

APPENDIX.

ARTICLES EMPLOYED IN CHEMICAL TESTING.

ACETIC ACID.

The Acetic Acid of the B.P.

ACETIC ACID, GLACIAL.

The Glacial Acetic Acid of the B.P.

ALBUMEN.

The liquid white, separated from the yolk, of the egg of *Gallus Bankiva* var. *domesticus*.

ALCOHOL, ABSOLUTE.

The Absolute Alcohol of the B.P.

ALCOHOL (90 p.c.), ALCOHOL (70 p.c.).

The Alcohol (90 p.c.), and Alcohol (70 p.c.) of the B.P.

ALUM.

The Alum of the B.P.

AMMONIUM MOLYBDATE ((NH₄)₂MoO₄).

A nearly white crystalline salt.

AMMONIUM OXALATE ((COONH₄)₂·H₂O).

Colourless crystals, prepared by neutralising Oxalic Acid with Solution of Ammonia.

AMMONIUM THIOCYANATE (NH₄SCN).

A crystalline salt.

AMYLIC ALCOHOL ((CH₃)₂:CH·CH₂·CH₂OH).

A liquid consisting principally of iso-primary Amylic Alcohol. It may be prepared by shaking commercial Fusel Oil with a saturated solution of Common Salt, separating the oily layer, submitting it to distillation, and collecting and reserving the portion which distils between 257° and 289° F. (125° and 142·8° C.).

BARIUM CHLORIDE (BaCl₂·2H₂O).

Colourless crystals. Its solution should not give a precipitate with Solution of Ammonium Hydrosulphide, and no residue should remain after adding excess of Diluted Sulphuric Acid, filtering, and evaporating the filtrate to dryness in a platinum dish. Barium Nitrate, Ba₂NO₃, or Barium Acetate, (CH₃COO)₂Ba, may be used in place of Barium Chloride, but each must respond to the foregoing tests.

BARIUM HYDROXIDE. (Ba(OH)₂·8H₂O.)

Colourless crystals, prepared by mixing concentrated solutions of Barium Chloride and Sodium Hydroxide. The precipitate is purified by recrystallization from water. It should be entirely soluble in Water, the resulting solution should give no precipitate with Solution of Ammonium Hydrosulphide, and a very slight residue should remain after adding excess of Diluted Sulphuric Acid, filtering, and evaporating the filtrate to dryness in a platinum dish.

BENZOL.

The Benzol of the B.P.

BENZOLATED AMYLIC ALCOHOL.

Benzol, 3 parts by volume; Amylic Alcohol, 1 part by volume. Mix; decant from any deposited water.

BISMUTH OXYNITRATE.

The Bismuth Oxynitrate of the B.P.

BORAX. ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$.)

The Borax of the B.P.

BROMINE.

The Bromine of commerce.

CADMIUM IODIDE. (CdI_2 .)

The pure crystals of commerce.

CALCIUM CARBONATE.

The pure white marble, or calc spar, of commerce.

CALCIUM HYDROXIDE.

The Calcium Hydroxide of the B.P.

CALCIUM OXIDE.

The Lime of the B.P.

CALCIUM SULPHATE. ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.)

Pure native Calcium Sulphate.

CARBON BISULPHIDE.

The Carbon Bisulphide of the B.P.

CHLOROFORM.

The Chloroform of the B.P.

CITRIC ACID.

The Citric Acid of the B.P.

COLLODION.

The Collodion of the B.P.

COPPER.

The metal in foil, wire, or turnings.

COPPER OXYACETATE.

The pure Copper Oxyacetate, or Verdigris, of commerce.

COPPER SULPHATE.

The Copper Sulphate of the B.P.

ETHER.

The Ether of the B.P.

FERRIC CHLORIDE.

The pure Anhydrous Ferric Chloride of commerce.

FERROUS SULPHATE.

The Ferrous Sulphate of the B.P.

GLYCERIN.

The Glycerin of the B.P.

HYDROCHLORIC ACID.

The Hydrochloric Acid of the B.P.

HYDROCHLORIC ACID, DILUTED.

The Diluted Hydrochloric Acid of the B.P.

HYDROCHLORIC ACID, GASEOUS. (HCl.)

The dry gas, prepared by the interaction of Sulphuric Acid and Common Salt.

HYDROGEN SULPHIDE. *Syn.*—SULPHURETTED HYDROGEN.

A gas prepared by the action of Hydrochloric Acid on Ferrous Sulphide. It will be sufficiently pure after passing through two wash-bottles each containing water. A solution of the gas in Water may also be employed, but only if it smells strongly of the gas and yields an abundant black precipitate with Solution of Lead Subacetate.

INDIGO.

A blue pigment prepared from various species of *Indigofera*.

IRON.

The Iron of the B.P.

ISINGLASS.

The swimming bladder, or sound, of various species of *Acipenser* prepared and cut into shreds.

LEAD ACETATE.

The Lead Acetate of the B.P.

LEAD PEROXIDE. (PbO₂.)

The pure Lead Peroxide of commerce.

LIME.

The Lime of the B.P.

LITMUS.

A blue pigment prepared from various species of *Rocella*. Litmus is used in several forms: for example, Solution of Litmus, Blue Litmus Paper made by impregnating unglazed white paper with a solution of litmus; and Red Litmus Paper, made by impregnating the paper with the solution reddened by the previous addition of a very minute quantity of Sulphuric Acid. Litmus may also be employed in the solid form.

MANGANESE PEROXIDE. (MnO₂.)

The powdered native Peroxide, Pyrolusite.

METHYL-ORANGE. (NaO·SO₂·C₆H₄·N·N·C₆H₄·N(CH₃)₂.)

Methyl-orange, or Helianthin, is prepared by the combination of Diazobenzene-sulphonic Acid and Dimethylaniline in an alkaline solution. Its warm aqueous solution should give no precipitate with an alkali or with Solution of Calcium Chloride, but an orange-yellow precipitate with Solution of Lead Subacetate.

MICROCOSMIC SALT. (NaNH₄HPO₄·4H₂O.)

The salt of commerce.

MILK OF LIME.

Lime, 100 grammes; Distilled Water, 200 c.c.: mix.

MORPHINATED WATER.

Prepare by digesting pure Morphine in Chloroform Water for seven days at a temperature of 60° F. (15·5° C.), with occasional agitation, so as to obtain a saturated solution of the alkaloid, and filtering from the undissolved Morphine.

MORPHINE.

The precipitate obtained on adding Solution of Ammonia, in slight excess, to a Solution of a pure Morphine salt in Water, the precipitate being washed with Water until free from Ammonium salt.

MUCILAGE OF GUM ACACIA.

The Mucilage of Gum Acacia of the B.P.

MUCILAGE OF STARCH.

Triturate 1 gramme of Starch with a small quantity of Distilled Water to form a smooth paste; add more Distilled Water, gradually, to produce 50 c.c. of mixture; boil a few minutes, constantly stirring: cool.

Mucilage of Starch should be recently prepared.

NITRIC ACID.

The Nitric Acid of the B.P.

NITRIC ACID, DILUTED.

The Diluted Nitric Acid of the B.P.

NITRIC ACID, FUMING.

Nitric Acid of sp. gr. 1.5.

OIL OF TURPENTINE.

The Oil of Turpentine of the B.P.

OLIVE OIL.

The Olive Oil of the B.P.

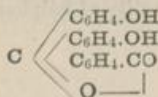
PETROLEUM SPIRIT. *Syn.*—PETROLEUM ETHER.

A colourless, very volatile, and highly inflammable liquid obtained from Petroleum, and consisting of a mixture of the lower members of the Paraffin series of Hydrocarbons. Boiling point 122° to 140° F. (50° to 60° C.). Sp. gr. .670 to .700.

PHENOL.

The Phenol of the B.P.

PHENOL-PHTHALEIN.



A crystalline substance produced by interaction of Phenol and Phthalic Anhydride.

PICRIC ACID. ($\text{C}_6\text{H}_2(\text{NO}_2)_3\text{OH}$.)

Trinitrophenol, obtained by the action of Nitric Acid on Phenol.

POTASSIUM BICHROMATE.

The Potassium Bichromate of the B.P.

POTASSIUM CHLORATE.

The Potassium Chlorate of the B.P.

POTASSIUM CHROMATE. (K_2CrO_4 .)

The pure, neutral, yellow crystals of commerce.

POTASSIUM CYANIDE. (KCN.)

The commercial salt, containing at least 90 p.c. of Potassium Cyanide.

POTASSIUM FERRICYANIDE. ($\text{K}_3\text{Fe}_2\text{C}_{12}\text{N}_{12}$.)

The red crystalline salt. Its aqueous solution should give no precipitate or blue colouration with a dilute solution of a pure ferric salt.

POTASSIUM FERROCYANIDE. ($\text{K}_4\text{FeC}_6\text{N}_6, 3\text{H}_2\text{O}$.)

The yellow crystalline salt, prepared by fusing together Potassium Carbonate, nitrogenous organic matter, and Iron.

POTASSIUM HYDROGEN SULPHITE. *Syn.*—ACID POTASSIUM SULPHITE.

(KHSO_3 .) The commercial salt.

POTASSIUM HYDROXIDE.

The Caustic Potash of the B.P.

POTASSIUM IODIDE.

The Potassium Iodide of the B.P.

POTASSIUM PERMANGANATE.

The Potassium Permanganate of the B.P.

POTASSIUM SULPHATE.

The Potassium Sulphate of the B.P.

POWDERED TALC.

A natural Magnesium Silicate, powdered, and purified by boiling with diluted Hydrochloric Acid, washing with distilled Water until neutral to Litmus, and drying.

SODIUM ACETATE. ($\text{CH}_3\text{COONa}, 3\text{H}_2\text{O}$.)

The pure commercial salt.

SODIUM ARSENATE.

The Sodium Arsenate of the B.P.

SODIUM BICARBONATE.

The Sodium Bicarbonate of the B.P.

SODIUM CARBONATE.

The Sodium Carbonate of the B.P.

SODIUM CHLORIDE.

The Sodium Chloride of the B.P.

SODIUM HYDROGEN SULPHITE. *Syn.*—ACID SODIUM SULPHITE.

(NaHSO_3 .) The commercial salt.

SODIUM HYDROXIDE.

The Sodium Hydroxide, Sodium Hydrate, or 'Caustic Soda' of commerce, occurs in hard greyish-white rods or cakes, deliquescent, very alkaline and corrosive. It affords the reactions characteristic of Sodium. It usually contains as impurities Alumina, Carbonates, Chlorides, Phosphates, Silicates, and Sulphates. A clear solution of Caustic Soda may be used, instead of a solution of Purified Sodium Hydroxide, in all analytical operations in which the foregoing impurities would not vitiate the result.

Purified Sodium Hydroxide may be obtained by dissolving Caustic Soda in Ethylic Alcohol, filtering the solution, evaporating it to dryness in a silver dish, occasionally adding Distilled Water during the evaporation. The residue is Purified Sodium Hydroxide. It should yield no characteristic reaction with the tests for Phosphates or Sulphates, and not more than the slightest reactions with the tests for Carbonates. It is not quite free from Alumina.

Pure Sodium Hydroxide may be prepared by the interaction of Pure Barium Hydroxide and Sodium Sulphate, or by the interaction of Pure Sodium and Water. A solution of Pure Sodium Hydroxide is required only in testing for small quantities of Aluminium.

SODIUM NITRITE.

The Sodium Nitrite of the B.P.

SODIUM POTASSIUM TARTRATE.

The Sodium Potassium Tartrate of the B.P.

SODIUM SULPHATE.

The Sodium Sulphate of the B.P.

SODIUM SULPHITE.

The Sodium Sulphite of the B.P.

SODIUM THIOSULPHATE. Syn.—SODIUM HYPOSULPHITE. (Na₂S₂O₃·5H₂O.)

The crystalline salt. 2·4644 grammes should decolorise 100 c.c. of the Volumetric Solution of Iodine.

SULPHUR.

The Sublimed Sulphur of the B.P.

SULPHURIC ACID.

The Sulphuric Acid of the B.P.

SULPHURIC ACID, DILUTED.

The Diluted Sulphuric Acid of the B.P.

TARTARIC ACID.

The Tartaric Acid of the B.P.

TEST PAPERS. See 'LITMUS' and 'TURMERIC.'**TIN.**

Tin, granulated by letting drops of it in the molten state fall into Water. It should yield no reactions with the tests for Lead, Copper, Iron or Zinc.

TURMERIC.

The dried Rhizome of *Curcuma longa*. Turmeric is commonly used in the form of Tincture prepared from the bruised rhizome, in the proportion of 1 gramme to 6 c.c. of Alcohol (90 p.c.), by the process of maceration or in the form of paper prepared by steeping unglazed white paper in the Tincture and drying.

URANIUM NITRATE.

The crystals of Pure Uranium Nitrate of commerce.

WATER.

The Distilled Water of the B.P.

ZINC.

The laminated or granulated metal. It should be entirely dissolved by Diluted Hydrochloric Acid. The solution should yield no characteristic reaction with the tests for Lead, Copper, Cadmium, Arsenium, Tin, and Iron.

TEST SOLUTIONS.
SOLUTION OF ALBUMEN.

Albumen, 2 c.c.; Distilled Water, 8 c.c. or a sufficient quantity. Mix by trituration in a mortar, and filter through clean tow first moistened with Distilled Water. Solution of Albumen must be recently prepared. The strength of the Solution may be adjusted to suit particular requirements.

SOLUTION OF AMMONIA.

The Solution of Ammonia of the B.P.

SOLUTION OF AMMONIA, STRONG.

The Strong Solution of Ammonia of the B.P.

SOLUTION OF AMMONIUM ACETATE.

The Solution of Ammonium Acetate of the B.P.

SOLUTION OF AMMONIUM CARBONATE.

Ammonium Carbonate, in small pieces, 10 grammes; Solution of Ammonia, 15 c.c.; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF AMMONIUM CHLORIDE.

Ammonium Chloride, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF AMMONIUM CHLORIDE (NESSLER'S).

Ammonium Chloride, 3.15 grammes; Distilled Water, recently boiled, and free from Ammonia, sufficient to produce 1000 c.c.: dissolve.

SOLUTION OF AMMONIUM CITRATE.

The Solution of Ammonium Citrate of the B.P.

SOLUTION OF AMMONIUM HYDROSULPHIDE.

Saturate 120 c.c. of Solution of Ammonia with washed Hydrogen Sulphide; add 80 c.c. of Solution of Ammonia.

The Solution should be freshly prepared.

SOLUTION OF AMMONIUM MOLYBDATE.

Ammonium Molybdate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF AMMONIUM OXALATE.

Ammonium Oxalate, 5 grammes; Distilled Water, warm, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF AMMONIUM THIOCYANATE.

Ammonium Thiocyanate, 5 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF AURIC CHLORIDE.

Pure Gold of commerce, in leaf, 1 gramme; Nitric Acid, 1.5 c.c.; Hydrochloric Acid, 7 c.c.; Distilled Water, a sufficient quantity. Place the Gold in a flask with the Nitric Acid and 6 c.c. of the Hydrochloric Acid, first mixed with 4 c.c. of the Distilled Water, and digest until it is dissolved. Add 1 c.c. of Hydrochloric Acid. Evaporate in a basin at a temperature not exceeding 212° F. (100° C.) until acid vapours cease to be given off. Dissolve the Auric Chloride thus obtained in 50 c.c. of Distilled Water.

SOLUTION OF BARIUM CHLORIDE.

Barium Chloride, in crystals, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF BARIUM HYDROXIDE.

Barium Hydroxide, 10 grammes; Distilled Water, recently boiled, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF BORIC ACID.

Boric Acid, 5 grammes; Alcohol (90 p.c.), sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF BROMINE.

Bromine, 1 c.c.; Distilled Water, sufficient to produce 150 c.c. Place the Bromine in a bottle furnished with a well-fitting stopper, and pour in the Distilled Water; shake several times. Keep the Solution in a dark place.

SOLUTION OF CADMIUM IODIDE.

Cadmium Iodide, 5 grammes; Distilled Water, sufficient to produce 100 c.c.: dissolve and filter.

SOLUTION OF CALCIUM CHLORIDE.

Calcium Chloride, fused, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF CALCIUM SULPHATE.

Calcium Sulphate, 2.5 grammes; Distilled Water, 200 c.c. Rub the Calcium Sulphate in a porcelain mortar for a few minutes with 20 c.c. of the Distilled Water; shake the mixture thus obtained with the rest of the Distilled Water: set aside; filter.

SOLUTION OF CHLORINATED SODA.

The Solution of Chlorinated Soda of the B.P.

SOLUTION OF CHLORINE.

Produced by saturating Distilled Water with Chlorine. The Chlorine may be obtained by the interaction of Hydrochloric Acid and Manganese Peroxide, and should be purified by passing through a small quantity of water contained in a wash-bottle. The Solution should be recently prepared.

SOLUTION OF CHROMIC ACID.

The Solution of Chromic Acid of the B.P.

SOLUTION OF COPPER ACETATE.

Copper Oxyacetate, in fine powder, 20 grammes; Acetic Acid, 40 c.c.; Distilled Water, sufficient to produce 200 c.c. Dilute the Acetic Acid with 20 c.c. of the Distilled Water; digest the Copper Oxyacetate in the mixture at a temperature not exceeding 212° F. (100° C.), with repeated stirring; continue heating until a dry residue is obtained. Digest the product in 160 c.c. of boiling Distilled Water; make up to the required volume with Distilled Water: filter.

SOLUTION OF COPPER AMMONIO-SULPHATE.

Copper Sulphate, in crystals, 10 grammes; Solution of Ammonia, a sufficient quantity; Distilled Water, sufficient to produce 200 c.c. Dissolve the Copper Sulphate in 160 c.c. of the Distilled Water, and cautiously add the Solution of Ammonia to the liquid until the precipitate first formed is nearly dissolved: filter the product; finally make up to the required volume with Distilled Water. A Concentrated Solution may be prepared by using a smaller quantity of Distilled Water.

SOLUTION OF COPPER SULPHATE.

Copper Sulphate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve, and filter if necessary.

SOLUTION OF FERRIC CHLORIDE. See 'TEST-SOLUTION OF FERRIC CHLORIDE,' p. 670.**SOLUTION OF FERRIC SULPHATE.**

The Solution of Ferric Sulphate of the B.P.

SOLUTION OF FERROUS SULPHATE.

Ferrous Sulphate, 4 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter. The Solution of Ferrous Sulphate should be recently prepared.

SOLUTION OF HYDROGEN PEROXIDE.

The Solution of Hydrogen Peroxide of the B.P.

SOLUTION OF INDIGO SULPHATE.

Indigo, dry and in fine powder, 0.2 gramme; Sulphuric Acid, 200 c.c. Mix the Indigo with 2 c.c. of the Sulphuric Acid in a small test-tube, and heat in boiling water for an hour; pour the product into the remainder of the acid; shake the mixture; decant the clear liquid.

SOLUTION OF IODINE.

The Volumetric Solution of Iodine, p. 680.

SOLUTION OF ISINGLASS.

Isinglass, in shreds, 4 grammes; Distilled Water, warm, sufficient to produce 200 c.c. Mix, and digest for half an hour on a water-bath with peated shaking, and filter through clean moistened tow. Solution of Isinglass must be recently prepared.

SOLUTION OF LEAD ACETATE.

Lead Acetate, 20 grammes; Distilled Water, recently boiled, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF LEAD SUBACETATE.

The Strong Solution of Lead Subacetate of the B.P.; or the same, more or less diluted.

SOLUTION OF LIME. *Syn.*—SOLUTION OF CALCIUM HYDROXIDE.

The Solution of Lime of the B.P.

SOLUTION OF LITMUS.

Litmus, in powder, 20 grammes; Alcohol (90 p.c.), 200 c.c.; Distilled Water, 200 c.c. Boil the Litmus with 80 c.c. of the Alcohol for one hour; pour away the clear liquid; repeat this operation with 60 c.c. of the Alcohol; and a third time with the remainder of the Alcohol. Digest the washed Litmus in the Distilled Water, and filter.

SOLUTION OF MAGNESIUM AMMONIO-SULPHATE.

Magnesium Sulphate, 20 grammes; Ammonium Chloride, 40 grammes; Solution of Ammonia, 84 c.c.; Distilled Water, 160 c.c. Dissolve the Magnesium Sulphate and Ammonium Chloride in the Distilled Water; add the Solution of Ammonia, and set the mixture aside for a few days in a well-closed bottle; decant and filter.

SOLUTION OF MAGNESIUM SULPHATE

Magnesium Sulphate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF MERCURIC CHLORIDE. *See* 'TEST-SOLUTION OF MERCURIC CHLORIDE,' p. 670.**SOLUTION OF MERCUROUS NITRATE.**

Mercury, 2 grammes; Nitric Acid, 1 c.c.; Distilled Water, a sufficient quantity. To the Mercury, in a small dish, add 1 c.c. of Distilled Water and the Nitric Acid, and set the whole aside for twenty-four hours in a cool dark place; drain the resulting crystals; dissolve them in 200 c.c. of Distilled Water.

SOLUTION OF METHYL ORANGE.

Methyl Orange, 0.4 gramme; Alcohol (90 p.c.), 50 c.c.; Distilled Water, sufficient to produce 200 c.c. Dissolve.

SOLUTION OF PHENOL-PHTHALEIN.

Phenol-phthalein, 0.4 gramme; Alcohol (90 p.c.), 120 c.c.; Distilled Water, sufficient to produce 200 c.c.: dissolve. The Solution should be colourless.

SOLUTION OF PICRIC ACID.

Picric Acid, 1 gramme; Distilled Water, sufficient to produce 150 c.c.: dissolve.

SOLUTION OF PLATINIC CHLORIDE.

Platinum foil of commerce, 10 grammes; Hydrochloric Acid, 60 c.c.; Nitric Acid, 10 c.c.; Distilled Water, sufficient to produce 200 c.c. Heat the Platinum foil with the Hydrochloric Acid to about 176° F. (80° C.); add the Nitric Acid very gradually; evaporate the solution to dryness on a water-bath; moisten the residue with a few drops of Hydrochloric Acid; again evaporate to dryness: dissolve the residue in sufficient Distilled Water to produce 200 c.c. of the Solution.

SOLUTION OF POTASSIO-CUPRIC TARTRATE. *Syn.* — **FEHLING'S SOLUTION.**

No. 1.—Copper Sulphate, in crystals, 34.64 grammes; Sulphuric Acid, 0.5 c.c.; Distilled Water, sufficient to produce 500 c.c.: dissolve.

No. 2.—Sodium Potassium Tartrate, 176 grammes; Sodium Hydroxide, 77 grammes; Distilled Water, sufficient to produce 500 c.c.: dissolve. Mix equal volumes of the solutions No. 1 and No. 2 at the time of using.

SOLUTION OF POTASSIO - MERCURIC IODIDE. *Syn.* — **NESSLER'S REAGENT.**

Potassium Iodide, 7 grammes; Mercuric Chloride, a sufficient quantity; Sodium Hydroxide, 24 grammes; Distilled Water, sufficient to produce 200 c.c. Dissolve the Potassium Iodide and 2½ grammes of Mercuric Chloride in 160 c.c. of Distilled Water; to this liquid add a cold saturated aqueous solution of Mercuric Chloride, with constant stirring, until a slight red precipitate remains; add the Sodium Hydroxide; when the latter has dissolved add a little more of the aqueous solution of Mercuric Chloride, and make up to the required volume with Distilled Water.

SOLUTION OF POTASSIUM ACETATE.

Potassium Acetate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM ACID TARTRATE.

Digest excess of Acid Potassium Tartrate in Distilled Water; filter.

SOLUTION OF POTASSIUM CARBONATE.

Potassium Carbonate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM CHROMATE.

Potassium Chromate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM CYANIDE.

Potassium Cyanide, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM FERRICYANIDE.

Potassium Ferricyanide, in crystals, 10 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter. This Solution should be freshly prepared.

SOLUTION OF POTASSIUM FERROCYANIDE.

Potassium Ferrocyanide, in crystals, 10 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM HYDROXIDE.

The Solution of Potash of the B.P.

SOLUTION OF POTASSIUM HYDROXIDE, ALCOHOLIC.

Potassium Hydroxide, 20 grammes; Alcohol (90 p.c.), sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM IODIDE.

Potassium Iodide, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF POTASSIUM PERMANGANATE.

The Solution of Potassium Permanganate of the B.P.

SOLUTION OF PYROXYLIN.

The Collodion of the B.P.

SOLUTION OF SILVER AMMONIO-NITRATE.

Silver Nitrate, in crystals, 5 grammes; Solution of Ammonia 10 c.c., or a sufficient quantity; Distilled Water, sufficient to produce 200 c.c. Dissolve the Silver Nitrate in 160 c.c. of the Distilled Water, and cautiously add the Solution of Ammonia to the liquid until the precipitate first formed is nearly dissolved; set aside; decant; finally make up to the required volume with Distilled Water.

SOLUTION OF SILVER NITRATE.

Silver Nitrate, 10 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve.

SOLUTION OF SODIUM ACETATE.

Sodium Acetate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF SODIUM CARBONATE.

Sodium Carbonate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF SODIUM HYDROXIDE.

Purified Sodium Hydroxide, 40 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF SODIUM PHOSPHATE.

Sodium Phosphate, in crystals, 20 grammes; Distilled Water sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF SODIUM SULPHATE.

Sodium Sulphate, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve and filter.

SOLUTION OF STANNOUS CHLORIDE.

Tin, granulated, 40 grammes; Hydrochloric Acid, 120 c.c.; Distilled Water, sufficient to produce 200 c.c. Dilute the Acid in a flask with 40 c.c. of the Distilled Water, and, having added the Tin, apply heat gently until gas ceases to be evolved; make up to the required volume with Distilled Water, allowing the undissolved Tin to remain in the Solution.

SOLUTION OF SULPHUROUS ACID.

The Sulphurous Acid of the B.P.

SOLUTION OF TANNIC ACID.

Tannic Acid, 20 grammes; Distilled Water, sufficient to produce 200 c.c.: dissolve. Solution of Tannic Acid should be freshly prepared.

SOLUTION OF TARTARATED ANTIMONY.

Tartarated Antimony, 10 grammes; Distilled Water, boiling, sufficient to produce 200 c.c.: dissolve and filter. Solution of Tartarated Antimony should be freshly prepared.

SOLUTION OF TARTARIC ACID.

Tartaric Acid, in crystals, 25 grammes; Alcohol (90 p.c.), 50 c.c.; Distilled Water, sufficient to produce 200 c.c. Dissolve the Tartaric Acid in 130 c.c. of the Distilled Water; add the Alcohol; make up to the required volume with Distilled Water.

SOLUTION OF URANIUM NITRATE.

Uranium Nitrate, 10 grammes; Distilled Water, sufficient to produce 200 c.c.

TEST-SOLUTION OF FERRIC CHLORIDE.

Dissolve 10 grammes of commercial Anhydrous Ferric Chloride in sufficient Distilled Water to produce 200 c.c. of solution; filter if necessary.

TEST-SOLUTION OF MERCURIC CHLORIDE.

Mercuric Chloride, 10 grammes; Distilled Water, boiling, sufficient to produce 200 c.c.: dissolve and filter.

**TESTS FOR SUBSTANCES MENTIONED IN THE
TEXT OF THE PHARMACOPEIA.**

ACETATES.

Neutral Acetates are decomposed by heat, yielding vapours which possess a characteristic acetous odour.

Hydrogen Acetate and Ethyl Acetate have characteristic odours. Acetates when warmed with Sulphuric Acid yield vapours of Hydrogen Acetate; or, when warmed with Sulphuric Acid and a small quantity of Alcohol (90 p.c.), yield Ethyl Acetate.

Test-solution of Ferric Chloride affords a deep red coloration with neutral or faintly acid Acetates, and the resulting liquid on boiling yields a reddish-brown precipitate. On adding Hydrochloric Acid the red solution turns yellow. On adding Test-solution of Mercuric Chloride the red colour is not discharged (distinction from Thiocyanates).

Dry Acetates heated with (a very minute proportion of) Arsenious Anhydride yield (the highly poisonous) Cacodyl Oxide, recognisable by its characteristic smell.

ALUMINIUM.

Solution of Ammonia or Solution of Ammonium Hydrosulphide affords a white gelatinous precipitate, soluble in Hydrochloric Acid, in Acetic Acid, and in Solution of Potassium Hydroxide or Solution of Sodium Hydroxide, but nearly insoluble in Solution of Ammonia and in Solutions of Ammonium salts, and quite insoluble when the solutions are boiled.

Solution of Ammonium Oxalate causes no precipitate.

AMMONIUM SALTS.

Ammonium salts volatilise when strongly heated, generally without residue. When heated with Solution of Potassium Hydroxide, or with Solution of Sodium Hydroxide, Ammonium salts evolve Ammonia, recognisable by its odour.

Solution of Platinic Chloride affords with Ammonium salts acidulated with Hydrochloric Acid a yellow crystalline precipitate, especially in the presence of Alcohol. On ignition, this precipitate leaves a residue of platinum only.

A concentrated Solution of Tartaric Acid produces in concentrated solutions of Ammonium salts a white crystalline precipitate, especially in the presence of much Alcohol.

Solution of Potassio-mercuric Iodide affords a brown precipitate, or a reddish-brown coloration, or, in excessively dilute solutions of Ammonium salts, a yellowish tinge.

ANTIMONY.

Hydrogen Sulphide yields, in slightly acid solutions, an orange-coloured precipitate, soluble in Solution of Potassium Hydroxide, in Ammonium Hydrosulphide, and in the strongest Hydrochloric Acid with evolution of Hydrogen Sulphide, but almost insoluble in solution of the official Ammonium Carbonate and in solution of Potassium Hydrogen Sulphite.

Hydrogen, generated by the interaction of Zinc and Diluted Sulphuric Acid, partially converts Antimony compounds into Hydrogen Antimonide. A cold porcelain tile held in the flame of this gas acquires a dark metallic deposit which is not appreciably dissolved by Solution of Chlorinated Soda. The gas, when passed into Solution of Silver Nitrate, causes a black precipitate containing Antimony and Silver, and on the cautious addition of Solution of Ammonia the supernatant liquid yields no yellow precipitate. If one end of a strip or rod of Zinc be allowed to rest on a platinum capsule containing the acidulated Antimony solution, the other end being in the liquid, Hydrogen Antimonide is not evolved, but the Antimony is precipitated on the platinum as a black, adherent, non-granular stain, insoluble in Hydrochloric Acid.

Copper Foil precipitates antimony from solutions, and the Antimony may be volatilised by heat, condensing as a white amorphous sublimate of Oxides of Antimony near to the Copper.

ARSENICUM.

Hydrogen Sulphide affords in solutions containing Hydrochloric Acid a yellow precipitate, soluble in Solution of Potassium Hydroxide, Potassium Carbonate, Ammonium Hydrosulphide, and Potassium Hydrogen Sulphite, and in solution of the official Ammonium Carbonate, but reprecipitated on addition of Hydrochloric Acid. The precipitate is insoluble in the strongest Hydrochloric Acid.

Nascent Hydrogen, generated by the interaction of Zinc and Diluted Sulphuric Acid, converts Arsenium compounds into Hydrogen Arsenide. A cold porcelain tile held in the flame of this gas acquires a dark metallic deposit, which is readily dissolved by Solution of Chlorinated Soda. The gas, when passed into excess of Solution of Silver Nitrate, causes a black precipitate of Silver, and the cautious addition of Solution of Ammonia to the supernatant liquid causes a yellow precipitate.

Hydrogen, generated by the interaction of Zinc and Solution of Potassium Hydroxide or Sodium Hydroxide, converts Arsenium compounds into Hydrogen Arsenide. This gas gives a black stain to filtering-paper soaked with Solution of Silver Nitrate and placed as a cap over the tube in which the test is being performed. Hydrogen Antimonide is not evolved from Antimony compounds under similar circumstances. The operation should be performed in an atmosphere which is free from Hydrogen Sulphide.

Stannous Chloride dissolved in a large excess of Hydrochloric Acid gives on boiling with a solution containing Arsenium a brownish-black precipitate.

Bright Copper Foil precipitates Arsenium from solutions acidulated by Hydrochloric Acid, and the Arsenium may be volatilised by heat in an open tube, when it condenses, at some distance from the Copper, as a white sublimate of characteristic octahedral crystals.

ARSENITES.

Solutions of Arsenites yield a yellow precipitate with Solution of Silver Ammonio-nitrate.

ARSENATES.

Solutions of Arsenates yield a reddish-chocolate precipitate with Solution of Silver Ammonio-nitrate. Solution of Magnesium Ammonio-sulphate affords a white crystalline precipitate.

BISMUTH.

Hydrogen Sulphide affords a brownish-black precipitate, insoluble in Solution of Potassium Hydroxide, of Potassium Cyanide, in Diluted Hydrochloric Acid, and in Ammonium Hydrosulphide, but decomposed and dissolved by boiling Nitric Acid.

Solution of Potassium Hydroxide, Sodium Hydroxide, or Ammonia, except in the presence of Citrates, yields a white precipitate insoluble in excess of the precipitant.

Dilute Solution of Sodium Chloride in large excess gives in solutions which are not too acid a white precipitate, insoluble in Tartaric Acid.

Solution of Potassium Chromate gives a yellow precipitate, soluble in dilute Nitric Acid, insoluble in Solution of Potassium Hydroxide.

Stannous Chloride dissolved in a Concentrated Solution of Potassium Hydroxide gives a black precipitate when added in excess to a solution containing Bismuth.

Diluted Sulphuric Acid does not precipitate Bismuth salts.

BROMATES.

From Bromates Solution of Sulphurous Acid liberates Bromine, recognisable by its odour and appearance.

After ignition with Charcoal, Bromates are converted into Bromides, and the latter yield their characteristic reactions.

BROMIDES OR HYDROBROMIDES.

Solution of Silver Nitrate gives a yellowish curdy precipitate, readily soluble in Solution of Potassium Cyanide, somewhat soluble in strong but almost insoluble in weak Solution of Ammonia, and insoluble in Nitric Acid.

Solution of Sodium Nitrite with the addition of Diluted Hydrochloric Acid does not liberate Bromine from a Bromide.

Solution of Chlorine liberates Bromine, soluble in two or three drops of Carbon Bisulphide or of Chloroform, and forming a reddish solution.

Bromine is liberated when a Bromide is heated with Sulphuric Acid and Manganese Peroxide, Lead Peroxide, or Potassium Bichromate, the vapour giving an orange-yellow colour to filter-paper soaked in Mucilage of Starch.

In testing for Bromides in the presence of Iodides, all Iodine should first be removed by boiling the aqueous solution with excess of Lead Peroxide.

CADMIUM.

Hydrogen Sulphide yields a yellow precipitate, insoluble in cold dilute Hydrochloric Acid, in Solutions of Ammonium Hydro-sulphide, of Potassium Hydroxide, and of Potassium Cyanide, but soluble in Nitric Acid, in hot Diluted Hydrochloric Acid, and in hot Diluted Sulphuric Acid.

Solution of Potassium Hydroxide and Solution of Sodium Hydroxide afford white precipitates insoluble in excess.

Solution of Ammonia gives a white precipitate readily soluble in excess.

CALCIUM.

Solution of Ammonium Carbonate yields a white precipitate which, after boiling well and setting aside the mixture, is insoluble in Solution of Ammonium Chloride.

Solution of Ammonium Oxalate gives a white precipitate, soluble in Hydrochloric Acid but insoluble in Acetic Acid.

Solution of Potassium Chromate gives no precipitate.

CARBONATES AND BICARBONATES.

Dilute Acids cause an effervescence of Carbonic Anhydride, which is odourless, and causes a white precipitate in Solution of Lime, or in Solution of Barium Hydroxide.

Soluble Carbonates afford a brownish-red precipitate with Test-solution of Mercuric Chloride, Bicarbonates a whitish precipitate; the former yield a white precipitate with a cold Solution of Magnesium Sulphate, the latter do not.

CHLORIDES OR HYDROCHLORIDES.

Solution of Silver Nitrate affords a white curdy precipitate, soluble in Solution of Ammonia or Solution of Potassium Cyanide, but insoluble in Nitric Acid.

A solid Chloride or Hydrochloride, when subjected to distillation with Sulphuric Acid and Potassium Bichromate, yields a reddish-brown distillate, which is decomposed by Water. The resulting solution when nearly neutralised gives a yellow precipitate with Solution of Lead Acetate, or Solution of Barium Chloride, and a mixed red and white precipitate with Solution of Silver Nitrate, of which the red portion is dissolved by Nitric Acid, and both portions by Solution of Ammonia.

Heated with Manganese Peroxide and Sulphuric Acid, Chlorides or Hydrochlorides yield Chlorine, recognisable by its odour and by giving a blue colour with Solution of Potassium Iodide and Mucilage of Starch.

CITRATES.

Citrates become charred when heated.

Solution of Calcium Chloride added in excess affords, when boiled with a neutral solution of a Citrate, a white precipitate, insoluble in Solution of Potassium Hydroxide, but soluble in Solution of Ammonium Chloride and in solutions of alkaline citrates.

Solution of Silver Nitrate causes in solutions of neutral citrates a white precipitate soluble in Solution of Ammonia. A mirror is not formed on the sides of the tube when the ammoniacal solution is warmed (distinction from tartrates).

COPPER.

Hydrogen Sulphide or Solution of Ammonium Hydro-sulphide yields in solutions which are not strongly acid a brownish-black precipitate, insoluble in Diluted Hydrochloric Acid and in Solution of Potassium Hydroxide, almost insoluble in Solution of Ammonium Hydrosulphide, but decomposed and dissolved by boiling Nitric Acid, and when freshly precipitated soluble in Solution of Potassium Cyanide.

Solution of Potassium Hydroxide gives a bulky light-blue precipitate which becomes brownish-black on boiling. The light-blue precipitate is soluble in a very large excess of a concentrated solution of Potassium Hydroxide, forming a blue solution. In the presence of soluble tartrates or citrates the light-blue precipitate dissolves at once in the Solution of Potassium Hydroxide, yielding a blue liquid which is not affected on boiling. Dextrose and other sugars act similarly, but the resulting solution, on warming, affords a yellowish-red to bright-red precipitate. In the presence of non-volatile organic acids Solution of Potassium Hydroxide produces no precipitate, but on the addition of the reagent the solution becomes deep-blue.

Solution of Ammonia or of Ammonium Carbonate added in small quantity to a neutral solution of a Copper salt gives a greenish-blue precipitate which readily dissolves in excess of Solution of Ammonia, forming a deep-blue solution. This blue coloration is perceptible in highly dilute solutions.

Solution of Potassium Ferrocyanide gives a reddish-brown precipitate, or in very dilute solutions a reddish-brown coloration, unaffected by dilute acids but decomposed by Solution of Potassium Hydroxide.

Metallic Iron receives a reddish coating of copper when placed in a solution of a Copper salt.

CYANIDES.

Solution of Silver Nitrate affords a white curdy precipitate, soluble in Solution of Potassium Cyanide, in Solution of Ammonia, and in boiling concentrated Nitric Acid.

If to a soluble Cyanide be added a few drops of a mixed Solution of Ferrous and Ferric salts, then of Solution of Sodium Hydroxide, and lastly excess of Hydrochloric Acid, a precipitate of Prussian Blue results. Insoluble Cyanides decompose when heated, evolving Cyanogen, which burns with a characteristic peach-coloured flame.

HYDROBROMIDES. See BROMIDES, p. 672.

HYDROCHLORIDES. See CHLORIDES, p. 673.

IODATES.

Solution of Silver Nitrate gives a white crystalline precipitate, sparingly soluble in Water and in dilute Nitric Acid, but readily dissolved by Solution of Ammonia. Solution of Sulphurous Acid when added to the ammoniacal solution gives a pale yellow precipitate.

A mixed Solution of Potassium Iodide and Tartaric Acid in a solution of an Iodate yields Iodine, which affords a blue colour with Mucilage of Starch.

Solution of Barium Chloride gives a white precipitate nearly insoluble in Water and soluble with difficulty in Diluted Nitric Acid.

On the addition of Mucilage of Starch and Solution of Sulphurous Acid a blue colour is produced.

IODIDES.

Solution of Silver Nitrate affords a curdy yellow precipitate insoluble in Nitric Acid and almost insoluble in Solution of Ammonia, but soluble in Solution of Potassium Cyanide.

Solution of Mercurous Nitrate produces a green precipitate, insoluble in Diluted Nitric Acid, soluble in Solution of Potassium Iodide.

Test-solution of Mercuric Chloride yields a scarlet precipitate, slightly soluble in excess of this reagent, and very soluble in Solution of Potassium Iodide.

Solution of Lead Acetate causes a yellow precipitate, soluble in Diluted Nitric Acid and soluble in boiling Water. From the latter solution the precipitate separates in golden crystalline scales as the solution cools.

Solution of Copper Sulphate, mixed with the Solution of Ferrous Sulphate or of Sulphurous Acid, affords a whitish precipitate, soluble in Solution of Ammonia, sparingly soluble in Hydrochloric Acid.

A small quantity of Solution of Chlorine or Bromine, or a Solution of Sodium Nitrite and Diluted Hydrochloric Acid, liberates Iodine. A very minute quantity of free Iodine produces an intense blue coloration with Mucilage of Starch. If liquid containing free Iodine be shaken with Carbon Bisulphide, the Iodine is dissolved by the Carbon Bisulphide and communicates a violet colour to it.

IRON.

Reactions common to Ferrous and Ferric salts:

Solution of Ammonium Hydrosulphide yields, in neutral solutions, a black precipitate soluble in cold Diluted Hydrochloric Acid with evolution of Hydrogen Sulphide.

Solution of Potassium Ferrocyanide gives a blue precipitate, or a white precipitate rapidly turning blue, insoluble in dilute Hydrochloric Acid, decomposed by Solution of Potassium Hydroxide or by Solution of Sodium Hydroxide.

Reactions characteristic of Ferrous salts:

Hydrogen Sulphide causes no precipitate in a slightly acid solution.

Solution of Potassium Ferricyanide affords a dark-blue precipitate, insoluble in dilute Hydrochloric Acid, decomposed by Solution of Potassium Hydroxide or Solution of Sodium Hydroxide.

(Ferric salts gives a reddish-brown coloration but no precipitate with this reagent.)

Ferrous salts mixed with Solution of Potassium or Sodium Hydroxide give a dull-green precipitate.

Reactions characteristic of Ferric salts:

Hydrogen Sulphide gives a white precipitate of Sulphur.

Solution of Ammonium Thiocyanate produces a blood-red coloration which is discharged on the addition of Test-solution of Mercuric Chloride.

Solution of Tannic Acid yields a bluish-black coloration or precipitate with Ferric salts, and, more slowly, with Ferrous salts.

Solution of Potassium, Sodium, or Ammonium Hydroxide causes a reddish-brown precipitate, soluble in Solution of Citric or Tartaric Acid, and not formed in the presence of Citrates and Tartrates.

LEAD.

Hydrochloric Acid affords, except in very weak solutions, a white precipitate, soluble in boiling Water. The aqueous solution as it cools deposits the Lead Chloride in the crystalline form.

Hydrogen Sulphide, in not very strongly acid solutions, yields a black precipitate insoluble in dilute Hydrochloric Acid, Solution of Potassium Hydroxide, and Solution of Ammonium Hydrosulphide. It is decomposed by boiling with Diluted Nitric Acid, being partly converted into soluble Lead Nitrate and partly into white insoluble Lead Sulphate and Sulphur.

Diluted Sulphuric Acid causes a white precipitate almost insoluble in Water, and still less soluble in dilute Sulphuric Acid and in Alcohol, but soluble in Solution of Ammonium Acetate.

Solution of Potassium Chromate produces a yellow precipitate readily soluble in Solution of Potassium Hydroxide, in strong hot Nitric Acid, sparingly soluble in diluted Nitric Acid, insoluble in Acetic Acid.

Solution of Potassium Hydroxide gives a white precipitate soluble in excess of the reagent but insoluble in Solution of Ammonia.

MAGNESIUM.

Solution of Ammonium Carbonate, in the presence of Solution of Ammonium Chloride, affords no precipitate.

Solution of Sodium Phosphate, or Solution of Sodium Arsenate, in the presence of Ammonium salts and Solution of Ammonia, yields a white crystalline precipitate.

Solution of Potassium, Sodium, Ammonium, Barium, or Calcium Hydroxide causes a white precipitate, insoluble in excess of the reagent, but soluble in Solution of Ammonium Chloride.

MERCURY.

Reactions common to Mercurous and Mercuric salts:

Hydrogen Sulphide yields a black precipitate, insoluble in Solution of Ammonium Hydrosulphide and in boiling Diluted Nitric Acid.

Copper Foil immersed in a solution free from excess of Nitric Acid becomes coated with a deposit of Mercury which on rubbing becomes bright, and from which the Mercury may be volatilised by heat and obtained in globules.

Solution of Stannous Chloride reduces Mercuric salts, first to Mercurous salts and then to metallic Mercury.

Reactions characteristic of Mercurous salts:

Hydrochloric Acid affords a white precipitate insoluble in Water, which is blackened by Solution of Ammonia.

Solution of Potassium or Sodium Hydroxide produces a black precipitate of Mercurous Oxide, and Solution of Ammonia a black precipitate of a Mercurous-amido salt.

Solution of Potassium Iodide gives a green precipitate soluble in excess of the precipitant.

Reactions characteristic of Mercuric salts:

Solution of Ammonia affords a white precipitate.

Solutions of Potassium or Sodium Hydroxide yield a yellow precipitate of Mercuric Oxide.

Solution of Potassium Iodide produces a scarlet precipitate, soluble in excess of the precipitant, and in a considerable excess of the solution of the Mercuric salt.

NITRATES.

Ferrous Sulphate and Sulphuric Acid, when added to a solution of a nitrate in such a way that the acid forms a stratum below the aqueous solution, cause a purple or brown coloration at the junction of the two liquids.

Nitrates liberate red fumes when warmed with Sulphuric Acid and Copper. Nitrates discharge the colour of Solution of Indigo Sulphate containing excess of Sulphuric Acid, especially if the mixture is warmed.

NITRITES.

On the addition, to a solution of a Nitrite, of a few drops of Diluted Sulphuric Acid, Solution of Potassium Iodide, and Mucilage of Starch, a blue colour is produced.

Diluted Sulphuric Acid affords red fumes.

Solution of Ferrous Sulphate and Acetic Acid yield a deep brown colour.

OXALATES.

Solution of Calcium Chloride affords a white precipitate, soluble in Hydrochloric Acid but insoluble in Acetic Acid.

Solution of Silver Nitrate yields a white precipitate, soluble in Solution of Ammonia and in Diluted Nitric Acid.

Most Oxalates are on ignition converted into Carbonates.

Oxalates do not char when heated with Sulphuric Acid, but yield Carbonic Oxide and Carbonic Anhydride.

PHOSPHATES (ORTHO-).

Solution of Silver Ammonio-nitrate yields in solutions of Orthophosphates a light-yellow precipitate readily soluble in Solution of Ammonia and in cold dilute Nitric Acid.

Test-solution of Ferric Chloride, in the presence of Ammonium Acetate or other Acetate, yields a whitish precipitate, insoluble in Acetic Acid.

Solution of Magnesium Ammonio-sulphate affords a white crystalline precipitate.

Excess of Solution of Ammonium Molybdate, containing much Nitric Acid, produces, on warming, a yellow precipitate.

POTASSIUM.

Solution of Platinic Chloride affords with moderately strong solutions of Potassium Chloride (or with other Potassium salts if Hydrochloric Acid be present) a yellow crystalline precipitate, which, upon ignition, leaves a residue of Potassium Chloride and Platinum.

Potassium compounds moistened with Hydrochloric Acid communicate a violet coloration when introduced, on platinum wire, into the flame of a spirit lamp or Bunsen burner.

SELENIUM AND TELLURIUM.

Selenium and Tellurium may occur in compounds of Bismuth. To detect these elements, dissolve the compound in Nitric Acid, add solution of Sodium Chloride or Ammonium Chloride, and dilute freely with Water. The filtrate from the precipitated Oxychloride, mixed with excess of Sodium Sulphite, should give no precipitate or coloration even after twelve hours.

SILICA.

Silica, after exposure to a red heat, is insoluble in acids, and is not dissolved in a bead of Microcosmic salt when heated to fusion in the blow-pipe flame. The result of its fusion with Alkalis is soluble in Water, the solution yielding a gelatinous precipitate on the addition of Hydrochloric Acid.

SILVER.

Hydrochloric Acid and other Chlorides afford a white curdy precipitate, soluble in Solution of Ammonia but insoluble in Nitric Acid. Solution of Potassium Chromate, in the absence of Chlorides, Bromides, and Iodides, affords a red precipitate.

SODIUM.

Sodium compounds, moistened with Hydrochloric Acid, communicate a yellow coloration when introduced, on platinum wire, into the flame of a spirit lamp or Bunsen burner.

STARCH.

When Starch is boiled with Water, the mixture, on cooling, affords a deep blue coloration on the addition of Solution of Iodine.

When boiled for some minutes with Water acidulated with Hydrochloric Acid, and then made alkaline with Sodium Hydroxide, a red precipitate is formed on further boiling after the addition of Solution of Potassio-cupric Tartrate.

The varieties of Starch may be distinguished by their microscopical characters.

SULPHATES.

Solution of Barium Chloride affords a white precipitate insoluble in Hydrochloric Acid.

SULPHIDES.

The official Sulphides, Hydrosulphides, and Sulphurated compounds evolve Hydrogen Sulphide when boiled with strong Hydrochloric Acid.

Sulphonal and Thiocyanates do not evolve Hydrogen Sulphide when treated in this way. If fused with Sodium Carbonate, mixed with a small proportion of Potassium Nitrate, they afford a mass which, when dissolved in Water, responds to the tests for Sulphates.

SULPHITES.

Hydrochloric Acid liberates Sulphurous Anhydride, a colourless gas with a pungent smell of burning Sulphur.

Hydrochloric Acid and Zinc being added, Hydrogen Sulphide, recognisable by its odour, is liberated.

Sulphites decolorise Solution of Iodine.

TARTRATES.

Tartrates become charred when heated.

Solution of Calcium Chloride added in excess to a solution of a neutral Tartrate affords a white granular precipitate, soluble, when fresh, in cold moderately concentrated solution of Potassium Hydroxide, from which it is precipitated on boiling. It is also soluble in Tartaric Acid.

Solution of Silver Nitrate yields a white precipitate, soluble in Solution of Ammonia and in Nitric Acid. The Ammoniacal Solution is reduced on heating, and deposits metallic Silver as a mirror on the sides of the test-tube.

A concentrated Solution of Potassium Acetate gives a white precipitate in moderately concentrated solutions when acidulated with Acetic Acid and well stirred, and especially on the addition of Alcohol (90 p.c.).

If to the Solution of Tartaric Acid in Water, or of a Tartrate acidulated with Acetic Acid, be added a drop of Solution of Ferrous Sulphate, then a few drops of Solution of Hydrogen Peroxide, and finally an excess of Solution of Potassium Hydroxide, a purple or violet colour will be produced.

TELLURIUM. *See* SELENIUM.

THIOSULPHATES.

Hydrochloric Acid gives a yellow precipitate and liberates Sulphurous Anhydride, recognisable by its odour.

Hydrochloric Acid and Zinc liberate Hydrogen Sulphide.

Thiosulphates decolorise Solution of Iodine.

TIN.

Metallic Zinc placed in a solution of any Tin salt acidulated with Hydrochloric Acid precipitates the whole of the Tin in metallic scales or as a grey sponge. The metal, separated from the liquid, is soluble in boiling concentrated Hydrochloric Acid, and the solution, which contains Stannous Chloride, gives with Test-solution of Mercuric Chloride a white precipitate of Calomel, which becomes grey from separation of metallic Mercury, if excess of Tin salt is present.

ZINC.

Solution of Ammonium Hydrosulphide yields with neutral, and Hydrogen Sulphide with alkaline solutions, a white precipitate, soluble in Hydrochloric Acid, but insoluble in Acetic Acid.

Solution of Potassium Hydroxide or of Ammonia affords a white precipitate, soluble in excess of either reagent.

Solution of Potassium Ferrocyanide produces a white precipitate insoluble in Diluted Hydrochloric Acid.

TEST-SOLUTIONS FOR VOLUMETRIC ESTIMATIONS.

The following apparatus is required in the preparation and use of these solutions.

1. A glass flask which, when filled to a mark on the neck, contains 1000 grammes of Distilled Water at 60° F. (15.5° C.). This flask is described as the 'one-litre flask,' and is used in ordinary analytical operations to measure 1000 c.c.; as it is customary for the sake of convenience to make the measurement of liquids with metric apparatus which has thus been graduated at 60° F. (15.5° C.).

2. A graduated cylindrical jar which, when filled to the zero mark at 60° F. (15.5° C.), contains 1000 grammes of Distilled Water, and is divided into 100 equal parts, each of which is taken as corresponding to 10 c.c.

3. A burette. A graduated tube which, when filled to the zero mark at 60° F. (15.5° C.), holds, within the graduated portion, 50 grammes of Distilled Water; the graduated portion is divided into 50 equal parts, each of which is taken as corresponding to 1 c.c., and each such division is subdivided into 10 equal parts.

A standard Litre contains 1 kilogramme (1000 grammes) of Distilled Water at the temperature of maximum density (39.2° F. or 4° C.), and at the barometric pressure of 760 millimetres of Mercury. One-thousandth part of a standard Litre (1 millilitre) is, strictly speaking, equivalent to 1.00016 c.c., or 1 c.c. to 0.99984 millilitre. Any litre measure or other piece of volumetric apparatus not actually marked '60° F.' or '15.5° C.' is to be taken as having reference to the standard Litre graduated at 39.2° F. or 4° C.

Volumetric Solutions, before being used, should be shaken, in order that they may be throughout of uniform strength. They should also be preserved in stoppered bottles.

VOLUMETRIC SOLUTION OF IODINE.

(Iodine, I=125.9.)

Iodine 12.59 grammes; Potassium Iodide 18 grammes; Distilled Water a sufficient quantity. The Iodine should be pure. It may be obtained pure by mixing the official 'Iodum' with one-fourth of its weight of dry Potassium Iodide, resubliming, and leaving the resulting crystals for a few hours under a glass shade placed over a dish containing concentrated Sulphuric Acid.

Put the Iodine and the Potassium Iodide (which should be pure), with about 20 c.c. of Distilled Water, into the one-litre flask; gently agitate until solution is complete; then dilute the solution with Distilled Water until it measures 1000 c.c.

The strength of this Solution should be verified by the aid of pure Arsenious Anhydride, pure Barium Thiosulphate, or other suitable substance, and the Solution (*a*) be either strengthened or diluted, so that 1000 c.c. shall contain exactly 12.59 grammes of Iodine; or (*b*) have its actual strength noted, so that calculations may be made accordingly when the Solution is used.

This Solution is used for testing the following substances, and the figures are taken from the Text of the B.P. The Solution is dropped from the burette into the liquid to be tested until free Iodine begins to appear in the solution.

	Grammes weight of Substance.	=	C.C. of Vol. Sol.
Acid Arseniosum	0.25	=	50.8 to 50.9
„ Sulphurosum	1.0	=	15.7
Antimonii Oxidum	0.5	=	70.0
Antimonium Tartaratum	1.0	=	60.2 to 60.7
Liquor Arsenicalis	25 c.c.	=	50.8 to 50.9
„ Arsenici Hydrochloricus	25 c.c.	=	50.8 to 50.9

VOLUMETRIC SOLUTION OF POTASSIUM BICHROMATE.

(Potassium Bichromate, $K_2Cr_2O_7 = 292.3$.)

Potassium Bichromate, 4.87 grammes; Distilled Water, a sufficient quantity; put the Potassium Bichromate into the one-litre flask; dissolve it in about half a litre of Distilled Water; dilute the solution with Distilled Water until it has the exact bulk of 1000 c.c. 100 c.c. of this solution yield 0.0794 gramme of Oxygen, and are therefore capable of converting 0.556 gramme of Iron from the Ferrous to the Ferric state.

The strength of this Solution should be verified by the aid of pure Ferrous Ammonium Sulphate, or other trustworthy substance, and the Solution (*a*) be either strengthened or diluted, so that 1000 c.c. shall contain exactly 4.87 grammes of Potassium Bichromate; or (*b*) have its actual strength noted, so that calculations may be made accordingly when the Solution is used. This Solution is used for determining the proportion of Ferrous salt in the following preparations, and the figures are taken from the Text of the B.P. It is known that the whole of the Ferrous salt has been converted into a Ferric salt when a minute drop of the liquid, placed in contact with a drop of a very dilute solution of Ferricyanide of Potassium on a white plate, ceases to strike with it a blue colour.

	Grammes weight of Substance.	=	C.C. of Vol. Sol.
Ferri Arsenas	1	=	6.7
„ Carb. Sacch.	1	=	29.0
„ Phosph.	1	=	28.2
„ Sulphas	1	=	36.0
„ „ Exsiccatus	1	=	54.6
Ferrum Redactum	0.25	=	33.7

VOLUMETRIC SOLUTION OF SILVER NITRATE.

(Silver Nitrate, $AgNO_3 = 168.69$.)

Silver Nitrate, 16.869 grammes; Distilled Water a sufficient quantity. Put the Silver Nitrate into the one-litre flask; dissolve it in about half a litre of Distilled Water; dilute the solution with Distilled Water until it has the exact bulk of 1000 c.c. The solution should be kept in an opaque stoppered bottle.

The strength of this Solution should be verified by the aid of pure Sodium Chloride or solution of pure Hydrochloric Acid of known strength, and the Solution (*a*) be either strengthened or diluted, so that 1000 c.c. shall contain exactly 16.869 grammes of Silver Nitrate; or (*b*) have its actual strength noted, so that calculations may be made accordingly when the Solution is used.

This Solution is used in testing the following substances, and the figures are taken from the text of the B.P.

	Grammes weight of Substance.	=	C.C. of Vol. Sol.
Acid. Hydrobrom. Dil.	4.0	=	49.8
„ Hydrochloricum	0.1	=	8.7
„ Hydrocyan. Dil.	1.0	=	3.7
*Ammonii Bromidum	0.5	=	51.1 to 51.8
Aqua Laurocerasi			
Potassii Bromidum	1.0	=	83.7 to 85.4
„ Iodidum	1.0	=	59.5 to 61.9
*Sodii Bromidum	1.0	=	95.8 to 97.8
*Sodii Iodidum	1.0	=	66.5

* Dried salt to be used.

VOLUMETRIC SOLUTION OF SODIUM HYDROXIDE.

(Sodium Hydroxide, NaOH=39.76.)

Purified Sodium Hydroxide, 42 grammes; Distilled Water a sufficient quantity: dissolve the Purified Sodium Hydroxide in 1000 c.c. of Distilled Water.

Fill a burette with the solution of Sodium Hydroxide, and cautiously drop this into 100 c.c. of the Volumetric Solution of Sulphuric Acid until the Acid is exactly neutralised as indicated by Litmus. Note the number of c.c. (n) of the solution of Sodium Hydroxide used, and having then introduced 800 c.c. of it into a graduated jar, augment this quantity by the addition of Water, until it becomes $800 \times 100 \div n$ c.c. 1000 c.c. then contain exactly 39.76 grammes of Sodium Hydroxide.

A Decinormal Volumetric Solution of Sodium Hydroxide may be prepared by adding, to 100 c.c. of the above Volumetric Solution, sufficient Distilled Water to produce 1000 c.c.

Alcoholic solutions, normal and decinormal.—Alcohol (90 p.c.) may, when necessary, be used as the solvent. An equivalent proportion of Potassium Hydroxide, KOH=55.71, may in certain cases be employed in the place of Sodium Hydroxide.

The following substances are tested either with Volumetric or Decinormal Volumetric Solution of Sodium Hydroxide, and the figures are taken from the Text of the B.P.

	Grammes weight of Substance.	=	C. C. of Vol. Sol.
Acid. Aceticum	1.0	=	5.5
„ „ Dil.	1.0	=	7.1 $\frac{N}{10}$
„ „ Glac.	1.0	=	16.6
„ Citricum	1.0	=	14.3
„ Hydrobrom. Dil.	4.0	=	4.98
„ Hydrochloricum	1.0	=	8.7
„ „ Dil.	1.0	=	2.9
„ Lacticum	1.0	=	8.3
„ Nitricum	1.0	=	11.1
„ „ Dil.	1.0	=	2.7
„ Nit. Hydroch. Dil.	4.0	=	10.0
„ Sulphuricum	1.0	=	20.1
„ „ Arom.	—	=	—

	Grammas weight of Substance.	=	C. C. of Vol. Sol.
Acid Sulphuricum Dil.	1.0	=	2.8
„ Tartaricum	1.0	=	13.3
Adeps Lanae	10.0	=	0.1
Cetaceum	0.2	=	1 drop.
Potassii Tartras Acidus (dry salt)	1.0	=	5.2
Saccharum Lactis	1.0	=	3 drops.

VOLUMETRIC SOLUTION OF SODIUM THIOSULPHATE.

(Sodium Thiosulphate crystallised, $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O} = 246.44$.)

Sodium Thiosulphate, in crystals, 28 grammes; Distilled Water, a sufficient quantity: dissolve the Sodium Thiosulphate in 1000 c.c. of Distilled Water. Fill a burette with this solution, and drop it cautiously into 100 c.c. of the Volumetric Solution of Iodine, until only a faint brown or yellow colour remains. Add Mucilage of Starch and continue the addition of the Thiosulphate solution until the blue colour is discharged. Note the number of c.c. (n) required to produce this effect: then put 800 c.c. of the same solution into a graduated jar, and augment this quantity by the addition of Distilled Water until it amounts to $800 \times 100 \div n$ c.c. 1000 c.c. then contain exactly 24.644 grammes of Sodium Thiosulphate.

This Solution is used for testing the following substances, and the figures are taken from the Text of the B.P. In each case, excepting that of Iodine, a solution of Potassium Iodide and Hydrochloric Acid is added to the substance, and the amount of Iodine so liberated is indicated by this Solution.

	Grammas weight of Substance.	=	C. C. of Vol. Sol.
Calx Chlorinata	0.5	=	46.8
Iodum	1.0	=	78.4
Liq. Calc. Chlorinate	1.0	=	5.6
„ Sodae „	3.5	=	25.0
Tinctura Iodi	10 c.c.	=	19.6

VOLUMETRIC SOLUTION OF SULPHURIC ACID.

(Sulphuric Acid, $\text{H}_2\text{SO}_4 = 97.34$.)

Sulphuric Acid, 50 grammes; Distilled Water, a sufficient quantity: dilute the Sulphuric Acid with 900 c.c. of Distilled Water; cool. Prepare a small quantity of Sodium Carbonate by heating pure Sodium Bicarbonate to redness in a platinum crucible for a quarter of an hour. Make a solution of 1.053 grammes of the Sodium Carbonate, and add to it from a burette the solution of Sulphuric Acid until exact neutrality is obtained, taking care to boil off the Carbonic Anhydride.* Note the number of c.c. used (n), then put 900 c.c. of the solution of Sulphuric Acid into a graduated jar, and augment this quantity by the addition of Distilled Water until it amounts to $900 \times 20 \div n$ c.c. 1000 c.c. then contain exactly 48.67 grammes of Sulphuric Acid.

A Decinormal Volumetric Solution of Sulphuric Acid may be prepared by adding, to 100 c.c. of the above Volumetric Solution, sufficient Distilled Water to produce 1000 c.c.

* The use of Methyl Orange as an indicator would obviate the necessity of boiling off Carbonic Anhydride, and shorten the time required for the titration.

The Volumetric Solution and the Decinormal Volumetric Solution are used in the titration of the following substances, and the figures are taken from the text of the B.P.

	Grammes weight of Substance.	=	C. C. of Vol. Sol.
Ammonii Carbonas	1.0	=	18.7
Borax	1.0	=	5.2
Chloral Hydras	4.0	=	6.0
Liquor Ammoniae	1.0	=	5.9
„ „ Fortis	1.0	=	19.1
„ Calcis	24 c.c.	=	10.0 $\frac{N}{10}$
„ „ Saccharatus	10.0	=	6.3
„ Plumbi Subacetatis Fortis	1.0	=	17.0 $\frac{N}{10}$
„ Potassae	9 c.c.	=	10.0
Plumbi Acetas	1.0	=	53.1 $\frac{N}{10}$
Potassa Caustica	1.0	=	16.1
Potassii Bicarbonas 1.0 ignited leaves	0.69	=	10.0
„ Carbonas	1.0	=	11.9
„ Citras (dry salt)	1.0 ignited	=	9.7
„ Tartras (dry salt)	1.0 „	=	8.4
Sapo Animalis	5	=	3.0 $\frac{N}{10}$
„ Durus	5	=	3.0 $\frac{N}{10}$
„ Molle	5	=	3.0 $\frac{N}{10}$
Soda Tartarata	1.0 ignited	=	7.0
Sodii Benzoas	1.0 „	=	6.8 to 6.9
„ Bicarbonas	1.0	=	11.8 to 11.9
„ Carbonas	1.0	=	6.9
Sodium	1.0	=	42.6
Spiritus Ammoniae Aromaticus	20 c.c.	=	25.5
„ „ Fetidus	25 c.c.	=	42.5

In the case of Chloral Hydras, the substance is first treated with Volumetric Solution of Sodium Hydroxide, and the figure given above represents the excess of alkali after the reaction has taken place.

The figures for Sapo Animalis, Durus and Molle represent 'the limit of alkaline carbonate' allowed by the B.P. and it may here be mentioned that the B.P. uses phenol-phthalein as an indicator for the titration of a carbonate instead of Methyl Orange which is the one usually employed by chemists for that purpose.

INDICATORS OF THE TERMINATION OF REACTIONS IN VOLUMETRIC ESTIMATIONS.

MUCILAGE OF STARCH.

It gives an intensely blue colour with Iodine, at ordinary temperatures. It may be used in the titration of the following substances:—

Acidum Arseniosum	Liquor Arsenici Hydrochloricus
„ Sulphurosum	„ Calcis Chlorinatæ
Calx Chlorinata	„ Sodæ Chlorinatæ
Iodum	Tinctura Iodii
Liquor Arsenicalis	

The B.P. mentions this indicator and yet the only case in which they expressly direct it to be used is in the titration of Acidum Sulphurosum. The

completion of the reaction in this case depends upon the *appearance* of a blue colour, whilst in the majority of the other cases the final reaction is the *disappearance* of the yellow colour of free Iodine. If a few drops of the indicator are added when the yellow colour is very faint, the disappearance of the blue is much more marked than that from yellow to white.

SOLUTION OF POTASSIUM FERRICYANIDE.

It gives an intensely blue precipitate or coloration with Ferrous salts but none with Ferric salts.

It is the B.P. indicator used in the titration of the following substances:—

Ferri Arsenas	Ferri Sulphas
" Carbonas Saccharata	" " Exsiccata
" Phosphas	Ferrum Redactum

SOLUTION OF LITMUS.

It gives a red colour with Acids and a blue colour with Alkalis. It is not distinctly reddened by Boric Acid. It is reddened by moist Carbonic Anhydride; hence, when estimating a Carbonate with a volumetric solution of an Acid, the termination of the reaction is indicated by the neutral tint of the Litmus after the liquid under examination has been well boiled.

It may be used in the titration of the following substances:—

Acidum Hydrochloricum	Liquor Potassæ
" " Dilutum	Potassa Caustica
" Nitricum	Potassii Bicarbonas
" " Dilutum	" Carbonas
" Nitro-Hydroch. Dil.	" Citras
" Sulphuricum	" Tartras
" " Arom.	" " Acidus
" " Dil.	Soda Tartarata
Ammonii Carbonas	Sodii Benzoas
Liquor Ammonie	" Bicarbonas
" " Fortior	" Carbonas
" Calcis	Spiritus Ammonie Aromaticus
" " Saccharatus	" " Fetidus

SOLUTION OF METHYL ORANGE.

It gives a pink colour with mineral Acids and a faint yellow colour with Alkalis. It is a trustworthy indicator of excess of Ammonia. It is not reddened by moist Carbonic Anhydride or Boric Acid.

It may be used in the titration of the following substances:—

Alkaline Carbonates	Ammonia.
	Borax.

SOLUTION OF PHENOL-PHTHALEIN.

It gives a red colour with Alkalis, which is discharged by acids. It is the most trustworthy indicator of excess of Organic Acids. It does not accurately indicate the point of neutralisation of Ammonia with an acid. For the latter, Tincture of Cochineal is an appropriate indicator.

It may be used in the titration of the following substances:—

Acidum Aceticum	Acidum Citricum
" " Dilutum	" Tartaricum
" " Glaciale	Adeps Lanæ

SOLUTION OF NEUTRAL POTASSIUM CHROMATE.

It gives a red precipitate with Silver Nitrate, but not while any soluble Chloride, Bromide, or Iodide is present.

It may be used in the titration of the following substances:—

Ammonii Bromidum	Potassii Iodidum
Potassii "	Sodii Bromidum
	Sodii Iodidum.

THERMOMETRIC MEMORANDA.

Thermometers employed in taking Specific Gravities, Melting Points, or Boiling Points, should have been compared with a standard thermometer, and their errors recorded in a table, by means of which the readings of the instrument used are to be corrected. The zero-point of the instruments should be verified from time to time.

To determine the Melting Point of a Substance, a minute fragment of it should be placed in a thin-walled glass tube having an internal diameter of about 1 millimetre ($\frac{1}{25}$ inch), and sealed at the lower end. This tube should be attached to the thermometer so that the substance is near the middle of the bulb, and the thermometer with the attached tube should be immersed in a suitable liquid, contained in a beaker placed over a small lamp flame. Water is suitable for substances melting below 212° F. (100° C.), Sulphuric Acid, Hard Paraffin, or Glycerin for substances melting at higher temperatures. The liquid should be continually stirred by means of a glass ring moved up and down till the substance is seen to melt. The temperature is noted, the tube cooled till the substance solidifies, and the operation then repeated. The latter reading of the thermometer should be taken as the melting point. To obtain accurate results, the whole of the mercury column of the thermometer should be immersed in the heated liquid; but as this is seldom practicable, the mean temperature of the emergent column—that is, of that portion above the surface of the heated liquid—should be ascertained and the necessary correction applied. To obtain the mean temperature of the emergent column, a small thermometer is fixed by india-rubber bands in such a position that its bulb is about the middle of the emergent column. The corrected temperature may be calculated with approximate accuracy from the formula:

$$\text{Corrected Temperature} = T + \cdot 000143 (T-t) N,$$

in which

T = observed, *i.e.*, uncorrected, temperature;

t = mean temperature of the emergent column;

N = the length of the emergent column in scale degrees.

To determine the Boiling Point of a substance, the liquid under examination should be placed in a distilling flask having a side tube for conveying the vapour to a condenser, while the thermometer passes through a cork inserted in the neck. The bulb of the thermometer should be near to, but not immersed in, the liquid, and the whole of the thread of mercury should, if possible, be surrounded by the vapour; the temperature is read off as soon as the liquid is distilling freely. If any considerable length of the

mercurial column be not surrounded by the vapour, the temperature of the emergent column should be ascertained as directed under Melting Points, and the necessary correction applied.

The SYMBOLS, and ATOMIC WEIGHTS table; also the WEIGHTS AND MEASURES tables will be found, as in former editions, at the commencement of the book.

TINCTURES.

THE PROCESS OF PERCOLATION.

Moisten the solid materials with the prescribed quantity of menstruum, and set the mixture aside in a closed vessel for twenty-four hours. Pack the mixture in a percolator; lightly, closely, or otherwise, according to the nature of the materials. Pour over the contents, at intervals, further portions of the menstruum, always maintaining a layer of liquid above the materials, and allow percolation to proceed, slowly at first, and afterwards less slowly, until a sufficient quantity of the menstruum has been used to produce about three-fourths of the volume of the finished Tincture, or until exhaustion of the solid materials has been effected. When liquid ceases to pass, remove the marc from the percolator and submit it to pressure. Filter the expressed liquid, if necessary, either at once or after standing for twenty-four hours; mix the filtrate with the percolate, and then add a sufficient quantity of menstruum to produce the prescribed volume of Tincture.

THE PROCESS OF MACERATION.

Place the solid materials in the whole of the menstruum in a closed vessel for seven days, frequently agitating. Strain. Press the marc. Mix the expressed liquid with the strained liquid. Filter if necessary.

The details and minor variations of the processes for the preparation of the Tinctures are left to the judgment of the pharmacist. A cylindrical percolator, preferably of glass or earthenware, may be employed in most cases, of such dimensions as to present to the menstruum a column of solid materials at least six times as high as wide. If a conical percolator be employed, the lower diameter should be not less than one-half the upper diameter. The preliminary treatment for twenty-four hours may be carried on in a closed percolator when desirable. Any necessary clarification may be effected by subsidence, filtration, or both.

LOZENGES.

PREPARATION WITH FRUIT BASIS.

Take five hundred times the quantity of the drug ordered for 1 lozenge; mix it intimately with $15\frac{1}{2}$ oz. (or $439\frac{1}{2}$ grammes) of Refined Sugar, in fine powder, and 300 grains (or $19\frac{1}{2}$ grammes) of Gum Acacia, in powder. Make the mixture into a paste with $1\frac{1}{4}$ fl. oz. (or $35\frac{1}{2}$ c.c.) of Mucilage of Gum Acacia, and 2 oz. (or $56\frac{3}{4}$ grammes) of the Black-currant Paste of commerce previously softened with boiling Distilled Water, adding any additional Distilled Water that may be necessary. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

PREPARATION WITH ROSE BASIS.

Take five hundred times the quantity of the drug ordered for 1 lozenge; mix it intimately with $17\frac{1}{2}$ oz. (or 496 grammes) of Refined Sugar, in fine powder, and 300 grains (or $19\frac{1}{2}$ grammes) of Gum Acacia, in powder. Make the mixture into a paste with 5 fl. drm. (or $17\frac{1}{2}$ c.c.) of Mucilage of Gum Acacia and a sufficient quantity of the official Rose Water. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

PREPARATION WITH SIMPLE BASIS.

Take five hundred times the quantity of the drug ordered for 1 lozenge; mix it intimately with $17\frac{1}{2}$ oz. (or 496 grammes) of Refined Sugar, in fine powder, and 300 grains (or $19\frac{1}{2}$ grammes) of Gum Acacia, in powder. Make the mixture into a paste with $1\frac{1}{2}$ fl. oz. (or $35\frac{1}{2}$ c.c.) of Mucilage of Gum Acacia and a sufficient quantity of Distilled Water. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

PREPARATION WITH TOLU BASIS.

Take five hundred times the quantity of the drug ordered for 1 lozenge; dissolve what salts of Alkaloids may be ordered in 3 fl. drm. (or $10\frac{1}{2}$ c.c.) of Distilled Water; mix the solution intimately with 17 oz. (or 482 grammes) of Refined Sugar, in fine powder, and 300 grains (or $19\frac{1}{2}$ grammes) of Gum Acacia, in powder. Thoroughly incorporate with the mixture any other drugs ordered for the lozenges, and 3 fl. drm. (or $10\frac{1}{2}$ c.c.) of Tincture of Balsam of Tolu. Make into a paste with $1\frac{1}{2}$ fl. oz. (or $35\frac{1}{2}$ c.c.) of Mucilage of Gum Acacia and any additional Distilled Water that may be necessary. Divide the mass into 500 equal lozenges. Dry them in a hot-air chamber at a moderate temperature.

ALTERNATIVE PREPARATIONS SANCTIONED FOR
USE IN INDIA AND THE COLONIES.

ADEPS INDURATUS.

Lard deprived of a portion of its oil by pressure. Indurated Lard may be employed in India and the Colonies when prevailing high temperatures render the Lard of the Text of the Pharmacopœia too soft for use in Ointments.

AQUÆ OLEI ANETHI, ANISI, CARUI, CINNAMOMI, FENICULLI,
MENTHÆ PIPERITÆ, MENTHÆ VIRIDIS, PIMENTÆ.

Each of these Waters may be prepared by triturating the corresponding Oil with twice its weight of Calcium Phosphate and five hundred times its volume of Distilled Water and filtering the mixture. In India and other tropical countries these Waters may be used in place of the corresponding Aquæ of the Text of the Pharmacopœia.

EXTRACTA LIQUIDA.

Any Liquid Extract, defined in the Text of the Pharmacopœia, containing less than one-fourth of its weight of Alcohol (90 p.c.), may have the proportion of Alcohol (90 p.c.) increased, to an extent not exceeding one-fourth of the weight of the Extract, in India and other tropical countries where otherwise the preparation would be liable to ferment.

LIMONIS CORTEX SICCATUS.

In India, and the Colonies where fresh Lemon Peel cannot be obtained, Dried Lemon Peel may be used in preparing Compound Infusion of Orange Peel, Compound Infusion of Gentian, Syrup of Lemon, and Tincture of Lemon.

SUPPOSITORIA.

More or less White Beeswax, according to prevailing temperatures, may be used in place of an equivalent amount of Oil of Theobroma in India and the Colonies, when otherwise the Suppositories of the Text of the Pharmacopœia would be too soft for convenient use.

SYRUPUS RHŒADOS.

In India and the Colonies, when prevailing high temperatures render this preparation liable to ferment, the proportion of Alcohol (90 p.c.) may be increased, but to not more than double the proportion stated in the Text of the Pharmacopœia, an equivalent quantity of Distilled Water being omitted.

UNGUENTA.

In India and the Colonies, more or less Indurated Lard, Prepared Suet, Yellow Beeswax, or White Beeswax, may be employed in the preparation of the Ointments of the Text of the Pharmacopœia, when prevailing high temperatures otherwise render the basis too soft for convenient use; but the official proportion of the active ingredient must in all cases be maintained.