B.P.C.* percolate to exhaustion, reserving the first 90, and concentrate the subsequent weaker percolate to a soft extract and add to the reserved portion.

INFUSUM PRUNI VIRGINIANÆ.—Wild Cherry, in No 20 powder, 4; Glycerin, 5; Water, *q.s.* to make 100. Moisten the powder with 6 of Water, allow it to macerate for 1 hour, pack into a glass percolator, and having put the Glycerin into the receiving bottle gradually pour Water upon the powder, and continue percolation until the product measures 100, and mix well.—*U.S.P.*

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

PRUNUM.

PRUNES.

The dried ripe Fruits of *Prunus domestica* var. *Juliana*.

Imported from the South of France.

Medicinal Properties.—Mild laxative, nutritious and demulcent. Often used in dietetic treatment of constipation as a laxative.

Official Preparation.—Contained in Confectio Sennæ.

Foreign Pharmacopœias.—Official in Dutch, Pruna; Mex. (Ciruelo de Espana); Port. (Ameixas Passadas); U.S. Not in the others.

Descriptive Notes.—The dried fruits of *Prunus domesticus* var. *Juliana* DC. are official in the *B.P.*, but no special variety of the species is specified in the *U.S.P.* The size given in the *B.P.* is $1\frac{1}{4}$ in. (3 cm.) long, and in the *U.S.P.* 3 to 4 cm. Plums differ in size and shape and in the character of the stone. The stone of the var. *Juliana* is described by Hanbury as $\frac{7}{10}$ to $\frac{8}{10}$ in. long and $\frac{5}{10}$ to $\frac{6}{10}$ in. broad, broadly rounded at the upper end and slightly mucronulate, narrowed and somewhat stalk-like at the lower end and truncate. The ventral suture is broader and thicker than the dorsal. German prunes (Zwetschen or Quetschen) derived from the var. *Pruneauliana*, DC., are sometimes imported. These are rather larger and more elongated and have a thicker skin and a flatter narrower stone, pointed at either end, with the ventral suture more strongly curved than the dorsal, and the fruits are more prone to become covered with a saccharine efflorescence.

Not Official.

PSYLLII SEMEN.

The seeds obtained from *Plantago Psyllium*, L. They are small, about $\frac{1}{12}$ in. long and about half as broad; they are boat-shaped, convex on one side and concave on the other; they are a bright brown in colour, without odour, but have a disagreeable, somewhat acrid taste when fresh, which is removed by Alcohol with which some commercial specimens appear to have been treated. They are closely allied to the Ispaghul Seeds so well known in India, and, like them, are very mucilaginous. They have recently come into more general use in this country in some forms of habitual constipation.

Dose.—A teaspoonful to a tablespoonful of the seeds in half a tumbler of Water at bedtime, or before the principal meal.

PTEROCARPI LIGNUM.

RED SANDERS-WOOD.

B.P.Syn.—Red Sandal-Wood.

(Santalum Rubrum, *U.S.P.*)

The Heart-wood of *Pterocarpus santalinus*, Linn. f.

From Madras and Ceylon. Used solely as a colouring agent.

Official Preparation.—Used in the preparation of Tinctura Lavandulæ Composita.

Foreign Pharmacopœias.—Official in Austr., Jap. and Swed. (Lignum Santali Rubrum); Dutch (Lignum Santalinum); Port. (Sandalo Rubro); Span. (Sandolo Rojo); U.S. (Santalum Rubrum). Not in Fr., Ger., Hung., Ital., Mex., Norw., Russ. or Swiss.

Descriptive Notes.—Red Sandal-Wood being much valued for turning purposes, the logs imported for medicinal use are chiefly derived from the tree stumps or roots. The wood is blackish-brown externally, but of a deep red colour in transverse section, with lighter zones. It is usually met with in retail commerce in the form of splintery raspings of a purplish-red colour. The colouring matter is soluble in 90 p.c. spirit and in caustic alkalis, but is precipitated by acids. The wood has only a faintly astringent taste, and a slight aromatic odour when warmed.

Tests.—It contains about 1 p.c. of ash. It imparts a red colour to Alcohol, but not to Water.

Not Official.

PULSATILLA.

The Herb of *Anemone Pulsatilla*, L., and of *Anemone pratensis*, L., collected soon after flowering.

It should be carefully preserved, and not kept longer than one year.

It contains an unstable body, **Anemone-camphor**, which occurs in trimetric prisms. It splits up into Anemonin and Anemonic Acid.

Medicinal Properties.—Has been used in dysmenorrhœa with various results.

Has been recommended in orchitis and epididymitis, but in experiments at the Lock Hospital it was found to be valueless.—*L.* '89, ii. 216.

Foreign Pharmacopœias.—Official in Fr. Not in the others.

Not Official.

ALCOOLATURE D'ANEMONE PULSATILLE.—Bruised fresh flowers and leaves of Pulsatilla, 1; Alcohol (95 p.c.), by weight, 1. Macerate for 8 days, press and filter.—*Fr.*

TINCTURA PULSATILLÆ.—Carefully dried Herb, 1; Alcohol (60 p.c.), to percolate 10.

Dose.—5 to 30 minims = 0·3 to 1·8 c.c.

A tincture of this strength was included in *B.P.C. Formulary* 1901, and is now incorporated in the *B.P.C.*

Unless the Herb is very finely powdered, it answers better to soak it in warm Water for a day, and then add Alcohol to bring the mixture to the strength of Alcohol (60 p.c.).

It is best prepared from the fresh herb, as in *Fr. Codex, see* above.

LIQUOR CAULOPHYLLIN ET PULSATILLÆ, *see* p. 349.

PYRETHRI RADIX.

PYRETHRUM ROOT.

N.O.Syn.—PELLITORY ROOT.

FR., PYRÈTHRE D'AFRIQUE; GER., RÖMISCHE BERTRAMWURZEL;
ITAL., PIRETRO; SPAN., RAIZ DE PELITRE.

The dried Root of *Anacyclus Pyrethrum*, DC.

Collected chiefly in Algeria.

Medicinal Properties.—It is powerfully stimulant to the salivary glands, causing a copious flow of saliva, and, on that account, is used as a masticatory in dryness of the mouth and throat. The Tincture is used on Cotton-Wool for relieving toothache, or when diluted, as a mouth-wash.

Official Preparation.—Tinctura Pyrethri.

Not Official.—Trochisci Pyrethri.

Foreign Pharmacopœias.—Official in Austr., Fr. (Pyrèthre d'Afrique), Mex. (Peritre de Africa), Port. (Pyrethro), Span. (Pelitre), and U.S. Not in the others.

Descriptive Notes.—Pyrethrum root, or Pellitory of Spain, occurs in cylindrical pieces tapering slightly towards either end, unbranched, and having sometimes at the apex a short tuft of soft woolly hairs. It is longitudinally furrowed, is of a dark brown colour and has a short fracture, exhibiting in transverse section a radiate structure, with dark resin cells in the cortex, and medullary rays; the wood is porous and yellow, and the bark is dark brown. It has a characteristic odour, and a slowly pungent and acrid taste, causing a flow of saliva. It has been adulterated with the root of *Corrigiola telephiifolia*, Pourr. which, like Pyrethrum, is a product of Morocco. The root is similar in size, but paler, and exhibits in transverse section a series of horny concentric zones, but no resin ducts.

Tests.—It contains from 4 to 5 p.c. of ash, and the latter figure should not be exceeded.

Preparation.

TINCTURA PYRETHRI. TINCTURE OF PYRETHRUM.
Pyrethrum Root, 4; Alcohol (70 p.c.), *q.s.* to yield 20. (1 in 5)

The Tincture in *B.P.* '85 was made with Rectified Spirit or Alcohol (84 p.c.); *U.S.P.* employ Alcohol (95 p.c.), and *B.P.C.* Alcohol (90 p.c.), subsequently altered to Alcohol (70 p.c.); all are 1 in 5.

Foreign Pharmacopœias.—Official in Fr., Mex. and U.S., 1 in 5. Not in the others.

Tests.—Tincture of Pyrethrum has a sp. gr. of 0·900 to 0·904; it contains from 1·5 to 2 p.c. w/v of total solids and about 68 p.c. w/v of Absolute Alcohol.

Not Official.

TROCHISCI PYRETHRI.—Contain 1 grain in each.—*Throat.*

Not Official.

PYRETHRI FLORES.

Syn.—INSECT POWDER.

The powder of the Flower-heads, obtained in the Caucasus, from *Pyrethrum roseum*, Bieb., and *P. carneum*, Bieb., and in Dalmatia from *Pyrethrum cinerariæfolium*, Trev.

The active principle is an Ether-soluble Resin, not a volatile Oil.

Foreign Pharmacopœias.—Official in Mex. (Peritre del Caucaso). Not in the others.

Keeps away troublesome insects.

Descriptive Notes.—The Persian Insect powder of commerce is derived from the flowers of *Pyrethrum cinerariæfolium*, of which three qualities are sold, named respectively 'closed,' 'half-closed,' and 'open,' the closed being the most effective, if gathered when full grown. In the closed flowers the yellowish-white, lanceolate, acute, hairy phyllaries or outer bracts are incurved; in the half-closed the Flower-heads are frequently more or less deprived of the white ligulate florets; and in the open flowers even the tubular florets may be partially fallen away. The ovary has no pappus, but the calyx forms a short membranous ring with 5 minute teeth, and the fruit has 5 slender rib-like wings. The powdered flowers are characterised by the epidermal papillæ of the ligulate florets being more conical and narrower, and having a thinner apex than those of *Pyrethrum roseum*, the Flower-heads of which are now seldom used; they are distinguished by the red ligulate florets, and the phyllaries with brownish-black margins. As a rule the powder is more active the more abundant the pollen and the smaller the quantity of stem tissue. *See* also *P.J.* (4) iv. pp. 505–507.

This powder has been adulterated with the flowers of other species of *Chrysanthemum*, with White Hellebore, and with chrome yellow and with powdered Sumach leaves. *See Vogl, Pharmacognosie*, pp. 116, 117.

TINCTURA PYRETHRI FLORUM.—The Flower-heads, in powder, 1; Alcohol (60 p.c.), to percolate 4.

Diluted 1 to 10 of Water forms a **lotion** to keep away insects.

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

Not Official.

PYRIDIN.

C_5H_5N, eq. 78·49.

A colourless, volatile liquid, with a powerful and a peculiar odour. Its aqueous solution has a strong alkaline reaction to Litmus. It yields a crystalline deliquescent salt with Hydrochloric Acid.

It is a base obtained from the products of the destructive distillation of bones.

Commercially it always contains Picoline. In its cruder forms it is employed in Germany for 'denaturating' Alcohol, corresponding to 'Methylating' in this country.

Solubility.—It is miscible with Water, Alcohol (90 p.c.), Ether, and the fixed Oils.

Medicinal Properties.—Useful in the treatment of asthma; 4 or 5 grammes (62 to 77 grains) are allowed to evaporate from a flat dish in a small room, the patient being exposed to its vapour for about half an hour 3 times a day. Is most beneficial in cardiac dyspnœa, emphysema, and angina pectoris.

If the vapour be inhaled in quantity, it produces headache.

Like Nicotine, it is a good insecticide.

Official in Fr., Mex. and Span.

Tests.—Pyridin has a sp. gr. of about 0·980. It boils at about 116° C. (240·8° F.). When pure it has a strong alkaline reaction towards red Litmus paper, but no action on Phenolphthalein Solution. When added to Copper Sulphate Solution it gives a bluish-green precipitate, soluble in excess to a dark blue liquid similar to that produced by Ammonia. It may be titrated with Normal or Tenth-normal Volumetric Sulphuric or Hydrochloric Acid Solution, using Methyl Orange Solution as an indicator of neutrality. 1 c.c. of Pyridin requires about 12·4 c.c. of Normal Hydrochloric Acid. Each c.c. of Normal Volumetric Hydrochloric Acid Solution represents 0·07849 gramme of absolute Pyridin. The sample should not redden Phenolphthalein Solution, indicating the absence of Ammonia. It should have little or no action on Potassium Permanganate Solution, indicating the absence of readily oxidisable organic impurities; a 0·5 p.c. solution of Pyridin should give a crystalline precipitate, becoming almost semi-solid when mixed with an equal volume of saturated Picric Acid Solution. It should be completely volatilised by heat without leaving any weighable residue.

PYROXYLINUM.

PYROXYLIN.

N.O.Syn.—GOSSYPIUM FULMINANS; FULMI-COTON; LANA COLLODII; COLLOXYLINUM.

FR., FULMI-COTON; GER., KOLLODIUMWOLLE; ITAL., COTONE COLLODIO; SPAN., PIROXILINA.

A white, fibrous substance, having very much the appearance of ordinary cotton, but rapidly burning away with a flash when ignited. It requires to be kept in small quantities in a cool dry place, and away from lights.

Pyroxylin is Dinitrocellulose $C_6H_8(NO_2)_2O_5$, Gun Cotton is Trinitrocellulose $C_6H_7(NO_2)_3O_5$, and is not soluble in any mixture of Alcohol and Ether.

It sometimes decomposes on keeping, with disengagement of Nitrous fumes, and becomes insoluble.

The safest and best plan for its preservation is to moisten the dry material with an equal weight of Methylated Spirit, and preserve in a well-stoppered jar; when required for use it is quickly and easily dried.—*P.J.* '96, ii. 110; *C.D.* '96, ii. 207.

Pyroxylin is officially prepared by nitrating Cotton; 1 of Cotton being immersed in a mixture of 5 of Sulphuric Acid and 5 of Nitric Acid, the mixture being stirred during 3 minutes and the free acid separated by washing with Water till the washings no longer have an acid reaction. The Pyroxylin is drained and dried at a low temperature.

The proportions vary considerably in the different Pharmacopœias (*see* below).

Solubility.—Readily soluble in a mixture of equal volumes of Ether and Alcohol (90 p.c.); also in Acetone.

Different samples of Pyroxylin vary considerably in the extent to which they are soluble.

The use of Acetone as a cheap and efficient solvent for Pyroxylin was suggested in the 16th edition of the *Companion*. A good Pyroxylin will dissolve readily to the extent of 10 p.c. A formula corresponding with the *B.P.* Collodion is Pyroxylin 1, Acetone 48; but this produces an inconveniently thin solution, and a preferable strength is Pyroxylin 3·5, Acetone *q.s.* to make 100. The suggestion for its use has been followed by the *B.P.C.* with certain additions to the formula to make it more closely resemble a well-known proprietary article; it appears under the title **Collodium Acetonum** as follows:—Pyroxylin 5, Oil of Cloves 2, Amyl Acetate 25, Benzol 20, Acetone *q.s.* to produce 100. A more descriptive title for this would have been Collodium Acetonum Compositum, a simple solution in Acetone having been used as Acetone Collodion.

Foreign Pharmacopœias.—Official in Belg. (Pyroxylinum), Dutch, Ger. and Jap., Nitric Acid 400, Sulphuric Acid 1000, Purified Cotton 55; Russ. uses same formula, but Purified Cotton 50; Fr. (Fulmi-coton); Mex. (Piroxilina), Cotton 1, Nitre 20, Sulphuric Acid 30; Port. (Algodao Polvora), and Span. (Pyroxilina), Cotton 1, Nitre 20, Pure Sulphuric Acid (sp. gr. 1·84) 30; Austr., Dan., Hung., Ital., Norw., Swed., Swiss and U.S., no formula given.

Official Preparations.—Used in the preparation of Collodium, and Collodium Vesicans. Of **Collodium,** Collodium Flexile.

Not Official.—Collodium Stypticum, Hæmostatic Collodion, Collodium Anodynum, Celloidin, Photoxylin.

Tests.—Pyroxylin should be readily and completely soluble in a mixture of equal volumes of Ether and Alcohol (90 p.c.), it should be neutral in reaction towards Litmus paper. It should also be soluble in Acetone. When ignited with free access of air it should leave no mineral residue.

Preparations.

COLLODIUM. Collodion.

Dissolve 1 of Pyroxylin in a mixture of Ether 36, and Alcohol (90 p.c.) 12; after a few days decant.

If the Pyroxylin be first soaked in the Alcohol, it quickly dissolves when Ether is added.—*P.J.* '02, i. 138; *C.D.* '02, i. 269.

Mixes with Ether; but when mixed with Water or Alcohol (90 p.c.) the Pyroxylin is thrown out.

Official Preparation.—Collodium Flexile.

Official in Belg. (Pyroxylinum solutum), Pyroxylin 2, Alcohol 5, Ether 40, Castor Oil 3; Dan., Ger., Norw., Russ. and Span. (Collodium), Collodion Wool 4, Alcohol 12, Ether 84; Dutch, Collodion Wool 3, Alcohol 17, Ether 80; Fr. and Mex., Collodion Wool 1, Alcohol 4, Ether 15; Ital. (Collodio), Collodion Wool 1, Alcohol 4, Ether 12; Jap., Collodion Cotton 2, Alcohol 7, Ether 42; U.S., Pyroxylin 4, Alcohol 25, Ether 75; Port., same as Collodio Elastico. All by weight except U.S. Austr., Hung., Swed. and Swiss, no formula given.

Tests.—Collodion has a sp. gr. of 0·770 to 0·780. Upon evaporation it leaves a thin elastic film; when evaporated to dryness and ignited with free access of air it leaves no weighable residue.

COLLODIUM FLEXILE. Flexible Collodion. *N.O.Syn.*—Collodium Elacticum.

Collodion, 12 fl. oz.; Canada Turpentine, ½ oz. (by weight); Castor Oil, ¼ oz. (by weight).

Medicinal Properties.—Chiefly used for coating with a protective film, small clean cuts and abrasions, leech-bites, and fissure of nipple; it has been recommended as an application to erysipelatous surfaces and to burns, and to prevent the pitting of smallpox.

A large number of substances can be dissolved in Collodion to form medicated Collodions. *See* Acidum Salicylicum, Belladonna, Cantharis, Crotonis Oleum, Iodum, Iodoformum.

It does not contract or crack on drying.

Official in Austr., Dutch, Russ. and Swed., Castor Oil 2, Collodion 98; Dan., Castor Oil 1, Collodion 99; Fr., Castor Oil 5, Collodion 95; Ger. and Jap., Castor Oil 1, Turpentine 5, Collodion 94; Hung., Castor Oil 2, Collodion 100; Ital. and Swiss, Castor Oil 3, Collodion 97; Mex., Castor Oil 9, Collodion 90; Norw., Glycerin 1, Collodion 99; Port., Pyroxylin 5, Castor Oil 5, Alcohol (90 p.c.) 20, Ether 70; Span., Castor Oil 10, Collodion 90; U.S., Castor Oil 3, Canada Turpentine 5, Collodion 92. Not in Belg.

Tests.—Collodium Flexile has a sp. gr. of 0·790 to 0·800.

Not Official.

COLLODIUM STYPTICUM.—Dissolve 44 grains of Benzoin in 1 fl. oz. of Absolute Alcohol; filter, and in the filtrate dissolve 1 oz. of Tannic Acid; add Ether (sp. gr. 0·720), 4 fl. oz.; Pyroxylin, 44 grains; allow to stand 3 days, and decant.

B.P.C. Formulary 1901, now incorporated in *B.P.C.* as follows:—

Benzoin 1·50, Pyroxylin 1·50, Tannic Acid 16, Alcohol 16, Purified Ether, *q.s.* to produce 100.—*B.P.C.*

An adaptation of Dr. Richardson's Styptic Colloid.

Official in U.S., Tannic Acid 20, Alcohol 5, Ether 25, Collodion to 100.

HÆMOSTATIC COLLODION (Dr. Pavesi's).—Collodion 100, Carbolic Acid 10, Tannic Acid 5, Benzoic Acid 5; dissolve. Is applied by means of a camel-hair pencil, or by soaking strips of linen in it.

COLLODIUM ANODYNUM (Anodyne Collodion).—Aconitine, 1 grain; Veratrine, 6 grains; Æther Methylatus, 1 fl. oz.; Flexible Collodion, 1 fl. oz.

Collodium Anodynum. *Syn.* Anodyne Colloid.—Aconitine 0·10, Veratrine 0·60, Flexible Collodion, *q.s.* to produe 100.—*B.P.C.*

CELLOIDIN.—A concentrated Collodion occurring in light, yellowish-brown, brittle strips. Is readily soluble in a mixture of Absolute Alcohol and Ether, and the solution is used for embedding histological specimens previous to cutting sections.

A solution of Pyroxylin in Acetone is known under the name **Filmogen.**

PHOTOXYLIN.—A nitrated wood pulp prepared in St. Petersburg. When made into Collodion it is stated to give a tougher film than Pyroxylin on evaporation.—*L.* '87, i. 1253; *B.M.J.* '88, i. 555.

QUASSIÆ LIGNUM.

QUASSIA WOOD.

FR., QUASSIA DE LA JAMAÏQUE; GER., QUASSIAHOLZ; ITAL., QUASSIA; SPAN., LENO DE CUASIA.

The wood of the Trunk and Branches of *Picræna excelsa.*

Imported from Jamaica.

It contains a bitter principle, **Quassin,** sparingly soluble in Water.

Medicinal Properties.—Possesses in a high degree the properties of the simple bitters, without astringency. For contra-indications, and other notes, *see* Calumba. Particularly valuable in dyspepsia due to the debility which succeeds acute disease; containing no Tannin, it is a compatible vehicle for Iron preparations. The infusion is also used as an anthelmintic enema in thread-worm.

A few chips of Quassia or a weak infusion used in the morning bath is a protection against the annoying insects found in our cornfields.—*L.* '84, ii. 306. A strong infusion destroys fleas.—*L.* '95, i. 1018.

Official Preparations.—Infusum Quassiæ, Liquor Quassiæ Concentratus, Tinctura Quassiæ.

Not Official.—Extractum Quassiæ, Fluidextractum Quassiæ, Infusum Quassiæ Concentratum.

Foreign Pharmacopœias.—Official in U.S., same as Brit.; Austr., Belg., Norw., Span., Swed. and Swiss use *Quassia amara*; Dutch, Fr., Ger., Ital., Jap., Mex. (Cuasia), Port. and Russ. use both. Not in Hung. or Dan. Fr. has also Quassin.

Descriptive Notes.—In the *B.P.*, only the wood of the trunk and branches of *Picræna excelsa*, Lindl. (*Picrasma excelsa*, Planch.) is official, but in the *P.G.* and *U.S.P.* that of *Quassia amara*, L., is also official. The wood is met with in commerce in the form of splintery raspings or of coarse chips or transverse slices about an inch