भारत सरकार
आयुष मंत्रालय
भारतीय चिकित्सा एवं होम्योपैथी भेषज संहिता आयोग
(भारतीय चिकित्सा एवं होम्योपैथी केन्द्रीय औषधि प्रयोगशाला)
कमला नेहरू नगर, गाजियाबाद - 201002 (उ.प्र.)
Government of India
Ministry of Ayush
Pharmacopoeia Commission for Indian Medicine & Homoeopathy
(Central Drugs Laboratory for Indian Medicine and Homoeopathy)
Kamla Nehru Nagar,Ghaziabad- 201002 (U.P)
सत्यमेव जयते

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दिनांकित : 01-04-2024

नोटिस

तीसरे वैज्ञानिक सलाहकार बोर्ड (एसएबी) की सिफारिशों के अनुसार, एचपीआई वॉल्यूम-XI के ड्राफ्ट 66 मोनोग्राफ (9 रासायनिक मूल (नए), 54 रासायनिक मूल (संशोधित), और 3 प्राणी मूल), दिनांक 01-05-2024, शाम 5.30 बजे तक हितधारकों की टिप्पणियां/इनपुट/सुझाव आमंत्रित करने के लिए अनुलग्नक के रूप में संलग्न किया गया हैं। टिप्पणियां/इनपुट/सुझाव निर्धारित अवधि के भीतर dir.pcimh-ayush@gov.in को ईमेल किए जा सकते हैं।

भवदीय

01/04/24

(डॉ. रमन मोहन सिंह)
निदेशक

संलग्न: A/a

सत्यमेव जयते

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PCIM&H/Tech.29045/HPC/2023-2024/Part II/05

Dated : 01 -04-2024

NOTICE

As per the recommendations of 3rd Scientific Advisory Board (SAB), draft 66 Monographs (9 chemical origin (new), 54 chemical origin (revised) and 3 zoological origin) of HPI Vol-XI are hereby enclosed as annexure for inviting stakeholders comments/inputs/suggestions by 01-05-2024, 5.30 pm. Comments/inputs/suggestions may be sent through email to dir.pcimh-ayush@gov.in within the prescribed time period.

भवदीय

01/04/24

(डॉ. रमन मोहन सिंह)
निदेशक

Encl: A/a

Draft

HPI

Part- I

Volume - XI

54 Revised Homoeopathic monographs (Chemical)

SN	Drug name
1.	Acetanilidinum
2.	Acidum aceticum
3.	Acidum benzoicum
4.	Acidum hydrofluoricum
5.	Acidum lacticum
6.	Acidum muriaticum
7.	Acidum nitricum
8.	Acidum phosphoricum
9.	Acidum picricum
10.	Acidum sulphuricum
11.	Alloxan
12.	Alumina
13.	Ammonium carbonicum
14.	Ammonium muriaticum
15.	Amyl nitrosum
16.	Antimonium cruda
17.	Antimoniu mtartaricum
18.	Argentum metallicum
19.	Argentum nitricum
20.	Arsenicum album
21.	Arsenicum iodatum
22.	Arsenicum sulphuratum flavum
23.	Aurum metallicum
24.	Aurum muriaticum
25.	Aurum muriaticum natronatum
26.	Baryta carbonica
27.	Baryta iodata
28.	Baryta muriatica
29.	Borax
30.	Bromium
31.	Calcarea arsenicosa
32.	Calcarea carbonica
33.	Calcarea fluorica
34.	Calcarea hypophosphorosa
35.	Calcarea iodata
36.	Calcarea phosphorica
37.	Calcarea picrata
38.	Calcarea silicata
39.	Calcarea sulphurica
40.	Camphora

41.	Carbo vegetabilis
42.	Carboneum sulphuratum
43.	Causticum
44.	Chininum aresenicosum
45.	Chrysarobinum
46.	Colchicinum
47.	Cuprum arsenicosum
48.	Ferrum metallicum
49.	Ferrum phosphoricum
50.	Graphites
51.	Hepar Sulphur
52.	Iodium
53.	Kali bichromicum
54.	Kali muriaticum

ACETANILIDUM
(Acetan.)

Chemical Formula : **$C_6H_5NHCOCH_3$** **Molecular weight.:** 135.16

Chemical name Acetanilide

Other Language name : Acetanilide, N-phenylacetamide, antifebrinum, acetylaniline.

Description : Colourless, odourless; shining lamellar crystals with slightly pungent and burning taste. Appreciably volatile at 95^0. Slightly soluble in *water* and light petroleum. Soluble in boiling*water*, *dispensing alcohol*, *ether* and *glycerine.*

Identification : (i) Heat 0.1 g with 2ml of *sodium hydroxide solution*, aniline is liberated; to the mixture add 0.5 ml of *chloroform* and warm; the unpleasant odour of phenylisocyanide is developed.

(ii) To about 10 ml of a saturated solution in *water*, add a few drops of *bromine solution*; a yellowish- white precipitate is formed.

(iii) Shake 2 g with 20 ml of *water* and filter, to the filtrate add a few drops of *ferric chloride solution*; no colour is produced.

Melting Point : 113^0 to 115^0.

Reaction : A saturated solution in water is neutral to *litmus*.

Ash : Not more than 0.1 per cent.

Assay : Dissolve about 0.5 g accurately weighed in 50ml *1N sodium hydroxide solution* and reflux for one hour on a water bath. Cool and extract it with 3x20 ml *chloroform*. Wash the chloroform layer with alkaline water. Combine the washings with aqueous solution. Titrate the aqueous layer with *1N hydrochloric acid* using *phenolphthalein* as indicator. Carryout a blank with 50 ml *1N sodiumhydroxide solution*. Each ml of *1N sodiumhydroxide* is equivalent to 0.135 g of $C_6H_5NHCOCH_3$.

Preparation : (a)**Trituration 1x** Drug Strength 1/10

Acetanilidium	100g.
Saccharum Lactis	900 g.

to make one thousand grammes of the *Trituration.*

(b) **Potencies:** 2x and higher to be triturated in accordance with the method, HPI, Vol. I. ; 6x may be converted to liquid 8x, HPI, Vol. I, ; 9x and higher with *Dispensing Alcohol.*

Storage :

Caution :

History and authority : Clarke: *A Dictionary of Practical Mat. Med*., Vol. I, 120.

ACIDUM ACETICUM
(Acet. ac.)

Chemical Formula **CH_3COOH** **Molecular weight.:** 60.05

Chemical name : Glacial acetic acid

Other Language name : ***English***: Glacial acetic acid; ***French***: Acide acetique; ***German***: Essigsaure.

Description : A clear, colourless liquid having a very strong odour of vinegar and a sharp, acidictaste. Miscible with *water* and *alcohol, glycerol, ether, carbon tetrachloride*. Practically insoluble in *carbondisulfide*. Contains not less than 99.0 per cent w/w and not more than equivalent of 100.5 per cent w/w of $C_2H_4O_2$.

Specific gravity : 1.047.

Freezing point : 16.7^0.

Boiling point : 118^0.

Identification : (i) To 0.1 ml sample add 10 ml of *water* and neutralize with *dilute sodium hydroxide*. The solution gives reaction of *acetates*.

(ii) 10 per cent solution is strongly acidic.

Test solution: - Dilute 20 ml to 100 ml with *purified water.*

Chloride : 10 ml of test solution diluted to 15 ml with *purified water* complies with the *limit test for chloride* (25mg/I).

Sulphates : 15 ml of test solution complies with the *limit test for sulphates*. (50 mg /l)

Reducing substances : To 5 ml add 10 ml of *water* and mix. To 5 ml of the resulting solution add 6 ml of *sulphuric acid* and cool. Add 2 ml of *0.0167M potassium dichromate,* allow to stand for 1 minute and add 25 ml of *water* and 1 ml of freshly prepared dilute *potassium iodide solution*. Titrate with 0.1 M *sodium thiosulphate* using 1 ml of starch solution as indicator. Not more than 1.0 ml of *0.1 M sodium thiosulphate* is required.

Heavy metals : Not more than 10 ppm.

Arsenic : Not more than 2 ppm.

Iron : Evaporate 2g on water bath. The residue complies with *limit test for iron*. Note more than 5 ppm.

Residue on evaporation : Determined on 20.0 g by evaporating to dryness on a water-bath and drying at 105°. Not more than 0.01 per cent

Assay : Weigh accurately a conical flask with a ground-glass stopper containing 25 ml of *water*. Add 1.0 ml of substance to be examined and weigh again accurately. Add 0.5 ml of *phenolphthalein solution* and titrate with 1 N *sodium hydroxide*. Each ml of 1N *sodium hydroxide* is equivalent to 0.0601 g of $C_2H_4O_2$.

Preparation :

(a) **Mothersolution** Drug Strength 1/10 v/v

Acidum Aceticum	104.7 g
Purified Water in sufficient quantity.	

to make one thousand milliliters of the *Mother Solution*.

(b) **Potencies**: 2x and 3x with purified water to be prepared freshly for immediate use only. 4x and 5x with Dilute Alcohol, 6x and higher with *Dispensing Alcohol*.

(a) **Trituration** 1x Drug Strength 1/10 w/w

Acidum Aceticum	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

During the process of Trituration care should be taken to ensure that the temperature does not rise above 12^0.

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to the liquid 8x.

Chemical Formula

Storage : Store in a well-closed container protected from light.

Caution : Not to be repeated too often except in croup.

History and authority : Proved by Berridge; Allen, T.F., *Encyclop*. of pure Mat. Mad.,1874,/.4:Hering C., Guiding Symptoms 1879,/,4.

ACIDUM BENZOICUM

(Ac. benz.)

Chemical Formula **C_6H_5COOH** **Molecular Weight:** 122.10

Chemical name Benzoic acid

Other Language name : ***English:*** Benzoic acid; ***French:*** Acide benzoique; ***German:*** Benzoesäure.

Description : A white, crystalline powder or colourless crystals, odourless or with a very slight characteristic odour. Somewhat volatile at moderately warm temperature and is freely volatile in steam. Slightly soluble in *water*, soluble in boiling *water*, freely soluble in *alcohol* and in fatty oils. Contains not less than 99.5 per cent w/w of $C_7H_6O_2$.

Melting point : 121^0 -124^0.

Identification : (i) The solution obtained by gentle warming 0.2 g with 20 ml *water* and 1 ml of *1N sodium hydroxide* and filtering yield's a buff coloured precipitate with *ferricchloride solution.*

(ii) Dissolve about 0.1 g in 1 ml of 90per cent *alcohol*. Add 0.1 ml of *phloroglucinol solution* and boil. A red colour is produced.

Arsenic : Mix 5 g with 3 g of *anhydrous sodium carbonate*, add 10 ml of *bromine solution* and mix thoroughly. Evaporate to dryness on a water–bath, gently ignite and dissolve the cooled residue in 16 ml of *brominated hydrochloric acid* and 45 ml of *water*. Remove the excess of bromine with 2 ml of *stannous chloride*. The resulting solution complies with *limit test for arsenic*.Not more than 2 ppm.

Cinnamic acid Warm 0.1 g with 0.1 g of *potassium permanganate* and 5 ml of *dilute sulphuric acid*; no odour of benzaldehyde is developed.

Chlorinated compounds : Dissolve 0.33 g in 5 ml of *0.5 M sodium carbonate*, evaporate to dryness and heat the residue until completely charred, keeping the temperature below 400^0. Extract the residue with a mixture of 10 ml of *water* and 12 ml of *dilute nitric acid* and filter; the filtrate complies with the *limit testfor chlorides*.

Heavy metals : Not more than 10 ppm.

Sulphated ash Not more than 0.1per cent.

Water : Not more than 0.7 per cent, determined on 0.25 g and using a mixture of 1 volume of *methanol* and 2 volume of *pyridine* as solvent.

Assay : Dissolve about 1.0 g accurately weighed in 15 ml of warm *alcohol* (95 percent) previously neutralised to *phenolphthalein solution*. Add 20 ml of *water*and titrate with *0.5 Nsodium hydroxide* using *phenolphthalein solution* as indicator.Each ml of *0.5Nsodium hydroxide* is equivalent to 0.06106 g of $C_7H_6O_2$.

Preparation : (a) **Mother Tincture** Drug Strength 1/10.

Acidum Benzoicum	100 g.

Strong Alcohol in sufficient quantity;

to make one thousand millilitres of the *Mother Tincture.*

: (b) **Potencies:** 2x and higher with *Dispensing Alcohol*.

: (c) **Trituration 1X,** Drug Strength 1/10.

Acidum Benzoicum	100 g.
Saccharum Lactis	900 g.

to make One thousand grammes of *Trituration*.

(d) **Potencies:** 1x and higher to be triturated in accordance with the method, Vol I, HPI; 6x may be converted to liquid 8x., Vol. I, HPI; and higher wit *Dispensing Alcohol*.

Storage : Store well in airtight container.

Caution :

History and authority : Proved by Jeanes in 1838; by Lingen; 1844; Nusser in 1845. Allen's

ACIDUM HYDROFLUORICUM (FLUORICUM ACIDUM)

(Fluor. Ac)

Chemical Formula **HF** **Molecular Weight**20.01

Chemical name Hydrofluoric acid

Other Language name : ***English*****:** Hydrofluoric acid; ***French*****:** Acide fluorhydrique; ***German*****:**Wassrige Flub Saure.

Description : Colourless, clear, highly corrosive liquid,odour pungent and suffocating poisonous, readily attacks and dissolves glass and other siliceous materials; miscible with *water* and *ethanol*.Contain not less than 40 percent (w/w) of HF.

Test solution: - Dilute 0.5 ml to 5ml with *water* in a suitable plastic container.

Identification (i) To 1 ml of test solution add 1ml of *calcium chloride solution*. A white gelatinous precipitate is produced.

: (ii) Gives a white precipitate with *calcium* and *barium* salts.

Residue on evaporation : Max. 0.002 percent.

Residue on ignition : Max. 0.001 percent.

Chloride : Dilute 0.5 g to 30 ml with *water*. 15 ml of resulting solution complies with the *limit test for chloride*. Not more than 200 ppm.

Heavy metals : Dilute 10 ml of solution to 20 ml of water. 12 ml of resulting solution complies with *limit test for heavy metals*. . Not more than 20 ppm.

Assay : Weigh glass- stoppered conical flask containing 25.0 ml of 1 N *sodium hydroxide solution*. Add 1.0 g of the substance then weigh the flask again, add 25 ml of water and 0.1 ml of *phenolphthalein solution* and titrate with 0.5N *sulfuric acid*. Each ml of 1 N *sodium hydroxide solution* is equivalent to 0.02001g of HF.

Preparation : (a)**Mother solution** Drug Strength 1/10

Fluoricum Acidum 250g

Purified Water in sufficient quantity

to make one thousand milliliters of the *Mother Solution*.

(b) **Potencies**: 2x and higher upto 6x with *Purified Water*,7x and higher with *Dispensing Alcohol.*

Storage : *Acidum hydrofluoricum* and all its preparations below 4 potency should be kept in well closed bottles, the interior of which is coated with paraffin or well closed containers of paraffin, lead or wax..

Caution : Handle with care as it causes painful sores on the skin usually noticed on the next day only; avoid inhaling the vapours. Not to be dispensed below 4x. Preparations up to 6x to be freshly made.

History and authority : Proved under the direction of Hering; Hering: *Guiding Symptoms*, Vol. V., 328.

ACIDUM LACTICUM

(Ac. lact.)

Chemical Formula	**$CH_3CH\ (OH)\ COOH$ or $C_3H_6O_3$** **Molecular Weight.:** 90.08
Chemical name	Lactic acid
Other Language name	***English:*** Lactic acid; ***French:*** Acide lactique; ***German:***Milchsäure.
Description	A colourless or slightly yellow syrupy, hygroscopic liquid. Odourless or a slight but not unpleasant odour; taste sour. Miscible with *water* and *alcohol* in all proportions. Consists of a mixture of lactic acid and lactide. Contains not less than 88.0 per cent w/w and not more than 92.0 per cent w/w of $C_3H_6O_3$.
Identification	(i) Warm 1g with 0.1g of *potassium permanganate*, odour of acetaldehyde is evolved. (ii) To a drop add 2 ml of *sulphuric acid*; warn until the solution is pale yellow. Cool, add 2 drops of *alcoholicsolution* of *guaiacol*, an intense red colour appears. (ii) Gives reaction of *lactates.* (iii) A 10 per cent w/v solution is strongly acidic.
Specific gravity	1.20 to 1.21.
Arsenic	Dissolve 10 g in 50 ml of *water;* add 10 ml of *stannated hydrochloric acid*. The resulting solution complies with the *limit test for arsenic.*Not more than 1 ppm.
Calcium	Not more than 200 ppm.
Heavy metals	Not more than 10 ppm. Test solution: Dissolve 5 g in 42 ml of *1 N sodium hydroxide* and dilute to 50 ml with *purified water*.
Citric ,oxalic and phosphoric acid	To 5 ml of test solution add *dilute ammonia* until slightly alkaline. Add 1 ml of *calcium chloride solution* and heat on water-bath for 5 minutes. Both before and after heating, any opalescence in solution is not more intense than that in a mixture of 5 ml of the test solution and 1 ml of *water*.
Ether-insoluble substances	Dissolve 1.0 g in 25 ml of *ether*; the solution is not more opalescent than the solvent used for test.

Methanol : Not more than 50 ppm.

Volatile fatty acids : Cautiously heat 5 g in a glass-stoppered flask at 50^0 for 10 minutes; no unpleasant odour resembling that of lower fatty acids is recognisable immediately after opening the flask.

Reducing sugars : Dilute 1g with 10ml of *water*, neutralise with *sodium hydroxide solution*, add 5ml of *potassium cupric-tartrate solution* and boil; no red or greenish precipitate is produced.

Sulphated ash : Not more than 0.1 per cent w/w.

Assay : Dissolve about 1g accurately weighed in10 ml of *water*in a ground- glass- stoppered flask. Add 20 ml of *1N sodium hydroxide,* stopper the flask and allow stand for 30 minutes. Titrate the excess of alkali with *1 N hydrochloric acid* using *Phenolphthalein solution* as indicator until the pink colour is discharged. Each ml of *1N sodium hydroxide* is equivalent to 0.0901g of $C_3H_6O_3$.

Preparation : (a) **Mother Solution** Drug Strength 1/10

Acidum Lacticum 133g.
Purified Water in sufficient quantity
to make one thousand millilitres of *Mother Solution*.

(b) **Potencies:** 2x with *DiluteAlcohol*; 3x and higher with *DispensingAlcohol*.

Storage : 3x and below to be stored in a well closed container

Caution

Historyandauthority : Proved and introduced by Reisig and S.Swan, *N. Am. J. of Hom.*, 1871, 569; Allen: *Encyclop. Mat. Med.*, Vol V, 478; Clarke: A *Dictionary ofPractical Mat. Med.*,Vol. II

ACIDUM MURIATICUM
(Ac. Mur.)

Chemical Formula **HCL** **Molecular Weight.:** 36.5

Chemical name Hydrochloric acid;

Other Language name : ***English***: Hydrochloric acid; ***French***: Acide chlor hydrique s. muriatique; ***German***: Chlorwasserstoffsaure.

Description : A clear colourless, fuming liquid; odour, pungent and an acidic taste. Its fumes and odour disappear when it is diluted with 2 volumes of *water*. Miscible with *water* and *alcohol* producing strong acid solutions. Contains not less than 35.0 per cent w/w, and not more than 38.0 per cent w/w of HCL.

Specific gravity : 1.16.

Identification :

(i) When neutralized, it responds to all the reactions characteristic of *chlorides*.

(ii) When added *potassium permanganate*, *chlorine* is evolved.

Arsenic : Not more than 1ppm.

Heavy metals : Not more than 5 ppm.

Bromide and iodide : Dilute 5 ml with 10 ml of water, add 1 ml of *chloroform* and dropwise with constant shaking, *chlorinated lime solution*; the *chloroform* layer does not become brown or violet.

Sulphates : To 6.5 ml add 10 mg of *sodium bicarbonate* evaporate to dryness on a water-bath and dissolve the residue in 15 ml of *purified water*. The resulting solution complies with the *limit test for sulphates*. Note more than 20 ppm.

Sulphite : Dilute 1.0 ml with 10 ml of water and add 0.25 ml of *barium chloride solution* and 1 ml of *0.01M iodine*; the colour of the *iodine* is not completely discharged.

Residue on evaporation : Not more than 0.01 per cent, determined on 100 g by evaporating to dryness on a water bath and drying at 105°.

Assay : Weigh accurately about 2 g, add 30 ml of water, mix and titrate with 1N *sodium hydroxide* using *methyl red solution* as indicator. Each ml of 1N *sodium hydroxide* is equivalent to 0.03646 g of HCL

Preparation :

1. **Mother solution** Drug Strength 1/10

   Acidum Muriaticum 250 ml.

   Purified water in sufficient quantity

   to make one thousand milliliters of the *Mother Solution.*
2. **Potencies**: 2x and 3x be prepared with purified water. 4x and higher with *Dispensing Alcohol*.

Storage : Preserve hydrochloric acid in well closed container

Caution :

ACIDUM NITRICUM

Chemical Formula : **HNO_3Molecular Weight : 63.01**

Chemical name : Nitric acid

Other Language name : ***English*** :Nitric acid; ***French :*** Acide nitruque; Getman : Salpetersaure

Description : A fuming liquid, very caustic, highly irritating, odour characteristic, choking. Miscible with water and dilute alcohol in all proportions. Sp. gr. 1.41. B.P. 120° . Prepared by oxidation of ammonia with air in the presence of platinum as catalyst. Attacks most metals evolving brown fumes. Contain not less than 69% and not more than 71% w/w of HNO_3.

Identification : 1. It is acidic even when freely diluted with water.

2. When neutralised, responds to the reactions characteristic of *nitrates*.

3. Put one drop on a woollen fabric or animal tissues ; a bright yellow spot develops

Arsenic : Not more than 5ppm

Copper and zinc : Dilute 1 mL with 20 mL of *water* and add slight excess of dilute solution of *ammonia;* No blue colour is produced. Pass *hydrogen sulphide*; no precipitate is produced.

Chloride : 5 mL neutralised with *dilute ammonia solution* complies with the limit test for *chlorides*.

Lead : Not more than 23 ppm

Iron : 0.5 mL complies with the limit test for *iron*.

Sulphate : To 2.5 mL, add 10 mg of *sodium bicarbonate* and evaporate to dryness on water- bath; the residue dissolved in water, complies with the limit test for *sulphates*.

Non- volatile matter : Not more than 0.01 % w/w

Assay : Weigh accurately about 4g into a stoppered flask, containing 40 mL of water and titrate with 1N *sodium hydroxide* using solution of *methyl orange* as indicator Each mL of 1 N *sodium hydroxide* is equivalent to 0.06301g of HNO_3.

Preparation : **(a) Mother Solution** : Drug strength 1/10(w/v)

Acidum Nitricum : 140 mL

Purified water in sufficient quantity

To make one thousand millilitres of the Mother Solution.

(b) Potencies:

2x and 3x with Purified Water, to be freshly made for immediate use only. 4x and 5x with Dispensing Alcohol.

Storage : Preparations of this acid up to 3x potency are to be stored in well closed containers with glass stopper

Caution :

Finished Product Studies of Acidum nitricum:

Potency : 1 x

Colour less liquid, odour characteristic, irritating. Contains not less than 9.50 percent v/v to not more than 10.50 per cent v/v of HNO_3.

Reaction : Acidic to litmus.

Assay : Complies with the assay method given under Acidum Nitricum.

Reaction : Acidic to litmus.

Assay : Complies with the assay method given under Acidum Nitricum.

Potency : 2x

Colour less liquid. Contains not less than 00.095 per cent v/v to not more than 0.105 per cent v/v of HNO_3.

Reaction : Acid to litmus.

Assay : Weigh accurately about 40 g into a stoppered flask and titrate with 0.1 N *sodium hydroxide* using *phenolphthalein* as indicator. Each mL of 0.1 N *sodium hydroxide* is equivalent to 0.006301 g of HNO_3.

History and authority : Proving were made under Hahnemann’s directions. Allen T.F., Encyclop. Of Pure Mat. Med., 1874,7,10.

ACIDUM PHOSPHORICUM

(Ac.phos.)

Chemical Formula : **H3PO4** **Molecular Weight**: 98.00g

Chemical name : Orthophosphoric acid

Other Language name : ***English:*** Orthophosphoric acid; ***French:*** Acide Phosphorique; ***German:*** Phosphorsäure.

Description : A Colourless, odourless, orthorhombic crystals or syrupy liquid with pleasant taste when suitably diluted. At about 200^0 the acid gradually changes to pyrophosphoric acid, and at higher temperature it passes into meta phosphoric acid; miscible with *water* and *alcohol* with the evolution of the heat. Contains not less than 84.0 per cent w/v and not more than 90.0 per cent w/v of H_3PO_4.

Melting point : 42.35^0.

Weight per ml : 1.68 to 1.87.

Identification : (i) Dilute with *water*; the solution is strongly acidic.

(ii) When carefully neutralised with *potassium hydroxide solution* and a solution of *silvernitrate* added, a characteristic yellow precipitate soluble in *ammonium hydroxide* is formed.

Arsenic : Dissolve 5 g in 50 ml of *water* and add 10 ml of *stannated hydro chloric acid*; the resulting solution complies with the *limit test for arsenic*. Not more than 2 ppm.

Aluminum and calcium : To 1.7 g add 10 ml of *water* and 8 ml of *dilute ammonia solution*; the solution remains clear.

Chloride : 5 g complies with the *limit test for chlorides.* Not more than 50 ppm.

Heavy metals : Not more than10 ppm.

Test solution: Dilute 10 g to 150 ml with *water.*

Iron : 10 ml of test solution complies with the *limit test for iron.* Not more than 60 ppm.

Phosphorus and Hypo-phosphoric acid : To 5 ml of test solution add 2 ml of a 1.7 per cent w/v solution of *silver nitrate* and heat on a water bath for 5 minutes; the colour of solution should not change.

Sulphate : 20 ml of test solution complies with the *limit test for sulphates.* Not more than100 ppm.

Assay : Mix about 1 g accurately weighed with a solution of 10 g of *sodium chloride* in 30 ml of *water* and titrate with *1 Nsodium hydroxide* using *phenolphthalein solution* as indicator. Each ml of *1 Nsodium hydroxide* is equivalent to 0.04900 g of H_3PO_4.

Preparation : (a) **Mother Solution** Drug Strength 1/10 w/v.

Acidum Phosphoricum	118g

Purified Water in sufficient quantity;
to make one thousand millilitres of the *Mother Solution*.

(b) **Potencies**: 2x and 3x with *Purified Water* to be freshly made for their immediate use only, 4x and 5x with *Dilute Alcohol.* 6x and higher with *Dispensing Alcohol.*

Storage : Store protected from moister, in glass containers.

Caution :

History and authority : Drug was first proved under Hahnemann's directions. Allen's Encyclop. Mat. Med. Vol. VII, 346.

ACIDUM PICRICUM

(Ac. pic.)

Chemical Formula : **C6H2 (OH)(NO2)3** **Molecular Weight.:**229.11

Chemical name : Trinitrophenol

Other Language name : ***English***: Trinitrophenol, picric acid; ***French***: Acide picrique;
German**:** Pikrinsaure.

Description : Bright yellow, crystalline powder or yellow prisms or plates
Moistened with an equal weight of water for safety; odourless; very bitter; explodes when heated rapidly or subjected to percussion. Contain not less than 99.0 per cent of $C_6H_3N_3O_7$

Specific gravity : 1.760 to 1.765.

Melting point : 122 to 128^0C.

Identification : To 1 ml of a 0.1 per cent solution in *water* add 0.5 ml of *potassium cyanide solution*. A dark red colour is produced.

Loss on drying : Not less than 20.0 percent, determined on 0.5 g by drying in a desiccator for 24 hours.

Assay : Weigh accurately about 0.5 g of the sample, previously dried over *sulphuric acid* and dissolve it in 50 ml of warm *water*. Cool, add 2 drops of *phenolphthalein* and titrate with 0.1 N *sodium hydroxide* to pink colour. Each ml of 0.1 N *sodium hydroxide* is equivalent to 0.02291 g of $C_6H_3N_3O_7$.

Preparation :

(a) **Trituration**1x,

(a) **Trituration**1x,	Drug Strength 1/10
Acidum Picricum, in crystals	100 g.
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 2x and higher to be triturated in accordance with the method, Vol.I, H.P.I., 6x may be converted to liquid 8x, Vol. I. H.P.I., 9x and higher with *Dispensing Alcohol*.

(c) **MotherTincture** Drug Strength 1/10

Acidum Picricum, in crystalline powder	10 g.
Strong alcohol in sufficient quantity,	

to make one thousand milliliters of the *Mother Tincture.*

(d) **Potencies**: 3x and higher with *Dispensing Alcohol.*

Caution : Explosive when dry rapidly heated or heated by percussion. Handle with care. Forsafety in transportation, it is mixed with 10 to 15 percent water. Not to be

Storage : Keep in well closed containers, in cool place remote from life.

History and authority : Proved by Parisel in 1868; Allen: *EncyclopMat*. *Med*. Vol.VII, 519; Hering: *Guiding Symptoms*, Vol.VIII,437.

ACIDUMSULPHURICUM

(Ac.Sul.)

Chemical formula : $\mathbf{H_2SO_4}$ **Mol. wt**.: 98.08

Chemical name : Sulphuric acid

Other Language name : ***English***: Sulphuric acid;***French***: Acide sulfurique;***German***: -Schwefelsaure.

Description : Colourless, heavy caustic and corrosive liquid of oily consistency; odourless and a very sharp and acidic taste. Miscible with *water* and *alcohol* with the evolution of much heat. Freezes to a colourless crystalline mass, melting at 10.5^0. Contains not less than 95.0 per cent w/w of H_2SO_4.

Specific gravity : 1.84.

Boiling point : 290^0.

Identification : (i) When neutralised, it responds to all the reactions characteristic of *sulphates*.

(ii) Carefully add 1ml to 100 ml *water*. The solution is acidic.

Arsenic : Not more than 3 ppm.

Lead : Not more than 20ppm.

Heavy metals : Not more than 20 ppm.

Chloride : 5ml diluted with water and neutralized with dilute *ammonia solution* complies with the *limit test for chlorides.*

Ash : Not more than 0.01 per cent.

Assay : Weigh accurately about 2 g and mix with about 40 ml of *water*, and titrate with 1N *sodium hydroxide* using solution of *methylred* as indicator. Each ml 1 N *sodium hydroxide* is equivalent to 0.04904 g of H_2SO_4.

Preparation : (a) **MotherSolution**, Drug Strength 1/10

Acidum Sulphuricum 183.5g

Purified Water in sufficient quantity

to make one thousand Milliliters of the *Mother Solution*.

(b) **Potencies**: 2x and 3x to be prepared in *Purified Water*.4x and higher with *Dispensing alcohol.*

Caution

Storage : Potencies prepared in Purified Water should be freshly prepared and all preparation of this acid should be kept in ground stoppered vials.

Historyandauthority : First proved by Hahnemann. Allen’s *Encyclop*. *Mat*, *Med*. Vol. IX, 417.

ALLOXAN

Chemical formula : **$C_4H_2N_2O_4$Mol.** **Mol. wt.:**142. 07

Chemical name : **5,5-Dihydroxypyrimidine-2,4,6(1H,3H,5H)-trione**

Other Language Name : ***English*:Alloxan; *French*:Alloxan; *German*: Alloxan**

Description : Anhydrous orthorhombic crystals. Odour disagreeable, freely soluble in *water*, soluble in *acetone*, *alcohol*, *methanol*, *glacial acetic acid* slightly soluble in *chloroform*, *petroleumether* and insoluble in *ether*.

Identification : Test solution: - Dissolve about 0.3 g in 15 ml of *Purified Water*. Divide into three parts.

(i) Warm 5 ml of test solution, in a test tube, yellow colour develops which disappears on cooling.

(ii) When contacted with human skin for some time; a red colour develops.

(iii) To 2 ml add a few drops of *hydrogen sulphide* and add 1ml *ethanolic solution* of *ammonia*; purple solution forms which changes to blue on addition of a few drops of 0.1N *sodium hydroxide*.

Assay : Take about 0.1 g accurately weighed in a Kjeldahl flask; add 7 ml *concentrated sulphuric acid* and 1ml of *hydrogen peroxide solution* (30%). Add 1g of powdered mixture of 10 parts of *anhydrous potassium sulphate* and 1 part of *copper sulphate* and heat it on gas burner slowly till it becomes clear blue solution. Cool it, attach to nitrogen distillation assembly. Add 20 ml *water* and 25 ml 40 per cent cooled *sodium hydroxide solution*. Slowly warm and collect the gas in 50 ml 0.1 N *hydrochloric acid*. Titrate the 0.1 N *hydro chloric acid* with 0.1 N *sodium hydroxide* using *methyl red methylene blue solution* as indicator. Carry out blank titration. Each ml of 0.1 N *hydro chloric acid* consumed equivalent to 0.0071 g of $C_4H_2N_2O_4$.

Preparation :

(a) **Trituration1x**	Drug Strength 1/10
Alloxan in coarse powder	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 2x and higher to be Triturated in accordance with the method HPI, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol.*

Storage : Keep in dry and cool place.

Caution : LD50 in mice 200 mg/kg. Toxic. Is used for inducing diabetes in animals.

History Authority : Proved by Templeton, W.L., *British Homoeopathic journal*, 1949, 39, 242; James Stephenson: *Hahnemannian Proving.* A *Mat*. *Mad*. *And Repertory*1924-1939.

ALUMINA

(Alum.)

Chemical Formula : **$Al\,(OH)_3$ Molecular Weight:** 78.12

Chemical name : Aluminium hydroxide

Other Language name : ***English**:* Aluminium hydroxide; ***French**:* Hydrate d'alumina; ***German**:* Thonerdehydrate.

Description : The gel which is used in preparation is a white, viscous suspension, translucent in thin layers from which small amounts of clear liquid may separate on standing. The dried gel is a white, odourless, tasteless, amorphous powder, insoluble in *water* and in *alcohol* but readily soluble in dilute mineral acids and fixed alkali. Amphoteric in character. The dried gel contains not less than 65.0 per cent w/w of Al_2O_3 with reference to the substance dried to constant weight at 105^0.

Identification : (i) When moistened with a solution of *cobalt nitrate*, a blue residue is produced.

(ii) A solution in *hydrochloric acid* responds to the tests for *aluminium.*

Alkaline impurities : Shake 1.0 g with 20 ml of *carbon dioxide-free water* for one minute and filter. To 10 ml of the filtrate add 0.1 ml of *phenolphthalein solution.* Any pink colour disappears on addition of 0.3 ml of *0.1N hydrochloric acid.*

Arsenic : Dissolve 10 g in 18 ml of *brominated hydrochloric acid*, add 42 ml of *water* and remove the excess bromine with a few drops of *stannous chloride solution*. The resulting solution complies with the *limit test for arsenic*. Not more than1 ppm.

Chloride : Dissolve 0.5 g in 5 ml of *dilute nitric acid*, boil, cool, dilute to 100 ml with *water*, and filter. 20 ml of the filtrate complies with the *limit test for chlorides*. Not more than1 ppm.

Heavy metals : Not more than10 ppm.

Sulphate : Dissolve 1.0 g in 5 ml of *dilute hydrochloric acid* with the aid of heat. Cool and dilute to 100 ml with *water*. Mix well and filter, if necessary. To 5 ml of the filtrate add 2 ml of *dilute hydrochloric acid;*the solution complies with the *limit test for sulphates.* Not more than1 ppm.

Assay : Dissolve about 0.80 g accurately weighed, in 10 ml of *hydrochloric acid* by heating on water-bath; cool to below 20^0 and dilute to 50 ml with *water*. To 10 ml of this solution, add *dilute ammonia* until a precipitate begins to appear. Add the smallest quantity of *dilute hydrochloric acid* needed to dissolve the precipitate and dilute to 20 ml with *water*.Carry out the complexometric titration of *aluminium*. Each ml of *0.1 M sodium edetate* is equivalent to 0.005098 g of Al_2O_3.

Preparation : (a)**Trituration 1x** Drug Strength 1/10

Alumina in *coarse powder*	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x, ; 9x and higher with *Dispensing Alcohol*.

Storage **:** Store in an airtight container, at a temperature below 30^0.

Caution :

History and Authority : Allen’s *Encyclop*. *Mat*. *Med*. Vol. I, 206; Hering *Guid*.*Symp*. Vol. I, page 149.

AMMONIUMCARBONICUM

(Am. carb)

Chemical Formula : (NH_4COONH_2)

Chemical name : Ammonium carbanate

Other Language name : ***French***: Carbonated ammoniaque; ***German***: Konlensaures ammonium.

Description : Consists of *Ammonium bicarbonate* (NH_4HCO_3) and *ammonium carbanate* (NH_4COONH_2) in varying proportions. A white powder, colourless or hard, white translucent mass, crystalline masses; having a strong odour of *ammonia*, taste sharp and alkaline reaction. On exposure to air, it loses *ammonia* and *carbondioxide*, becoming opaque, and is finally converted into a white powder. Freely soluble in *water* and is slightly soluble in *alcohol*. Contains not less than 30 percent and not more than 33 percent of NH_3.

Identification : (i) When heated, it is volatilized without charring and the vapour is strongly *alkaline* to moistened litmus paper.

(ii) The substance gives the identification reaction for *ammonium salts* and salts of volatile bases and for *carbonates*.

Test solution: - Dissolve 10.0 g added in several portions, in a mixture of 15 ml of *nitric acid* and 45 ml of *purified water*. Heat to boiling, then cool, adjust to pH 6 with *dilute sodium hydroxide solution*, monitoring the pH with universal indicator paper and dilute to 100 ml with *purified water*.

Heavy metals : 12 ml of test solution complies with *limit test for heavy metals*. Not more than 10 ppm.

Chlorides : Dilute 10 ml of test solution to 15 ml with water. The resulting solution complies with the *limit test for chlorides*. Not more than 50 ppm.

Arsenic : 0.25 g complies with the *limit test for arsenic*. Note more than 20 ppm.

Lead : Not more than 5 ppm.

Non- volatile matter : When volatilized, not more than 0.01 per cent, of residue.

Assay : Dissolve about 1.0 g accurately weighed in 25 ml of *water* then slowly add 25.0 ml of 1N *hydrochloric acid*. Add 0.3 ml of *methyl orange solution* and titrate with 1N *sodium hydroxide* solution.

Each ml of 1N *hydrochloric acid* is equivalent to 0.01703 g of NH_3.

Preparation :

(a) **MotherSolution** ø Drug Strength 1/10

Ammonium Carbonicum in crystalline salt	100 g
Purified Water in sufficient quantity	
to make one thousand milliliters of the *Mother Solution*	

(b) **Potencies**: 2x and higher upto 6x with *Purified Water* to be prepared freshly for immediate use. 7x and higher to be prepared with *Dispensing Alcohol.*

Storage **:** Preserve in well closed light **-** resistant containers at temperature not below 30º.

Caution : Lower potencies deteriorate with age.

Historyandauthority : Allen's *Encyclop*. Of *pureMat*. *Mad*., Vol. I, 259; *Hering's Guid .Symp*., Vol. I, 229.

AMMONIUM MURIATICUM

(Am. mur.)

Chemical Formula : **NH_4Cl** **Molecular Weight:** 53.49

Chemical name : Ammonium chloride

Other Language name *English:* Ammonium chloride; ***French:*** Chlorure d' ammonium; ***German:*** Chlorammonium.

Description : Colourless crystals or white crystalline powder; cooling, saline taste; somewhat hygroscopic. Sublimes without melting. Soluble in *water*, *boiling water* and sparingly soluble in *alcohol*. Contains not less than 99.0 per cent w/w of NH_4Cl, when dried over silica gel for four hours.

Identification : An aqueous solution responds to the tests for *ammonium salts* and of *chlorides.*

Arsenic : Dissolve 2.5 g in 50 ml of *water* and add 10 ml of *stannated hydrochloric acid*. The resulting solution complies with the *limit testfor arsenic*. Not more than 4 ppm.

Calcium : 5 ml of a 10.0 per cent w/v solution diluted to 10 ml with *water* complies with the *limit test for calcium.* Not more than 200 ppm.

Heavy metals : Not more than 10 ppm.

Iron : 2.0 g complies with *the limit test for iron.* Not more than 20 ppm.

Sulphate : 1.0 g complies with the *limit tests for sulphates*. Not more than 150 ppm.

Thiocyanate : Acidify 10 ml of a 10 percent w/v solution with *hydrochloric acid* and add a few drops of *ferric chloride solution*; no red colour is produced.

Sulphated ash : Not more than 0.1 per cent.

Loss on drying : Loses not more than 1.0 per cent of its weight determined on 1.0 g by drying in an oven at 105^0.

Assay : Dissolve about 0.1 g accurately weighed in 20 ml of *water*. To this add a mixture of 5 ml of *formaldehyde solution*, previously neutralised to *phenolphthalein solution,* and 20 ml of *water*. After 2 minutes, titrate slowly with 0*.1N sodium hydroxide* using 0.2 ml of *phenolphthalein solution* as indicator. Each ml of 0*.1 N sodium hydroxide* is equivalent to 0.005349 g of NH_4Cl.

Preparation : (a) **Mother Solution** Drug Strength 1/10

Ammonium Muriaticum fresh crystals 100g.

Purified Water in sufficient quantity;

to make one thousand milliliters of the *Mother Solution*.

(b) **Potencies**: 2x and 3x with *Purified Water*, 4x and 5x with *Dilute Alcohol*, 6x and higher with *Dispensing Alcohol*.

Storage **:** Store in a well-closed container

Caution **:**

History and authority **:** The first provings by Nenning in Germany. Allen's Encyclop. Mat. Med. Vol.1, 286.

AMYL NITROSUM

(Amyl nit.)

Chemical formula : **$C_5H_{11}O_2N$** **Molecular Weight:** 117.15

Chemical name : Amyl nitrite

Other Language name : ***English:*** Amyl nitrite; ***French:*** Azotit d' amyl; ***German:*** Amylnitrit.

Description : Amyl nitrite is a mixture of the nitrite esters of 3-methyl-1-butanol and 2-methyl-1-butanol. A transparent, yellowish liquid, odour a peculiar ethereal, fruity and pungent with aromatic taste. Volatile even at low temperature and inflammable. Immiscible with *water*, miscible with *alcohol* and *ether*. Slowly decomposes on exposure to air and light. Contains not less than 90.0 per cent w/w of $C_5H_{11}O_2N$.

Boiling point : 97^0 to 99^0.

Relative density : 0.870 to 0.876.

Identification : (i) To 2 drops ,add 2 drops of *water* and 2 ml of *sulphuric acid*, shake and dilute with *water*; amyl valerate is produced which is recognised by its characteristic odour.

(ii)To 3 drops, add a few drops of *2 N sodiumhydroxide*, warm and dilute with *water* and cool. Add a crystal of *potassiumiodide* followed by a few drops of *starch solution* and acidify with *sulphuric acid*, a blue colour is produced.

Non -volatile residue : Leaves not more than 0.01 per cent w/v of the residue when evaporated and dried to constant weight at 105^0.

Assay : Weigh accurately about 0.5 g in a 100 ml graduated stoppered flask,add10 ml of *alcohol*, 15 ml of 0.5 per cent w/v solution of *potassium chlorate solution* and 10 ml of *dilute nitric acid*. Stopper the flask, and allowto stand for 30 minutes. Add 25 ml *0.1 N silvernitrate solution*, shake vigorously, and make up with *water* to the mark. Filter through the dried filter paper into a dry flask, discarding the first 20 ml of the filtrate. Titrate 50 ml of the subsequent filtrate with *0.1 N ammonium thio cyanate solution* to yellowish-pink colouration, using 5 ml of the solution of *ferric-ammonium sulphate* as indicator. Perform a blank test in the same manner. The difference between the titrations represents quantity of *0.1 N silvernitrate* used by the *amylnitrate*. Each ml of *0.1 N silvernitrate* solution is equivalent to 0.035144 g of $C_5H_{11}O_2N$.

Preparation : (a)**Mother Solution** Drug Strength 1/10

Amyl Nitrosum	87.5 g

Strong Alcohol in sufficient quantity;

to make one thousand millilitres of the *Mother Solution*..

(b) **Potencies:** 2x and higher with *DispensingAlcohol*.

Storage **:** Preserve in well closed containers, protected from light and in a cool place away from fire. It forms explosive mixture with air or oxygen.

Caution :

History and Authority : Allen's Encyclop. Mat. Med.1874,Vol. I, page 309.

ANTIMONIUM CRUDA
(Ant. cr.)

Chemical Formula : **Sb_2S_3** **Molecular Weight :** 339.70

Chemical name : Antimony trisulphide

Other Language name : ***English:*** Antimony trisulphide; ***French:*** Sulfure d' antimoine; ***German:*** Schwefelspiessglanz.

Description : A grey or greyish-black, lustrous, crystalline mass, when obtained from natural sources; iron grey colour when pulverized. Insoluble in *water*; soluble in *concentrated hydro chloric acid* with the evolution of hydrogen sulphide. Contains not less than 99.0 per cent w/w of Sb_2S_3.

Identification : (i) A *solution in hydrochloric acid* responds to the tests characteristic of *antimony.*

(ii) To 0.1 g of the powdered substance in a test tube add 2 ml of *dilutehydrochloric acid* and warm on water bath. The colour of a moistened lead acetate paper held over the mouth of test tube changes to blackish brown.

Arsenic : To 0.50 g add 5 ml of *ammonium carbonate solution*. Leave to stand at 50^0 to 60^0 for 2 minutes, shaking repeatedly, then filter. Add 2 ml of *hydrochloric acid*. A yellow flocculent precipitate is not produced within 6 hours.

Copper : Dissolve 0.10 g in 5 ml of *hydrochloric acid* and add 8 ml of *concentrated ammonia*. A blue colour is not produced.

Hydrochloric acid-insoluble impurities : To 2.0 g add 40 ml of *hydrochloric acid*. Boil for 10 minutes, then filter through a sintered glass filter. Wash the residue with three 10 ml portions of *dilute hydrochloric acid*, then dry the filter and its contents to constant mass at $105^0$to 110^0. Not more than 1 per cent.

Assay : Take 0.30 g accurately weighed powdered substance in a 500 ml conical flask, add 20 ml of *sulphuric acid* and warm to dissolve. Cool, add 100 ml of *water* and 40 ml of *hydrochloric acid*, then add another 30 ml of *water*. Warm to 40^0 to 50^0, add 0.2 ml of *methyl orange solution* and titrate with *0.1M ammonium cerium sulphate solution* until the colour disappears.

Each ml of *0.1Mammonium cerium sulphate solution* is equivalent to 0.00849 g of Sb_2S_3.

Preparation : **(a) Trituration 1x** Drug Strength 1/10

Antimonium crudum	100 g
Saccharum Lactis	900 g

to make one thousand grammes of *Trituration.*

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI,.6x may be converted to liquid 8x HPI, . 9x and higher with *Dispensing Alcohol*.

Storage **:**

Caution **:**

History and Authority : Allen's *Encyclop*. *Mat*. *Med.* 1874, Vol. I, 363.

ANTIMONIUM TARTARICUM
(Ant. tart.)

Chemical Formula : **K (SbO) $C_4H_4O_6$. ½H_2O** **Molecular Weight:** 333.93

Chemical name : Antimony potassium tartrate

Other Language name : ***English*****:** Tartar emetic; ***French*****:** Tartrate d' antimone et de potassee; ***German*****:**Brechweinstein.

Description : A colourless, transparent crystals or White granular powder odourless, taste sweet metallic. Effloresces upon exposure to air. Soluble in *water*, freely soluble in boiling *water*, practically insoluble in *alcohol*. Contains not less than 99.0 Percent of K (SbO) $C_4H_4O_6$. ½H_2O.

Identification :

(i) Aqueous solution responds to the tests characteristic of *antimony* and *tartrates*.

(ii) An acidic solution gives orange –red precipitate with *hydrogen sulphide*.

Arsenic : Not more than 10 ppm.

Lead Note more than 5 ppm.

Acidity or alkalinity : Dissolve 1.0 g in 50 ml of *carbon dioxide free water*, and titrate with 0.01N *hydrochloric acid* or 0.01N *sodium hydroxide* to a pH of 4.5: not more than 2.0
: ml is required.

Loss on drying : Dry at it 105° to constant weight; not more than 2.7 per cent of weight.

Assay : Dissolve about 0.5 g accurately weighed, in 50 ml of *water*, add about 2g of *sodium bicarbonate* and titrate with 0.1 N *iodine* using starch as indicator till persistent of blue colour. Each ml 0.1N *iodine* is equivalent to 0.01670 g of K(SbO) $C_4H_4O_6$. ½H_2O.

Preparation : (i) **Trituration 1x** Drug Strength 1/10

AntimoniumTartaricum in crystals	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

Potencies: 2x and higher to be Triturated in accordance with the method HPI, 6x may be converted to liquid 8x, and higher with *Dispensing Alcohol*.

Storage : Preserve in well-closed container.

Caution : Lower potencies sometimes aggravates.

History and authority : Introduced by Hottereb&Trink: *Homoeopathic Materia Medica*; Allen's *Encyclop.* of *pure Mat. Med.*, Vol. I, 379.

ARGENTUM METALLICUM
(Arg.met.)

Chemical Formula : **Ag** **Atomic weight.:**107.87

Chemical name : Silver

Other Language name : ***English*****:** Silver; ***French*****:** Argents; ***German***: Silber.

Description : Grey- white, dull or slightly lustrous, ductile metal; tasteless and odourless. Next to gold, most malleable and ductile of all metals. Does not dissolve in *hydrochloric acid* or *ammonia solution*, dissolves in *dilutenitric acid*. Contains not less than 99.0 and not more than 100.5 percent of Ag.

Specific gravity : 10.49.

Identification : (i) Solution in *nitric acid* gives a heavy, white, curdy precipitate with *hydrochloric acid*, soluble in *ammonium hydroxide*.

: (i) Dissolve 10 mg in 5 ml of *dilutenitric* acid with warming, the solution gives the identification reaction for *silver*.

(ii) An Ammonical solution when treated with a small quantity of *formaldehyde* and warmed, causes the formation of a *silver* mirror on the walls of the test tube.

Test solution: -Dissolve 1.50 g in a mixture of 2 ml of *nitric acid* and 2 ml of *water* with warming. Cool and dilute to 10 ml with *water*.

Aluminium, lead ,copper bismuth : To 4 ml of test solution add 6 ml of *concentrated ammonia solution*. The mixture is clear and colourless.

Foreign metals and salts : Not more than 0.4 per cent. To 5.0 ml of test solution add 20 ml of water and 7.5 ml of *dilute hydrochloric acid* than shake vigorously and filter. Evaporate 10.0 ml of the filtrate to dryness on a water bath and dry the residue to constant mass in a drying cabinet at 100 to 105°. The mass of the residue is not more than 1 mg.

Acidity or alkalinity : Boil 1.0 g with 40 ml of *water* for 5 min and filter, discarding the first 10 ml of the filtrate. To 10 ml of the filtrate add 0.25 ml of *bromothymol blue solution* and 0.10 ml of 0.02 M *hydrochloric acid*, the solution turns yellow. Add 0.15 ml of 0.02 M *sodium hydroxide solution*, the solution turns blue.

Assay : Take about 0.1 g accurately weighed in a 100 ml flask add 6 ml of *dilute nitric acid* and warm on a water bath until the evolution of brown fumes has ceased. Add 25 ml of *water* and 3 ml of *ferric ammonium sulphate solution* and titrate with 0.1 M *ammonium thiocyanate solution* until an orange tinge is observed that persists even after vigorous shaking. Each ml of 0.1 M *ammonium thiocynate solution* is equivalent to 0.01079 g of Ag.

Preparation : (a) **Trituration 1x** Drug Strength 1/10

Argenticum Metallicum in fine powder	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*

Potencies: 2x and higher to be trituration in accordance with the method HPI, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol.*

Storage :

Caution : Inhalation of dust should be avoided.Not to be repeated frequently.

History and Authority : Proved by Hahnemann. Allen, s *Encyclop. Mat. Med*., Vol. 1,436.

ARGENTUMNITRICUM
(Arg. nit.)

Chemical Formula : **$AgNO_3$** **Molecular Weight :** 169.87

Chemical name : Silver nitrate

Other Language name : ***English:*** Silver nitrate; ***French:*** Azotate d'argent; ***German:*** Silber nitrat.

Description : Colourless crystals or white, crystalline powder; odourless, having bitter caustic and metallic taste. Freely soluble in *water* and more slightly soluble in boiling *water*; soluble in *alcohol*. Melts at 212^0; into a slightly yellow liquid solidifying to a white, crystalline mass on cooling. Contains not less than 99.0 per cent w/w of $AgNO_3$ with reference to the substance dried over silica gel protected from light.

Specific gravity : 4.35.

Identification : (i) With s*odium chloride* its aqueous solution gives an abundant white precipitate, soluble in *ammonia*.

(ii) Responds to the tests characteristic of *silver* and of *nitrates*.

(iii) A solution in *water* is clear and colourless and is neutral to litmus.

Aluminium, lead, copper and bismuth : Dissolve 1.0 g in a mixture of 4 ml of *strong ammonia solution* and 6 ml of *water*, the resulting solution is clear and colourless.

Foreign salts : To 30 ml of a 4 per cent w/v solution, add 7.5 ml of *2M hydrochloric acid*, shake vigorously, heat for 5 minutes on a water-bath, filter and evaporate 20 ml of the filtrate to dryness on a water-bath. Dry the residue at 105^0 and weigh. Not more than 0.3 per cent.

Assay : Dissolve about 0.3 g accurately weighed in 50 ml of *water*; add 2 ml of *2M nitric acid* and 2 ml of *ferric ammonium sulphate solution* and titrate with *0.1N ammonium thiocyanate* until a reddish yellow colour is produced. Each ml of *0.1N ammoniumthiocyanate* is equivalent to 0.01699g of $AgNO_3$.

Preparation : **(a) Mother Solution** Drug Strength 1/10

Argentum Nitricum	100 g
Purified Water in sufficient quantity	

to make one thousand mililitres of the *Mother Solution.*

(b) **Potencies**: 2x and 4x with purified water. 5x with *Dilute Alcohol*, 6x and above with *Dispensing Alcohol*.

(c) Trituration: 1x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x HPI, , 9x and higher with *Dispensing Alcohol.*

Storage : Preparations up to 6x potency are to be kept in well closed containers protected

Caution : Best as an aqueous solution, 1 is to 9, 2 or 3 drop doses. This solution in water is preferable to lower trituration; unless fresh, it readily decomposes into the oxide.

History and Authority : Allen's *Encyclop*. *Mat*. *Med*. 1874, Vol. I, 452.

ARSENICUM ALBUM
(Ars. alb.)

Chemical Formula : **As_2O_3** **Molecular Weight.:** 197.84

Chemical name : Arsenic trioxide

Other Language Name : ***English:*** Arsenic trioxide, Arsenious acid; ***French:*** Acide arsenieux; ***German:*** Arsenige säure.

Description : White or transparent, glassy, amorphous lumps or crystalline powder; odourless, stable in air. Soluble in *water*, amorphous variety is more soluble than crystalline variety. Sparingly soluble in *alcohol* and soluble in *glycerine*. Contains not less than 99.8 per cent w/w of As_2O_3 calculated with the reference to substance dried at 105^0 to constant weight.

Melting point : 313^0(monoclinic).

Identification : (i) A small quantity warmed with about 5 ml of *hydrochloric acid* gives a brown coloured or white precipitate on addition of few drops of solution of *stannous chloride.*

(ii) An acidified solution gives a yellow precipitate with *hydrogen sulphide,* soluble in aqueous ammonia.

(iii) Dissolve 20 mg in 1 ml of *hydrochloric acid*, add 5 ml of *hypo phosphorous reagent* and warm in a water bath for 15 min. A black precipitate is produced.

Test solution: A solution of 0.5 g in 5 ml of *dilute ammonia.*

Sulphides : To the test solution; add 8 ml of *hydrochloric acid*. No yellow colour or precipitate is produced.

Non-volatile matter : Leaves not more than 0.1 per cent of the residue.

Assay : Dissolve about 0.08 g accurately weighed in a mixture of about 10 ml of *water* and 10 ml of *dilute sodium hydroxide solution*. Add 10 ml of *dilute hydrochloric acid* followed by about 3 g of *sodium bicarbonate* and titrate the mixture with *0.05 M iodine solution* using starch solution as indicator. Each ml of *0.05 M iodine* is equivalent to 0.004946 g of As_2O_3**.**

Preparation : (a) **Mother Solution** Drug Strength 1/100

Arsenicum album in fine powder	10 g
Glycerine	100 ml
Strong Alcohol	100 ml

Purified Water in sufficient quantity;
to make one thousand milliliters of the *Mother Solution.*

Heat fine powder of Arsenicum album with *Glycerine* at 100^0 until a clear solution is obtained. Cool this solution and add to it 750 ml of *Purified Water* and 100 ml of *Strong Alcohol*. Mix well, Bring the volume to one thousand milliliters by adding *Purified Water* if found necessary.

(b) **Potency**: 3x and higher with *Dispensing Alcohol*.

(c) **Trituration 1C** Drug Strength 1/100

Arsenicum album in fine powder	10 g
Saccharum Lactis	990 g

to make one thousand grammes of the *Trituration.*

(d) **Potency**: 3x and higher to be triturated in accordance with method HPI, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol*.

Storage :

Caution : Not to be prescribed below 3x.

History and Authority : Allen’s Encyclop. Med. Mat.Vol. I, 496.

ARSENICUM IODATUM

(Ars. iod)

Chemical Formula : **AsI_3** **Molecular Weight:** 455.64

Chemical name : Arsenious iodide

Other Language name : ***English*:** Arsenious iodide; ***French***: Iodure d' arsenic; ***German***: Arsenikjodur.

Description : Scarlet or garnet-red lustrous crystals or plates, having odour of *iodine*, gradually losing iodine on exposure to air. Soluble in *water* with partial decomposition, soluble in *alcohol*, *ether*, *chloroform* and *carbondi-sulphide*. Contain not less than 97 per centof AsI_3.

Specific gravity 4.39.

Melting point 140 to 144^0.

Identification : (i) It emits violet vapours of *iodine*,with *nitric* acid.

(ii) The substance gives the identification reactions characteristic for *arsenic* and *iodides*.

(iii) Sublimes when heated slowly but decomposes if heated rapidly.

: Test solution: - Dissolve 0.6 g in 15 ml of *water*.

Free iodine iodate : Shake 10 ml of test solutionwith 2 ml of *chloroform*. The chloroform layer appears colourless (free iodine). Add 0.2 ml of *dilute sulfuric acid* and shake again. The chloroform layer remains colourless (iodate).

Chlorides, bromides : Not more than 500 ppm.

Potassium : Not more than 300 ppm.

Loss on drying : Not more than 3.0 percent, determined on 1.0 g by drying in a drying cabinet at.105^o- 110^o.

Assay : Dissolve about 0.5 g accurately weighed in 50 ml of *water*, add about 2 g of *sodium bicarbonate* and titrate with 0.1 N *iodide*, using *starchsolution* as indicator. Each ml of 0.1 N *iodide* is equivalent to 0.0227 g of AsI_3

Preparation : (a) **Trituration1C** Drug Strength 1/100

Arsenicum Iodatum	10 g
Saccharum Lactis	990 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 3x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol*.

Storage : All potencies upto 6x should be freshly prepared.

Caution : Not to be prescribed below 3x.Ought to be prepared fresh and protected from light.

History and authority : Allen's *Encyclop*. *Mat*. *Med*., Vol.I, 552.

ARSENICUM SULPHURATUM FLAVUM

(Ars. s. f.)

Chemical Formula : As_2S_3 **Molecular Weight.:** 246.00

Chemical name : Arsenic trisulphide

Other Language name : ***English:*** Arsenic trisulphide, Orpiment; ***French:*** Sulfure Jaune d' arsenic; ***German:*** Sulfide arsenieux, Goldgelb.

Description : A yellow or orange tasteless, odourless powder. Practically insoluble in *water* and *alcohol*; soluble in alkalies, alkali sulfide or carbonates; slowly soluble in hot *hydrochloricacid* and decomposes in boiling *dilute nitric acid* with separation of sulphur. Contains not less than 98.0 per cent w/w of As_2S_3,with reference to the substance dried to constant weight at 105^0.

Melting Point : 300^0-325^0.

Specific gravity : 3.46.

Identification : (i) When heated with charcoal, it is reduced to the metallic state.

(ii) It responds to all the tests characteristic of *arsenic*.

Assay : Dissolve about 0.5 g accurately weighed in 50 ml of *water* to which is added about 2 g of *sodium bicarbonate*. Titrate with *0.1 Niodine* using *starch* as indicator. Each ml of *0.1N iodine* is equivalent to 0.00615 g of As_2S_3.

Preparation : (a) **Trituration 1C** Drug Strength 1/100 Arsenicum

sulphuratum Flavum

in coarse powder 10 g

Saccharum Lactis 990 g

to make one thousand grammes of the *Trituration.*

(b) **Potencies:** 3x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x, HPI, 9 x and higher with *Dispensing Alcohol.*

Storage :

Caution : Not to be prescribed below 2x.

History and Authority : Allen's Encyclop. Mat. Med., Vol. I, 556.

AURUM METALLICUM
(Ac.mur.)

Chemical Formula : **Au** **Atomic weight.:**197.0

Chemical name : Gold

Other Language name : ***English***: Gold, Gold leaf;***French***: Or;***German*****:** Gold.

Description : Bright yellow metal; most malleable and ductile; brown in powdered form. Do not react with air, *hydrogen suphides*; ordinary *acids*. Soluble in *aquaregia*. Gold generally occurs in the free state. Contains not less than 99.9 per cent of Au.

Specific gravity : 19.3.

Identification :

(i) *Sodium hydroxide solution* of *goldsalts* gives a brown precipitate soluble in excess of reagent.

(ii) When treated with *stannous chloride*, solution of salt in *aquaregia* slowly forms a purple precipitate (purple of Cassius).

Iron : Not more than 200 ppm.

Heavy metals : Not more than 40 ppm.

Assay

Preparation :

(a) **Trituration** 1x Drug Strength 1/10

Aurum Metallicum	100g
Saccaharum Lactis	900g

to make one thousand grammes of the *Trituration.*

(b) **Potencies**: 2x and higher to b Triturated, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol.*

Storage :

Caution :

History and authority : Allen's *Encyclop*. *Mat*. *Med*., Vol. II, 1.

AURUM MURIATICUM

(Aur. mur.)

Chemical Formula : **$AuCl_3.2H_2O$** **Molecular Weight .:** 339.36

Chemical name : Gold trichloride

Other Language name : ***English**:* Gold trichloride; ***French**:*Chlorure d'or; ***German**:* Gold chlorid.

Description : Yellow orange, reddish-yellow or dark orange-red deliquescent crystals having strong metallic taste. Soluble in *water* and *alcohol*. Its aqueous solution stains the skin purple. Contains not less than 48.0 per centw/w of Au with reference to the substance dried to constant weight at 105^0.

Identification : Test solution: Dissolve 50 mg in 2 ml of *water*.

(i) It responds to the *reactions* characteristic of *gold* and of *chlorides*.

(ii) Briefly warm 1 ml of test solution with 0.5 g of glucose, then add 0.3 ml of *0.1N sodium hydroxide solution*. A transient brownish to violet colour is produced.

Ether-insoluble impurities : A solution of 50 mg in 2.0 ml of *ether* is clear.

Free hydrochloric acid : The substance does not generate white fumes when placed close to a glass rod moistened with *concentrated ammonia solution.*

Heavy metals : Not more than 100 ppm.

Nitrates : Dissolve 0.2 g in 15 ml of *water* and add 0.25 g of *oxalic acid.* Warm, then filter and dilute to 20 ml by washing the filter with *water.* To 3 ml of this solution, add 0.5 ml of *ferrous sulphate solution* and carefully pour 1 ml of *sulphuric acid* down the side of tube. A brown colur is not produced at the interface between the two layers.

Foreign metals : The filtrate obtained in the 'assay' does not darken when *hydrogen sulphide* is passed for a few seconds, or on further treatment with *dilute ammonia solution* in excess.

Assay : Dissolve about 0.5 g accurately weighed in 50 ml of *water*, add 10 ml of *0.1 Nsodiumhydroxide* and 10 ml *hydrogenperoxidesolution* and boil until the excess of *hydrogenperoxide* is destroyed, acidify with *dilutehydrochloricacid*, filter off precipitated gold, wash with *water*, dry and ignite to constant weight and weigh. It should not be less than 48.0 per cent of the substance taken.

Preparation : (a) **Mother Solution** Drug Strength 1/10

Aurum muriaticum 100 g

Purified Water in sufficient quantity

to make one thousand mililitres of the *Mother Solution.*

(b) **Potencies**: 2x to contain one part Mother Tincture, four parts *Purified Water* and 5 parts *Strong Alcohol*, 3 x and higher with *Dispensing Alcohol*.

Caution : Not to be prescribed below 3x.

Storage : Keep well closed and protected from light.

History and Authority : Allen’s *Encyclop*. *Mat*. *Med*. 1874, Vol. II, 14; Clark: Mat. Med. I, 229.

AURUM MURIATICUM NATRONATUM

(Aur. m. n.)

Chemical Formula : **Na $[AuCl_4].2H_2O$** **Molecular Weight.:** 397.8

Chemical name : Sodium tetrachloroaurate(III) dihydrate

Other Language name : ***English:*** Sodium tetrachloroaurate, Sodium auric chloride; ***French:*** Chloure d' or et de sodium; ***German:*** Natrium gold chlorid.

Description : Orange-yellow, long, four sided crystals or crystalline powder; odourless; taste metallic; light sensitive and deliquescent. Freely soluble in *water* and *alcohol water* mixture. Contains not less than 99.0 per centw/w of Na $[AuCl_4].2H_2O$ calculated with reference to 49.0 per centw/w of Gold.

Identification : Test solution: Dissolve 100 mg in 4 ml of *water*.

(i) Briefly warm 1 ml of test solution with 0.5 g of *glucose*, and then add 0.3 ml of *0.1 Nsodium hydroxide solution*. A transient brownish to violet colour is produced.

(ii) A mixture of 0.5 ml of test solution and 1.5 ml of *water* gives reactions characteristic of *chlorides*.

(iii) Evaporate 1.5 ml of s test solution to dryness in a porcelain crucible on a water bath. Calcine the residue at about 600^0 for 30 min, then cool and extract with 0.5 ml of *water*, warming if necessary. The clear supernatant solution gives *identification reaction for sodium*.

Free hydrochloric acid : The substance does not generate white fumes when placed close to a glass rod moistened with *concentrated ammonia solution.*

Heavy metals : Not more than 100 ppm.

Nitrates : Dissolve 0.2 g in 10 ml of *water* and add 0.20 g of *oxalic acid.* Warm on water bath for 30 minutes; cool and then filter. Dilute the combined filtrate to 20 ml by washing the filter with *water*. To 3 ml of this solution add 0.5 ml of *ferrous sulphate solution* and carefully pour 1 ml of *sulphuric acid*down the side of tube. A brown colour is not produced at the interface between the two layers.

Assay : Dissolve accurately weighed 0.50 g in 25 ml of *water* in a porcelain dish. Add 5 ml of *20 percent potassium hydroxide solution* and 5 ml of *strong hydrogen peroxide solution* and warm on a water bath for 1hr. Filter the mixture, adding 5 ml of *dilute hydrochloric acid* to the precipitate obtained, then wash with *water until* the filtrate is chloride-free. Dry the precipitate at 105 to 110^0, and then calcine to constant mass at about 600^0. Each mg of the residue (Au) is equivalent to 0.00202 g of $Na[AuCl_4].2H_2O$.

Preparation :

(a) **Trituration 1x** Drug Strength 1/10

Aurum Muriaticum Natronatum, in crystalline powder	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration.*

(b) **Potencies:** 2x and higher to be triturated in accordance with the method, Vol. I., HPI, 6x may be converted to liquid 8x, , Vol. I. HPI, 9x and higher with *Dispensing Alcohol.*

(c) **Mother Solution** Drug Strength 1/10

Aurum Muriaticum Natronatum in crystalline powder	100 g

Purified Water in sufficient quantity;
to make one thousand millilitres of the *Mother Solution*.

(d) **Potencies:** 2x to contain one part *Mother Solution*, four parts *purified Water* and five parts *Strong alcohol*. 3x and higher *Dispensing Alcohol.*

Storage : Keep in well closed container, protected from light.

Caution

History and authority : Proved by Lembke in Germany; by Hale and Clarke. Allen: Encyclop. Mat. Med., Vol II, 18; Hering's Guiding Symptoms, Vol. II, 304.

BARYTACARBONICA

(Bar. carb.)

Chemical Formula : **$BaCO_3$** **Molecular Weight .:** 197.35

Chemical name : Barium carbonate

Other Language name : ***English**:* Barium carbonate; ***French**:* Carbonate de baryte; ***German**:* kohlensaures barium.

Description : A white, heavy, odourless and tasteless powder. Practically insoluble in *water*; readily decomposed by acids with the evolution of *carbondioxide*. Soluble in *dilute hydrochloric acid*, *nitric acid* and *acetic acid*. Contains not less than 98.0 per centw/w of $BaCO_3$ with reference to the substance dried to constant weight at 105^0.

Specific gravity : 4.43.

Identification : (i) The substance gives the identification reaction of *barium and carbonates.*

(ii) Dissolve 0.2 g in 5 ml of *dilute hydrochloric acid* and add 0.3 ml of *dilute sulphuric acid.* A white precipitate is formed which is insoluble in *dilute hydrochloric acid*.

(iii) Moistened, with *hydrochloric acid*, heat it on a platinum wire in a bunsen flame; it imparts a green colour to the flame.

Chloride : A solution of 0.1 g in 5 ml of *dilute nitric acid* and 10 ml of *water* complies with the *limit test for chloride.* Not more than500 ppm.

Heavy metals : Not more than200 ppm.

Assay : Weigh accurately about 0.40 g, add 10 ml of *1 N hydrochloric acid* and 10 ml of *water* and shake for 1 minute, titrate with *1 N sodium hydroxide solution* using 0.2 ml of *methylorange solution* as indicator. Perform similar titration omitting test sample. Each ml of *1 N hydrochloric acid* is equivalent to 0.0987 g of $BaCO_3$.

Preparation : (a)**Trituration 1x,** Drug Strength 1/10

Baryta carbonica	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration.*

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x HPI; 9x and higher with *Dispensing Alcohol*.

Storage **:**

Caution : Not to be prescribed below 3x.

History and Authority : Allen's *Encyclop*. *Mat*. *Med*. Vol. II, 49; X. 372.

BARYTA IODATA

(Bar. iod.)

Chemical Formula : **$BaI_2.2H_2O$** **Molecular Weight .:**427.0

Chemical name : Barium iodide

Other Language name : ***English:*** Barium iodide; ***French:*** Iodure de baryum; ***German:*** Jodbarium.

Description : Colourless, small slender needles, deliquescent. Freely soluble in *alcohol* and in *water*. Rapidly become reddish in air due to liberation of iodine. Aqueous solution neutral or faintly alkaine. Contains not less than 98 per cent w/w of $BaI_2.2H_2O$, with reference to substance dried to constant weight at 105^0.

Test solution: Add 5 g to 50 ml of *carbon dioxide-free water* and shake vigorously for 1 minute. Filter and dilute to 50 ml with *carbon dioxide-freewater.*

Identification : (i) The substance gives the identification reaction of *barium andiodides.*

(ii) To 1 ml of test solution add 0.3 ml of *dilute sulfuric acid*. A white precipitate is formed which is insoluble in *dilute hydrochloric acid*.

Free iodine, iodate : Shake 5 ml of test solution in a centrifuge vial with 2 ml of *chloroform.* The organic phase is colourless (free iodine). Add 0.2 ml of *dilute sulphuric acid*, shake and centrifuge. The organic phase remains colourless (iodate).

Thiosulphate : To 10 ml of test solution add 0.1 ml of *iodine-free starch solution* and 0.05 ml of *0.01 Miodine solution*. A blue colour is produced.

Acidity or alkalinity : A solution 1 in 20 in freshly boiled *water* remains neutral to a *solution of litmus.*

Carbonate : A solution of 1 in 20 solution does not give any effervescence on addition of *hydrochloric acid.*

Heavy metals : Not more than 10 ppm.

Phosphate : A solution in *nitric acid* 1 in 5 gives no yellow precipitate with 5 ml solution of *ammonium molybdate.*

Sulphate : No turbidity is produced in one minute on adding *barium chloride solution* to 1 in 20 solution of this salt in *water.*

Loss on drying : When dried to constant weight at 105^0, loses not more than 2 per cent of its weight.

Assay : Weigh accurately about 0.35 g of the substance add 50 ml of *water*, 5 ml of *dilute nitric acid*and 25 ml of *0.1N silver nitrate solution* and shake. Titrate with *0.1 Mammonium thiocyanate solution* using 2 ml of *ferric ammonium sulfate solution*(a 100 g/l solution) as indicator until the colour changes to reddish yellow. Each ml of *0.1Nsilver nitrate solution* is equivalent to 0.02046 g of $BaI_2.2H_2O$

: (a) **MotherTincture** Drug Strength 1/10

Baryta Iodata 100 g

Dilute Alcohol in sufficient quantity;

to make one thousand millilitres of the *Mother Tincture.*

(b) **Potencies**: 2x and higher with *Dispensing Alcohol*.

Storage **:**

Caution **:**

HistoryandAuthority : *Clarke: A Dictionary of Practical Material Medica,* Vol. I, 253.

BARYTA MURIATICA

(Bar.mur.)

Chemical Formula : **$BaCl_2. 2H_2O$** **Molecular Weight .:** 244.28

Chemical name : Barium chloride

Other Language name : ***English:*** Barium chloride, Barii chloridum; ***French:*** Chlorure de baryum; ***German:*** Chlorbaryum.

Description : Colourless, odourless crystals or white crystalline powder with a bitter and salty taste. Freely soluble in *water*; slightly soluble in *alcohol*. Loses its water of crystallization at 120^0. Contains not less than 99.0 per cent w/w of $BaCl_2. 2H_2O$.

Specific gravity : 3.86.

Identification : (i) The substance gives identification reaction for *barium and chlorides*.

(ii) Dissolve 0.1 g in 1 ml of *water* and add 0.3 ml of *dilute sulfuricacid*. A white precipitate is formed which is insoluble in *dilutehydrochloric acid* and in *dilute nitric acid*.

Heavy metals : Not more than 10 ppm.

Nitrate : Dissolve 1 g in 10 ml of water, add 1 ml of solution of *indigo caramine* and 10 ml of *nitrogen free sulphuric acid* and heat to boiling. The blue colour does not entirely disappear.

Loss on drying : Losses not more than 16.0 per cent of its weight, when dried to constant weight at 120^0.

Assay : Dissolve about 0.20 g accurately weighed in 100 ml of *water*. Add 100 ml of *methanol*, 10 ml of *concentrated ammonia* and 2 mg of *phthalein purple*. Titrate with *0.1 Msodium edetate* until the colour changes from violet to colourless. Each ml of *0.1 Msodium edetate* is equivalent to 0.02443 g of $BaCl_2. 2H_2O$.

Preparation : (a)**Trituration 1x,** Drug Strength 1/10

Baryta muriatica in coarse powder	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration.*

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x HPI; 9x and higher with *Dispensing Alcohol.*

: (c) **Mother Solution** Drug Strength 1/10

Baryta Muriatica	100 g

Purified Water in sufficient quantity;

to make one thousand millilitres of the *Mother Solution.*

(d) **Potencies**: 2x to contain one part *Mother Solution*, four parts *Purified Water* and five parts *Strong Alcohol*. 3x and higher with *Dispensing Alcohol*.

Storage **:**

Caution **:**

History and Authority : Allen's *Encyclop*. *Mat*. *Med*.1874, Vol. II. 65: 373.

BORAX

(Borax)

Chemical Formula : **$Na_2B_4O_7.10H_2O$** **Molecular Weight:** 381.4

Chemical name : Sodium tetraborate decahydrat

Other Language name : ***English***: Borate of sodium; ***French***: Borate de Soude; ***German***: Natrium pyroborat.

Description : Transparent, colourless crystals, or white, crystalline powder, odourless; taste saline and alkaline, effloresces in dry air, on ignition loses all its water of crystallization.Soluble in *water* and very soluble in boiling *water*, freely soluble in *glycerol*. Contains not less than 99.0 per cent and not more than 103.0 per cent of $Na_2B_4O_7.10H_2O$.

Identification :

(i) An acidic solution gives a reddish-brown colour to *turmericpaper*, which intensifies on drying; dried when moistened with *ammonium solution*, changes to greenish- black.

(ii) It responds to all the test of *sodium.*

Test solution: - Dissolve 4.0 g in *carbon dioxide –free water* prepared from *distilled water* and dilute to 100 ml with the same solvent.

(iii) To 1 ml of test solution add 0.1 ml of *sulphuric acid* and 5 ml of *methanol* and ignite. The flame has a green border.

Arsenic 5 ml of test solution complies with *limit test for arsenic*. Note more than 5 ppm.

Heavy metals : 12 ml of test solution complies with *limit test for heavy metals*. Not more than 25 ppm.

Chloride : 1 g complies with the *limit test for chloride*.

Iron : 0.5 g complies with the *limit test for iron*.

Sulphate : 1 g complies with the *limit test for sulphate.*

Assay : Weigh accurately about 3 g and dissolve in 75 ml of *water* and titrate with 0.5 N *hydrochloricacid*,using *methylred solution* as indicator; note the volume of 0.5 N *hydrochloric acid* required. Boil and cool the solution. Add 20 g of *mannitol* and titrate with 1N *sodium hydroxide* using *phenolphthalein solution* as indicator.Each ml of 1 N *sodium hydroxide* is equivalent to 0.09534 g of $Na_2B_4O_7.10H_2O$.

Preparation : (a) **Trituration** 1x Drug Strength 1/10

Borax in coarse powder	100g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 2x and higher to be *Triturated* in accordance with the method HPI, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol*.

Storage : Borax should be kept in a wall closed container.

Caution :

History and authority : Allen’s *Encyclop*. *Mat.Med*., Vol. II,195.

BROMIUM
(Brom.)

Chemical Formula : **Br_2** **Molecular Weight.:** 159.80

Chemical name : Bromine

Other Language Name : ***English*:**Bromine;***French***: Brojme;***German***: Brom.

Description : Brownish red, fuming liquid with an irritant odour, slightly soluble in water, soluble in *ethanol* and *ether*; these solutions decompose gradually; relative density about 3.1. Contain not less than 99.0 percent of Br_2.

Specific gravity : 3.10 to 3.14.

Test solution: - To 0.5 ml add 2 ml of *dilute sodium hydroxide solution*. Dilute to 20 ml with *water* and shake until a solution is obtained.

Identification :

(i) To 1ml of test solution add 0.2 ml of *nitric acid* and 0.5 ml of *silvernitrate* solution; curdled whitish yellow precipitate is produced.

(ii) To 0.1 ml of test solution add 2 ml of *potassium iodide solution* and 2 ml of *chloroform*, the organic phase turns violet.

(iii) Addition of a saturated solution of phenol to an aqueous solution of bromine yields a white precipitate.

Arsenic : Not more than 10 ppm.

Heavy metals : Not more than 20 ppm.

Limit test for chloride : Dissolve 1 g in 10 ml of solution of *ammonia*, add 65 ml of *water* followed by 25 ml of *nitricacid*; bring to vigorous boiling and completely expel the *bromine* by passing a rapid current of air through the solution for 20 minutes while cooling; the residual liquid requires not more than 1.4 ml of 0.1 N *silver nitrate*
Solution for complete precipitation.

Limit test for iodine : Boil 0.2 ml with 20 ml of *water* and 0.2 ml of 1 N *sulphuric* acid and a small piece of marble until the liquid is almost colourless. Cool, add one drops of liquefied *phenol*, allow to stand for two minutes, and then add 0.2 g of *potassium iodide* and 1 -ml of solution of starch; no blue colour is produced.

Sulfates : To 0.50 ml carefully add dropwise 20 ml of *diluteammonia solution* and evaporate to dryness on a water bath. Dissolve the residue in 15 ml of purified water. The resulting complies with the limit test for sulfates. Not more than 100 ppm.

Assay :

Weigh accurately about 0.2 g into a stoppered flask containing 35 ml of *potassium iodide solution*, titrate with 0.1N *sodium thiosulphate* using starch mucilage as indicator. Correct for the amount of *chloride* present as determined in the limit test for *chlorides*. Each ml of 0.1 N *sodium thiosulphate* is equivalent to 0.007992 g of Br_2.

Preparation : (a) **Mother Solution** Drug Strength 1/100

Bromium, in saturated aqueous solution (Drug Strength 1/33)	330 ml
Purified Water	670 ml

to make one thousand milliliters of the *Mother Solution*.

(b) **Potencies**: 3x and higher up to 5x with *Purified Water*, 6x and higher with *Dispensing Alcohol.*

Storage **:** Bromium and all its preparations below 4x potency should be kept in glass stoppered bottles, well closed in a cool place. Handle with great care as it causes severe burns and blisters when brought into contact with the skin. Solutions and potencies up to 5x should be stored in a dry cool place protected from light and preferably should be prepared fresh for use.

Caution **:** Must be prepared fresh, as it is liable to rapid deterioration.

History and authority : Proved by Hering in 1838; Allen: *Encyclop. Mat. Med*., Vol II, 229, X, 392; Haring: *Guiding symptoms*, Vol. II, 508.

CALCAREA ARSENICOSA

(Cal. ars.)

Chemical Formula : $CaHAsO_3$

Chemical name : Calcium arsenicosum, calcium arsenite, arsenite of lime.

Other Language name : *English:* calcium arsenite*; German*:Calciumarsenit; *French*:arsénite de calcium

Description : White granular powder, slightly soluble in *water*; soluble in acids. It is a mixture of $CaHAsO_3$ and $Ca_3(AsO_3)_2$, containing not less than 41.0 per cent w/w and not more than 45.7 per cent w/w of arsenic.

Identification : (i) It responds to all the tests characteristic of *calcium* and of *arsenic.*

(ii) Dissolve 50 mg in 10 ml of *dilute hydrochloric acid*. Add 0.5 ml of *ammonium oxalate solution* and 5 ml of *ammonia solution*. A white precipitate that dissolves in *dilute hydrochloric acid* is produced.

(ii) Dissolve 20 mg in 1 ml of *dilute hydrochloric acid.* Add 5 ml of *hypophosphorous reagent* and warm in a water bath for 15 min. A dark brown to black precipitate is produced.

Arsenic(V) : Dissolve 50 mg in 3 ml of *hydrochloric acid*. Add 3 ml of *chloroform* and 0.5 ml of *potassium iodide solution* and shake. The chloroform phase is not violet.

Carbonates : To 0.5 g add 5.0 ml of *carbon dioxide-free water* and 4 ml of *dilute hydrochloric acid*. No evolution of gas is observed.

Test solution: Dissolve 2 g in 10 ml of *hydrochloric acid*. Dilute the solution to 60 ml with *purified water*.

Barium : Dilute 1.5 ml of test solution to 10 ml with *water*. Add 10 ml of *calcium sulphate solution*. The mixture remains clear for at least 15 minutes.

Sulphates : 15 ml of test solution complies with the *limit test for sulphates.* Not more than 300 ppm.

Assay : Weigh accurately about 0.2 g and dissolve in a mixture of 50 ml of *water* and 2 ml of *hydrochloric acid*. Add 25 ml of *dilute ammonium acetatesolution* and slight excess of solution of *ammonium oxalate*. Heat for one hour on a water bath, filter, wash the residue with warm *water* suspend in 50 ml of *water*, acidify to litmus paper with *dilute sulphuric acid.* Heat to 70^0 and titrate with *0.1N potassium permanganate* keeping the solution at 70^0 during the entire titration. Each ml of *potassium Permanganate* is equivalent to 0.0061 g of $Ca_3(AsO_3)_2$.

Drug Preparation: (a)**Trituration 1x,** Drug Strength 1/10

Calcarea Arsenicosa	10g
Saccharum Lactis	990 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 3x and higher to be triturated in accordance with the method HPI. 6x may be converted to liquid 8x HPI, . 9x and higher with *Dispensing Alcohol*.

Storage **:**

Caution **:** Not to be prescribed below 3x.

History and Authority : Dr. Hering first prepared this and proved in 1848. A *Dictionary ofPract. Mat. Med. Clarke Vol I, 335.*

CALCAREA CARBONICA

(Calcium Carbonate of Hahnemann)
(Cal.carb.)

Chemical Formula : **$CaCO_3$** **Molecular Weight**: 100.08

Chemical name : calcium carbonate

Other Language name : ***English***: Calcarea ostrearum; ***French***: Carbonate of chaux;
German: Calciumkarbonate.

Description : White to light gray scales, with sharp, angular edges; practically insoluble in carbon dioxide- free water, partly soluble in dilute acidic. Contain not less than 90.0 per cent of $CaCO_3$.

Identification : (i) The substance gives the identification reaction for *carbonates*.

(ii) Dissolve 0.5 g in 5ml of *dilutenitric acid* with gentle warming. The solution gives identification reaction for *phosphates*.

: Test solution: - Dissolve 2.50 g in 40 ml of dilute *acetic acid*. When the evolution of gas has ceased, boil the solution for 2 min. Cool, then dilute to 50 ml with dilute *acetic acid* and filter through a sintered glass filter if necessary.

Barium : To 10 ml of test solution add 10 ml of *calcium sulfate solution*. The mixture remains clear for at least 15 minutes.

Heavy metals : 12 ml of test solution complies with *limit test for heavy metals*. Not more than 20 per cent.

Arsenic : Not more than 4 ppm.

Acetic acid- insoluble impurities : Wash the residue left on the sintered glass filter in the preparation of test solution with four 5 ml portions of hot water than dry at 100^{o} to 105^{o} for 1hour. Not more than 10 per cent.

Loss on drying : Determined on 1.0 g by drying in a drying cabinet at 100^o to 105^o. Note more than 2.0 percent.

Assay : Weigh accurately about 1g and transfer to a 250 ml beaker. Moisten with a few ml of water and add dropwise sufficient *dilute hydrochloric acid* to effect complete solution. Transfer the solution to a 250 ml flask; add water to make the volume and mix. Pipette 50 ml of the solution in a suitable container, add 100 ml water and 15 ml of solution of *sodiumhydroxide*, 40 mg of *murexide* indicator preparation and 3 ml of solution of *naphthol* green and titrate with 0.05 M *disodium ethylenediaminetetra-acetate* until the solution is deep blue in colour. Each ml of 0.05 M *disodium ethylenediaminetetra-acetate* is equivalent to 0.005005 g of $CaCO_3$.

Preparation : **Trituration1x** Drug Strength 1/10

Calcarea Carbonica Precipitate	100 g
Saccharum Lactis	900g

to make one thousand grammes of the *Trituration*.

Potencies: 2x and higher to be *Triturated* in accordance with the method HPI, 6x may converted to liquid 8x, 9x and higher with *Dispensing Alcohol.*

Storage **:** Preserve calcium carbonate in a well closed container.

Caution **:** Should not be repeated too frequently in elderly people.

Historyandauthority : Hahnemann prepared and proved this salt of calcium; Allen's *Encyclop*. of pure *Mat*. *Med*., VOI.II,351.

CALCAREA FLUORICA

(Cal. fl.)

Chemical Formula : **CaF_2** **Molecular Weight:**. 78.07

Chemical name : Calcium fluoride

Other Language name : ***English*:**Calcii fluorica, Calcium fluoride;***German*:**Fluorcalcium.

Description : White or whitish grey powder; odourless; becomes luminous when heated. Practically insoluble in *water*, slightly soluble in very *dilute acids*; soluble in concentrated mineral acids. Occursin nature in large deposits. Contains not less than 99.0 Per cent of CaF_2.

Identification : (i) It melts at a low red heat and after fusion assumes the appearance of a glassy substance.

Carbonates : Disperse 0.5 g of the substance in 5.0 ml of freshly boiled water and add 4 ml of *dilute hydrochloric acid*. No gas evolves.

Teat solution: - Heat 1.5 g with 45 ml of *acetic acid* 12 per cent to boiling filter when cold.

Sulphates : 15 ml of the test solution complies with the *limit test for sulphates*. Not more than 300 ppm.

Water-insoluble material : Heat 2.0 g of the substance with 100 ml of *water* for 5 minutes to boiling. Centrifuge the hot solution. When cold dilute the supernatant liquid with sufficient *water* to produce 100 ml. Evaporate 50 ml of the resulting solution to dryness in an evaporating pan. Dry the residue at 100°-150°. Not more than 0.6 per cent.

Heavy metals : Dilute 12 ml of the test solution to 20 ml with *water*. 12 ml of the resulting solution complies with *limit test for heavy metals*. Note more than 100 ppm.

Phosphates : Not more than 5 ppm.

Assay : Weigh accurately about 0.15 g of the substance, accurately weighed, in a 500 ml conical flask in 8 ml of *hydrochloric acid* heating and rotating the flask. When cold add 300 ml of *water*. Adjust the pH of the solution to 12-13 with concentrated *sodium hydroxide solution* add 100 mg of calcon indicator and titrate with 0.1 M *sodium EDTA solution* until the colour changes to blue. Each ml of 0.1 M *sodium EDTA solution* is equivalent to 0.0781g of CaF_2

Preparation : **Trituration 1x**, Drug Strength 1/10

Calcarea Fluorica in coarse powder	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

Potencies: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x.9x and higher with *Dispensing Alcohol*.

Storage :

Caution : Should not be repeated too frequently**.**

Historyandauthority : Dr. Schussler made use of this salt of calcium first. Allen's Encyclop.of pure

CALCAREA HYPOPHOSPHOROSA

(Calc. hyp.)

Chemical Formula : **$Ca(H_2PO_2)_2$** **Molecular Weight.:** 170.20

Chemical name : Calcium hypophosphite

Other Language name : ***English*:** Calcium hypophosphite; ***French***; Hypophosphite de chaux; ***German***; Calcium hypophosphite.

Description : White powder or lustrous crystals, odourless; taste bitter and nauseous. Freely soluble in *water*; insoluble in *alcohol*. Contains not less than 98.0 percent and not more than 101.0 percent equivalent to$CaH_4O_4P_2$ with reference to substance dried at 105° to constant weight.

Identification : (i) Dissolve 0.25 g in 5 ml of water, add 2 ml of *dilute sulphuric acid* and 5 ml of *copper sulphate solution* and boil; a red precipitate is formed.

: (ii) Dissolve 0.5 g in 10 ml of *dilute hydrochloric* acid and add 2 ml of *mercuric chloride* test solution; a white precipitate is formed which becomes grey on standing and on heating deposits a globule of mercury.

: (iii) Gives reactions characteristic of *calcium*.

Reaction : 1.0 g dissolve in 20ml of water – *carbondioxide free*, required for neutralization not more than 0.5 ml of 0.1N *sodium hydroxide*, using *phenolphthalein* as indicator.

Arsenic : Not more than 10 ppm.

Barium : Dissolve 1.0 g in 20 ml of water, filter and add an equal volume of calcium *sulphatesolution*; no turbidity or precipitate is obtained.

Lead : Not more than 10 ppm

Phosphate and other insoluble : Dissolve 0.5 g accurately weighed, in 50 ml of *water*, filter wash the residue with *water*, and dry to constant weight at 105°. Not more than 0.5 per cent.

Assay : Dissolve about 0.5 g accurately weigh in 50 ml of *water* and make up the volume to 100 ml with *water*. Pipette 10 ml of this solution in a glass- stoppered flask, immediately add 50ml of 0.1 N *bromine* and 20 ml of *dilute sulphuricacid*, shake thoroughly at the interval of 15 minutes. Allow to stand for 2 hours at 20° to 25°. Cool in ice for 5 minutes; add 30 ml of *potassium iodide solution*. Titrate with 0.1N *sodium thiosulphate*. Carry out same process omitting the sample. The difference between the two titrations represents the amount of *bromine* required by the sample. Each ml of 0.1N *bromine* is equivalent to 0.002126 g of $CaH_4O_4P_2$.

Preparation :

Trituration 1x	Drug Strength 1/10
Calcarea Hypophosphorosa	100g
Saccharum Lactis	900g

to make one thousand grammes of the *Trituration*.

Potencies: 2x and higher to be Trituration in accordance with the method HPI, 6x may be converted to liquid 8x, 9x higher with *Dispensing Alcohol*.

Storage :

Caution :

History and authority : Proved and introduced by Barrett; Clarke: *A Dictionary of Practical Mat. Med.*, VoI I, 355.

CALCAREA IODATA

(Cal. iod.)

Chemical Formula : **$CaI_2.4H_2O$** **Molecular Weight.**: 366.0

Chemical name : Calcium iodide

Other Language name : ***English****:* Calcium iodide; ***French****:* Iodate de calcium; ***German****:* Calcium iodid.

Description : A white, very deliquescent, lumps of powder. Freely soluble in *water* and *alcohol*. On exposure to air becomes yellow and incompletely soluble due to absorption of carbon dioxide and liberation of iodine. Contains not less than 97.0 per centw/w of $CaI_2.4H_2O$ with reference to the substance dried on *anhydrous calcium chloride* in vacuum to constant weight.

Identification Yields reaction characteristic of *calcium* and of *iodides.*

Heavy metals : Not more than 10 ppm.

Iron : Not more than 10 ppm.

Test solution: - Dissolve 10 g in *purified water* and dilute to 100 ml with the same solvent.

Free iodine, iodates : To 5 ml of test solution add 2 ml of *methylene chloride.* Shake and allow to stand. The organic layer is colourless (free iodine). Add 0.2 ml of *dilute sulphuric acid.* Shake and allow to stand. The organic layer remains colourless (iodates).

Sulphates : Dilute 10 ml of test solution to 15 ml with *purified water.*Not more than 150 ppm.

Water : 18.0 per cent to 22.0 percent, determined on 0.10 g.

Assay : Dissolve about 0.30 g accurately weighed in 50 ml of *water*. Add 5 ml of *dilute nitric acid* and 25 ml of *0.1 Nsilver nitrate solution*. Shake and add 2 ml of *ferric ammonium sulphate solution* (a 100 g/l solution) and titrate with *0.1 Mammonium thiocyanate* until the colour changes to reddish yellow. Each ml of *0.1 Nsilver nitrate solution*is equivalent to 0.0147 g of $CaI_2.4H_2O$

Preparation : (a) **Trituration 1x** Drug Strength 1/10

Calcarea Iodatum	100 g.
Saccharum Lactis	900 g.

to make one thousand grammes of *Trituration.*

(b) **Potencies:** 2x and higher to be Triturated in accordance with the method Vol. I., HPI, 6x may be converted to liquid 8x,, Vol. I., HPI., 9x and higher with *Dispensing Alcohol*.

(c) **Mother Tincture** Drug Strength 1/10

Calcarea Iodatum	100 g.

Strong Alcohol in sufficient quantity

to make one thousand milliliters of the *Mother Tincture*.

(d) **Potencies:** 2x and higher with *Dispensing Alcohol*.

Storage : Keep in a well closed amber colour container, protected from light.

Caution :

History and : Proved by W. Jas Blakely; A Manual of Homoeopathic Pharmacodynamics,

CALCAREA PHOSPHORICA

(Cal.phos.)

Chemical Formula : Ca_3 (PO_4)$_2$ **Molecular Weight**.: 310.20

Chemical name : Calcium Phosphate

Other Language name : ***English***: Phosphate of calcium; ***French***: Phosphate de chaux Hydrate;***German***: Calcium phosphate.

Description : A white amorphous or micro-crystalline powder, odourless and tasteless, stable in air. Practically insoluble in *water* and in*ethanol*. Soluble in *dilute hydrochloric acid* and in *dilutenitric acid*. Contains not less than 85.0 per cent of calcium phosphate calculated as Ca_3 (PO_4)$_2$.

Specific gravity : 3.14.

Identification :

(i) Dissolve 0.1 g in 5 ml of 25 per cent v/v solution of *nitric acid*. The solution gives reaction of *phosphate*.

(ii) Solution in *dilute hydrochloric acid* responds to the test for *calcium*.

(iii) Gives a characteristic flame test for *calcium*.

Acid- insoluble substances : Heat 5 g with a mixture of 40 ml of *water* and 10 ml of *hydrochloricacid* and dilute to 100 ml with *water*. Filter, wash with hot *water* until the last washing is free from chloride and dry the residue at $105^{o}$for 1 hour. Not more than 0.3 per cent.

Water -soluble substances : Digest 2.0 g with 100 ml of *water* for 30 minutes on a water-bath, cool add sufficient water to restore the original volume, stir well and filter. Evaporate 50 ml of the filtrate to dryness and dry the residue at 105^{o} to constant weight. Note more than 0.5 per cent.

Chloride : Dissolve 0.1 g in water by addition of 1ml of *nitric acid*, the solution complies with the limit test for *chloride*.

Lead : Not more than 20 ppm.

Iron : Not more than 200 ppm.

Arsenic : Not more than 5 ppm.

Heavy metals : Not more than 40 ppm.

Sulphate : Dissolve 100 mg in *water* with the aid of 3ml of 1M *hydrochloric acid* and dilute to 60 ml with *water*. 15 ml of the resulting solution complies with the limit test for *sulphates*

Loss on ignition : Not more than 8.0 percent , determined on 1g , by ignition at 800^0 for 30 minutes.

Assay : Weigh accurately about 0.2 g and dissolve in a mixture of 50 ml of water and 2 ml of *hydrochloric acid*. Add 25 ml of *dilute ammonium acetate* solution and a slight excess of solution of *ammonium oxalate*. Heat for one hour on a water-bath and filter, wash the residue with warm water, suspend in 50 ml of *water*, acidify to litmus paper with *dilute sulphuric* acid. Heat to 70^0 and titrate with 0.1 N *potassium permanganate*, keeping the solution at 70^0 during the entire titration. Each ml of 0.1 N *potassium permanganate* is equivalent to 0.00517 g of $Ca_3 (PO_4)_2$.

Preparation :

Trituration 1x	Drug Strength 1/10
Calcarea Phosphorica in coarse power	100 g
Saccharum Lactis	900g

to make one thousand grammes of the *Trituration*.

Potencies: 2x and higher to be Trituration in accordance with the method HPI, 6x may be converted to liquid 8x.

Storage **:** Preserve in a well closed container.

Caution **:**

History and authority : Introduced by Hering, proved by Humphrey, 1834; Allen's *Encyclop*. of *pure Mat. Med*., Vol. II, Clarke, I, 358.

CALCAREA PICRATA

(Cal. pic.)

Chemical Formula : **$[C_6H_2N_3O_7]_2Ca$** **Molecular Weight** .: 496.0

Chemical name : Calcium trinitrophenolate

Other Language name : ***English**:* Calcium trinitrophenolate, picrate of calcium.

Description : Yellow rhombic odourless crystals. Soluble in *alcohol*; slightly soluble in *water*. Contains not less than 90.0 per cent w/w of $C_{12}H_4N_6O_{14}Ca$ with reference to the substance dried to constant weight on *silicagel*.

Identification : Yields the reactions characteristic of *calcium* and *picrates*.

Sulphate : Dissolve 2.5 g in 50 ml of *boilingwater* containing 5 ml *dilute hydrochloric acid*, cool and filter; 20 ml of the filtrate complies with the *limittestforsulphates*.

Assay : Dissolve 2 g in hot*water* and titrate with *0.5N sodium hydroxide*, using *phenolphthalein solution* as indicator. Each ml of *0.5N sodium hydroxide* is equivalent to 0.1146 g of *picric acid*.

Preparation : (a)**Trituration 1x,** Drug Strength 1/10

Calcarea Picrata	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration.*

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, Vol. I ; 6x may be converted to liquid 8x, HPI, Vol. I.

Storage :

Caution :

History and Authority : Clarke: *A Dictionary of Practical Mat. Med.,* Vol I, 363.

CALCAREA SILICATA
(Calc. sil)

Chemical Formula : Ca_2O_4Si **Molecular mass** 172.24 g/mol

Chemical name : Calcium silicate

Other Language name : ***English***: Calcium silicate;***French***: silicate of chaun.

Description : White or slightly cream coloured, free flowing powder. Practically in soluble in *water*. Forms monocalcium, dicalcium and tricalcium silicates in varying proportions. Contains not less than 31 per cent w/w of *calcium*.

Reaction : Aqueous slurry is alkaline to litmus.

Identification : Yields the reaction characteristic of *calcium* and *silica*.

Assay : Take about 0.5 g accurately weighed in a platinum crucible and fuse with 2g fusion mixture. Dissolve the residue in 25 ml *dilute hydrochloric acid*; filter and wash the residue with *purified water* and make up the volume to 100 ml. Pipette out 50ml of the solution to a suitable container, and 100 ml of water and neutralize with *sodium hydroxide solution*, add 2ml of buffer solution of pH 10 (*ammonia- ammoniumchloride* buffer), 1 ml of 0.1 M *magnesium sulphate* and 3to4 drop *Eriochrome- T* as indicator. Titrate with *0.1M EDTA* solution until the colour change from wine red to clear blue. From the volume of *0.01M EDTA* substract the volume of 0.01M *magnesium sulphate*. Each ml of *0.01 M EDTA* is equivalent to 0.00040g of *calcium*.

Preparation :

(a) **Trituration 1x** Drug Strength 1/10

Calcarea Silicata	100g
SaccharumLactis	900g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 2x and higher to be Triturated in accordance with the method HPI, 6x may be converted to liquid 8x, HPI.

Storage :

Caution :

History and authority : Introduced by Usher, H.W.,XXXIV,491; Clerke: A *Dictionary of Practical Materia Medica*, Vol. l, 364.

CALCAREA SULPHURICA

(Cal. sul.)

Chemical Formula : **$CaSO_4.2H_2O$** **Molecular Weight .:** 172.17

Chemical name : Calcium sulphate

Other Language name : ***English***: Calcium sulphate, Gypsum; ***French****:* Sulfate de chaux; ***German****:* Calciumsulfat.

Description : A fine, white to yellowish-white; odourless; tasteless powder. Slightly soluble in *water*, insoluble in *alcohol*, *ether* and *chloroform*. When exposed to air, becomes granular and loses the property of solidifying when mixed with *water*. Solubility in *water* is increased by acids, ammonium chloride and rising temperature. Occurs naturally as gypsum. Contains not less than 99.0 per cent w/w of $CaSO_4.2H_2O$.

Identification : (i) With a solution of *ammoniumoxalate*, a white precipitate is formed which is insoluble in *aceticacid* and is soluble in *dilute hydrochloric acid*.

(ii) With a solution of *bariumchloride*, it gives a white precipitate, insoluble in acids.

Test solution: Dissolve 1 g in 50 ml of a 10 per cent v/v solution of *hydrochloric acid* by heating at 50^0 for a minute. Allow the solution to cool.

Arsenic : 5 ml of test solution complies with the *limit test for arsenic*. Not more than10 ppm.

Acidity or alkalinity : Shake 1.5 g with 15 ml of *carbon dioxide-free water* for 5 minutes. Allow to stand for 5 minute and filter. To 10 ml of the filtrate, add 0.1 ml of *phenolphthalein solution* and 0.25 of *0.01N sodium hydroxide*. The solution is red. Add 0.3 ml of *0.01N of hydrochloric acid.* The solution is colourless. Add 0.2 ml of *methyl red solution*. The solution is reddish orange.

Chloride : Shake 0.5 g with 15 ml of *water* for 5 minutes. Allow to stand for 15 minute and filter. Dilute 5 ml of the filtrate to 15 ml with *water.* The solution complies with *the limit test for chloride.* Not more than 300 ppm.

Heavy metals : Not more than 20 ppm.

Iron : To 0.25 g add a mixture of 5 ml of *hydrochloric acid* and 20 ml of *water*. Heat to boiling, cool and filter. 10 ml of the filtrate complies with the *limittest for iron.* Not more than 100 ppm.

Residue on ignition : When ignited leaves not less than 78.5 per cent and not more than 80 per cent of residue.

Assay : Weigh accurately about 0.2 g and dissolve in a mixture of 50 ml of *water* and 2 ml of *hydrochloricacid*. Add 25 ml of *dilute ammonium acetate solution* and slight excess of solution of *ammonium oxalate*. Heat for one hour on a water bath, filter, wash the residue with warm *water* suspend in 50 ml of *water*, acidify to litmus paper with *dilutesulphuric acid.* Heat to 70^0 and titrate with *0.1N potassium permanganate* keeping the solution at 70^0 during the entire titration. Each ml of *potassium permanganate* is equivalent to 0.004305 g of $CaSO_{4}.2H_{2}O$.

Preparation : (a)**Trituration 1x,** Drug Strength 1/10

Calcarea sulphurica in fine powder	100 g
Saccharum Lactis	900 g

to make one thousand grammes of the *Trituration*.

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x HPI, 9x and higher with *Dispensing Alcohol*.

Storage :

Caution :

History and Authority : Proved by Dr. Clarence Conant, U.S. Allen’s Encylop. Mat. Med.Vol. 11, 410.

CAMPHORA

(Camph.)

Chemical Formula : $\mathbf{C_{10}H_{16}O}$ **Molecular Weight.:** 152.2

Chemical name : Camphor

Other Language name : ***English*****:** Camphor officinarum;***French***: Camphre;***German***: kampfar.

Description **:** A White, crystalline powder or friable crystalline masses, highly volatile even at room temperature; odour strong characteristic and pungent, taste bitter followed by a cooling sensation. Slightly soluble in *water*, very soluble in *alcohol*, and ether, freely soluble in fatty oils, slightly soluble in *glycerol*. Contains not less than 96 per cent of $C_{10}H_{16}O$.

Boiling point : 204^{0}.

Melting point : 174^{0} to 180^{0}.

Specific gravity : 0.99.

Optical rotation : 10 per cent solution in strong alcohol natural camphor $+42^{o}$ to $+ 43^{o}$.

Identification **:** (i) A solution of 1g in 4ml of *alcohol* is clear and colourless.

: (ii) Burns with a bright smoky flame.

Residue on evaporation **:** Not more than 0.05 per cent, when volatilized at 105^{0}.

Assay **:** Dissolve about 0.2 g accurately weighed, in 25ml of *aldehyde free alcohol* in a 250 ml flask. Slowly add with constant shaking, 75 ml of *dinitrophenylhydrazine solution*. Heat on a water bath under a reflux condenser for four hours. Remove the alcohol by distillation, allow to cool, dilute to 200 ml with a 2 per cent v/v solution of *sulphuric acid* in water and allow to stand for 24 hours. Filter in a tared Gooch crucible and wash precipitate with successive quantities of 10 ml of cold *water* until the washing are neutral to litmus. Dry to constant weight at 80^{o} and weigh. Each grammes of precipitate is equivalent to 0.458 g of $C_{10}H_{16}O$.

Preparation : (a) **MotherTincture** Drug Strength 1/10

Camphora	100g

Strong Alcohol in sufficient quantity

to make one thousand milliliters of the *Mother Tincture*.

(b) **Potencies**: 2x and higher with *Dispensing Alcohol*

(c) **Trituration**: 1x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x, 9x and higher with *Dispensing Alcohol*.

Storage : Mother Tincture and potencies should be kept in well closed containers in a cool place.

Caution :

History and authority : Allen's *Encyclop*.of pure *Mat*. *Med*.,Vol.II, 422.

CARBO VEGETABILIS

(Carbo. Veg.)

Chemical Formula : Carbon **Molecular Weight** 12.0

Chemical name : Vegetable charcoal

Other Language Name : ***English*****:** Vegetable charcoal, Wood charcoal; ***French*****:**Charbon vegetal; ***German*****:**Holzkohle.

Description : A bluish -black, porous substance, having a peculiar glistening aspect and retaining minutely both the form and texture of the wood from which it was made. Odourless and tasteless; insoluble and infusible. Commonly prepared from selected birch or beach wood by heating at high temperatures. The product is washed free from mineral matter and dried. Charcoal has the property of absorbing gases and of condensing them within its porous mass. Denser when obtained by pile-burning than when prepared in retorts. On continued exposure to gases it becomes saturated with them, but its absorbing powers are restored by heating until redness out of contact with air.

Specific gravity : 1.70

Identification :
1. When heated in air it is converted into *carbon dioxide*.(2)
2. When burnt, it should give no smoke or unpleasant odour.(2)
3. Absence of flame shows freedom from organic compounds.

Ash value : Not more than 7 per cent. (1)

Cyanides : To 5.0 g add 50 mL of *Purified water* and 2 g of *tartaric acid*. Transfer to a distillation apparatus fitted with a receiver flask containing a mixture of 10 mL of *Purified water* and 2 mL of 1 M *sodium hydroxide solution* and boil carefully until about 25 mL of distillate has collected. Dilute to 50 mL with *Purified water*. To 25 mL of the resulting solution add 50 mg of *ferrous sulphate* and heat until just boiling. Cool to 70 ° in a *purified water* bath and add 10 mL of *dilute hydrochloric acid*. The solution is not green or blue. (1)

Sulphides : To 1.0 g in a conical flask add 20 mL of *Purified water* and 5 mL of *hydrochloric acid* and heat to boiling. The vapour evolved does not turn a moistened *leadacetate* paper brown.(1)

Heavy metals : Not more than 10.0 ppm (1)

Loss on drying : Not more than 15 per cent, determined on 1.00 g by drying in a drying cabinet at 120 ° for 4 hours. (1)

Preparation : (a)Trituration 1x, Drug strength 1/10

Carbo vegetabilis in *fine powder*	100 g
Saccharum Lactis	900 g

To make one thousand grammes of the *Trituration*.

(b) Potencies: 2x and higher to be triturated in accordance the method, HPI; 6x may be converted to liquid 8x, H.P.I.; 9xand higher with *Dispensing Alcohol*.

Storage : Preserve in well-closed containers.

Caution :

History and authority : It was proved by Hahnemmann. Allen’s Encyclop. Mat. Med., Reprint edition 2005Vol II. 565.

CARBONIUM SULPHURATUM

(Carb. sul.)

Chemical Formula : **CS_2** **Molecular Weight.:** 76.14

Chemical name : Carbon disulphide

Other Language name : ***English***: Carbon disulphide; ***French***: Sulfure de carbon; ***German***: Schwefelkohlenstoff.

Description : Clear, colourlessor yellowish, mobile, highly refractive very flammable liquid. Immiscible with *water*, miscible with *alcohol* and*ether*; odour foul.

Identification : Burns with a blue flame, forming CO_2 and SO_2.

Specific gravity : 1.260 to 1.270.

Boiling range : Not less than 95 percent distills between 46^0 and 47^0.

Water : Take 10 ml ina test tube & cool to 0^0. No turbidity or drops of *water* appear.

Non- volatile matter : When evaporated on water bath and dried in oven at 105^0 leaves not more than 0.005 per cent w/v of residue.

Preparations : (a) **Mother Tincture ø** Drug Strength 1/10

Carbonium Sulphuratum	100 ml

Strong Alcohol in sufficient quantity
to make one thousand milliliters of *Mother Tincture*.

(b) **Potencies**: 2x and higher with *Dispensing Alcohol*.

Storage : Keep in well closed container, in a cool place away from flame.

Caution : Highly poisonous.

History and authority : Proved by permerl and Noch; and introduced by Buchner; Allen: *Encyclop*. of *Pure Met*. *Med*., Vol. ll, 617, X, 425, 653; Hering: *Guiding Symptoms*, Vol , lll, 397.

CAUSTICUM

(caust.)

Chemical Formula : KOH **Molecular Weight.:**56.10

Chemical name : potassium hydrate

Other Language name : Tinctura acris sine Kali, Causticum Hahnemanni.

Description : This preparation has been introduced into homoeopathic pharmacy by Hahnemann and is peculiar to homoeopathy. It is of indefinite composition and hence should be made in strict accordance with Hahnemann's instructions. Take a piece of freshly burnt lime of about 1 kg, dip this piece into a vessel of *Purified water* for about one minute; then lay it in a dry dish in which it will soon turn into powder with the development of much heat and its peculiar odour, called lime vapour. Of this fine powder take 60 g and mix with it in a (warmed) porcelain triturating bowl, a solution of 60 ml of *potassium bisulphate* which has been heated to red heat and melted, cooled again and then pulverised and dissolved in 60 ml of *boiling water*. This thickish mixture is put into a small glass retort, to which the helm is attached with a wet bladder; into the tube of the helm is, inserted the receiver, half submerged in *water*; the retort is warmed by the gradual approach of a charcoal fire below and all the fluid is then distilled over by applying suitable heat. The distilled fluid will be about 30 ml of watery clearness, containing Causticum in a concentrated form. It smells like the lye of caustic potash. Taste burning; it freezes only at a lower temperature than of *water*.

Tests : Does not respond to the test for *sulphates* and for *calcium*.

Appearance of solution : Clear and colourless.

Acidity or alkalinity : To 5 ml add 0.05 ml of *methyl red solution*. A red colour is not produced. To 5 ml add 0.05 ml of *bromothymol blue solution*. A blue colour is not produced.

Relative density : 0.930-0.932.

pH : 11.0

Residue on drying : Leave not more than 0.01 per cent.

Preparation : (a) **Mother Solution,** Drug Strength ½

Causticum 500 ml

Strong Alcohol in sufficient quantity
to make one thousand millilitres of *Mother Solution.*

(b) **Potencies**: 2x and higher with *DispensingAlcohol.*

Storage :

Caution :

History and : Allen's Encylop. Mat. Med.Vol. III, 35.

CHININUM ARSENICOSUM

(Chin. ars.)

Chemical Formula : **$(C_{20}H_{24}N_2O_2)_3H_3AsO_3.4H_2O$** **Molecular Weight: 1170.60.**

Chemical name : Quinine arsenite

Other Language name : ***English:*** Quinine arsenite; **French:** Arsenite dequinine;***German*:**Chininarsenit.

Description : White crystals; odourless; taste bitter; slightly soluble in *water*, soluble in *alcohol*.Prepared by the reaction of *silver arsenite* and *quinine hydrochloride*. Contains not less than 98.0 percent of *quinine arsenite* with reference to the substance dried to constant weight at 105 °.

Identification : 1. To 0.5 mL of a saturated solution add 1 drop dilute *sulphuric acid*; a vivid blue fluorescence is produced.

2. To 5 mL of a 0.1 per cent w/w solution add 2 or 3 drops of solution of *bromine* and then 1 mL of*dilute ammonia* solution an emerald green colour is produced.

3. Responds to the reaction characteristic of arsenates.

Specific optical rotation : +275° to 290°, determined in a 2.0 per cent w/v solution in 0.1 hydrochloric acid[(2)]

Other cinchona alkaloid : Determine by liquid chromatography

Test solution: Dissolve 20 mg of the substance under examination in 5 mL of the mobile phase. Heat gently, if necessary to dissolve the powder as completely as possible, cool, and dilute to 10mL with the mobile phase and mix.

Reference solution: (a). Dissolve 20 mg of quinine sulphate with gentle heating if necessary, in 5mL of the mobile phase and dilute to 10 mL with the mobile phase.

Reference solution: (b) Prepare in the same manner as reference solution (a) but using quinidine sulphate in place of quinine sulphate.

Reference solution: (c). Mix equal volumes of reference solution (a) and (b)

Reference solution: (d). Dilute 1 volume of reference solution (a) to 10 volumes with the mobile phase and dilute 1 volume of the resulting solution to 50 volumes with the mobile phase.

Reference solution: (e)A solution containing 0.1 percent w/v of thiourea in the mobile phase.

Chromatographic system : A stainless steel column 25 cmx 4.6 mm packed with octadecylsilane bonded to porous silica (5 µm) (such as Hypersil ODS 5 µm),

- mobile phase: a solution prepared by dissolving 6.8 g of *potassium dihydrogen orthophosphate* and 3.0 g of *hexylamine* in 700 mL of water, adjusting the pH to 2.8 with 1 M *orthophosphoric acid* adding 60 mL of *acetonitrile* and diluting to 1000 mL with water,
- flow rate: 1.5 mL per minute,
- spectrophotometer set at 250 nm for reference solution (e) and 316 nm for the other solutions,
- injection volume : 10µl.

Inject reference solutions (b) and (e). If necessary, adjust the concentration of *acetonitrile* in the mobile phase so that in the chromatogram obtained with reference solution (b) the capacity factor of the peak due to quinidine is 3.5 to 4.5 Vo (the distance along the baseline between the point of injection and the perpendicular dropped from the maximum of the peak of and unrestrained component) being calculated from the peak due to thiourea in the chromatogram obtained with reference solution (e).

Inject reference solutions (a), (b), (c) and (d). The chromatogram obtained with reference solution (a) show principal peak due to quinine and a peak due to dihydroquinine with a retention time relative to quinine of about 1.4. The chromatogram obtain with reference solution (b) shows a principal peak due to quinidine and a peak due to dihydroquinidine, with a retention time relative to quinidine of about 1.2. The chromatogram obtained with reference solution (c) shows four peaks due to quinine, dihydroquinine, quinidine and dihydroquindine which are identified by comparison of their retention ties with those of the corresponding peaks in the chromatograms obtains with solutions (a) and (b) The test is not valid unless (a) in the chromatogram obtained with reference solution (c) the resolution between the peaks due to quinine and quinidine is at least 1.5 and the resolution between the peaks due to dihydroquinidine and quinine is at least 1.0 and (b) the signal – to noise ratio of the principal peak in the chromatogram obtain with reference solution (d) is at least 5.

Inject the test solution and allow the chromatography to proceed for 2.5 times the retention time of the principal peak. Calculate the percentage content of related substances by normalization, ignoring any peaks the areas of which are less than that of the peak in the chromatogram obtained with reference solution (d) (0.2 per cent) .The content of dihydroquinine is not greater than 10 percent, the content of any related substance eluting before quinine is not greater than 5 percent and the content of any other related substance is not greater than 2.5 per cent.(2)

Sulphated ash : Not more than 0.1 percent(2)

Loss on drying : 3. 0 per cent to 5.0 per cent, determined on 1.0 g by drying an oven at 105°.

Assay : Weigh accurately about 0.5 g and dissolve in 20 mL of *Purified water and* 5 mL of *dilute sulphuric* acid in a separator, add 5 mL of *sodium hydroxide solution* extract by shaking with successive quantities of 20 mL of *chloroform* until complete extraction of the alkaloid is effected, wash each quantity of *chloroform* in succession twice with 5 mL of *purified water*. Transfer *the chloroform solution* to taredvessel, remove the solvent by evaporation , add 2 mL of *alcohol*, evaporate and dry to constant weight at 105 ° and weigh. Each g of the residue is equivalent to 1.200 g of $(C_{20}H_{24}N_2O_2)_3H_3AsO_3.4H_2O$.

Preparation :

(a)Trituration 1x,	Drug strength1/10
Chininumarsenicosum in *crystals*	100 g
SaccharumLactis	900 g

To make one thousands grammes of the *Trituration*.

(b)Potencies: 2x and higher to be triturated according with the method, H.P.I.; 6x may be converted to liquid 8x, H.P.I.;9x and higher with *Dispensing Alcohol.*

Storage :

Caution : Not to be prescribed below 2x.

History and authority Clarke; Dist. Of Pract. Mat. Med. Reprint edition 2009 Vol.I,487.Allen'sEncyclop. Mat. Med. Vol.III 214.

Finished product studies of Chininum arsenicosum

Potency : 1x

White amorphous powder. Contains not less than 9.30 per cent w/w to not more than 10.30 per cent w/w of $(C_{20}H_{24}N_{2}O_{2})_{3}.3H_{3}AsO_{3}4H_{2}O$.

Assay : Complies with the assay method given under Chininum arsenicosum

Potency : 2x

: White amorphous powder. Contains not less than 0.93 per cent w/w to not more than 10.3 per cent w/w of $(C_{20}H_{24}N_{2}O_{2})_{3}.3H_{3}AsO_{3}4H_{2}O$

Assay : Weigh accurately 20 g, dissolve in 100ml water and 5 ml and proceed as given under Chininum arsenicosum.

CHRYSAROBINUM

(Chrys.)

Chemical Formula : **$C_{15}H_{12}O_3$** **Molecular Weight:240.25**

Chemical name : Chrysarobin

Other Language Name : ***English***: Chrysarobin; ***French***: Chrysarobine; ***German***: chrysarobin.

Description A neutral principal in its impure commercial form extracted from Goa powder, a substance found deposited in cavity of the trunk of *Andiraararoba Aquiar* of family *Leguminosae*. Brownish to orange - yellow, microcrystalline powder; odourless; tasteless. Very slightly soluble in *water*; slightly soluble in *alcohol*. Soluble in *chloroform* and in *toluene*. Contain 72-85 per cent mixture of anthraquinone derivatives.

Melting point : 203-204°.

Identification :

(i) Dissolve 0.1 g in 5 ml of *potassium-sodium hydroxide solution,* a dark brownish – red solution is produced; 5 drops of this solution when diluted with 10 ml of *water*; a green fluorescence is produced.

(ii) Mix about 1 mg on a white tile a drops of fuming *nitric acid*; a brownish –red liquid is produced; add a drop of *diluteammonia solution*, an evanescent violet colour is produced at the surface of contact.

Reaction : Alcoholic solution is neutral to litmus.

Ash : Note more than 0.8 per cent.

Preparation :

(I) **Trituration 1x** Drug Strength 1/10

Chrysarobinum in fine powder	100 g
SaccharumLactis	900 g

to make thousand grammes of the *Trituration*.

(iii) **Potencies:** 2x and higher to be Triturated in accordance with the method HPI, 6x may be converted to liquid potency 8x.

Storage :

Caution : If used externally should be used with caution on account of its ability to produce inflammation.

History and : Boericke: *HomoeopathicMateria Medica with Repertory*, 9th edn.

authority

COLCHICINUM

(Colchic.)

Chemical Formula : **$C_{22}H_{25}NO_6$ Molecular Weight: 399.40.**

Chemical name : Colchicine

Other Language name **:** ***English*****:** Colchicine; ***French*****:** Colchicine; ***German*****:**Colchicinum.

Description **:** It is major alkaloid obtain from corm, flower and seed of Colchicum autumnale Linn.(family: Liliaceae). Isolated compound occurs in a yellowish-white, amorphous or crystalline powder.(1)Odour hay-like, taste bitter; darkens on exposure to light. Highly soluble in *water,* freely soluble in *alcohol*, practically insoluble in *cyclohexane*.(1) .

Identification **:** 1. Darkens on exposure to light owing to formation of oxydicolchicine.

2. Aqueous solution is neutral to *litmus*.

3. Dissolved 1 mg inn 0.2 mL in *sulphuric acid* a yellow colour is produced which on addition of 0.05 mL of *nitric acid* produces a greenish blue to red and yellow.

4. Add *nitric acid* to colchicine powder, a dull violet colour produced which changes in to greenish and eventually to yellow.

5. Dissolve about 30 mg in 1 mL of *alcohol* and add 0.15 mL of *ferric chloride solution*. A brownish- red colour is develops.(1)

Melting point **:** 142 .5 °.

λmax. **:** 0.001% in *ethanol*,max 243nm and 350 nm.

Specific optical rotation **:** Between -230° and -250° determined at 20° in 0.5 percent w/v aqueous solution.

Sulphated ash : Not more than 0.1 Percent. (1)

Assay : Test solution: Dilute 1.00 g of the solution to 100.0 mL with methanol. Dilute 5.0 ml of the resulting solution to 50.0 mL with methanol Successively add three 20 mL portions of methanol to 1.00 g of the 2nd decimal trituration, each time stirring for 10.min and then centrifuging. Dilute the combined organic phases to 100 mL with methanol. Dilute 5.0 mL of the resulting solution to 50.0 mL methanol.

Reference solution: Dissolve 10.0 mg of colchicine in methanol to 100 mL dilute 5.0, 10.0 and 15.0 mL volumes of the resulting solution to 100 mL with methanol(5 µg colchicine/ mL, 10 µg colchicine/ mL ,15 µg colchicine/ mL)(2)

Preparation : (a) Trituration 2x, Drug strength 1/10

Colchicinum	10 g
Saccharum Lactis	990 g

to make one thousand grammes of the *Trituration.*

(b) Potencies: 3x and higher to be triturated in accordance with the method, H.P.I.; 6x may be converted to liquid 8x, H.P.I.; 9x and higher with *Dispensing Alcohol*.

(c) Mother solution 2x, Drug strength 1/100

Colchicinum	10 g

Strong Alcohol in sufficient quantity.

to make one thousand milliliters of the *Mother Solution*.

(d) Potencies: 3x and higher with *Dispensing Alcohol.*

Storage :

Caution : Highly poisonous, not to be dispensed below 6x and should be kept in dark place.

History and authority	**:**	Proved by Schroff; Allen, T.F., Encyclop. Of Pure Mat. Med., 1876, 3,448. Clarke, J.H., A Dict. Of Pract. Mat. Med., 1900, 1,562.

CUPRUMARSENICOSUM

(Cup.ars)

Chemical Formula : **$CuHAsO_3$** **Molecular Weight:187.47.**

Chemical name : Cupric arsenite

Other Language name : ***English*:**Copper arsenite; ***French:***Arsenitedecuivre;***German*:** Kupferarse-nit; *Latin*:Cupriiarsenis.

Description : Yellowish green to green power, Insoluble in *water* and in *alcohol*, dissolves readily in *mineral acids* and *ammonia solution*.(1)Prepared by adding *potassium arsenite* or solution of *copper sulphate*. Precipitated *copper sub arsenite*,containing not less than 36.0 and not more than 41.0 per cent of Cu andnot less than 27.0 and not more than 33.0 per cent of As .(1)

Identification :

1. Respondstothe reactions characteristics of *copper* and of *arsenites.*
2. A solution produces with a solution of *potassium ferricyanide*, areddish brown precipitate or in very dilute solution, a reddish browncolour.
3. A Solution *in potassium hydroxide* is blue in colour and when boiled,*cupric oxide*is deposited.
4. Dissolve about 20 mg in 2 mL of *dilute acetic acid* and add 10 mL of *water*. Add an excess of *ammonia solution* of the light blue solution. An intense deep blue colour is produced. (1)
5. Dissolve about 20 mg in 0.4 mLof *hydrochloric acid* and dilute to 5mLwith *purified water*.The solution gives the identification reaction for *arsenic*. (1)

Assay : 1.Weigh accurately about 0.5g,add 25mLof *dilute hydrochloric acid*, 2g of *potassium iodate*, and titrate the liberated *iodine* with 0.1 N *sodium thiosulphate solution*,using solution of starch as indictor.

Continue titration till a faint blue colour remains add 1.5 gof *potassium thiocyanate*, stir well, and continue the titration until the blue colour disappears. Each mL of 0.1 N *sodium thiosulphate*, is equivalent to 0.01875 gof CuHAsO3.

Preparation : (a) Trituration 1x,Drug Strength 1/10

Cuprum arsenicosum in *coarse powder*	100g
Saccharum Lactis	900 g

To make one thousand grammes of the*Trituration*.

(b) Potencies:2x and higher to be triturated accordance with method,H.P.I.6xmay beconverted to liquid,H.P.I.8x,9xand higher with *Dispensing Alcohol*.

Storage :

Caution : Not to be prescribed below3x

History and authority Allen‘sEncycop.Mat.Med.Reprint edition 2005 Vol.IV,28.

FERRUM METALLICUM

Chemical Formula **(Fer.Met.)Fe** **Atomic weight.:55.85**

Chemical name **:** Iron

Other Language Name ***English*****:** Iron reduced by hydrogen; ***French*****:** Ferreduitpar L‘hydrogen;***German*****:** ReducirtesEisen;*Latin*:Ferrumreductum.

Description **:** An odourless, grayish- black powder. Almost lusterless. It is stable in dry air,butin moistair.Slow lyoxidizedtoa *hydrated ferric oxide*.Insoluble in *purified water* and in alcohol; soluble in dilute mineral acids with the evolution of *hydrogen*.. Contains not less than 90 per cent of *Fe* with there reference to the sub stance dried to constant weight at 105˚.

Identification **:**

1. Make a solution of 0.2 g in 5 mL of *dilute hydrochloric acid* and dilute the solution with an equal amount of *purified water*.On adding a solution of *potassium ferro cyanide*,a dark-blue precipitateis formed.
2. A solution in minerals acids yields a black precipitate with a*mmonium sulphide*.

Sulphides **:** 1 g of the solution obtained in 25 mL of dilute *hydrochloric acid,* the evolving gas should not immediately turn back the filter paper moistered with asolution of lead acetate.

Coal,SilicicAcid **:** The solution obtained in the ‗ Sulphides‘ is filtered through,a tared filter, wash the flask and filter until a negative test for chloride, then dry the filter at 105° to constant weight. The residue should not exceed 0.01g.

Testsolution : Mix10.0g with 40 mL of purified water and boil for 1min. Filter,washing the filter with purified water and dilute the filtrate to 50.0 mL.

Alkalinity : To10 mL of solution add 0.1mL of bromo thymol blue solution.A blue colour is not observed.

Acid insoluble impurities : Not more than 1.0 percent.(1).

Water-soluble impurities : Not more than 0.1 percent.(1)

Chlorides : Not more than 50 ppm.

Arsenic : Not more than10 ppm.

Ironoxide : Rub a sample against a piece of white paper.The substance does not leave behind any reddish brown spots or streaks.

Otherheavy metals : Not more than 120 ppm

Assay : 1. Shake in a stoppered flaskfor ten minutes about 0.25 g.accurately weighed with a hot solution of 1.25 g of copper sulphate in 20 mLof water,filter rapidly, and wash thefiltrate with water; acidify the mixed filtrate and washing with sulphuric acid and titrate with 0.1 potassium permanganate until a pink colour is obtain.Each mL of 0.1N potassium permanganate is equivalent to 0.005585g of Fe.

Preparation : (a)Trituration1x, Drug strength1/10

Ferrum metallicum in *fine powder*	100 g
Sacchar Lactis	900 g

To make one thousand grammes of the *Trituration.*

(b) Potencies: 2x and higher to be triturated in accordance with the method, H.P.I., 6x may be converted to liquid 8x,H.P.I.,9xand higher with *Dispensing Alcohol.*

Storage : Preserve in well tightly closed containers.

Caution :

History and authority : Allen‘s Encyclop. Mat. Med. Reprint edition:2005,Vol.IV,303.

FERRUM PHOSPHORICUM

Chemical Formula : **$Fe_3(PO_4)_2.8H_2O$**

Chemical name : Ferrous phosphate

Other Language Name : ***English*:** Ferroso-fericphosphate; ***Germen*:** Ferrum Phosphoricum;.

Description : Consists of a mixture of *hydrated ferrous phosphate*, ferric phosphate and some hydrated oxides of iron. A greyish-blue amorphous powder; odourless and tasteless. Insoluble in *water a*nd *alcohol*; soluble in *hydrochloric acid*.(1) Its colour darkens on exposure to air. Commonly prepared by the interact ion of *ferrous sulphate*, *sodium phosphate* and *sodium bicarbonate* in aqueous solution. Contains not less than 47 percent of ferrous salts, calculated as $Fe_3(PO_4).8H_2O$.

Identification : The substance yields the identity reaction as for *iron (II) salts* and *phosphates.*

Test for Phosphate : A. To 5 mL of the prescribed solution, neutralized if necessary, add 5 mL of *silver nitrate solution*. A yellow precipitate is formed whose colour is not changed by boiling and which dissolves on the addition of *ammonia*. (2)

B. Mix 1 mL of the prescribed solution with 2 mL of *molybdovanadic reagent*. A yellow colour develops. (2)

Test for Iron : A. Dissolve a quantity of the substance to be examined equivalent to about 10 mg of *iron* (Fe^{2+}) in 1 mL of *water* or use 1mL of the prescribed solution. Add 1 mL of *potassium ferric-cyanide solution*. A blue precipitate is formed that does not dissolve on addition of 5 mL of *dilute hydrochloric acid*. (2)

Arsenic : Not more than 5 ppm

Sulphate : 0.25 g of substance dissolved in *water* with the addition of 3mL of *dilute hydrochloric acid* complies with the limit test for *sulphates.* (1)

Lead : Not more than 50 ppm(3)

Cadmium : Not more than 10 ppm(3)

Ferrous : Not more than 50 ppm(3)

Assay : 1. Dissolve about 1 g. accurately weighed, in 20 mL of a 25 percent w/v solution of *sulphuric acid* in water in a stoppered flask. Add 6 mL of strong solution of *iodine mono chloride* and 60 mL of *hydrochloric acid*; titrate with 0.05 M *potassium iodate* until solution becomes light brown in colour; add 5 mL of *chloroform* and continue the titration until it becomes colourless. Each mL. of 0.05 M *Potassium iodate* is equivalent to 0.0334 g of $Fe_3(PO_4)_2 8H_2O$.

2.Dissolve about 1 g accurately weighed in a cooled mixture of 3 mL of *phosphuric acid* and 10 mL of a 14 percent solution (v/v) of *sulphuric acid* in *water* and add 100 mL of *water* and titrate with 0.1N *potassium permanganate* each 1 mL of 0.1N *potassium permanganate* is equivalent to 0.005585 g of Fe.(1)

Preparation : **(a) Trituration 1x,** : Drug strength1/10

Ferrum phosphoricum in *fine powder* : 100 g

Saccharum Lactis : 900 g

To make one thousand grammes of the Trituration.

(b) Potencies: 2x and higher to be triturated in the accordance with the method, HPI; 6x may be converted to liquid 8x, HPI; 9x and higher with *Dispensing Alcohol.*

Storage Protected from light.

Store in air tight containers, because it is liable to darken on exposure to air due to oxidation.

Caution

History and Authority : Dr. Schussler introduced it and Dr. John Moffat proved this drug. Allen's Encyclop. Mat. Med. Reprint edition: 2005, Vol. X,525.

Finished product studies of Ferrum phosphoricum:

Potency : 1x

: Greenish-blue, amorphous powder. Contains not less than 4.60 percent w/w to not more than 5.04 percent w/w of $Fe_3(PO_4)_2.8H_2O$.

Assay : Complies with the assay method given under ferrum phosphoricum.

Potency : 2x

Light greenish- blue amorphous powder. Contains not less than 0.46 percent w/w to not more than 0.50 percent w/w of $Fe_3(PO_4)_2.8H_2O$.

Assay : Weigh accurately about 5 g, char in silica crucible to make ash. Dissolve the ash in 20mL of a 25 per cent w/v solution of sulphuric acid and follow the method given under Ferrum phosphoricum. For titration use 0.01 M potassium iodate. Each mL of 0.01 M potassium iodate is equivalent to 0.0067 g of $Fe3\ (PO_4)_2.8H_2O$.

Potency : 3x

Light greenish- blue amorphous powder. Contains not less than 0.046 percent w/w to not more than 0.050 percent w/w of $Fe_3(PO_4)_2.8H_2O$.

Assay Weigh accurately 20 g, char in silica crucible to ash. Dissolve the ash in 20mL of a 25 per cent w/v solution of sulphuric acid and follow the method given under Ferrum phosphoricum. For titration use 0.01 M potassium iodate. Each mL of 0.01 M potassium iodate is equivalent to

GRAPHITES

(Graph.)

Chemical Formula : **C**

Chemical name : Graphite

Other Language name : ***English*:**Blacklead; ***French*:**Graphite; ***German*:**Reisblei.

Description : Graphite is mineral carbon. Blackish-grey in colour, soft and lustrous; odourless, tasteless. Insoluble in water, acids and organic solvents. Good conductor of electricity. Next to diamond it is the purest nature form of carbon and occurs in nature.

Identification : Mix 50 mg with 250 mg of *potassium dichromate*, transfer the mixture to a test tube and cover with 100 mg of *potassium dichromate*. Close the tube with a stopper fitted with a U- shaped tube dipping at the other end in about 5 mL of barium *hydroxide solution*. Heat the test tube over an open flame. A white precipitate is produced in the *barium hydroxide* solution.(1)

Losson drying : Not more than 1.25 percent w/w.

Losson ignition : Not more than 30%(1)

Total ash : Not more than 5.0 percent , Determined at about 800°.(1)

Acid insoluble Impurities : Not more than 1.0 percent.(1)

Sulfur : Mix 0.100 g of the powdered substance in a metal crucible with1 g of a powdered mixture of equal parts of *anhydrous sodium carbonate* and *potassium nitrate* and cover with about0 .5g of The *sodium carbonate-potassiumnitrate* mixture. Cover the crucible and heat at about 600° for 2 h. Cool, then dissolve the melt in10 mL of *distilled water* and transfer the solution to a 100 mL glass beaker. Acidity the solution with dilute *hydrochloric acid* using blue litmus paper to monitor the pH, then boil for1to 2 min and neutralize with dilute *sodium hydroxide solution* this time using red litmus paper. Filter the mixture into a 100 mL volumetric flask and make up volume to the mark with *distilled water*. Dilulte 5.0 mLof the solution to15 mL with *distilled water*. The resulting solution complies with the limit test for *sulfates*(1).

Lead : To 2.0 g add 20 mL of *glacial acetic acid* and boil under a reflux condenser then cool and filter. To 2.0 mL of the filtrate add 0.1mL of *potassium chromate solution*.The mixture does not become sturbidanda yellow precipitateis not produced(1).

Preparation : (a) Trituration 1x, DrugStrength1/10

Graphites in fine powder	100 g
Saccharum Lactis	900 g

To make one thousand grammes of the *Trituration.*

(b) Potencies:2x and higher to be triturated in accordance to the method, H.P.I.;6x may beconverted to liquid 8x, H.P.I.; 9x and higher with *Dispensing Alcohol.*

Storage

Caution

History and Authority First idea of using this substance as a drug is of S.Swin hold. Ruggieri used it later internally as well as externally. Allen‘sEncycop.Mat. Med.Repeat edition2005 Vol.IV, 647.

Finished product studies of Graphite :

Potency : 1x

Blackish white amorphous powder. Contains not less than 9.5 per cent w/w to not more than 10.5 per cent w/w of graphites.

Assay : Dissolve 1 g in 50 mL distilled water and filter. The black amorphous residue insoluble in alkali or acid and organic solvents. Dry at 105° and weigh. It should weigh not less than 0.095 g and not more than 0.105g.

Potency : 2x

Light blackish amorphous powder. Contains not less than 0.95 per cent w/w to not more than 1.05 per cent w/w of graphites.

Assay : Dissolve 1 g in 50 mL distilled water and filter. The black amorphous residue insoluble in alkali or acid and organic solvents. Dry at 105° and weigh. It should weigh not less than 0.0095 g and not more than 0.0105g.

HEPAR SULPHUR

(Hep. sul.)

Chemical Formula : **CaS**

Chemical name : calcium sulphide

Other Language Name : ***English*:**Impure calcium sulphide; ***French*:**Foie de sourfrecalcaire; ***German*:**Heparsulphuriscalcareum.

Description : A grayish-white amorphous powder; odour and taste of hydrogen sulphide. Insoluble in *purified water* and *alcohol*, soluble in hot *hydrochloric acid* with evolution of *hydrogen sulphide*. Prepared by fine powder of oyster shells and sulphur. Contains not less than 70 percent of CaS with reference to the substance dried to constant weight at 105°.(1)

Identification : (a) To 0.1 g, add 2 mL of acetic acid; the *hydrogen sulphide* evolved turns a moistened *lead acetate paper* brown. Retain this mixture for identification test (b).(2)

(b) To the suspension obtained in identification test (a) add 3 mL of *purified water* and filter. Add 0.5 mL of *ammonium oxalate solution* to the filtrate. A white precipitate is produced. Add 1 mL of *ammonia*; the precipitate does not dissolve; add 2 mL of *hydrochloric acid*; the precipitate dissolves.(2)

(c) To 0.1 g add 5 mL of *hydrochloric acid* and boil until the odour of *hydrogen sulphide* is no longer perceptible. Add 10 mL *purified water* and 0.5 mL of *barium chloride solution*; a fine white precipitate is produced.(2)

Assay : Weigh accurately about 0.1 g in *iodine* flask, add 40.0 mL of 0.05 M *iodine solution* and 1 mL of *dilute sulphuric acid*; stopper the flask and allow standing, protected from light for 30 min., with occasionally shaking several. Dilute to about 100 mL with *purified water*, add 1 mL of *starch solution* and titrate with 0.1 M *sodium thiosulphate solution*. 1 mL of 0.05 M *iodine solution* is equivalent to 0.0016 g of *sulphide* . Carry out a blank determination omitting sample.(2)

Preparation : (a) Trituration 1x, Drug strength 1/10

Hepar sulphur in *coarse powder*	100 g
SaccharumLactis	900 g

To make one thousand grammes of the *Trituration.*

(b) Potencies: 2x and higher to be triturated in accordance with the method, H.P.I.; 6x may be converted to liquid 8x, H.P.I.; 9x and higher with *Dispensing Alcohol.*

Storage : Preserve in well-closed glass stoppered bottles, protect from light.

Caution :

History and authority : Proved and introduced by Hahnemaun, Mat. Med. Pura, 1830, 1,639; Allen, T.F., Encyclop. Of Pure Mat. Med.,1874, 4,572; Clarke, J,H., A. Dict. Of Pract. Mat. Med.,1900,1,894.

IODIUM

(Iod.)

Chemical Formula **I_2Atomic weight.: 253.80.**

Chemical name Iodine

Other Language name ***English*: Iodine; *French*: Iode; *German*: Jod ;** *Latin*: Iodum.

Description : Heavy, grayish-black, brittle rhombic plates, having a metallic luster. A distinctive odour, and a sharp, acrid taste. Volatilizes at ordinary temperature. Soluble in *chloroform* and *ethanol*; slightly soluble in *glycerin*; very slightly soluble in *purified water*. Very soluble in concentrated solutions of *iodides.* Contain not less than 99.5 percent of I (1).

Identification : 1. When gently heated, it gives off violet-coloured vapours, which condenses forming a bluish-black crystalline sublimate.

2**.** A saturated solution yields a blue colour in the presence of *starch solution* disappears when the solution is heated and reappears when it is cooled (1).

Non-volatile matter : Not more than 0.1 percent, determined by heating 1 g in a porcelain dish on awater-bath until the *iodine* has volatilized and drying the residue at 105 °.(1)

Assay : 1. Weigh accurately about 0.5 g and dissolve in a solution of 1 g of *potassium Iodide* in 5 mL of *purified* water. Dilute to 50 mL with *purified* water, add 1 mL of *dilute acetic acid*, and titrate with 0.1 N *sodium thiosulphate,* using solution of starch as Indictor. Each mL of 0.1 *sodium thiosulphate* is equivalent to 0.01269 g of I.

Preparation : **a) Mother solution** : Drug strength1/100

Iodium in *coarse powder* : 10 g

Strong alcohol in sufficient quantity.

To make one thousand milliliters of the *Mother Solution.*

b). Potency:

2x and higher dispensing alcohol.

Storage Store an amber glass stoppered bottle or in earthen-ware container with a well waxed bung.

Caution

History and Authority : Allen's Encyclop.Mat. Med. Reprint edition 2005, Vol. V 119.

Finished Product Studies of Iodium:

Potency : 2x

: A violet coloured clear liquid. Contains not less than 0.95 per cent w/v to not more than 1.05 per cent w/v of I.

Alcohol content : 91.0 to 95 95.0 per cent v/v

Assay : Weigh accurately about 5 g, add 5 ml 20 per cent potassium iodide solution in water, dilute to 50ml and follow the assay method given under Iodium .

Potency : 3x

: A violet coloured clear liquid. Contains not less than 0.095 per cent w/v to not more than 0.105 per cent w/v of I.

Alcohol content 88.0 to 92.0 per cent v/v

Assay : Weigh accurately about 20 g, add 5 ml 20 per cent *aqueous potassium iodide*. Dilute to 50 ml with water, add 1 ml of *dilute acetic acid* and titrate with 0.01 N *sodium thiosulphate* using starch as indicator. Each ml of 0.01N *sodium thiosulphate* is equivalent to 0.00127g of I

KALI BICHROMICUM

(Kali. Bich.)

Chemical Formula **$K_2Cr_2O_7$ Molecular Weight.: 294.19.**

Chemical name Potassium bichromate

Other Language name : ***English*: Potassium bichromate; *French*: Bichromate de potasse; *Germen:* Kalium bichromat.**

Description : Large, orange- red, tabular crystals, odourless and of a taste bitter, metallic; (1) Soluble in *water*, freely soluble in boiling *water*, insoluble in *alcohol*. Containing not less than 99.5 and not more than 100.5 per cent of $K_2Cr_2O_7$.(2)

Identification : 1. An aqueous solution gives a yellow precipitate with *lead acetate* with *lead acetate solution* and a ted precipitate with a solution of *silver nitrate*.

2. 1 g dissolved in 20 mL of *purified* water and 5 mL of hydrochloric acid form, on the gradual addition of 1 mL of alcohol, a green solution.

3. Dissolve 10 mg in 5 mL of *purified water* add 0.25 mL of *dilute sulphuric acid*, 1mL of *ether* and 0.5 mL of strong *hydrogen peroxide solution* and shake. The organic phase is blue. (2)

Calcium : Not more than 500 ppm. (2)

Chlorides : Dilute 10 mL of **Solution S-I** (Appendix 1) to 15 mL with *purified water*. The resulting solution complies with the limit test for *chlorides* *(*50 ppm). (2)

Sulphates **:** Dilute 10 mL of **Solution S-II** (Appendix 2) to 15 mL with *distilled water*. The resulting solution complies with the limit test for *sulphates* (150 ppm). (2)

Assay **:** 1. Dissolve about 0.2 g accurately weighed in 25 mL freshly boiled and cooled *water* in glass stoppered flask, add 2 g of *potassium iodide* and 10 mL of *hydrochloric acid*, and allow stand in the dark for ten minutes. Add about 200 mL of freshly boiled and cooled *water* and titrate with 0.1 *sodium thiosulphate* , using solultion of starch, added towards the end of the reaction as indicator. Each mL of 0.1 N *Sodium thiosulphate* is equivalent to 0.004904 g of $K_2Cr_2O_7$.

Preparation **:** **(a) Mother Solution (ø)** : Drug Strength 1/10

Kali bichromicum in granules : 100 g

Purified water in sufficient quantity.

To make one thousand milliliter of the *Mother Solution.*

(c) Potencies:

2x and 3x to be prepared in *purified water*. 4x and higher with *Dispensing Alcohol*.

Storage Below 3x fresh preparation of this salt should be used and should be discarded if there is discoloration, sedimentation or visible particles.

Caution The lower preparation of the salt, should not be kept for too long

History and Authority **:** Allen's Enclcop. Mat. Med. Reprint edition 2005, Vol. V 213

Appendix **:** 1. **Solution S-I:** Dissolve 0.5 g in distilled *water* to 50.0 mL. (2)

2. **Solution S-II**: To 20.0 mL of **Solution S-I** add 20 mL *hydrochloric acid* and 50 mL of *tributyl phosphate* and shake for 2 minutes. Collect

the aqueous phase, shake with 10 mL of *ether* and evaporate to dryness under reduced pressure. Dissolve the residue in 10 mL of *distilled water*, add *dilute ammonia* until the solution is neutral to blue litmus paper and dilute to 20.0 mL with *distilled water*. (2)

Finished product studies of Kali bichromicum:

Potency : 1x

: Orange-red coloured, clear liquid. Contains not less than 9.40 percent w/v to not more than 10.40 per cent of $K_2Cr_2O_7$

Assay : Complies with the assay method given under Kali bichromicum.

Potency : 2x

: Light orange-red clear liquid. Contains not less than 0.94 per cent w/v to not more than 1.40 per cent of $K_2Cr_2O_7$.

Assay : Weigh accurately about 5 g in 25 ml freshly boiled water and follow the assay method given under Kali bichromicum.

Potency : 3x

Light orange-red clear liquid. Contains not less than 0.094 percent w/v to not more than 0.140 per cent of $K_2Cr_2O_7$.

Assay : Weigh accurately about 20g and follow the assay method given under Kali bichromicum.. For titration use 0.01 N *sodium thosulphate solution* is equivalent to 0.00049 g of $K_2Cr_2O_7$.

KALI MURIATICUM

(Kali.Mur.)

Chemical Formula Kcl **Molecular Weight.:74.6.**

Chemical name Potassium chloride

Other Language name : ***English*:** Potassium chloride; ***French*:**Chlorure de potasse; ***German*:**Kaliumchloratum.

Description : White or almost, crystalline powder or colourless crystals. Odourless and a saline taste. Freely soluble in *water*, insoluble in *alcohol*. *Potassium chloride* contains not less than 99.0 percent and not more than the equivalent of 100.5 percent of KCl, calculated with reference to the dried substance.(1,2)

Melting point : 772 °.

Specific gravity : 1.988.

Identification : 1.A solution of *potassium chloride* responds to the tests characteristics of *potassium* and *chlorides*
2. **Potassium**: Dissolve 0.1 g of the substance to be examined in 2 mL of *water*. Add 1 mL of *sodium carbonate* solution and heat. No precipitate is formed. Add to the hot solution 0.05 mL of *sodium sulphide solution.* . No precipitate is formed. Cool in *iced water* and add 2 mL of a 150 g/l solution of *tartaric acid.* Allow to stand. A white crystalline precipitate is formed.(1)

Loss on drying : Not more than 1.0 percent, determined on 1.000 g by drying in an oven at 100-105 °for 3 hours. (1)

Iodides : Moisten 5g by the drop wise addition of a freshly prepared mixture of 0.15 mL of *sodium nitrite solution* 2 ml of 0.5 M *sulphuric acid*, 25 mL of *iodide- free starch solution* and 25 of water. After 5 min. examine in daylight. The substance shows no blue colour (1).

Sulphates : Note more than 300 ppm .(1)

Barium : To 5 mL of solution (Dissolve 10.0 g in *carbon dioxide-free water* prepared from *distilled water* and dilute to 100mL with the same solvent) add 5 mL of *distilled water* and 1 mL of dilute *sulphuric acid*. After 15 min. any opalescence in the solution is not more intense than that in a mixture of 5 mL of solution and 6 mL of *distilled water*. (1)

Heavy metals : Not more than 10.0 ppm (1)

Iron : Not more than 20.0 ppm(1)

Reaction : 5 g dissolved in 50 mL of freshly boiled and cooled *water* requires not more than 0.5 mL of 0.01N *sodium hydroxide or* 0.01N or 0.01N *hydrochloric acid* for neutralization to solution of *Phenol-red.*

Assay : (d) Weigh accurately about 0.25g, dissolve in 50 mL of *water* and titrate with 0.1 N *silver nitrate*, using solution of *potassium chromate* as indictor. Each mL of 0.1 N *silver nitrate* is equivalent to 0.007456 g KCL

2. Dissolve 1.300 g in *water* and dilute to 100.0 mL with the same solvent. To 10.0 mL of the solution add 50 mL of *water*, 5 mL *dilute nitric acid,* 25.0 mL of 0.1 M *silver nitrate* and 2 mL of *dibutyl phthalate* shake. Titrate with 0.1 M *ammonium thiocyanate*, using 2 mL of *ferric ammonium sulphate solution* as indicator and shaking vigorously towards the end-point.1 mL of 0.1M *silver nitrate* is equivalent to 7.46 mg of the KCl. (1)

Preparation : (a**)** Trituration 1x, Drug Strength 1/10

Kali Muriaticum in *crystals*	100 g
SaccharumLactis	900 g

To make one thousand grammes of the *Triturationn*

(e) Potencies: 2x and higher to be triturated in accordance with the method H.P.I.; 6x may be converted to liquid 8x, H.P.I.; 9x and higher with *Dispensing Alcohol*.

Storage

Caution

History and Authority Dr. Schussler introduced this salt in Homoeopathy. Clarke: A Dictionary of Practical Mat. Med. Reprint edition 2009 Vol. II 140.

09 New Homoeopathic Monographs (Chemical)

S. NO	**DRUG NAME**
1)	AMMONIUM TARTARCIUM
2)	CALCAREA CALCINATA
3)	*CHLORPROMAZINUM*
4)	FERRUM PICRICUM
5)	MERCURIUS SULPHURICUS
6)	METHYLENE BLUE
7)	PLUMBUM IODATUM
8)	QUARTZ
9)	UREA PURA

AMMONIUM TARTARCIUM
(Am. Tart)

Chemical Formula : $(NH_4)_2C_4H_4O_6$ **Molecular Weight** : 184.15

Chemical Name : Ammonium tartarate

Other Language Name : ***English***: Ammonium tartarate: ***French*****:** Tartarate acid d’ ammonium.

Description : White crystalline solid, evolves ammonia on exposure to air. Soluble in water, slightly soluble in alcohol, contains not less than 98 percent w/w of *Ammonium tartrate*

Identification: : ***Test for ammonium salt*****:** Heat 10 mg of substance with *sodium hydroxide solution*, which gives white fumes when moist rod with *conc. Hydrochloric Acid* placed on the mouth of test tube.

Test for tartrate:Slightly warm the drug with *sulphuric acid*, charring occurs, and *carbon monoxide* evolved with a blue flame on ignition

Chloride : 10g complies with the limit test for *chlorides*

Sulphates : 10g complies with the limit test for *Sulphate*

Specific gravity : 1.648

Loss on drying : Not more than 0.85 percent w/w

Sulphated Ash : Not more than 0.01 percent w/w

pH : 6.0 to 7.0 (at 25° C, 0.2 M in H_2O)

Acidity and alkalinity : Dissolve 10 g in *purified water* and dilute to 100 ml with water, to 10 ml of this solution, add 0.05 ml of *methyl red solution*. 1.5 ml of 0.01 M *sodium hydroxide* is required to change the colour of the indicator.

Assay : Dissolve accurately about 2g in 20 ml of water. Add 40 ml of 50 *percent formaldehyde*, previously neutralized to *phenolphthalein* with 1N *sodium hydroxide* and keep it for 30 minutes. Titrate with 1N *sodium hydroxide* to a pink color which persists for five minutes. Each ml of 1N *sodium hydroxide* is equivalent to 0.09208g of $C_4H_{12}N_2O_6$.

Preparation: : (a)Trituration 1X Drug strength 1/10

Ammonium Tartaricum	100g
SaccharumLactis	900g

To make one thousand grams of the Trituration.

(b) Potencies: 2x and higher to be triturated in accordance with method, HPI; 6x may be converted to liquid 8x, HPI; 3x and higher with *Dispensing Alcohol*

Storage* : Potencies 6x and below should be protected from air. The drug decomposes on exposure to air. Trituration or solutions should not be stored for indefinite period.

Caution :

History and Authority : Boericke, Williams Mat. Med. and Repertory, 1927,43.

CALCAREA CALCINATA
(cal. cal.*)

Chemical Formula : **$Ca(OCl)2$** **Molecular Weight** : 142.99

Chemical name : Calcium hypochlorite

Other Language Name : ***English:***Calcium hypochlorite; ***German:*** Chlorure de chause..

Synonyms : Bleaching powder; Chlorinated lime; Calcihypochloris; Calcariachlorata.

Description : A dry, dull white powder; odour characteristic. On exposure to air, it becomes moist. Partially soluble in water and in alcohol, contains not less than 30 percent w/w of available chlorine.

Identification: : To 1g drug add a few drops of *dilute Hydrochloric Acid, chlorine* is evolved.

Chloride : Shake 0.1gm with 10 ml of *water* and filter. Acidify with 2-3 ml of *dilute nitric acid*, add 0.5 ml of *silver nitrate solution,* shake and allow to stand; a curdy white precipitate is formed, which is insoluble in *nitric acid* but soluble in strong *ammonia solution*, after well washed with *water* or in *dilute ammonia solution* which is re-precipitated by the addition of *dilute nitric acid*.

Calcium : 1. A strong solution of drug reacts with *ammonium carbonate solution*, a white precipitate appears, insoluble in 10 percent of *ammonium chloride solution*, on boiling and cooling the mixture.

2. A strong solution of drug reacts with 2.5 percent of *ammonium oxalate solution*, a white precipitate, soluble in *hydrochloric acid* but sparingly soluble in *acetic acid*.

3. A strong solution of drug reacts with a 5 percent of *potassium chromate solution*; yield a yellow crystalline precipitate, soluble in *water* or *acetic acid,* on shaking.

Assay : Weigh accurately about 4g, triturate in a mortar with small quantity of *water,* and add more water to produce 1 litre. Take 100 ml of this suspension in an Iodine flask, add 100ml of 3 percent *potassium iodide solution*, acidify with 5ml of 6 *M Acetic Acid*, and titrate the liberated *iodine* with 0.1 *N sodium thiosulphate* using 1 ml of *starch solution* as an indicator, added towards the end of titrations.

Each ml of 0.1 *N sodium thiosulphate* is equivalent to 0.003545g of available *chlorine*.

Preparation: : (a) Trituration 1x,

Drug strength	1/10
Calcarea Calcinata	100 g
Saccharum Lactis	900g

To make one thousand grams of the Trituration.

Potencies: 2x and higher to be triturated in accordance with method of HPI. 6x may be converted to liquid 8x, HPI; 9x and higher with *Dispensing Alcohol.*

Storage : Preparations below 6x are to be stored in a well closed container.

Storage	Preparation below 6x are to be preserved in well closed containers.
Caution	
History and Authority:	New and Old Forgotten Remedies, Indian edition, 89; Boericke: Mat. Media with Repertory.

CHLORPROMAZINUM
(Chlorp.)

Chemical Formula **:** $C_{17}H_{19}ClN_2S.HCl$ **Molecular Weight** **:** 355.33

Chemical name **:** 3-(2-chloro-10*H*-phenothiazin-10-yl)-*N*, *N* dimethyl-propane-1-amine

Other Language Name **:** Chlorpromazinihydrochloridum, Chlorpromazine hydrochloride, Chlorpromazinum.

Description **:** A white or slightly creamy white, crystalline powder, odourless. Decomposes on exposure to air and light becoming yellow, pink and finally violet. Very soluble in water, freely soluble in alcohol, practically insoluble in ether.

Identification: **:** 1. Dissolve about 5mg in 2 ml of *sulphuric acid* and allow to stand for 5 minutes, a red colour is produced.

2. To 5 ml of a *1% solution*, add 2 ml of nitric *acid*, a dark red colour develops which become yellowish.

3. To 5 ml of a solution of *chlorpromazine hydrochloride* (1 in 100), add 1 drop of *ferric chloride* TS, a red colour develops.

Loss on drying : Not more than 0.53% w/w

Sulphated Ash : **:** Not more than 0.035% w/w

Assay : Dissolve 0.8 g in 300 ml of acetone and carry out the tritration with 0.1 M *perchloric acid* using a saturated solution of methyl orange in acetone as indicator. Each ml of 0.1 M *perchloric acid* is equivalent to 0.03189 g of $C_{17}H_{19}CIN_2S$

Preparation: **:** **a) Trituration:** 1x

Drug strength	1/10
Chlorpromazinum	100 g
Saccharum Lactis	900 g

To make one thousand grams of the trituration.

b) Potencies: 2x and higher to be Triturated in accordance with the method and 6x may be converted to liquid 8x. 9x and higher with *Dispensing Alcohol*.

Storage **:** Preparations are to be kept in well-closed containers, protected from light

Caution : Prescribed dose 3x and higher.

History and Authority **:** Proved by N P Rai, Bombay in 1964 and O. A. Julian in 1968; *Mat. Med. in New Homoeopathic Remedies* by O. A. Julian.

FERRUM PICRICUM
(Ferr. Pic.)

Chemical Formula : $C_{18}H_6FeN_9O_{21}$ **Molecular Weight** : 740.13

Chemical Name : Iron (3+);2,4,6-trinitrophenolate

Other Language Names : ***English***: Ferric picrate; ***German***: Ferropikrat;***French***: Picrate de fer

Description : Amorphous mass, yellow coloured, odourless, soluble in water and alcohol. Prepared by the action of *ferric sulfate solution* on *barium picrate solution*. Contains not less than 88% percent of *picric acid* and 7.0 % of *iron* with reference of the substance dried to constant weight on *silica gel*, as desiccant.

Identification: : **1. Test for Iron (III):** Take 5 ml of 5% *sodium hydroxide* solution, add 250 mg of ferric picrate and heat to boil and add a drop of *ammonium thiocyanate* solution, a deep red colour appears.

2. Test for Picric acid: A 5.0% of *aqueous solution* is acidic to *litmus paper*.

Caution Picric acid/Metal picrate are known to explode violently. Thus, fume hood with safety attires (lab coat, gloves & safety glasses) and equipment's (transparent shield) are required

Assay : Take about 0.5 g or equivalent accurately weighted in conical flask and dissolve in *chloroform* and filter, repeat the operation till complete extraction. Evaporate the *chloroform* layer to dryness, dissolve the residue in 50 ml 0.1 N *sodium hydroxide solution* and titrate it with 0.1N *hydrochloric acid* using *phenolphthalein* as indicator. Each ml of 0.1 N *sodium hydroxide* is equivalent to 0.0229 g of *picric acid*. Iron: Dissolve the residue left after *chloroform* extraction in 25 water, add 1 ml *sulphuric acid* and 0.1 N *potassium permagnate* drop by drop until pink colour persists for five seconds. Add 15 ml of *hydrochloric acid* and 2 g of *potassium iodide*. Allow to stand for 3 minutes and titrate with 0.1 N *sodium thiosulphate*. Each ml of 0.1 N *sodium thiosulphate* is equivalent to 0.0056 g.

Preparation: : (a)**Mother Solution: 2x**

Drugs strength	1/100
FerrumPicricum	10 g
Dispensing Alcohol	In sufficient quantity

To make one thousand ml of the trituration.

(b) **Potencies:** 3x and higher with *Dispensing Alcohol*.

Storage : Preparations are to be kept in well-closed containers, protected from light.

Caution : It undergoes explosion on shock and any other kind of energization.

History and Authority : Dr. Cooper has reported a case of lupoid wart cured by it. P.C. Mujumdar (Ind. Hom. Rev., October 1899) cured a student, suffering from anaemia and Malarias fever off and on for a year.

MERCURIUS SULPHURICUS
(Merc. sul.)

Chemical Formula : $HgSO_4$ **Molecular Weight** : 296.65

Chemical Name : Mercuric sulphate.

Other Language Name : ***Latin:*** Hydrargyrisulphas, Hydragyrumsulphuricummercuriusvitriolatus, sulphas mercuricus. ***English:*** Persulfate of mercury, Mercuric sulphate. ***French:*** Deuto- sulfate (per-sulfate) demercure, Sulfatemercurique; ***German:*** SchefelsauresQueck, silberoxyd.

Description : A white crystalline powder, odorless decompose by water into a yellow insoluble *basic sulphate* and *free* H_2SO_4. Soluble in *Hydrochloric Acid, hot dilute Sulphuric Acid* and concentrated solution of *Sodium Chloride*. Contains not less than 98% of $HgSO_4$ when dried to constant weight at 105°.

Identification: :
1. Solution in *dilute nitric acid* responds to the test of *mercuric salts and sulphates.*
2. It became yellowish-brown when heated and white again on cooling.
3. Decomposes in water with the formation of a yellow powder.
4. At higher temperature, it volatilized completely with partial decomposition.

Chloride : Dissolve 2.0 g in a mixture of 2 ml of *dilute nitric acid* and 10 ml of *purified water.* Add 2g of *zinc powder*, shake frequently for 5 minutes and filter (appendix) complies with the limit test for *chloride*.

Nitrate : Dissolve 0.40 g in a mixture of 9 ml of *water* and 1 ml of *dilute sulphuric acid,* add 1ml of *indigo carmine solution* and 10 ml of *nitrogen free sulphuric acid*, and boil; the blue colour is not entirely discharged. (Appendix).

Iron : 5ml of the above solution complies with the limit test of iron.

Limit test: : **Arsenic:** Not more than 2 parts per million.

Chloride: 0.5 g dissolved in water with the addition of 1.5 ml of *nitric acid*, complies with the limit test for *chlorides*.

Lead: Not more than 10 parts per million.

Sulphated ash : 0.1 percent w/w.

Assay : Weigh accurately about 1.07g and transfer to a 300ml long necked flask. Add 25 ml of *water*, 2 ml of 3 percent w/v *copper sulphate solution* and 8ml of *sulphuric acid*. Heat gently15 minutes so that copious fumes are evolved, cool, and slowly add 100ml of *water* and 0.2 g *granulated zinc* connect the flask to ammonia distillation apparatus. The delivery tube of the apparatus should be dipped in 50 ml of 2 percent w/v solution of *boric acid*. Heat the flask and when the air is driven out, add slowly 75 ml of *sodium hydroxide solution.* Distil and collect the *ammonia*. Titrate the distillate with 0.0N *hydrochloric acid*, using *methyl red solution* as indicator. Repeat the experiment with the same reagents in the same manner omitting urea. The difference between the titrations represents the amount of ammonia evolved from urea. Each ml of 0.2 N

Hydrochloric acid is equivalent to 0.006006 of CH4ON2.

Preparation: : (a) **Trituration: 1x**

Drugs strength	1/10
MercuriusSulphuricus	100 g
SaccharumLactis	900 g

To make one thousand grams of the trituration.

(b) **Potencies:** 2x and higher to be Triturated. 6x may be converted to liquid 8x. 9x and higher with Dispensing *Alcohol*.

Storage : Preparations are to be kept in well-closed containers, protected from light

Caution : Poisonous

History and Authority : Boericke William, A pocket manual of Homoeopathic Materia Medical & Repertory 2007: 441& Allen T.F. Am encyclopedia of Homoeopathic material medica; vol:6:325-28.

Proved and introduced into homoeopathy by C. Heting; C. Heting: Guiding Symptoms, Vol VII, T.F Allen's Encyclop. Of pure Mat. Med. Vol VI.

METHYLENE BLUE
(Methylene blue)

Chemical Formula : **$C_{16}H_{18}ClN_3S.3H2O$** **Molecular Weight** : 373.90

Chemical Name : Methyl thioninium chloride

Other Language Names : Urelene blue, Proveblue, Provable

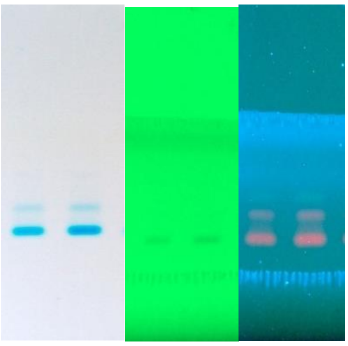
Description : Dark green crystalline powder, odourless, stable in air. Readily soluble in water, sparingly soluble in alcohol and chloroform. Water and aqueous solutions are deep blue in colour. Contains not less than 98.0 percent and not more than 103.0 percent of $C_{16}H_{18}ClN_3S3H_2O$, calculated on dried basis.

Identification: : **Thin layer chromatography**

Dissolve accurately weighed about 10 mg, of Methylene *blue* in 10 ml methanol to obtain a standard solution containing 1 mg/ml.

Dissolve one ml of standard solution in 10 ml methanol to obtain test solution having concentration of 100 µg/ml. Apply 0.5-2.5 µl on silica gel 60 F_{254} pre- coated plate using *water: n-butanol: glacial acetic acid (10: 8: 2, v/v/v)* as mobile phase for TLC studies.

A. In White light, blue coloured spot appears at Rf. value 0.42 corresponding to Methylene blue.
B. Under UV light (254nm) one brown coloured spot appears at Rf. 0.42 corresponding to Methylene blue.
C. Under UV light (366nm) one major spot appears at Rf. 0.42 (red) corresponding to Methylene blue and two additional spots appear at Rf. 0.52 (red) and 0.61 (light blue) neither of which exceeds in size or intensity of major spot.



At White Light **Under UV 254 nm** **Under UV 366 nm**

TLC Methylene blue

UV Study : λ max. 656 nm

pH : 3.0 water(10g/l) at 25 °

Assay Take about 100 mg accurately weighed Methylene blue into a 250 ml volumetric flask, dissolve in dilute alcohol and make up to the mark.

Transfer 5 ml of this solution to a 100 ml volumetric flask, dilute with *dilute alcohol* and make up to the mark. Transfer 5 ml of this solution to 50 ml volumetric flask dilute with dilute alcohol and make up to the mark. These solutions contain 2.4 µg of methylene blue hydrate (2µg of anhydrous methylene blue) per ml and prepare Standard Solution. Determine the absorbance of both solutions using 1cm path length cuvette at the wavelength of maximum absorbance at about 656 nm, using a spectrophotometer, use *dilute alcohol* as the blank. Calculate the quantity in mg of methylene blue in each ml using following formula:(337.85/319.85) (40C/V) (A_U/A_S); in which 337.85/319.85 are the M.W. of methylene blue hydrate and anhydrous methylene blue respectively is the concentration, in µg ml of Standard solution; V is the volume in ml and A_U and A_S are the absorbance of the solution and the Standard solution.

Preparation: : (a) Mother Tincture 2X

Drug Strength	1/100
Methylene blue	10 g

Dispensing alcohol in sufficient quantity
To make one thousand millilitre of Mother Tincture.

(b) Potencies: 3x and higher with *dispensing alcohol*.

Storage : Preparations are to be kept in well-closed containers, protected from light

Caution : Prescribed dose: 3x attenuation.

History and Authority : Clark: A Dictionary of Practical Mat. Med., Vol. II Boericke W. A pocket Manual Homoeopathic Materia Medica and Repertory, 2007:41.

PLUMBUM IODATUM
(Plum. iod.)

Chemical Formula : **PbI_2** **Molecular Weight** : 461.01

Chemical Name : Lead iodide

Other Language Names : ***English:*** Lead iodide; ***French:*** Iodure de plub;***German:*** Jodidi

Description : Yellow or golden yellow powder odourless, slightly soluble in *alcohol*, soluble in aqueous solution of *potassium hydroxide* and *sodium hydroxide*, freely soluble in *sodium thiosulphate*, contain not less than 98 per centw/w of Lead iodide dried to constant weight.

Identification: : 1. To the 5 ml of 10 % *w/vnitric acid solution* of sample, add 2 ml of *concentratedhydrochloric acid*, a white precipitate appears which dissolves in boiling water.

2. To the 5 ml of 10 % w/v solution of sample, pass *H_2S gas*, a black precipitate appears.

1. Potassium cyanide is extremely toxic.

Caution 2. It is essential that the pH of the solution does not fall below 9.5 temporarily as there is always a chance of liberation of HCN gas.

Nitrate Dissolve 0.40 g in a mixture of 9 ml of *water* and 1 ml of *dilute sulphuric acid*, add 1ml of *indigo carmine solution* and 10 ml of *nitrogen free sulphuric acid*, and heat to boiling; the blue colour is not entirely discharged.

Assay : Weigh accurately about 0.3 gm of the drug and dissolve in a mixture of 5 ml of *acetic acid* and 100 ml of water. Heat on a water bath to 85° C add 5 ml of 5% w/v solution *of potassium chromate* and continue the heating for half an hour. Collect the precipitate wash with hot wateruntil the washings are colourless and dry to constant weight at 120°. Each g of residue is equivalent to 1.427 g of *plumbum iodatum* (pbI_2)

Preparation: : (a) **Trituration: 1x**

Drugs strength	1/10
Lead iodide	100 g
SaccharumLactis	900 g

To make one thousand grams of the trituration.

(b) **Potencies:** 2x and higher to be Triturated in accordance with the method and 6x may be converted to liquid 8x. 9x and higher with *Dispensing Alcohol*.

Storage : Preparations are to be kept in well-closed containers, protected from light.

Caution : Poisonous.

History and Authority : Clarke, Dictionary of Practical Mat. Med., Vol.III.

QUARTZ
(Quart.)

Chemical Formula : SiO_2 **Molecular Weight** : 60.10 (monomer)

Chemical Name : Silicon dioxide

Other Language Names : ***English:*** Silica, ***French:*** Silice***; German:*** Silica.

Description : Glass-clear, colourless crystals with a vitreous lustre, occurring singly or in clusters. The habitus forms are hexagonal, e.g. hexagonal-bipyramid (dihexahedra) or hexagonal columns terminating in rhombohedra. The crystals are often distorted or twisted. The prism faces show horizontal striations. The powdered substance is white to grey-white, insoluble in *water, alkali hydroxide solutions* and acids, dissolves in *hydrofluoric acid* similar to Silica, but it is recognised in many countries as a separate drug. May contains traces of metallic gold, silver or aluminium.

Identification: : 1. **Test for Silica (silicon):** Heat 0.5 g of the raw drug with 3.0 g of *sodium hydroxide* in platinum crucible until; molten. Dissolve the melt in *hot water* and filter. Add a slight excess of *hydrofluoric acid* to the filtrate and boil. A white gelatinous precipitate is produced.

2. Test for Silica (Silicon): Mix the prescribed quantity of the substance to be examined in a lead or platinum crucible by means of a copper wire with about 10 mg of *sodium fluoride* ***R*** and a few drops of *sulphuric acid* to give thin slurry. Cover the crucible with a thin, transparent plate of plastic under which a drop of water is suspended and warm gently. Within a short time, a white ring is rapidly formed around the drop of *water*.

Loss on Drying Not more than 0.1% w/w.

Assay **1. Gravimetric Method:**

Weigh accurately about 0.2-0.5 g of the drug in a dried and weighed empty platinum crucible. Fuse the sample with *anhydrous sodium carbonate* (5 g) at 1000º in a muffle furnace for 1 hr. Then cool the crucible and leach the material in to diluted *hydrochloric acid* (1:1) in 250 ml beaker. Evaporate the solution and bake on hot plate and then oven dried.

Again add dil. *hydrochloric acid* (1:1) to the beaker. Allow the insoluble silicates to settle down. Then filter the material using Whatman filter paper No.42. Ignite the filter paper at 1000º in a muffle furnace for 1 hr.

Then add 2 drops of Water, 2 drops of conc. *Sulfuric acid* and 10 ml of *Hydrofluoric acid*. Evaporate the acids until the clearing of dense fumes. Again, evaporate the excess acids by keeping in furnace at 1000º for 30 min. The loss of weight denoted the loss of Silicon as volatile silicon tetrafluoride. Loss in weight denotes the presence of 27 % of silicon/ 57.75 % of *silicon dioxide*.

Preparation : **a.** Trituration 1x

Drug strength 1/10

Quartz	100 g
Saccharum Lactis	900 g

To make one thousand grams of the trituration

b. Potencies: 2x and higher to be Triturated accordingly. 6x may be converted to liquid 8x. 9x and higher with *Dispensing Alcohol*.

Storage : Preparations are to be kept in well-closed containers, protected from light.

Caution Prescribed dose: 6x and higher.

History and Authority : Encyclopaedia of Homoeopathic pharmacopoeia, vol II by Dr. P.N. Varma &Dr. (Mrs.) Indu vaid.

UREA PURA
(Urea)

Chemical Formula : **NH_2CONH_2** **Molecular Weight** : 60

Chemical Name : Carbonic diamide

Other Language Names : ***English:*** Urea, Carbamide; Carbonyl Diamide. ***French:*** Uree.

Description : White opaque crystals, odour of *ammonia*, *hygroscopic*, cooling, taste saline, *soluble in water&alcohol;* contains not less than 99.0 percent and not more than 101.0 percent; calculated on the dried basis.

Identification: : On heating above 132.7° evolves *ammonia*. *Alkaline solution* of the drug when treated with *copper sulphate solution* gives violet colour.

Loss on Drying Not more than 1.0 *percent.*

Assay Dissolve about 0.5 g accurately weight of the drug in sufficient quantity of 10% v/v *sulphuric acid* to produce 100.0 ml and mix. Place 5.0 ml of the resulting solution in a long-necked flask, add 10 ml of the *sulphuric acid* and heat gently until evolution of gas ceases. Boil gently for 10 minutes, cool cautiously add 40 ml of *water*, cool again and place in a steam distillation apparatus. Add 50 mL of 10 M *sodium hydroxide* and distill immediately by-passing steam through the mixture. Continue the distillation for 1 hour. Collecting the distillate in 40 ml of a 4 *per cent* w/v *solution of boric acid*. Titrate with 0.1 M *hydrochloric acid*, using mixture of 0.25 ml *methyl red-methylene blue solutions* as indicator. Carry out a blank titration.

Each ml of 0.1 *N hydrochloride* is equivalent to 0.003003 gm of CH_4N_2O.

Drug Preparation: : (a) **Mother Solution**

Drugs strength 2x	1/100
Urea pura	1.0 g
Strong alcohol	70 ml
Purified water	30 ml

(b) **Potencies:** 3x and higher with *dispensing alcohol*.

(c)**Trituration** 1x:

Drug strength	1/10
Urea pura	100g
Saccharumlactis	900g

To make one thousand grams of trituration.

(d)**Potencies**: 2x and higher

Storage : Preparations are to be kept in well-closed containers, protected from light.

Caution : Prescribed dose: 1x and higher

History and Authority : Homoeopathic Mat. Med. with: Repertory by Boericke.

.03 Revised monographs (Zoological origin)

S/No.	**Drug name**
1.	Cholesterinum
2.	Carboanimalis
3.	Badiaga

CHOLESTERINUM

(Cholest.)

Chemical Formula $C_{27}H_{46}O$ **Molecular Weight :386.64.**

Chemical name Cholesterol

Other Language Name : ***English*: cholesterol, *German*:**Cholesterinum.

Description : A white or almost white, crystalline powder, almost odourless, Insoluble in *water*, soluble in *acetone*, sparingly soluble in *alcohol*. Sensitive to light. Contains not less than 95.0 percent and not less than 97.0 percent and not more than 103.0 percent of *total sterols*, calculated with reference to the dried substance.$^{(1)}$

Identification : 1. Dissolve about 5 mg in 2 mL of *methylene chloride*. Add 1 mL of *acetic anhydride* 0.01 mL of *sulphuric acid* and shake. Pink colour is produced which rapidly change to red, then to blue and finally to brilliant green$^{(1)}$.

2. Take a solution of of 10 mg in1 mL of *chloroform* add 1 mL of *sulphuric acid,* the *chloroform* acquires a blood red colour and the *sulphuric acid* shows a green fluorescence.

Specific gravity : 1.050 to 1.052.

Melting point : 147 ° to 150 °.

Specific rotation : Determined in a solution in dioxin containing 0 .2g in each 10 mL, is not less than-34° and not more than-38°.

Loss on drying : Not more than 0.3 percent, determined on 1.000 g by drying in vacuum at 60 ° for 4 hours. $^{(1)}$

Residue on Ignition: : Not more than 0 .1 percent.

Acidity : Dissolve 1 g in 10 mL of *solvent ether* in a small flask add 10 mL of 0.1 N *sodium hydroxide* and shake for about 1 minute. Heat gently to eliminate the *ether* and then boil for 5 minutes. Cool, dilute with 10 mL of *purifiedwater* and add 0.1 mL of *phenolphthalein solution* and titrate with 0.1M *hydrochloric acid* until the pink colour just disappears, stirring the solution vigorously throughout the titration. Carry out a blank titration. The difference between the volumes of 0.1M *hydrochloric acid* required to change the colour of the indicator in the blank and in the test is not more than 0.3 mL.(1)

Solubility in alcohol (96 Percent) : In a stoppered flask, dissolve 0.5 g in 50 mL of *ethanol* at 50 ˚. Allow to stand for 2 h. No deposit or turbidity is formed (2).

Sulphated ash : Not more than 0.1 percent, determined on 1.0 g. (1)

Assay : Dilute 1.0 g of the solution to 25.0 mL with glacial aciticacid . Transfer 0.100 g of the 1st decimal trituration to a 50 mL separating funnel with 10mL of water and shake with 10 mL portions of chloroform. Evaporate the combined organic phases to dryness under reduced pressure at about 40˚. Dissolve the residue in glacial acetic acid and dilute to 25.0 mL with glacial acetic acid. To 1.0 mL of he resulting solution add a freshly prepared (in and ice bath) mixture of 1.9 mL of ice-cooled acetic anhydride and 0.1 mL of sulphuric acid and leave to stand, protected from light, for 15 min at about 30˚. Measure the absorbance at 619 nm against a compensation liquid prepared in exactly the same way from 1.0 mL of glacial acetic acid and freshly prepared (in an ice bath) mixture of 1.9 mL of ice- cooled acetic anhydride and 0.1 mL of sulphuric acid.

Determine the per cent total sterol content ($X_{\%}$) from the specific absorbance =46 according to the following equation:

$X_{\%} = 1630.4\ A/m$

Where m mass of the solution 1st decimal trituration in mg . (3).

Preparation : (a) Trituration 1x, Drug strength 1/10

Cholesterinum	100 g
SaccharumLact is	900 g

To make one thousands grammes of the *Trituration*.

(b) Potencies:2x and higher to be triturated in accordance with the

method, H.P.I.; 6x may be converted to liquid 8x, H.P.I.; 9x and

Higher with *Dispensing Alcohol.*

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Storage : Protected from light (2)

Caution

History and authority	**:**	A Dictionary of Practical Materia Medica, Clarke, Reprint edition 2009, Vol. I, 507. Materiamedica, Thercepeutics & Pharmacology, Blackwood,240

CARBOANIMALIS

(carbo. an.)

Chemical Formula C

Chemical name Animal charcoal

Other Language name : ***English:*** Leather charcoal, Animal charcoal; ***French:***Charbon animal; ***German:***Knockenkohle.

Description : It occurs as odourless, tasteless powder. Crude animal charcoal is the material prepared by heating bones with a limited access of air and consists chiefly of calcium phosphate and other inorganic constituents of bone, with about one tenth of its weight of carbon; it occurs in dullblack, granular fragments or as a dull black, odourless powder. It may be prepared by the following process: Place a thick piece of ox-hide on red hot coal, and leave it there for as long as it burns with a flame. As soon as flame ceases, lift off the red hot mass and press it between two flat stones. Boil it with *hydrochloricacid*, washing thoroughly, drying and reheating. It may yield as much as 10 per cent of ash.

Identification : Heat a small amount on a metal spatula over a low flame. A white vapour with a burnt odour is given off, which colours red to reddish violet a filter paper dipped in a mixture of 10 ml of *vanillin solution* and 1 ml of *hydrochloric acid*.

Acidity or alkalinity : Boil 2.0 g in 40 ml of *water* for 5 minutes. Cool, then make up to the original volume with *carbon dioxide-free water* and filter, discarding the first 20 ml of filtrate. To 10 ml of the filtrate add 0.25 ml of *bromothymol blue solution* and 0.25 ml of *0.02 N sodium hydroxide solution.* The solution is blue or green. Add 0.75 ml of *0.02N hydrochloric acid.* The colour of the solution changes to yellow.

Acid-soluble impurities : Not less than 15 per cent and more than 25 per cent. Boil 1.0 g with 25 ml of *dilutenitric acid* for 5 minutes, then filter hot through a sintered glass filter, washing the residue with 10 ml of hot *water*. Evaporate the combined wash *water* and filtrate to dryness on a water bath. Moisten the residue with

1 ml of *hydrochloric acid*, evaporate again to dryness and dry to constant mass at 100^0 to105^0.

Cyanides : To 5.0 g add 50 ml of *water* and 2 g of *tartaric acid*. Transfer to a distillation apparatus fitted with a receiver flask containing a mixture of 10 ml of *water* and 1 ml of *dilute sodium hydroxide solution* and distill carefully until about 25 ml of distillate has collected. Dilute the distillate to 50 ml with *water*. To 25 ml of resulting solution add 50 mg of *ferrous sulphate* and heat until just boiling. Cool to 70^0 in a water bath and add 10 ml of *hydrochloric acid*. The resulting solution is not green or blue.

Heavy metals : Not more than 10 ppm.

Sulphides : To 1.0 g in a 100 ml conical flask add 20 ml of *water* and 5 ml of *hydrochloric acid* and heat to boiling. The vapour evolved does not turn a moistened *lead acetate paper* brown.

Sulphated ash : Not more than 3.0 per cent.

Loss on drying : Not more than 10 per cent, determined on 1.0 g by drying in a drying cabinet at 105^0 to 110^0 for 4 hours.

Preparation : (a)**Trituration 1x,** Drug Strength 1/10

CarboAnimalis in *coarse powder*	100g
SaccharumLactis	900 g

to make one thousand grammes of the *Trituration.*

(b) **Potencies**: 2x and higher to be triturated in accordance with the method HPI, 6x may be converted to liquid 8x HPI, 9x and higher with *Dispensing Alcohol*.

Storage

Caution

History and Authority : Allen's *Encylop. Mat. Med. Vol.* II, 549.

Appendix: -

Vanillin solution: Dissolve 1 g of vanillin in *alcohol* (90 per cent v/v).

BADIAGA
(Badiaga)

Drug consist of whole sponge of *Spongilla lacustris* L.; syn.: *Spongilla palustris* L.*; Spongilla fluviatillis* L.,(Fam. Spongillidae); a fresh water sponge grows detached from soil, greenish or yellowish-brown to grayish-white externally; branching ramifications from thickness of a quill to that of a finger, resembling stag's horns, with rounded corners and ends; contains white granules, siliceous bodies and fragments of monaxon spicules; rhagon type of canal system, flageliate cells confined to certain enlargements of canals called ciliated chambers; occurs in rivers, canals and lakes, mainly in Russia and Europe

Regional and other names:

English: Fresh water sponge, River sponge; *French*: Eponge des fleuves; *German*: Flupschwamm

Description

Macroscopic:

Raw drug occurs dry, yellowish-dusty, fragile, branched or crusty, porous skeletal; shape and size varies; odourdisagreeable and slightly musty; taste bad.

Chemical Constituents:

iodine

Preparation of Mother Tincture:

(a) Mother Tincture φ	Drug strength 1/10
Dried pulverized sponge	100 g
Strong Alcohol, is sufficient quantity	

Tomake one thousand millilitres of the Mother Tincture

(b) Potencies: 2x and higher with *Dispensing Alcohol.*

Test for Finished Product:

S.No.	BADIAGA	
1.	**Organoleptic test**	
	Appearance	Clear liquid
	Colour	very light brown
	Odour	Characteristic
2.	Sediments	Absent
3.	Alcohol content	92.0-95.0 %

4.	pH	6 - 7
5.	Wt. per ml	0.800 – 0.830
6.	Total solid	NLT 0.25 %

Storage :

Caution :

History and authority : Proved & introduced by Bedford, *Hahnemannian Monthly*, II, 121,1866; Allen; *Encyclo. Mat. Med.*, Vol II, 25; Hering; *Guiding Symptoms*, Vol II, 307

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APPENDIX I

MATERIALS AND SOLUTIONS EMPLOYED IN TESTS

Acetic Acid : Description: A clear, colourless liquid; odour, pungent; taste, sharply acidic.
Solubility: Miscible with water, with alcohol and with glycerin.

Weight per ml: At 25°, about 1.039.

Arsenic: Not more than 1 part per million.

Heavy metals: Evaporate 5 ml to dryness in a porcelain dish on a water-bath, warm the residue with 2 ml of 0.1 N hydrochloric acid and add water to make 25 ml, the limit of heavy metals is 10 parts per million.

Chlorides: 5 ml complies with the limit test for chlorides.

Sulphate: 5 ml complies with the limit test for sulphates.

Certain aldehydic substances: Distil 50 ml and collect the first 5 ml of the distillate. Add 10 ml of mercuric chloride test solution and make alkaline with sodium hydroxide solution, allow to stand for 5 minites and acidify with dilute sulphuric acid, the solution does not show more than a faint turbidity.

Formic acid and oxidisable impurities: Mix 5 ml with 2.0 ml of 0.1 N potassium dichromate and 6 ml of sulphuric acid and allow to stand for one minute. Add 25 ml of water, cool to 15°, add 1 ml of freshly prepared potassium iodide solution and titrate the liberated iodine solution with 0.1 N sodium thiosulphate, using starch solution as indicator. Not less than 1 ml of 0.1 N sodium thiosulphate is required.

Odourous impurities: Neutralise 5 ml with sodium hydroxide solution; the solution has no odour other than a faint acetous odour.

Readily oxidisable impurities: To 5 ml add 20 ml of water and 0.5 ml of 0.1 N potassium permanganate, the pink colour does not entirely disappear within half a minute.

Non-volatile matter: Leaves not more than 0.01 per cent w/w of residue when evaporated to dryness and dried to constant weight at 105°.

Assay: Weigh accurately about 2.5g into a stoppered flask containing 50 ml of water and titrate with 1N sodium hydroxide using phenolphthalein solution as indicator. Each ml of 1N sodium hydroxide is equivalent to 0.06005 g of $C_2H_4O_2$.

Acetic Acid (90 per cent): To glacial acetic acid add sufficient quantity of water to produce a solution containing 90 percent w/v of $C_2H_4O_2$.

Acetic Acid, Dilute (Approximately 6 percent w/w of $C_2H_4O_2$).

Acetic anhydride: $(CH_3\ CO)_2O$: Contains not less than 95 per cent of $C_4H_6O_3$

Description: A colourless, refractive liquid; pungent odour. It boils at 140°. It is slowly soluble in water, forming acetic acid; soluble in chloroform and ether. Wt per ml- 1.080g.

Assay: Weigh accurately about 2 g in a glass stoppered flask. Add 100 ml of carbondioxide free water, stopper, allow to stand for 30 minutes, add *phenolphthalein* solution and titrate with 1 N *sodium hydroxide*, calculate the percentage of $(CH_3CO)_2O$ by the formula (34.03v/w—566.7, where V is the volume in ml of the sodium hydroxide used, and W is the weight, in g of the sample.

Acetone : C_3H_6O

Description: A clear, colourless, mobile and volatile, liquid; taste, pungent and sweetish; odour, characteristic, Inflammable.

Solubility: Miscible with water, with alcohol, with solvent ether and with chloroform.

Boiling range: Not less than 95.0 per cent. Distils between 55.5° and 57°.

Acidity: 10 ml diluted with 10 ml of freshly boiled and cooled water, does not require for neutralization more than 0.2 ml of 0.1N sodium hydroxide, using phenolphthalein solution as indicator.

Reaction: 10 ml diluted with 10 ml of freshly boiled and cooled water is not alkaline to litmus solution.

Methyl alcohol: Dilute 10 ml with water to 100 ml. To 1ml of the solution add 1 ml of water and 2 ml of potassium permanganate solution in phosphoric acid. Allow to stand for ten minutes and add 2 ml of oxalic acid solution and sulphuric acid; to the colourless solution add 5 ml of decolourised magenta solution and set aside for thirty minutes between 15° and 30°; no colour is produced.

Substances reducing permanganate—To 20 ml add 0.1 ml of 0.1N potassium permanganate and allow to stand for fifteen minutes; the solution is not completely decolourised.

Water: Shake 10 ml with 40 ml of Carbon disulphide; a coloured solution is produced. Non-volatile matter—When evaporated on a water-bath and dried to constant weight at 105°, leaves not more than 0.01 per cent w/v of residue.

Alcohol, Absolute: Contains not less than 99.4 per cent v/v or 99 per cent w/v, and not more than 100.0 per cent v/v or 100.0 per cent w/w $C_9 H_6 O$.
It complies with the requirements given under Alcohol (95 per cent) of Homoeopathic Pharmacopoeia of India.

Alcohol (95 per cent), Aldehyde-free: Alcohol (95 per cent) which complies with the following additional test: **Aldehyde**—To 25 ml, contained in a 300 ml flask add 75 ml of solution of 2:4 dinitrophenyl hydrazine, heat on a water-bath under a reflux condenser for twenty four hours, remove the alcohol by distillation, dilute to 200 ml with 2 per cent v/v solution of sulphuric acid, and set aside for twenty four hours; no crystals are produced.

Alcohol (90 per cent): Dispensing Alcohol of the Homoeopathic Pharmacopoeia of India.

Alcohol (80 percent): Contains 79.5 to 80.3 percent of Alcohol (V/V Dilute 842 ml of *Alcohol* to 1000 ml with water *specific gravity*—At 25°, 0.840 to 0.842, H.P.I.

Alcohol (60 per cent): Limits 59.0 to 61.0 v/v
Dilute 632 ml of alcohol to 1000 ml of water.
Specific gravity—At 15.25°/15.25°, 0.8918 to 0.8871.
Refractive index—At 20°, 1.3617 to 1.3618.

Alcohol (50 per cent): Dilute 526 ml of Alcohol (95 per cent) to 1000 ml with Purified Water.

Alcohol (20 per cent): Contains 19.5 to 20.5 percent of alcohol (V/V) Dilute 210 ml of *alcohol* to 1000 ml of with *water* specific gravity—at 25°, 0.968 to 0.970, H.P.I. Refractive index—at 25°, 1.340 to 1.342, H.P.I.

Aluminium Wire : Al
Description—Bright, malleable, ductile metal with somewhat bluish tint.
Solubility—Soluble in dilute hydrochloric acid, sulphuric-acid, potassium hydroxide solution and in sodium hydroxide solution. Almost insoluble in nitric acid or in hot acetic acid.
Arsenic—Not more than 1 part per million.

Aluminium Chloride : $AlCl_3. 6H_2O$

Contains not less than 98.0 per cent of $AlCl_3. 6H_2O$
Description—A white, crystalline powder.
Solubility—Soluble in *water*.

Iron—2.0 g complies with the *limit test for iron*, H.P.I.
Sulphate—0.5 g complies with the *limit test* for *sulphates*, H.P.I.

Assay—Dissolve 0.3 g in 35 ml of *water*, add 15 ml of *dilute nitric acid*, 5 ml of *dibutylpthalate*, add 50 ml of 0.1N silver nitrate, and shake for 1 minute. Add 5 ml of *ferri-annumium sulphate solution* and titrate with 0.1N *ammonium thiocyanate* until a reddish brown colour is obtained, which, after shaking, does not fade in five minutes. Each ml of 0.1N *silver nitrate* is equivalent to 0.008038 g of $AlCl_3$. $6H_2O$.

Aluminium Chloride: **Alcoholic solution of:** A 1.0 percent w/v solution of aluminium chloride in *alcohol* (of the HPI).

Aluminium Chloride, Aqueous Solution of **:** A 1.0 per cent w/v solution of aluminium chloride in *water*.

Amaranth : Contains not less than 78 per cent of $C_{20}H_{11}N_9O_{101}Na_9S_8$.

Description: Dark reddish brown powder.

Identification: Boil a 1 per cent w/v solution with aluminium hydroxide, Filter and add one drop of solution of copper sulphate; a yellow colour that changes to red on acidification is produced.

Colour: The colour of a 1 per cent w/v solution when viewed through a depth of a 1 cm is vivid red.

Assay: Weight accurately about 0.4 g, dissolve in water, add 10 g of sodium acid tartrate, heat to boiling, pass a current of carbon dioxide through the solution, and titrate with 0.1 N titanous chloride. Each ml of 0.1 N titanous chloride is equivalent 0.01511 g of $C_{36}H_{11}Na_8S_8$.

Ammonia Solution, dilute: Dilute 375 ml of strong ammonia solution, to 1000 ml with water. This solution contains approximately 10 per cent w/w of NH_3 and has a weight per ml of about 0.957g.
Ammonia Solution, Strong : Ammonium causticum of the Homoeopathic Pharmacopoeia of India.

Ammonium Acetate: CH_3 CO_2 NH_4

Description: Colourless crystals or crystalline masses, odour, slightly acetous, very deliquescent.

Solubility: Very soluble in water, and in alcohol.

Reaction: Dissolve 1 g in 20 ml of carbon dioxide free water; the reaction of the solution is not more acid than pH 6.5 using solution of bromothymol blue as indicator.

Chloride: 3.5 g complies with the limit test for chlorides.

Sulphate:Dissolve 4 g in 5 ml of water, add 10 mg. Of sodium bicarbonate evaporate to dryness, and heat at 120° until the ammonium acetate is volatilized. The residue complies with the limit test for sulphates.

Sulphated ash: Not more than 0.035 per cent.

Ammonium Acetate, Dilute solution of: Dissolve sufficient ammonium acetate in water to produce a solution containing 61.5 per cent w/v of CH_3 $COONH_4$.

Ammonium bicarbonate : Of Indian Pharmacopoeia.

Ammonium carbonate : A variable mixture of ammonium bicarbonate (NH_4HCO_3 and ammonium carbonate ($NH_2CO_2NH_4$, Contains the equivalent of not less than 30.0 per cent of NH_3

Description: Translucent, hard crystalline masses; odour, strongly ammoniacal; taste, pungent and ammoniacal. Exposed to air, it partially dissociates and volatilizes and becomes converted into porous lumps or a white powder.

Solubility: Soluble in about 4 parts of water; partly soluble in alcohol yielding a residue of the bicarbonate.

Iron: Boil 2.5 g with water until all the ammonia has been driven off; the solution complies with the limit test for iron.

Chloride: 10g, boiled with water until all the ammonia has been driven off; complies with the limit test for chlorides.

Sulphate: 10g, boiled with water until the ammonia has been driven off; complies with the limit test for sulphates.

Tarry matter : Mix 5 g with 15 ml of water and 7g of citric acid and stir until dissolved; no tarry odour is produced.
Non-volatile matter: When volatilized at a temperature below red heat leaves not more than 0.25 per cent of residue.

Assay: Weight accurately about 2g and dissolve in 50 ml of 1 N sulphuric acid diluted with 50 ml of water, boil, cool, and titrate the excess of acid with 1 N sodium hydroxide, using solution of methyl red as indicator. Each ml of 1 N sulphuric acid is equivalent to 0.01703 g of $NH_{3.}$

Ammonium Carbonate should be kept in a well-closed container.

Ammonium Carbonate, Solution of: Dissolve 5 g of ammonium carbonate in a mixture of 7.5 ml of dilute ammonia and 50 ml of water; add sufficient quantity of water to produce 100 ml; filter, if necessary.

Ammonium Chloride, Solution of: A 10.0 per cent w/v solution of ammonium chloride in water.

Ammonium Chromate **:** $(NH_4)_2 Cr O_4$

Contains not less than 98.0 percent of $(NH_4)_2 CrO_4$.

Description: yellow crystals or granular.

Solubility: Soluble in *water*.

Assay: Weigh accurately about 1.2g, dissolve in *water* and dilute to 200ml Transfer 20 ml into a glass stoppered flask, dilute with 130 ml of *water* and add 7 ml of *hydrochloric acid* and 3g of *potassium iodide*, allow to stand for 15 minutes, then titrate the liberated iodine with 0.1N *sodium thiosulphate*, using *starch* toward the end. Correct for a blank. Each ml of 0.1N *sodium thiosulphate* is equivalent to 0.005070 g of $(NH_4)_2 CrO_4$.

Ammonium Chromate, Solution of **:** A 5.0 percent w/v solution of *ammonium Chromate* in *water*.

Ammonium Ferric, Sulphate **:** of H.P.I.

Syn. Ferric ammonium sulphate.

Ammonium Ferric: Sulphate solution of Syn. Ferric ammonium sulphate solution A 10.0 percent w/v solution of *Ferric ammonium sulphate* in *water*.

Ammonium Hydroxide, Solution of : Mix 1 volume of water with 2 volume of Ammonia, strong solution.

Ammonium Molybdate: $(NH_4)_6 MO_3 O_{24} 4 H_2O$.

Contains about 80 to 83 per cent of $Mo O_3$

Description: White crystals or crystalline masses sometimes with a yellowish or green tint. It is soluble in water; insoluble in alcohol.

Phosphate : Dissolve 5 g in 5 ml of dilute ammonia solution and 15 ml of water, the solution is not more than slightly turbid; add it to 25 ml of nitric acid and 50 ml of water and allow to stand at about 40° for six hours; not more than a slight yellow precipitate is produced.

Assay: Weigh accurately about 0.2 g and dissolve in 40 ml of dilute ammonia solution and 50 ml of water, and add 20 ml of glacial acetic acid; heat to boiling and add 10 ml of solution of lead acetate and 40 ml of water. Boil gently until the precipitate becomes granular, collect the precipitate in Gooch crucible, wash with hot water and dry; and ignite at a dull red heat. Each g of residue is equivalent to 0.3921 g of MoO_3.

Ammonium Molybdate, Solution of: A 10.0 per cent w/v solution of ammonium molybdate in water.

Ammonium Nitro Molybdate, Solution of : To a solution of 125 g of *moylbdic acid* in mixture of 80 ml of *ammonia solution* and 320 ml of *water* add a solution of 400g of *ammonium nitrate* in sufficient *water* to produce 100 ml followed by a mixture of 380 ml of *nitric acid* and 620 ml of *water*. Allow to stand for 24 hours at about 35° and filter.

Ammonium Nitrate :$NH_4\ NO_3$.

Description: Colourless crystals.
Solubility: Readily soluble in water.
Reaction: A solution in water is slightly acidic to litmus.

Chloride **:**3.5 g complies with the limit test for chlorides.

Sulphate :5 g complies with the limit test for sulphates.

Sulphated ash :Not more than 0.05 percent.

Ammonium Nitrate, Solution of: A 2.5 per cent w/v solution of ammonium nitrate.

Ammonium Oxalate : $(CO_2\ NH_4)_2\ 2H_2\ O$.

Description: Colourless crystals.
Solubility: Soluble in water.

Chloride : 2g, with an addition of 2 ml of nitric acid, complies with the limit test for chlorides.

Sulphate **:** Dissolve 1 g in 50 ml of water, add 2.5 ml of hydrochloric acid and 1 ml of solution of barium chloride, and allow to stand for one hour; no turbidity or precipitate is produced.

Sulphated ash : Not more than 0.05 per cent.

Ammonium Oxalate, Solution of: A 2.5 per cent w/v solution of ammonium oxalate in water.

Ammonium Polysulphide, Solution of: Dissolve sufficient quantity of sublimed sulphur in solution of ammonium sulphide to produce a deep yellow solution.

Ammonium Sulphide, Solution of: Saturate 120 ml of dilute ammonia solution with washed hydrogen sulphide; add 80 ml of dilute ammonia solution.
Solution of Ammonium sulphide must be recently prepared.

Ammonium Thiocyanate : NH_4 SCN.

Description: Colourless crystals.

Solubility: Very soluble in water, forming a clear solution; readily soluble in alcohol.

Chloride **:**Dissolve 1 g in 30 ml of solution of hydrogen peroxide, add 1 g of sodium hydroxide, warm gently, rotate the flask until a vigorous reaction commences and allow to stand until the reaction is complete; add a further 30 ml of solution of hydrogen peroxide, boil for two minutes, cool and add 10 ml of dilute nitric acid and 1 ml of solution of silver nitrate, any opalescence produced is not greater than that obtained by treating 0.2 ml of 0.01 N hydrochloric acid in the same manner. Sulphated ash moisten 1 g with sulphuric acid, and ignite gently, again moisten with sulphuric acid and ignite, the residue weighs not more than 2.0 mg.

Ammonium Thiocyanate, solution of: A 10.0 per cent w/v solution of ammonium thiocyanate in water.

Ammonia Solution Standard: Dissolve 31.4 mg of ammonium chloride in water to make one litre (1ml=0.1mg NH_3)

Ammonia Ammonium Chloride Buffer Solution: Dissolve 5.4 g of ammonium chloride in 70 ml of dilute ammonia solution and add sufficient water to produce 100 ml.

Ammonia Ammonium Chloride Solution (Strong): Dissolve 67.5 g of ammonium chloride in 650 ml of strong ammonia solution and add sufficient water to produce 1000 ml.

Ammonium Persulpahte : $(NH_4)_2S_2O_8$

Contains not less than 98.0 per cent of $(NH_4)_2S_2O_8$.

Description: Colourless crystals or white granules.

Solubility: Soluble in water.

Residue on ignition: Not more than 0.05 per cent.

Sulphated ash : Not more than 0.1 per cent.

Heavy metals :Not more than 30 parts per million.

Iron :Not more than 10 parts per million; 4g complies with the limit test for iron.

Chloride : 10g complies with the limit test for chlorides

Assay: Dissolve 1 g of ferrous sulphate and 6g of potassium iodide in a mixture of 50 ml of water and 50 ml of dilute sulphuric acid. Add 0.5 g of the finely powdered sample to half of this solution and allow to stand in a stoppered flask for thirty minutes. Titrate the liberated iodine with 0.1N sodium thiosulphate using starch mucilage as indicator. Repeat the operation using the remaining portion of the solution and omitting the sample, and substract the second burette reading from the first. Each ml of 0.1N sodium thiosulphate is equivalent to 0.01141g of $(NH_4)_2S_2O_8$

Ammonium Sulphate : **$NH_2SO_3NH_4(H_6N_2O_3S)$**

Contains not less than 99.5 per cent and not more than 100.5 per cent of $H_6N_2O_3S$ calculated with reference to the substance dried to constant weight at 105°.

Description: Colourless or white hygroscopic crystals.

Solubility: Readily soluble in water; sparingly soluble in alcohol.

Melting point: 130 to 133°.

Reaction: pH of a 5% solution is between 5 and 6.5.

Heavy metals: Not more than 5 parts per million.

Sulphated ash: Not more than 0.1 per cent.

Loss on drying: Loses not more than 1 per cent of its residue when dried to constant weight at 105°.

Residue on ignition: Not more than 0.02 per cent.

Assay: Boil about 1.5g accurately weighed, with a mixture of 10 ml of sulphuric acid and 50 ml of water for two hours under a reflex condensor. Transfer to an ammonia distillation apparatus, make alkaline with a 30 per cent w/v solution of sodium hydroxide, solution and distil, collecting the distillate in 50 ml of 1N sulphuric acid. Titrate the excess of acid with N sodium hydroxide, using methyl red solution as indicator. Each ml of 1N sulphuric acid is equivalent to 0.05706g of $H_6N_2O_3S$.

Ammonium vandate : $NH_4\ VO_3$

Should contain not less than 98.0 per cent of NH_4VO_3. Description: A white crystalline powder.

Assay: Dissolve 0.5 g in 30 ml of water in 1 ml of sulphuric acid, and pass sulphur dioxide into the solution until reduction is complete. Remove the excess of sulphur-dioxide by boiling gently in a current of carbon-dioxide, cool and titrate with 0.1N potassium permanganate. Each ml equivalent to .0117 g of NH_4O_3.

Anaesthetic Ether **:** $(C_2H)\ _5O_2$

Anaesthetic ether is purified diethyl ether. It contains a suitable stabilizer in a proportion not greater than 0002 per cent w/v

Description: Colourless, transparent, very mobile liquid; odour, characteristic; taste, sweet and burning. Very volatile and inflammable.

Solubility: Soluble in *water*; miscible with *alcohol* and with *chloroform*.

Boiling Range: 34° to 35°, H.P.I.

Wt. Per ml: 0.7130 to 0.7145 g (at 20°), H.P.I.

Peroxides: Place in a stoppered tube of about 12 ml capacity and about 1.5 cm in diameter, 8 ml of *solution of potassium iodide* and *starch*, fill to brim with sample of Anaesthetic ether, and place the stopper in position so that no air bubble is enclosed, shake vigorously, and set aside in the dark for 30 minutes; no brown or reddish colour is produced.

Non-volatile matter: 50 ml when evaporated and dried to constant weight at 105° leaves not more than 1 mg of residue.

Aniline **:** $C_2H_5NH_2$

Description: Colourless or pale yellow, oily liquid; odour characteristic.

Solubility: Soluble in *water*; miscible with *alcohol, beneze* and *ether*.
Boiling range: 183° to 186°, H.P.I.

Ignition residue—Evaporate 20 ml and ignite to constant weight the residue does not exceed 1.0 mg.

Aniline phthalate, **:** Mix 0.93 g of *aniline* with 1.66 g of *phthalic acid* and dissolved in 100 ml *n-butanol* saturated with water.

Antimony Solution, Standard: Dissolve 188 mg of antimony trichloride in a mixture of 20 volumes of hydrochloric acid and 80 volumes of water to make 1 litre. Dilute 1 ml of this solution with water to 50 ml (1 ml=.002 mg).

Antimony Trichloride **:** $SbCl_3$

Contains not less than 99.0 per cent of $SbCl_3$.

Description: Colourless crystals or transluscent crystalline masses, very deliquescent.

Solubility: Soluble in small quantity of water, decomposed by larger amounts to insoluble oxychloride. Soluble in hydrochloric acid, in alcohol and in chloroform.

Sulphate: 5g complies with the limit test for sulphates, HPI.

Iron: 1g complies with the limit test for iron, HPI.

Assay—Dissolve about 0.5g accurately weighed, in a solution of 4g potassium sodium tartrate in 30 ml of water, add 2g sodium hydrogen carbonate. Titrate immediately with 0.1 N iodine, using starch as indicator.

Each ml of 0.01 N iodine is equivalent to 0.001141g of $SbCl_3$.

Aqua regia (Nitrohydrochloric acid): It is made by mixing 20 per cent nitric acid with 80 per cent *hydrochloric acid* in a dish or loosely stoppered container and allowing to stand at room temperature for about 15 hours, or until gas is no longer evolved.

It immediately liberates iodine when 1 drop of the acid is added to 1 ml of an aqueous solution of potassium iodide (1 in 5).

Arsenious acid, solution of : Arsenic chloride solution prepared with 1 g arsenious trioxide, 5 m dilute hydrochloric acid and water 100 ml.

Ascorbic Acid : $C_6H_8O_6$

Contains not less than 99.0 per cent of $C_6H_8O_6$.

Description: Colourless crystals or a white crystalline powder; odourless, taste acidic. Rapidly deteriorates in solution in presence of air.

Solubility: Soluble in 3 parts of water and in 30 parts of alcohol; practically insoluble in chloroform, in solvent ether and in benzene. Soluble in methyl alcohol.

Reaction: pH of a 2 per cent w/v solution, 2.4 to 2.8.

Melting range: 190° to 192°, with decomposition.

Specific rotation: Determined in a 2.0° percent w/v solution in water at 20°, + 22° to 23°.

Heavy metals: Dissolve 1g in 200 ml of water, add 0.5ml of 0.1N hydrochloric acid and dilute to 25 ml with water; the limit of heavy metals in 20 parts per million.

Sulphated Ash: Not more than 0.1 per cent.

Assay: Weigh accurately about 0.1g and dissolve in a mixture of 100 ml of freshly boiled and cooled water and 25 ml of dilute sulphuric acid. Immediately titrate with 0.1N iodine icing, starch solution as indicator as the end point is neared. Each ml of 0.1 N iodine is equivalent to 0.008806g of $C_6H_8O_6$.

Barium Chloride **:** $BaCl_2\,2H_2\,O$.

Description: Colourless crystals.

Solubility: 1g dissolves completely in 5 ml of water.

Lead : Dissolve 1 g in 40 ml of recently boiled and cooled water, add 5 ml of lead free acetic acid, render alkaline with lead-free solution of ammonia, and add 2 drops of lead-free solution of sodium sulphide. Not more than a slight colour is produced. Nitrate—Dissolve 1 g in 10 ml of water, add 1 ml of solution of indigo caramine and add 10 ml of nitrogen free sulphuric acid and heat to boiling. The blue colour does not entirely disappear.

Barium Chloride, Solution of **:** A 10.0 per cent w/v solution of barium chloride in water.

Benzene : C_6H_6

Description: A colourless, transparent liquid, inflammable.

Distillation range: Not less than 95 per cent. Distils between 79.5° and 81°.

Weight per ml—At 20°, 0.876 to 0.881g, HPI.

Sulphur compounds :Boil 10 ml with 1 ml of absolute alcohol and 3 ml of potassium plumbite solution for fifteen minutes. The aqueous layer remains colourless.

Thiophen: Shake 2 ml with 15 ml of sulphuric acid containing 3 mg of isatin in a stoppered tube for five minutes and allow to separate. No blue or green colour is produced.

Non-volatile matter—When evaporated on a water-bath and dried to constant weight at 105°, leaves not more than 0.01 per cent w/v of residue.

Benzidine

: NH1 $(C_6N_4)_2NH_2$.
Description: A pale buff coloured crystalline powder.
Solubility: Readily soluble in alcohol (90 per cent) yielding a clear solution; 1 g dissolves in a mixture of 3 ml of dilute hydrochloric acid and 25 ml of water, yielding a clear solution.

Melting range: 128° to 129°.

Organic impurities: Dissolve 0.1 g in 5 ml of glacial acetic acid, the solution is clear and not more than faintly coloured; add 6 ml of a mixture of equal volumes of solution of hydrogen peroxide and water; no darkening is produced.

Boric Acid

: H_3BO_3
Boric acid contains not less than 99.5 per cent of H_3BO_3, calculated with reference to the substance dried over *concentrated sulphuric acid* for five hours.

Description: white crystals of a somewhat pearly lusture or a white crystalline powder; taste slightly acidic and bitter, touch unctuous. Heated at 100°, it loses water and is partially transformed into metaboric acid, BHO_2.

Solubility: Soluble in *water* and in *alcohol,* freely soluble in boiling *water* and in boiling alcohol.

Identification: (i) Acidify a 5 percent w/v solution with *hydrochloric acid*; moisten a piece of turmeric paper with this solution and dry; the colour of the paper becomes pink or brownish red, pour *dilute ammonia solution* or *solution of* *sodium hydroxide* on the paper; the colour changes to blue or greenish black.

(ii) Ignite in a porcelain dish a solution in *alcohol*, it is tinged green.

Assay—weigh accurately about 2g, and dissolve in a mixture of 50 ml of *water* and 100 ml of *glycerin*, titrate with 1N *sodium hydroxide*, using *solution of phenolphthalein* as indicator. Each ml of 1N sodium hydroxide is equivalent to 0.1638g of H_3BO_3.

Boric Acid **:** A 5.0 percent w/v solution of boric acid in *water*.

Bismuth Oxide Nitrate : (Bismuth oxynitrate, Bismuth nitrate basic)
It is prepared by partial hydrolysis of Bismuth nitrate. Contains 70.0 to 74.0 per cent of Bismuth.
Description—A white, slightly hygroscopic micro-crystalline powder; odourless; tasteless.

Solubility—Insoluble in water, in alcohol; readily soluble in dilute hydrochloric acid and in dilute nitric acid.

Assay—Dissolve about 1g accurately weighed in in a mixture of 20 ml of glycerol and 20 ml of water. Add 0.1g of sulphuric acid and tritrate with 0.05M disodium, edetate, using catechol violet solution as indicator. Each ml of 0.05 M disodium edetate, is equivalent to 0.01045g of Bismuth.

Storage—Keep in a well-closed container protected from light.

Borax **:** Of the Homoeopathic Pharmacopoeia of India.

Bromine **:** Br_2

Description: A reddish brown, fuming, corrosive liquid, sparingly soluble in water; soluble in alcohol and in ether.

Iodine—Boil 0.2 ml with 20 ml of water, 0.2 ml of 1 N sulphuric acid and a small piece of marble until the liquid in almost colourless, cool, add one drop of liquefied phenol, allow to stand for two minutes and then add 0.2 g of potassium iodide and 1 ml of solution of starch; no blue colour is produced.

Arsenic—Not more than 1 part per million.

Sulphate—Shake 3 ml with 30 ml of ammonia solution and evaporate to dryness on a water-bath, the residue complies with the limit test for sulphates.

Non-Volatile matter—Leaves not more than 0.1 per cent of its weight when evaporated to dryness in porcelain dish on a water-bath.

Bromine Solution of **:** A saturated solution of bromine in water.

Brucine : $C_{22} H_{96} O_4 N_2 4H_2 O$, An alkaloid obtained from Nux-vomica.

Description**:** Colourless crystals; soluble in 320 parts of water.

Identification**:** When treated with nitric acid gives a deep red colour.

Butyric Acid : $C_4H_8O_2$

n-Butanol **:** C_4H_3OH

Description**:** A clear, colourless liquid

Solubility: Soluble in *water*.

Boiling Range: Not less than 95.0 percent distils between 115° and 118°, HPI.

Wt. Per ml: At 25°, about 0.81 g, HPI.

Fluorescence**:** when examined under screened ultraviolet light, it shows no fluorescence.

Non-volatile matter**:** when evaporated to dryness on a water-bath and dried to constant, weight at 105°, leaves not more than 0.01 percent w/v of residue.

Calcium Acetate : $(CH_2COO)\ _2Ca$

Description**:** Very hygroscopic, rod-shaped crystals.

Solubility**:** Soluble in water; slightly soluble in methanol, practically insoluble in ethanol, in acetone and in benzene.

Calcium Carbonate **:** Of the Indian Pharmacopoeia.

Calcium Chloride, Solution of: A 10.0 per cent w/v solution of calcium chloride, in water.

Chloride **:** Boil 5 g with 50 ml of water and filter while hot. The filtrate after cooling, complies with the limit test for chlorides.

Acid-insoluble matter-Boil 2 g with 100 ml of 1 N hydrochloric acid, filter, wash with hot dilute hydrochloric acid and then with water, dry, ignite and weight; the residue weights not more than 2 mg.

Alkalinity—Boil 1g with 50 of water, cool and titrate with 0.1 N hydrochloric acid, using solution of bromothymol blue as indicator; not more than 0.3 ml of 0.1 N hydrochloric acid is required.

Calcium Oxalate :$CaC_2O_4. H_2O$

Description**:** Monohydrate, white cubic crystals. Insoluble in *water* and in *acetic acid*, soluble in dilute *hydrochloric acid* and in *nitric acid*.

Calcium Oxide :(Quicklime)CaO.

Description: Dry, white lumps or powder; it readily absosrbs moisture and carbon dioxide from the atmosphere. When moistured with water, a reaction takes place with the evolution of heat and the lumps swell and fall to powder forming calcium hydroxide.

Loss on ignition**:** When ignited strongly, loses, not more than 10 per cent of its weight.

Calcium Sulphate : $CaSO_4 2H_9O$.

Description**:** A white powder.

Solubility**:** Slightly soluble in water.

Calcium Sulphate, Solution of—A saturated solution of calcium sulphate in water.

Calcium Sulphate, Semihydrate **:** $CaSO_4. H_2O$

Description**:** A white powder; odourless and tasteless.
Solubility: Slightly soluble in water, practically insoluble in *alcohol*.
Identification**:** See CALCAREA SULPHURICA of the HPI.

Calcon **:** $C_{20} H_{13} N_2 NaO_5 S$

Description**:** A brownish-black powder with a violet sheen.

Solubility**:** Sparingly soluble in *water*, freely soluble in *alcohol* and in *acetone*. Very soluble in *methanol.*

Calcon Triturate : Triturate 1 part of *Calcon* with 99 parts of freshly ignited sodium *sulphate*.
Test for sensitivity**:** Dissolve 0.2 g in 5 ml of *water*. To 1 ml of the solution add 50 ml of *water*, 10 ml of 1N *sodium hydroxide* and 1 ml of a 1 percent w/v *solution of magnesium sulphate*. The solution is blue. On addition of 0.1 ml of a 0.15 percent w/v *solution of calcium chloride,* the solution becomes violet, and on the subsequent addition of 0.1 ml of .01m M *sodium edetate,* turns to pure blue.

Carbonate : Boil 1 g with 10 ml with water and add 1 ml of *hydrochloric acid*; no carbon dioxide is evolved.

Residue on ignition: When ignited, leaves not less than 78.5 per cent and not more than 80.0 per cent of residue.

Carbon Dioxide : Of the Indian Pharmacopoeia.

Carbon Disulphide : CS_2.

Description: A clear, almost colourless, inflammable liquid.

Boiling range—Not less than 95.0 per cent distils between 46° and 47°.

Wt. Per ml—At 25°, about 1.263g.

Non-volatile matter—When evaporated to dryness on a water-bath and dried to constant weight at 105°, leaves not more than 0.005 percent w/v of residue.

Carbon Tetrachloride : CCl_4.

Description—A clear, colourless, volatile liquid; odour, characteristic. It is almost insoluble in water, miscible with ethyl alcohol, and in solvent ether. Not less than 95 percent distils between 76° and 77°.

Wt. Per ml—At 20°, 1.592 to 1.595, page 233.

Acidity—Shake 13 ml with 25 ml of carbon dioxide free-water for 5 minutes, separate, and reject the carbon tetrachloride. To 10 ml of the water layer add 2 drops of solution of phenolphthalein and titrate with 0.1 N sodium hydroxide; not more than 0.05 ml is required to produce a pink colour.

Residue on evaporation—Evaporate 63 ml on a steam-bath, and dry at 105° for 30 minutes; the residue weighs not more than 1 mg. (0.001 percent).

Free chlorine—Shake 10 ml for 2 minutes with 10 ml of whater containing 2 drops of solution of potassium iodide and allow to separate; the lower layer does not show a violet tint.

Charcoal **:** Decolourising.

Description: A fine, black powder.

Decolourising power**:** Add 0.1 g to 50 ml of a 0.006 per cent w/v solution of bromophenol blue in alcohol (20 percent) contained in a 250 ml flask, and mix by rotating the vessel; allow to stand for five minutes, and filter; the colour of the filtrate is not deeper than that of a solution prepared by diluting 1 ml of solution of bromophenol blue to 50 ml with alcohol (20 percent).

Acid soluble matter: Heat 1g with 10 ml of dilute sulphuric acid and 20 ml of water for five minutes on a water-bath. Filter, evaporate the filtrate to dryness, ignite and weight; the residue weighs not more than 25 mg.

Sulphated ash: Not more than 5.0 per cent.

Chloroform **:** $CH\,Cl_3$
Chloroform is trichloromethane.

Description: A colourless volatile liquid; odour, characteristic; taste sweet and burning.

Solubility: Slightly soluble in *water*; freely miscible with *ethyl alcohol* and with *solvent ether*.

Wt. Per ml: At 25°, 1.4738 to 1.4742 g; H.P.I.

Boiling range: 60° to 62°, H.P.I.

Acidity: Shake 10 ml with 20 ml of freshly boiled and cooled *water* for three minutes, and allow to separate. To a 5 ml portion at the aqueous layer add 0.1 ml of *solution of litmus*; the colour produced is not different from that produced on adding 0.1 ml of solution of litmus to 5 ml of freshly boiled and cooled *water*.

Non-volatile matter: 25 ml, when evaporated and dried to constant weight at 105°, leaves not more than 1 mg of residue.

Chloroplatinic Acid : (Hexa) : See Platinic Chloride.

Chloral Hydrate : $CCl_3CH(OH)_2$

Contains not less than 90.0 per cent of $C_2H_3O_2Cl_3$.

Description: Colourless transparent crystals; odour pungent but not acrid; taste, pungent and slightly bitter. Volatilises slowly on exposure to air.

Solubility: Soluble in 0.25 parts of water, in 1.3 parts of alcohol, in 2 parts of chloroform and in 1.5 parts of solvent ether.

Reaction: 2ml of a 10 per cent w/v solution gives a yellow or orange colour on addition of solution of dimethyl yellow.

Chloride: 3g complies with the limit test for chlorides.

Chloral alcoholate: Warm 1g with 6 ml of water and 0.5 ml of sodium hydroxide solution, filter, and add sufficient 0.1N iodine to impart a deep brown colour and set aside for one hour; no yellow crystalline precipitate is produced and no smell of iodoform is perceptible.

Assay: Weigh accurately about 4g and dissolve in 10ml of water and add 30ml of 1N sodium hydroxide. Allow the mixture to stand for two minutes and then titrate with 1N sulphuric acid, using phenolphthalein solution as an indicator. Titrate the neutralized liquid with 0.1N silver nitrate using potassium chromate solution as an indicator. Add two-fifteenths of the amount of 0.1N silver nitrate used to the amount of 1N sulphuric acid used in first titration and deduct the figure so obtained from the amount of 1N sodium hydroxide added. Each ml of 1N sodium hydroxide obtained as difference is equivalent to 0.1654g of $C_2H_3O_2Cl_3$.

Chlorine, Solution of **:** A saturated solution of chlorine in water.

Chloroform **:** Of the Indian Pharmacopoeia.

Citric Acid **:** $C_6H_8O_7H_2O$

It contains not less than 99.5 per cent and not more than the equivalent of 101.0 per cent $C_6H_8O_7H_2O$.

Description: Colourless, translucent crystals, or a white, crystalline powder slightly hygroscopic in moist air; and slightly efflorescent in warm dry air; odourless, taste, strongly acidic.

Solubility: Very soluble in *water*; freely soluble in *alcohol* and slightly soluble in *solvent ether*.
Identification: Yields, when neutralized, the reactions characteristic of *citrates*, H.P.I.

Copper and Iron: Dissolve 2 g in 40 ml of *water*, and add 10 ml of *dilute ammonia solution* and 5 drops of *solution of sodium sulphide*; the colour produced is at most slightly deeper than that produced in a similar mixture, containing in addition 1 ml of *solution of potassium cyanide*.

Assay: Weigh accurately about 3g and dissolve in 100 ml of *water* and titrate with 1N *sodium hydroxide* using *solution of thymol blue* as indicator. Each ml of 1N *sodium hydroxide* is equivalent to 0.07005 g of $C_6H_8O_7$. H_2O.

Cobaltous Chloride : $CoCl_2$, $6H_2O$

Syn. Cobalt chloride.

Contains not less than 87.5 per cent of $COCl_2$, $6H_2O$.

Description—Deep red crystals or crystalline powder.

Solubility—Freely soluble in water; soluble in ether, in alcohol, in acetone.

Clarify of solution—5.0g dissolved in 50ml of water to yield a clear pink solution.

Iron—Dissolve 3.0g in 30 ml of water, add 0.3g of zinc oxide and boil for one minute. Filter with suction, wash the residue with water, dissolve in 4.5 ml of dilute hydrochloric acid and 30 ml of water, add 0.3g of zinc oxide and again boil for one minute. Filter with suction, wash the residue with water, dissolve in 6 ml of dilute hydrochloric acid and add sufficient water to produce 60 ml. 4 ml of this solution complies with the limit test for iron, 6 drops of thioglycollic acid being used.

Sulphate—0.5g complies with the limit test for sulphates.

Assay—Dissolve 1g in 300 ml of water, add 2 g of hydroxylammonium chloride and 25 ml of strong ammonia solution and heat to above 80°. Titrate the solution with 0.1M disodium edetate using methyl thymol blue mixture as indicator, until the colour changes from blue to purple. Each ml of 0.1 N disodium edetate is equivalent to 0.02379 g of $COCl_2$, $6H_2O$.

Cobaltous Chloride Solution : Syn. Cobalt Chloride solution.

Dissolve about 65g of cobaltous chloride in a sufficient quantity of a mixture of 25 ml of hydrochloric acid and 975 ml of water to produce 1000ml; determine the proportion of cobalt chloride, $COCl_2$, $6H_2O$ in the solution to by the Assay prescribed below and adjust the strength of the solution to 59.5 mg of $COCl_2$ $6H_2O$ per ml by the addition of a calculated quantity of a mixture of 25 ml hydrochloric acid and 975 ml of water.

Assay—Place 5 ml in a 250 ml glass-stoppered flask, 2.5 ml of hydrogen peroxide solution and 15 ml of sodium hydroxide solution, boil for ten minutes, cool, add 2g of potassium iodide and 20 ml of a mixture of 1 volume of sulphuric acid and 3 volumes of water, allow the precipitate to dissolve and titrate the liberated iodine with 0.1N sodium thiosulphate. Each ml of 0.1N sodium thiosulphate is equivalent to 0.0238g of $CoCl_2$ $6H_2O$.

Copper **:** Cu. The pure metal known commercially under the term ‘electrolytic copper’.

Description: Usually in the form of turnings or borings.

Copper Sulphate, Solution of : A 12.5 per cent w/v solution of copper sulphate in water.

Copper Acetate : $(CH_3COO)\ _2Cu.\ H_2O$.

Syn. : Cupric acetate.

Contains not less than 98.0 per cent of $C_4H_6CuO_4H_2O$.

Description—Dark bluish-green crystals or a green powder having a faint odour of acetic acid, efflorescent in dry air.

Solubility—Soluble in water and in alcohol; slightly soluble in ether. Iron 2g complies with the limit test for iron.

Chloride –3g complies with the limit test for chlorides.

Sulphate—1.5g dissolved in 5 ml of dilute hydrochloric acid complies with the limit test for sulphates.

Assay—Dissolve 0.8g in 50 ml of water, add 2 ml of acetic acid and 3g of potassium iodide and titrate the liberated iodine with 0.1N sodium thiosulphate, using starch mucilage as indicator, until only a faint blue colour remains; add 2 g of potassium thiocyanate and continue the titration until blue colour disappears. Each ml of 0.1N sodium thiosulphate is equivalent to 0.01997g of $C_4H_6CuO_4H_2O$.

Copper Acetate, Dilute Solution of **:** A 0.05 per cent w/v solution of copper acetate in water.

Copper, Solution Standard : Dissolve 393 mg of cupric sulphate $CuSO_4$, $5H_2O$ in water to make one litre. Dilute 1 ml of this solution with water to 10 ml. (1ml = 0.01 mg of Cu).

Cupric Sulphate **:** $Cu\ SO_4.\ 5H_2O$

Copper sulphate contains not less than 98.5 per cent and not more than the equivalent of 101.0 percent of $CuSO_4.\ 5H_2O$.

Description—Blue triclinic prisms or a blue crystalline powder.

Solubility—Soluble in *water*, almost insoluble in *alcohol*, very slowly soluble in *glycerine*
Identification—Yields the reactions characteristic of *copper*, H.P.I. and of *sulphates*, H.P.I.

Acidity and clarity of solution—1g dissolved in 20 ml of *water*, forms clear blue solution, which becomes green on the addition of 0.1 ml of *solution of methyl orange.*

Assay—weigh accurately about 1 g and dissolve in 50 ml of *water*; add 3 g of *potassium iodide*, 5 ml of *acetic acid*, and titrate the librated iodine with 0.1 N *sodium thiosulphate*, using *solution of starch* as indicator. Continue titration till faint blue colour remains, add 2 g of *potassium thiocyanate*, stir well, and continue the titration until the blue colour disappears. Each ml of 0.1N *sodium thiosulphate*, is equivalent to 0.02497 g of $Cu\ SO_4.\ 5H_2O$.

Cupric Sulphate, Aqueous Solution of **:** A 1.0 percent w/v solution of *cupric sulphate* in *water*.

Cuprous Chloride : CuCl

Contains not less than 98.0 per cent of CuCl.

Description—White crystalline powder or cubic crystals. Stable to air and light if dry, but in presence of moisture turns green on exposure to air and blue to brown on exposure to light.

Solubility—Sparingly soluble in water with partial decomposition, practically insoluble in alcohol in acetone; soluble in concentrated hydrochloric acid and in concentrated ammonium hydroxide.

Sulphate—3g complies with the limit test for sulphates.

Iron—2g complies with the limit test for chlorides.

Arsenic—Not more than 1 part per million.

Assay—Dissolve about 0.5g accurately weighed in 30ml of a cold solution containing 10g ferric ammonium sulphate in 100 ml of (1+1) hydrochloride acid. Add 5 ml of phosphoric acid and titrate with 0.1N potassium permanganate. Repeat the procedure as described above, omitting the substance being tested. Each ml of 0.1 N potassium permanganate is equivalent to 0.009903g of CuCl.

Storage—Store in a tightly closed container protected from light.

Cuprous Chloride Solution, 15 per cent: A 15 per cent solution of cuprous chloride in hydrochloric acid.

Devarda's Allay **:** It consists of 50 parts of *copper,* 45 parts of *aluminium* and 5 parts of *zinc*.
Description—Grey powder.
Solubility—Partly soluble in hydrochloric acid.

Dimethyl Yellow : $C_{14}H_{15}N_3$
Syn: 4 dimethylamino-azobenzene; Methyl yellow.
Description—yellow crystalline powder or plates.
Solubility—Insoluble in water; soluble in alcohol, in benzene, in chloroform and in ether.
Sulphated ash—Ignite 0.5g with 0.5 ml of sulphuric acid to constant weight. Not more than 1.0 mg of residue remains.
PH range—2.9 to 4.0 (Read to yellow).
Melting point—114°—117°.

Dimethyl Yellow Solution : A 0.2 per cent w/v solution of dimethyl yellow in alcohol (90 per cent).

2.9 Dimethyl 1.10 Phenanthroline Solution, : A 0.1 per cent w/v solution of 2.9 dimethyl-1.10 phenanthroline in alcohol.

Diphenylamine : $(C_6H_5)_2NH$.

Contains not less than 98.0 per cent of $C_{12}H_{11}N$.

Description—White crystals; odour, slight aromatic. Discolours in light.

Solubility—Insoluble in water; soluble in alcohol, in ether and in strong acids.

Melting point—53° to 54°.

Iron—4g complies with the limit test for iron.

Sulphated ash—Not more than 0.03 per cent.

Storage—Store at a place protected from light.

Diphenylamine, Solution of : Dissolve 0.05g of diphenylamine in a cooled mixture of 90g of sulphuric acid and 10g of water.

Diphenyl Benzidine : $C_{24}H_{20}N$

Description—A white or faintly grey-coloured, crystalline powder. Darkness in air and light.

Solubility—Insoluble in water; slightly in alcohol; freely in ethyl acetate (hot); in toluene.

Melting point—246° to 250°.

Nitrate—Dissolve 25 mg in 1 ml of hydrochloric acid. Add cautiously 0.2 ml of this solution to 10 ml of sulphuric acid. No blue colour is produced.

Sulphated ash—Not more than 0.1 per cent.

Dinitrophenyl hydrazine: 2:4—Dinitrophenyl hydrazine $(NO_9)_8C_6N_8$ NH_9.

Description—Orange red crystals or a crystalline powder.

Solubility—Insoluble in water; slightly soluble in alcohol, 0.5 g yields a clear yellow solution on heating with a mixture of 25 ml of water, and 25 ml of hydrochloric acid.

Melting range—198° to 200°.

Sulphated ash—Not more than 0.5 per cent.

Dinitrophenyl hydrazine, Solution of: Dissolve 1.5 g of dinitrophenyl hydrazine in 20 ml of sulphuric acid (50 per cent v/v); dilute to 100 ml with water and filter.

Solution of Dinitrophenyl hydrazine must be prepared fresh.

Disodium Ethylenediamine Tetracetate: C_{10} H_{14} O_8 N_2 Na_2 $2H_2$ O.

Description—White crystals.

Reaction—pH of a solution of 5 g in 100ml of ammonia-free and carbondioxide—free water, 4.0 to 6.0.

Assay—Weigh accurately about 2g and dissolve in 25 ml of water, add 2 drops of solution of eriochrome black T, prepared by dissolving 0.5 g of eriochrome black in 0.9 g of hydroxylamine hydrochloride in 100 ml of methyl alcohol and 5 ml of ammonia—ammonium chloride buffered. Mix and titrate with freshly standardized magnesium chloride solution until the solution is wine red in colour. Calculate the percentage $C_{10} H_{14} O_8 N_2 Na_2 2H_2 O$ b the formula 1530.4 (Vc/w) in which v is the volume of the magnesium chloride solution in ml, c the concentration of the standard magnesium chloride solution in g of magnesium per ml and w is the weight of the sample; not less than 99.0 per cent is found. Magnesium chloride solution is prepared by dissolving 32g of magnesium chloride in water to produce 1000 ml. The solution is standardized as follows: To 10 ml of the solution add 140 ml of water, heat to 75°, add 10 ml of a solution of 5g of 8-hydroxyquinoline in 100 ml of 2 N, acetic acid and slowly add dilute ammonia solution until the pH is between 11 and 12. Cool the solution and after one hour filter through a tared Gooch crucible. Wash with cold eater, ignite to constant weight. Each g of precipitate is equivalent to 0.6032 g of magnesium.

Disodium hydrogen orthophosphate, decahydrate: Natrum Phosphoricum of the H.P.I.

Dragendorff's Reagent **:** For alkaloids and other nitrogen containing compounds.

Solution A—1.7 g basic bismuth nitrate and 20 g tartaric acid are dissolved in 80 ml water.
Solution B—16 g potassium iodide dissolved in 40 ml water.

Stock Solution—A 1:1(v/v) mixture of A and B is prepared.

Spray reagent—5 ml of stock solution are added to a solution of 10 g *tartaric acid* in 50 ml *water*.

Ether **:** $(C_2H_6)_2O$
It is diethyl ether.

Description—A colourless, transparent, very mobile liquid, odour, characteristic, taste, sweet and burning; very volatile and inflammable. Mixture of its vapour with oxygen, air or nitrous oxide in certain concentrations are explosive.

Solubility: Soluble in water, miscible with *alcohol* and with *chloroform*.

Boiling Range: 34° to 35°, H.P.I.

Wt. Per ml.: At 25°, 0.704 to 0.708 g, H.P.I.

Peroxides: Place in a stoppered tube of about 12 ml capacity and about 1.5 cm in diameter 8 ml of *solution of potassium iodide* and *starch*. Fill to the brim with the sample and place the stopper in position so that no air bubble is enclosed, shake, vigorously, and set aside in the dark for thirty minutes, no brown or reddish colour is produced.

Non-volatile matter: 50 ml when evaporated and dried to constant weight at 105° leaves not more than 1 mg of residue. It is dangerous to perform this test if the sample does not comply with the test for peroxides.

Ethyl Acetate **:** $CH_3COOC_2H_5$.

Description—A colourless liquid; odour, characteristic.

Solubility—Soluble in *water*, miscible with *alcohol* and with *solvent ether*.

Boiling range—Not less than 95.0 per cent, distils between 74° and 79°, H.P.I.

Wt. Per ml—At 25°, 0.895 to 0.898 g H.P.I.

Non-volatile matter—when evaporated to dryness on a water—bath and dried to constant weight at 105°, leaves not more than 0.01 percent $W/_v$ of residue).

Boric Ammonium Sulphate **:** Of the H.P.I.

Boric Chloride **:** Of the H.P.I.

Ether, Solvent **:**Of the Indian Pharmacopoeia.

Ethyl Alcohol, Strong alcohol of the Homoeopathic Pharmacopoeia of India.

Formaldehyde, solution **:** Formaldehyde solution is a solution of *formaldehyde* in *water* with *methyl alcohol* added to prevent polymerization. It contains not less than 34.0 percent w/w and not more than 38.0 percent w/w of CH_2O.

Description—A colourless liquid; odour, characteristic pungent and irritating; taste burning. A slight white cloudy deposit is formed on long standing especially in the cold due to separation of paraformaldehyde. This white deposit disappears on warming the solution.

Solubility—Miscible with water, and with alcohol.

Identification—(i) Dilute 2 ml with 10 ml of *water* in a test tube, and add 1 ml of *sodium of silver ammonium nitrate;* metallic silver is produced either in the form of a finely divided, grey precipitate or as a bright metallic mirror on the sides of the test tube.

(ii) Add 2 drops to 5 ml of *sulphuric acid* in which about 20 mg of salicylic acid has been dissolved and warm the liquid very gently; a permanent deep red colour appears.

Acidity—To 10 ml add 10 ml of *carbon dioxide-fee water* and titrate with 0.1N *sodium hydroxide* using *solution of bromothymol blue* as indicator; not more than 5 ml of 0.1 N *sodium hydroxide* is required.

Wt per ml—At 25°, 1.076 to 1.080g, H.P.I.

Assay—Weigh accurately about 3g and to a mixture of 50 ml of solution of hydrogen peroxide and 60 ml of 1N sodium hydroxide, arm on a water—bath until effervescence ceases; titrate the excess of alkali with 1N sulphuric acid, using solution of phenolphthalein as indicator. Repeat the experiment with the same quantities of the same reagents in the same manner omitting formaldehyde solution. The difference between the titrations represents the sodium hydroxide required to neutralize the formic acid produced by the oxidation of the formaldehyde. Each ml of 1N *sodium hydroxide* is equivalent to 0.03003g of CH_2O_4.

Formic Acid **:** HCOOH

Contains not less than 90 percent w/w of CH_2O_2.

Description—A colourless liquid having a very pungent odour. Highly caustic.

Solubility—Miscible with water and with alcohol.
Wt. Per ml—At 25°, about 1.2g, H.P.I.
Chloride—1 ml complies with the limit test for chlorides, H.P.I.

Sulphate—0.5 ml complies with the *limit test for sulphates*, H.P.I.

Non-volatile matter—When evaporated on a water-bath, and dried to constant weight at 105° leaves not more than .05 percent w/w of residue.

Assay—Weigh a flask containing about 10 ml of *water*, quickly add about 1 ml of the acid and re-weigh; dilute with 50 ml of water, and titrate with 1 N sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of 1 N sodium hydroxide is equivalent to 0.04603 g of CH_2O_2.

Ferric Ammonium Sulphate: $Fe(NH_4)(SO_4)_2\ 12H_2O$.

Contains not less than 99.0 per cent, and not more than the equivalent of 101.0 per cent of $Fe(NH_4)\ (SO_4)_2\ 12H_2O$.

Description—Pale violet crystals, or a nearly colourless crystalline powder.

Solubility—Soluble in water, yielding a clear yellow or brown solution.

Ferrous iron **:** Dissolve 1 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of solution of potassium ferricyanide; no green or blue colour is produced.

Assay—Dissolve about 2g accurately weighed, in 10 ml of dilute hydrochloric acid and dilute to 50 ml with water, add 3 g of potassium iodide, allow to stand for ten minutes and titrate the liberated iodine with 0.1 N sodium thiosulphate. Each ml of 0.1 N sodium thiosulphate is equivalent to 0.04822 g of Fe $(NH_4)_2\ 12H_3O$.

Ferric Ammonium Sulphate: solution of—An 8.0 per cent w/v solution of ferric ammonium sulphate in water.

Ferric Chloride **:**$FeCl_3$.

Description—Greenish black crystals or a crystalline powder, free from the orange colour of the hydrated salt, which is readily acquired by exposure to atmospheric moisture.

Solubility—Soluble in water, yielding an orange coloured solution.

Ferrous Salt **:** Dissolve 1 g in 50 ml of water, add 1 ml of dilute hydrochloric acid and 1 ml of solution potassium ferricyanide; no blue or green colour is produced.

Free chlorine **:** Dissolve 5g in 10 ml of water and boil solution: no blue colour is produced on a starch iodide paper exposed to the vapours.

Ferric Chloride, solution of **:**Contains not less than 14.25 percent and not more than 15.75 per cent w/v of $FeCl_3$.

Description—A clear, yellowish brown liquid.

Assay—Dilute 2 ml with 20 ml of water, add 1 ml of sulphuric acid and 0.1 N potassium permanganate drop by drop until a pink colour persists for five seconds. Add 15 ml of hydrochloric acid and 2 g potassium iodide, allow to stand for three minutes and titrate with 0.1 N sodium thiosulphate. Each ml of 0.1 N sodium thiosulphate is equivalent 0.01622 g of $FeCl_3$.

Ferric Chloride, Test solution of: A 5.0 per cent w/w solution of ferric chloride in water.

Ferric chloride, acid solution of: Mix 60 ml gracial acid with 5ml of sulphuric acid, add 1 ml of solution of ferric chloride, mix and cool.

Ferrous Sulphate **:** Of the Indian Pharmacopoeia.

Ferrous Sulphate Solution **:** A 2.0 per cent w/v solution of Ferrous sulphate in freshly boiled and cooled water.

Ferrous sulphate solution must be freshly prepared.

Formaldehyde, solution of **:** Formaldehyde solution of the Indian Pharmacopocia.

Fuller's Earth—Of commerce,—

Glucose **:** $C_6 H_{12} O_{12} H_2O$

Description—Colourless crystals or a white or cream coloured, crystalline or granular powder; odourless; taste, sweet.
Solubility—Freely soluble in *water* and slightly soluble in *alcohol*.

Identification—(i) When heated, it melts, swells up, and burns, evolving an odour of burnt sugar.

(ii) When heated with *potassium cupri-tartarate solution*, it produces a copious precipitate of cuprous oxide.

Acidity—5.0g dissolved in 50 ml of freshly boiled and cooled *water*; requires for neutralization not more than 0.2 ml of 0.1N *sodium hydroxide, phenolphthalein solution* being used as indicator.

Specific optical rotation—Determined in a solution prepared by dissolving 10g in 50 ml of *water*, adding 0.2 ml of *dulute ammonia solution* and sufficient water to produce 100 ml and allowing to stand for thirty minutes, +52.5 to +53.0, H.P.I.

Less on drying—When dried to constant weight at 105°, loses not less than 7.0 percent and not more than 10.0 percent of its weight.

Glycerin : $C_3H_8O_3$

Contains not less than 98.0 per cent w/w of $C_3H_8O_3$.

Description—A clear colourless liquid of syrupy consistency; odourless; taste, sweet. It is hygroscopic.

Solubility—Miscible with water and with alcohol; insoluble in chloroform, in ether.

Reaction—A 10 per cent w/v solution is neutral to litmus solution.

Wt. Per ml—At 25°, 1.252 to 1.257 g.

Copper—To 10 ml add 30 ml of water, mix, add 1 ml of dilute hydrochloric acid and 10 ml of hydrogen sulphide solution, no colour is produced.

Iron—10 g complies with the limit test for iron.

Heavy metals—Mix 5g with 2 ml of 0.1N hydrochloric acid and water to make 25 ml; the limit test of heavy metals is 1.5 parts per million.

Sulphate—1ml complies with the limit test for sulphates.

Chloride—1 ml complies with the limit test for chlorides.

Acraldehyde and glucose—Heat strongly; it assumes not more than a faint yellow, and not a pink colour, Heat further; it decomposes with little or no charring and with no colour of burnt sugar.

Certain reducing substances—To 5ml in a Nessler grinder, add 5 ml of dilute ammonia solution, mix well and heat at 60° for five minutes. Quickly add 0.5ml silver nitrate solution from a pipette keeping the tip of pipette above the mouth of the cylinder and allowing the reagent to fall directly into the solution without touching the sides of the cylinder. Mix thoroughly and keep in the dark for five minutes. Repeat the experiment with the same quantities of the same reagent in the same manner omitting the glycerin but using 5 ml of water. Compare the turbidity/colour of the two solutions in normal day light viewing them from the tops of the cylinders preferably against a white background. The turbidity or the darkening in the sample is not greater than that of the black.

Sulphated ash—Ignite 50g and allow to burn. Cool the residue, moisten with sulphuric acid, ignite, cool, moisten again with sulphuric acid and ignite to constant weight; the residue weights not more than 5 mg.

Gold Chloride : AURUM MURITICUM OF H.P.I.

Gold Chloride Solution : A 2.0 per cent w/v solution of gold chloride in water

Gold Leaf : Au

Description—Yellow, soft metal.

Solubility—Soluble in aqua regia, but not in individual numeral acids, also in alkali-cyanides; solutions of thiocyanates.

Guiacol : $C_7H_8O_2$ (2-methoxyphenol)

Description—White or slightly yellow, crystalline mass; odour, characteristic; darkens on exposure to air and light.

Solubility—Sparingly soluble in water, in petroleum ether; miscible with alcohol, with chloroform, with ether.

Guiacol Solution, Alcoholic: A 2% w/v solution of guiacol in alcohol.

Hexamine : $C_6H_{12}N_4$

Should contain not less than 99.0 per cent of $C_6H_{12}N_4$.

Description—Colourless, lustrous crystals or a white, crystalling powder, odourless, taste at first sweetish but afterwards bitter. Sublimes at about 260° without melting and with partial decomposition and evolution of a disagreeable odour. Burns readily with a blue smokeless flame.

Solubility—Soluble in water and alcohol.

Identification—1. Mix 0.1 g with an equal weight of salicylic acid and heat with 1 ml of sulphuric acid; a caremaine red colour is produced.

2. Heat solution with dilute sulphuric acid decomposition takes place and formaldehyde is produced. Add excess of solution of sodium hydroxide; ammonia is evolved.

Reaction—A 10.0 per cent w/v solution is alkaline to solution of litmus.

Assay—Weigh accurately 1.5 g and dissolve in 10 ml of water add 50 ml of 1N sulphuric acid, and boil gently until the odour of formaldehyde has disappeared, replace it from time to time the water lost by evaporation. Titrate the excess of sulphuric acid with 1N Sodium hydroxide using solution of methyl red as indicator. Each ml of 1N sulphuric acid sis equivalent to .03505 g of $C_6H_{12}N_4$.

Hydrochloric acid, Iron free: Hydrochloric acid which contains 35.0 per cent w/w of HCl, and complies with the following additional test—

Iron—Evaporate 8.5 ml of the acid in porcelain or glass disc almost to dryness. Take up the residue in 2 ml of the acid and dilute to 50 ml. Add about 30 mg of ammonium persulphate and 3 ml of ammonium thiocyanate and mix. Any red colour produced is not darker than that of a control made with .01 mg of Fe, 2 ml of sample and the same quantities of ammonium persulphate and ammonium thiocyanate as with the sample.

Hydrochloric Acid, Dilute (10% w/v): Contains 10 per cent w/v of hydrochloride, Acid Muriaticum of H.P.I.

Wt. Per ml.—At 25°, 1.04—1.05g, H.P.I.

Assay—Carry out the 'Assay' as described in H.P.I. using 10g accurately weighed.

Hydrochloric Acid, Arsenic Free (AST): Hydrochloric acid which complies with the following tests:

(i) Dilute 10 ml with sufficient water to produce 50 ml, add 5 ml of ammonium thiocyanate solution and stir immediately; no colour is produced.

(ii) To 50 ml add 0.2 ml of bromine solution AST, evaporate on a water-bath until reduced to 16 ml adding more bromine solution AST, if necessary, in order that an excess, as indicated by the colour, may be present throughout the evaporation, add 50 ml of water and 5 drops of stannous chloride solution AST and apply the general test, the stain produced is not deeper than a 0.2 ml standard stain prepared with the same acid, showing that the proportion of Arsnic present does not exceed 0.05 ppm.

Hydrogen Peroxide Solution: A solution in water containing approximately 6.0 per cent w/v of H_2O_2 of reagent purity.

Hydroxylamine Hydrochloride : NH_2OH, HCI. Sy, Hydroxylammonium Chloride.

Contains not less than 96.0 per cent of NH_2OH, HCI.

Description—Colourless crystals, or a white crystalline powder.

Solubility—Very soluble in water;soluble in alcohol.

Free acid—Dissolve 1g in 50ml of alcohol, add 3 drops of dimethyl yellow solution, and titrate to a full yellow colour with 1N sodium hydroxide; not more than 0.5 ml is required.

Assay—Dissolve about 0.1g, accurately weighed, in 20ml of water, add 5g of ferric ammonium sulphate dissolved in 20 ml of water, add 15 ml of dilute sulphuric acid, boil for 5 minutes, dilute with 200 ml of water, and titrate with 0.1N potassium permanganate. Each ml of 0.1N potassium permanganate is equivalent to 0-003475g of NH_2OH.HCI.

Hydroxylammonium Chloride Solution : A 6 percent w/v solution of hydroxylammonium chloride water.

Hydrogen Peroxide, 30 per cent solution of : A solution in water containing, approximately 30 per cent w/v of H_2O_2 of reagent purity.

Hydrogen Sulphide :H_2S.

Prepared by the action of hydrochloric acid, diluted with an equal volume of water, on iron sulphide; the resulting gas is washed by passing through water.

Description—A colourless, poisonous gas, with a characteristic unpleasant odour.

Hydrogen Sulphide, Solution of—A recently prepared saturated solution of hydrogen sulphide in water.

Hypophosphorus Acid, Dilute: A solution in water containing approximately 10 per cent w/v of Hypophosphorus acid of Indian Pharmacopoeia.

Hydroquinone, Aqueous solution of : A solution of Hydroquinone in water containing 5.0 per cent w/v of $C_6H_24(CH)_2$.

Iodoplatinate, (Spray Reagent) **:**5 ml of 5.0 percent *hexachloroplatinic acid* and 45 ml 10 percent *aqueous potassium iodide solution* are mixed and diluted to 100 ml with *water*. The mixture is freshly prepared before use.

Iodohydroxyquinoline Sulphonic Acid (7—iodo-8 hydroxyquinoline-Sulphonic Acid: $C_2H_2INO_2S$)

Description—A yellow, crystalline powder. Slightly soluble in water and in alcohol.

Melting Range: 260° to 270° with decomposition.

Sensitivity—To 1 ml of a solution containing 0.025 mg of ferric chloride add 2 drops of hydrochloric acid and 1 drop hydrogen peroxide solution, and mix. To this mixture add 0.1 ml of a solution of the sample (1 in 1000): a green or bluish green colour is produced.

Residue on ignition—It yields not more than 0.1% of residue on ignition.

Indigo Carmine **:** Of the Indian Pharmacopoeia which may not comply with the test for Pyrogens.

Indigo Carmine, Solution of—A solution of indigocarmine in a mixture of 10 ml of hydrochloric acid and 990 ml of 20.0 percent w/v solution of nitrogen-free sulphuric acid in water, adjusted to comply with the following test: add 10 ml of a solution of 1.0 mg of potassium nitrate in 10 ml of water, add rapidly 20 ml of nitrogen free sulphuric acid and heat to boiling-point; the blue colour is just discharged in one minute.

Iodine **:** Of the Homoeopathic Pharmacopoeia of India.

Iodine, Solution of **:** Dissolve 2.6 g of iodine and 3 g of potassium iodine in water to produce 100 ml.

Iodine Monochloride, Strong Solution of **:** Dissolve 6.44 g of potassium iodate and 10 g of potassium iodide in 75 ml of water; and 75 ml of hydrochloric acid and shake until a clear solution is obtained; add 5 ml of chloroform, and add 0.05 M potassium iodate, shaking vigorously, until the chloroform becomes colourless. Strong solution of iodine Monochloride should be kept in stoppered bottle protected from light and store in a cool place.

Iron, Reduced **:** Contains not less than 80.0 per cent of metallic iron, Fe.

Description—A fine, grayish-black powder, free from metallic luster, and from gritty particles.
Solution—Insoluble in water, and in alcohol; almost completely soluble in dilute hydrochloric acid.

Assay—Shake in a stoppered flask for ten minutes about 0.25 g, accurately weighed, with a hot solution of (1.259) of copper sulphate in 20 ml of water; filter, rapidly, and with the filter with water; acidify the mixed filtrate and washing with sulphuric acid and titrate with 0.1 N potassium permanganate. Each ml of 0.1 N potassium permanganate is equivalent to 0.005585 g of Fe.

Iron, Metallic **:** Iron, reduced of the Homoeopathic Pharmacopoeia of India.

Isatin : $C_8H_5NO_2$

Description—Brick red crystals or crystalline powder.

Solubility—Very slightly soluble in cold water, freely soluble in hot water, in alcohol in ether, and in dilute ammonia solution.

Melting point—200° to 204°.

Sulphated ash—Not more than 0.2 per cent.

Lead **:** Plumbum Metallicum of the Homoeopathic Pharmacopoeia of India.

Lead Acetate **:** $(CH_3COO)_2$ Pb. $3H_2O$

It contains not less than 99.5 percent and not more than the equivalent of 104.5 percent of $C_4H_6O_4$ Pb. $3H_2O$.

Description—Small white, transparent, monoclinic prisms, crystalline masses; odour acetous; taste sweet and astringent.

Solubility—Freely soluble in *water* and in *glycerine*, soluble in *alcohol*.

Identification—Yields the reactions characteristic of *lead*; H.P.I. and of acetates; H.P.I.

Water insoluble matter—Dissolve 1g in 10 ml of recently boiled and cooled *water*; a solution if produced which is, at most, faintly opalescent and becomes clear on the addition of one drop of *acetic acid*.

Assay—Weigh accurately about 0.3g and dissolve in a mixture of 5 ml of *acetic acid* and 100 ml of *water*, heat on a water-bath to 85°, add 5 ml of *solution of potassium chromate*, and continue the heating for half an hour. Collect the precipitate wash with hot *water* until the washings are colourless, and dry to constant weight at 120°. Each g of residue is equivalent to 1.174 g of $(CH_3\,COO)_2\,Pb.\,3H_2O$.

Lead Acetate, Solution of :A 10.0 percent w/v solution of lead acetate in recently boiled water.

Lead Monoxide **:** PbO.

Contains not less than 98.0 percent of PbO.

Description—Yellow or orange—yellow powder.

Solubility—Almost insoluble in *water*; soluble in *nitric* or *acetic acid* and warm solutions of *alkali hydroxides*.

Assay—Weigh accurately about 0.3 g and dissolve in 5 to 10 ml of *water* and minimum quantity of *acetic acid.* Add 50 ml of *water,* about 50 mg of *xylenol orange* reagent and sufficient *hexamine* until the solution becomes red. Titrate with 0.05M *sodium acetate* until the red colour becomes yellow. Each ml of 0.05 M *sodium acetate* is equivalent to 1.101 mg of PbO.

Lead Paper **:**Lead Acetate Paper—Pieces of thin white filter paper about 100 mm by 50 mm, soaked in solution of lead acetate and dried.

Lead Chloride : $PbCl_2$

Description—White crystalline powder.

Solubility—Sparingly soluble in water, insoluble in alcohol; readily soluble in ammonium chloride solution.

Iron—4 g complies with the limit test for iron, H.P.I.

Lead Solution, Standard : Refers to the standard Lead solution as given in limit test for lead in H.P.I.

Lead Chloride Solution, Saturated : A saturated solution of lead chloride in water.

Lead dioxide : PbO_2

Description—A white powder; odourless taste, slightly alkaline. Readily absorbs moisture and carbondioxide when exposed to air.

Solubility—Almost insoluble in water in alcohol. Soluble in dilute acids.

Magenta : $(H_2\,N.\,C_6\,N)_{12}\,C\!:\,C_6\,H_3\,(CH_3)\,NH_2CI$

Syn : Fuchsin

Description—A dark red power or green crystals, with a metallic luster.

Solubility—Soluble in water, in alcohol, and in amyl alcohol.

Clarity—100 mg when dissolved in 20 ml of water produce a clear solution.

Loss on drying—Loses not more than 5% of its weight when dried to constant weight at 105°.

Sulphated ash—Not more than 5.0 per cent.

Magenta Solution Decolourised : Dissolve 0.1g basic magenta in 60 ml of water and cool in ice; add 2 g of sodium sulphate dissolved in 10 ml of water, cool in ice and add slowly and with constant stirring, 1 ml of hydrochloric acid, dilute to 100 ml. If the resulting solution is turbid, it should be filtered and if brown in colour it should be shaken with decolourising charcoal (0.02 to 0.04g) to render it colourless and then filtered immediately. Occasionally it is necessary to add 0.2 to 0.3 ml of hydrochloric acid, followed by shaking to remove a little residual pink colour. Allow this solution to stand overnight.
Storage—Store at a dark place.

Manganese Dioxide **:** MnO_2.

Contains not less than 70.0 per cent of MnO_2.

Description—A black or brownish-black, powder. It is insoluble in water.

Chloride **:** Warm 1 g with 20 ml of water, 3 ml of nitric acid and 5 ml of solution of hydrogen peroxide until solution is complete; cool and dilute to 50 ml with water; the solution complies with the limit test for chlorides.

Assay—Place about 0.2 g accurately weighed, in a stoppered flask, add 50 ml of water 3g of potassium iodide and 10 ml of dilute hydrochloric acid and shake until solution is complete; titrate the librated iodine with 0.1 N sodium thiosulphate. Each ml of 0.1 N sodium thiosulphate is equivalent to 0.004347 g of MnO_2.

Magnesium Acetate : $(CH_2CO_2)_2$ Mg, $4H2O_2$

Contains not less than 99.0 per cent of $C_4H_6MgO_4$, $4H_2O$

Description—Small colourless or white crystals; deliquescent.

Solubility—Freely soluble in water, in alcohol.

Melting point—About 80°.

Reaction—pH of a 5.0 per cent w/v solution is between 8.2 to 8.8.

Heavy metals—Not more than 10 parts per million.

Assay—Dissolve l 0.8g in 100 ml of water, add 10 ml of strong ammonia ammonium chloride solution and 0.5 ml of mordant black 11 solution. Titrate at 40° with 0.1 M disodium edetate until the last trace of red colour disappears and the solution becomes pure blue. Each ml of 0.1 M disodium edetate is equivalent to 0.02345g of $C_4H_6MgO_4$, $4H_2O$.

Magnesium Carbonate **:** Light Magnesium carbonate of the Indian Pharmacopoeia which complies with the following additional test.

Ammonia **:** Dissolve 0.50 g in 4 ml of dilute hydrochloric acid, boil remove carbon dioxide, and dilute with water to 95 ml, add 5 ml of solution of sodium hydroxide and allow to stand for one hour. Dilute 40 ml, of the clear liquid to 50 ml with water and add 2ml of alkaline solution of potassium mercurciodide. Any yellow colour produced is not deeper than that produced by adding 2 ml alkaline solution of potassium mercuriciodide to a mixture of 44 ml of water 2 ml of dilute solution of sodium hydroxide.

Magnesium Chloride **:** $MgCl_2$, $6H_2O$.

Description—Deliquescent crystals.
Solubility—Freely soluble in alcohol.
Sulphate—1g complies with the limit test for sulphates.

Free acid or alkali—Dissolve 2g in 50 ml of carbon dioxide—free water. The solution requires, for neutralization to solution of bromothymol blue, not more, than 0.05 ml of 0.01 N sodium hydroxide or 0.05 ml of 0.01 N hydrochloric acid.

Magnesium Powder **:** Mg.
Description—Silvery white powder.
Solubility—Soluble in dilute acids and solutions of ammonium salts, slightly soluble in hot *water*; insoluble in cold *water*.
Iron—To 2.0 ml of *magnesium solution* add 2 ml of *hydrochloric acid* and 50 mg of *ammonium thiocyanate*, the resulting red colour is not darker than that of a blank to which .015mg of iron has been added.

Magnesium, Solution S: Place 2.5 g of the *Magnesium Powder* in a 300 ml Erlen meyer flask, add 50 ml of *water* then add through a funnel in the neck of the flask 2-3 ml of *hydrochloric acid at* a time, allow the reaction to subside before adding the next portion of the acid (about 20 ml of the acid will be required). No insoluble residue remains. Dilute the solution to 100 ml.

Magnesium Sulphate : Of the Indian Pharmacopoeia.

Magnesium Sulphate, Sodium of **:** A 10.00 per cent w/v solution of magnesium sulphate in water.

Magnesium Uranyl Acetate : (a) Dissolve 50g of uranyl acetate in water, add 25 ml of glacial acetic acid and dilute with water to 500 ml.

(b) Dissolve 300 g of magnesium acetae in water, add 25 ml of glacial acetic acid and dilute to 500 ml.

Mix the two solutions (s) and (b), allow to stand overnight. Filter, if necessary.

Mannitol **:** Of the Indian Pharmacopoeia.

Mercuric ammonium thiocyanate, solution of : Dissolve 30 g of ammonium thiocyanate and 27g of mercuric chloride in sufficient water to produce 1000 ml.

Mercuric Chloride : $HgCl_{2.}$

Contains not less than 99,5 percent of $HgCl_{2.}$.

Description—Heavy, colourless or white, crystalline masses, or a white crystalline powder.

Solubility—Soluble, at 20° in 15 parts of water, and in 3 parts of alcohol.

Non-volatile matter—When volatilized, leaves not more than 0.1 per cent of residue.

Assay—Dissolve about 0.3 g, accurately weighed, in 85 ml of water in a stoppered flask, add 10 ml of solution of calcium chloride, 10 ml of solution of potassium iodine, 3 ml of solution of formaldehyde and 15 of solution of sodium hydroxide and shake continuously for two minutes. Add 20 ml of acetic acid and 35 ml of 0.1 N iodine, shake continuously for about ten minutes or until the precipitated mercury is completely redissolved, and titrate the excess of iodine with 0.1 N sodium thiosulphate. Each ml of 0.1 N iodine is equivalent to 0.01358 g of HgCl.

Mercuric Chloride, Solution of : A 5.0 per cent w/v solution of mercuric chloride in water.

Mercuric Chloride Solution, 2 per cent : A 2 per cent w/v solution of mercuric chloride in 60 per cent alcohol.

Mercury :Of the Indian Pharmacopoeia.

Mercuric Iodide **:**Of the Homoeopathic Pharmacopoeia of India.

Mercurous Nitrate, Solution of :Dissolve 200 g of mercury in sufficient nitric acid, and add water to produce 1000 ml. Solution of mercurous nitrate should be kept in a bottle containing a little mercury.

Metaphosphoric Acid, Solution of: A 20.0 per cent w/v solution of metaphosphoric acid in water.

Solution of Metaphosphoric Acid must be freshly prepared.

Methyl ethyl ketone : $CH_3CO\ C_2H_5$
Contains not less than 88.0 per cent of C_4H_8O

Description—A colourless, flammable liquid with a characteristic odour.

Solubility—Miscible with water, alcohol, ether and benzene.

Boiling point—About 79° to 80°.
Wt/ml—0.81g

Methyl Alcohol **:** CH_3OH

Description—A clear, colourless liquid with a characteristic odour.

Solubility—Miscible in all proportions with *water*, forming a clear, colourless liquid.

Specific gravity—At 25°, not more than 0.7—1.0, H.P.I.

Boiling range—Not more than 95.0 percent distils between 64.50 and 65.5, H.P.I.
Refractive index—A 25°, 1.40, H.P.I.

Acetone—Place 1 ml in a Nessler glass, add 19 ml of *water*, 2 ml of a 1 percent w/v solution of *O-nitrobenzaldehyde* (50 percent) and 1 ml of a 30 percent w/v solution of sodium hydroxide and allow to stand in the dark for fifteen minutes. The colour developed does not exceed that produced by mixing 1 ml of standard solution *acetne*, 19 ml of *water*, 2 ml of *solution of O-nitrobenzaldehyde* and 1 ml of a 30 percent W/V solution of sodium hydroxide.

Acidity—To 5 ml add 5 ml of *carbon dioxide-free water*, and titrate with 0.1N *sodium hydroxide*, using *solution of bromothymol blue* as indicator. Not more than 0.1 ml is required.

Non-volatile matter—When evaporated on water-bath and dried at 105°, leaves not more than 0.005 percent w/v of residue.

Mercuric Nitrate **:** $Hg\ (NO_3)_2\ H_2O$
Contains not less than 99.0 percent of $Hg\ (NO_3)_2 .\ H_2O$.
Description—Colourless or slightly coloured, hygroscopic crystals.
Solubility—Soluble in *dilute nitric acid*.

Non-Volatile matter—Moisten 2 g with *sulphuric acid* and ignite; not more than 1 mg of residue is obtained.

Assay—Dissolve 0.5g in 100 ml of *water* containing 5 ml of *nitric acid.* Titrate with 0.1N *ammonium thiocyanate*, using 5 ml of *ferric ammonium sulphate* as indicator. Each ml of 0.1N *ammonium thiocyanate* is equivalent to 0.01713g of $Hg\ (NO_3)_2 .\ H_2O$.

Methylaminophenol : 4 Methylaminophenol Sulphate $CH_{2.}\ NH_{4.}\ C_5\ H_9\ OH)_2\ H_{2.}\ SO_{5...}$

Description—A white or cream-coloured crystalline powder becoming darken on exposure to air.

Solubility—Slightly soluble in water.

Sulphated ash—Not more than 0.2 per cent.

Test Solution Mordant Black II **:** (Colour Index No. 14645). The sodium salt of 2-(2-hydroxy-6-nitro-4 sulpho-1- naphthaylazo-1-naphthol).

Gives a wine-red colour with calcium, magnesium, zinc and certain other metals in alkaline, solution. When metal ions are absent, for example, in the presence of an excess of disodium edetate, the solution is blue.

Mordant Black	Syn. : Muroxide indicator preparation.
Mixture	A mixture of 0.2 per cent of mordant black II with 100 parts of sodium chloride. Mordant mixture should be freshly prepared.
Beta Naphthol	$C_{10}H_7OH$ Syn.: 2-Naphthol. Description—White leaflets or a crystalline powder; odour, faint and resembling that of phenol. Discolours on exposure to light. Solubility—Very slightly soluble in water; more soluble in boiling water; soluble in alcohol, in ether, in chloroform and in solutions of alkali hydroxides. Acidity or alkalinity—Shake 1.0g with 100 ml of water at frequent intervals during fifteen minutes and filter; the filtrate is neutral to litmus solution. Melting point—121° to 123°. 1-Naphthol—Boil 0.1g in 10 ml of water until dissolved, and add 1 ml of ferric chloride test solution; a white precipitate is produced, which, on heating becomes brown but not violet. Naphthalene and other organic substances—Dissolve 0.5g in 25 ml of dilute ammonia solution; no residue remains and the solutions is not darker than pale-yellow. Heavy metals—Not more than 10 parts per million. Sulphated ash—Not more than 0.05 per cent. Storage—Store in a dark place.
Beta Naphthol Solution	Dissolve 5g of beta naphthol, freshly re-crystallised, in 8ml of sodium hydroxide solution and add sufficient water to produce 100 ml. Beta naphthol solution must be freshly prepared.
N(1 Naphthyl)	$C_{12}H_{14}N_2$2HCI
Ethylenediamine	Contains not less than 95.0 per centof $C_{12}H_{14}N_2$2HCI.
Hydrochloride	Description—A white or cream coloured powder. Solubility—Soluble in water; sparingly soluble in alcohol. Sulphated ash—Not more than 0.2 per cent. Assay—Carry out the determination of nitrogen by the following method:

Place 0.25g and 8 ml of nitrogen-free sulphuric acid in a 200 ml long-necked flask and heat for 15 minutes. Add 3g of anhydrous sodium sulphate and 0.3 g of nitrogen-free mercuric oxide. Heat the mixture over a small flame until colourless and boil gently for a further two hours. Precautions should be taken to prevent the upper part of the flask from becoming overheated. Cool, dilute 75 to 85 ml with water and a piece of granulated zinc and a solution of 15g of sodium hydroxide and 2g of sodium thiosulphate in 25 ml of water. The quantity of sodium hydroxide should be increased if necessary, to ensure that, before distillation, the mixture is strongly alkaline. Immediately connect the flask to a distillation apparatus, mix the contents, distil the liberated ammonia into 50ml of 0.1 N sulphuric acid and the excess of acid with 0.1 N sodium hydroxide using methyl red solution as indicator. Repeat the operation without the substance being tested, the difference between the titrations represents the smmonia liberated by the substance being tested. Each ml of 0.1 N sulphuric acid is equivalent to 0.01296 g of $C_{12}H_{14}N_2$. 2HCI.

N(1-Naphthol) Ethylenediamine Hydrochloride, Solution of : A 0.5% w/v solution of N-(1-naphthol) ethylenediamine hydrochloride in water.

Ninhydrin : $C_9H_4O_3$. H_2O

Description—A very pale yellow, crystalline powder.

Melting range—254° to 256°.

Ninhydrin, solution of : A 0.2 per cent w/v solution of ninhydrin in a mixture of 95 volumes butanol and 5 volumes of 2M acetic acid.

Nitric Acid, Dilute : (10 per cent w/v of NHO_3) Dilute 106 ml of nitric acid with sufficient water to make 1000 ml.

Nitric Acid Fuming : HNO_3

Contains not less than 95.0 per cent w/w of HNO_3.

Description—A clear, almost colourless to yellow, fuming liquid.

Wt. Per ml—At 20°, about 1.5g, H.P.I.

Residue on ignition—When evaporated and gently ignited to constant weight, leaves not more than 0.01 per cent w/w of residue, H.P.I.

Nitrobenzaldehyde	:$NO_2C_4H_{19}CHO_4$. Description—Yellow needles; odours, suggesting that of benzaldehyde. It is soluble in alcohol. Melting Range—40° to 45°. Sulphated Ash—Not more than 0.1 per cent.
Nickel Sulphate	**:** $NiSO_4$ $6H_2O$ Contains not less than 98.0 percent of $NiSO_4$ $6H_2O$. Description—Emerald green crystals. Solubility—Soluble in *water*, almost insoluble in *alcohol*. Assay—Weigh accurately about 1.5g, dissolve in *water* and dilute to 200 ml Transfer 50 ml to a 500—600 ml beaker and dilute with *water* to 200 ml. Add 1 g of *sodium citrate,* heat to boiling, then add to the boiling solution, with stirring, a solution of 0.6g of *dimethyl glyoxime* in 100 ml of warm *alcohol,* follow with 5 ml of *ammonium hydroxide* and let stand over night. Filter on a gooch crucible wash with hot *water,* then with 50 percent *alcohol* and dry at 100° to constant weight. The weight of the nickel dimethyl'glyoxime multiplied by 0.910 is equal to $NiSO_4$. $6H_2O$.
Nickel Sulphate, Solution of	**:** A 5.0 percent w/v solution of *Nickel sulphate* in *water*.
Nitrobenzene	: $C_6H_5NO_2$ Description—A pale yellow, liquid; odour characteristic.
Potassium nickel cyanide	: It can be prepared by dissolving 5 g of nickel sulphate in distilled water and adding portion wise 5 g of potassium cyanide. A yellow solution is formed and a white precipitate of potassium sulphate separates; add menhanol and filter off the precipitated potassium sulphate. Concentrate the filtrate at 70° and collect the crystals of potassium nickel cyanide.
Nitrobenzene	: C_6 H_5NO_2. Description—A pale, yellow, liquid, odour, characteristic. Solubility—Insoluble in water. Boiling range—Not less than 95.0 percent distils between 210° and 212°.

Wt. Per ml—At 25°, about 1.20g.

O-Nitre Benzaldehyde, Solution of (50%) : A 50.0 percent w/v solution of *O-nitro benzaldehyde* in *alcohol.*

Oxalic Acid : $(CO_2 H)_2 2H_2O$.

Contains not less than 99.5 per cent of $C_2H_2O_4$. $2H_4O$ as determined by both the parts of the Assay.

Description—Colourless crystals.

Solubility—Soluble in water, and in alcohol.

Chloride—To 1 g dissolved in 20 ml of water add 5 ml of dilute nitric acid and 1 drop of solution of silver nitrate; no turbidity is produced.

Sulphated Ash—Not more than 0.5 per cent.

Assay—(1) Dissolve, about 3 g accurately weighed, in 50 ml of carbon dioxide-free water and titrate with 1 N sodium hydroxide using solution of phenolphthalein as indicator. Each ml of 1N sodium hydroxide is equivalent to 0.06304 g of $C_2H_2O_4$, $2H_2O$.

(2) Dissolve about 3 g accurately weighed, in water and add sufficient water to produce 250 ml. To 25 ml of this solution add 5 ml of sulphuric acid previously diluted with a little water and titrate at a temperature of about 70° with 0.1 potassium permanganate. Each ml of 0.1 N potassium permanganate is equivalent to 0.006304 g of $C_2H_2O_4$. $2H_2O$.

Oxalic Acid Solution : A 5 per cent w/v solution of oxalic acid in water.

Oxalic Acid Solution, Ammonical : A solution of oxalic acid in water rendered slightly alkaline with ammonium hydroxide solution.

Paraffin Liquid : Liquid paraffin is a mixture of liquid hydrocarbon obtained from petroleum. Tocopherol is not more than 10 parts per million may be added as a stabilizer.

Description—A transparent, colourless, oily liquid, free or nearly free from fluorescence by day light; odourless and stateless which cold, and develops not more than a faint odour of petroleum, when heated.

Solubility—Practically insoluble in *water*, and in *alcohol*; soluble in c*hloroform*, in *solvent ether* and in volatile oils.

Wt. per ml—At 25°, 0.860 to 0.904 g, H.P.I.
Kinetic viscosity—At 37. 8°, not less than 64 centistokes.

Reaction—Boil 5g with 10 ml of *alcohol* previously neutralized to *solution of litmus*, the alcohol is neutral to *solution of litmus*.

Solid Paraffin—Please a suitable quantity, previously dried by heating at 100° for two hours and cooled in a dessicator over *sulphuric acid* in a glass cylindrical vessel. Close the vessel, and immersed it in a mixture of ice and water, the liquid is dufficiently clear after four hours and that a black line, 0.5 mm in width, held vertically behind the vessel can be easily seen.

Perchloric Acid **:** (60 per cent w/w) : An aqueous solution containing not less than 59.0 percent w/w of $HCIO_4$.

Description: A clear, colourless liquid.

Solubility: Miscible with *water* in all proportions.

Assay: Titrate about 4g, accurately weighed, and diluted with 50 ml of *water*, with 1 N *sodium hydroxide* using *solution of phenolphthalein* as indicator. Each ml of 1N *sodium hydroxide* is equivalent to 0.005g of $HClO_4$

Petroleum Ether : Syn.: Petroleum Light (40° – 60°).
Wt. Per ml—At 20°, 0.630 to 0.650, HPI.

Description: A colourless, very volatile, highly inflammable liquid, obtained from petroleum, consisting of a mixture of the lower members of the paraffin series of hydrocarbons, and complying with one or other of the following definitions:—

Light Petroleum (41° to 40°)

Wt. per ml—At 25°, 0.665 to 0.684, H.P.I.

Non-volatile matter—when evaporated on a water-bath and dried to constant weight at 105° leaves not more than 0.002 percent w/v of residue.

Phosphoric Acid : Of the Indian Pharmacopoeia (approximately 88.0 per cent w/w of H_2PO_4).

Phosphorus, Red—Description—A Dark red powder, insoluble in water and in dilute acids.

Soluble matter—Heat 2 g with 30 ml of acetic acid on a water-bath for fifteen minutes, cool, dilute to 50 ml, filter, evaporate 25 ml of the filtrate on a water-bath and dry the residue at 100° for two hours; the residue weighs not more than 50 mg.

Yellow Phosphorus: Shake 5g with 20 ml of carbon di-sulphide in a glass stopper cylinder, filter and immerse in the filtrate a strip of filter paper, 10 cm by 0.5 cm previously immersed in solution of copper sulphate and allow to dry in the air; no stain is produced.

Loss on drying : When dried to constant weight over sulphuric acid, loses not more than 1 per cent of its weight.

Phenazone : $C_{11}H_{12}ON_2$

Contains not less than 98.0 per cent of $C_{11}H_{12}ON_2$.

Description—A white, crystalline powder.

Melting range—111° to 123°.

Sulphated ash—Not more than 0.1 per cent.

Assay—Weigh accurately abaout 0.2 g and dissolve in 20 ml of a 100 per cent w/v solution of sodium acetate add 30 ml of 0.1 N iodine and allow to stand for twenty minutes with occasional shaking. Add 10 ml of chloroform, shake until precipitate is dissolved and titrate the excess of iodine with 0.1N sodium thiosulphate, using starch as indicator. Each ml of 0.1N iodine is equivalent to 0.009412 g of $C_{11}H_{12}ON_2$.

Phthalic Acid : (Ortho): $C_8H_6O_4$

Description—Crystalline; when rapidly heating forming phthalic anhydride and water.

Solubility—Slightly soluble in *water and in ether*; freely soluble in *alcohol*; insoluble in *chloroform*.

Melting range—229° to 231°, H.P.I.

Phioroglucinnol : $C_6H(CH)_3$. $2H_2C$

Description—White or light brown crystals or a crystalline powder.

Solubility—Slightly soluble in water, soluble in alcohol and in solvent ether. Melting range—215° to 219°.

Sulphated ash—Not more than 0.1 per cent be kept protected from light.

Phosphomolybdic acid : H_3PO_4. 12 MoO_3.24 H_2O
Description—Deep yellow crystals.

Solubility—Very soluble in water. A 10 per cent w/v solution in water is clear.

Ammonia—Boil 0.5 g with 20 ml of a 5 per cent w/v solution of sodium hydroxide. Vapour evolved does not change the colour of moistured red litmus paper.

Phosphorous pentoxide : P_2O_5
Description—A white amorphous very deliquescent powder.

Solubility—Soluble in water with evolution of heat from phosphoric acid.

Reducing substances—Dissolve 1 g in 50 ml of water, add 0.5 ml of 0.1N potassium permanganate and heat for five minutes on a steam bath; the pink colour is not completely discharged.

Picric Acid **:** ACIDUM PICRICUM of the H.P.I.

Picric Acid, Aquous solution of **:** A solution of *water* containing approximately 1:0 percent w/v of *picric acid*.

Platinic Chloride **:** H_2 Pt Cl_6. $6H_2O$

Contains not less than 40.0 per cent of Pt.
Description—Brownish yellow, crystalline masses rapidly deliquescent.
Solubility—Very soluble in *water* or *alcohol.*
Assay—Weigh accurately about 1g and dissolve in 20 ml *water* and 10 ml of a *saturated solution of ammonium chloride*, cover and allow to stand over night. Filter, wash the precipitate with 20 ml of *saturated ammonium chloride solution*, dry, ignite carefully, and weigh. The residue is the platinum content of sample taken.

Platinum **:** Pt.—Of the H.P.I.

Potassium Antimonate **:** $KSbO_3$. $3H_3O$.

Contains not less than 40.0 percent of Sb.
Description—A white crystalline powder.
Solubility—Soluble in *water*.

Assay—Dissolve about 0.3g, accurately weighed, in 100 ml of *water* and 2 ml of *dilute hydrochloric acid* and pass *hydrogen sulphide* until the antimony is completely precipitated. Add 2 ml of *hydrochloric acid* and again pass *hydrogen sulphide*. Boil, filter, wash the precipitate with hot *water* saturated with *hydrogen sulphide* and dissolve the precipitate in 25 ml of *hydrochloric acid*. Boil to remove *hydrogen sulphide* and dilute to 50 ml with *water*. Add 2g of *sodium potassium tartarate*, neutralize carefully with *sodium carbonate*, and titrate with 0.1N *iodine*, using *solution of starch* as indicator. Each ml of 0.1N *iodine* is equivalent to 0.006088 g of Sb.

Potassium Antimonate, Solution of **:** Boil 2 g of *potassium antimonite* with 95 ml of *water* until dissolved. Cool rapidly and add 50 ml of solution of *potassium hydroxide* and 5 ml of 1N *sodium hydroxide*. Allow to stand for 24 hours, filter and add sufficient water to produce 150 ml.

Sensitivity—to 10 ml add 7 ml of 0.1N *sodium chloride*; a white crystalline precipitate is formed within 15 minutes.

Potassium bicarbonate : $KHCO_3$
Contains not less than 99.0 per cent of $KHCO_3$.

Description—Colourless, transparent, monoclinic prisms, or a white granular powder; odourless; taste, saline and feebly alkaline.

Solubility—Soluble in water practically, insoluble in alcohol.

Reaction—pH of a 1.0 per cent w/v solution is not greater than 8.6.

Potassium Bisulphate : $KHSO_4$

Contains not less than 98.0 per cent and not more than the equivalent of 102.0 per cent of $KHSO_4$.

Description—Fused, white hygroscopic lumps.

Solubility—Very soluble in water giving an acid solution.

Assay—Dissolve about 4.5 g, accurately weighed, in 50 ml of water and titrate with 1 N sodium hydroxide, using solution of phenolphthalein as indicator. Each ml of 1 N sodium hydroxide is equivalent to 0.1362 g of $KHSO_4$.

Potassium Bromate **:** $KBrO_3$.

Contains nsot less than 99.5 percent of $KBrO_3$ calculated with reference to the substance dried to constant weight at 105°.

Description—A white, crystalline powder.

Solubility—Soluble in *water*; freely soluble in boiling *water*; insoluble in *alcohol*.

Reaction:—A 5.0 percent w/v solution in *water* is clear and colourless and neutral to *solution of litmus*.

Assay—Dissolve 1g in *water* and dilute to 250 ml. To 25 ml of this solution add 3g of *potassium iodide* and 10 ml of *hydrochloric acid*, dilute with 100 ml of *water* and titrate with 0.1 N *sodium thiosulphate*. Each ml of 0.1N *sodium thiosulphate* is equivalent to 0.002783 g of $KBrO_3$.

Potassium Bromide **:** KBr.

Contains not less than 98.0 percent of KBr.

Description—Colourless, transparent or opaque, crystals, or a white granular powder; odourless; taste, saline and faint bitter.

Solubility—Freely soluble in *water* and *glycerine*. Slightly soluble in *alcohol*.

Identification—Yields the reactions characteristic of *potassium*, H.P.I. and of *bromides*; H.P.I.

Alkali—Dissolve 5g in 50 ml of freshly boiled and cooled *water*, and add 0.2 ml of 0.1N *sulphuric acid*; no colour is produced on the addition of a drop of *solution of phenolphthalein*.

Loss on drying—Loses not more than 1.0 percent of its weight when dried to constant weight at 105°.

Assay—Weigh accurately about 0.4g and dissolve in 40 ml of *water* and 5 ml of *nitric acid*. Add 50 ml of 0.1N *silver nitrate* and 5 ml of *nitrobenzene*, and shake. Titrate with 0.1 N *ammonium thiocyanate*, using solution *of ferric ammonium sulphate* as indicator, shaking vigorously as the end point is approached. Correct for the amount of chloride present. Each ml of 0.1N *sulver nitrate* is equivalent to 0.0119 g of KBr.

Potassium Bromide Solution of **:** A 5.0 percent solution of *potassium bromide* in *water*.

Potassium Carbonate **:**K_2CO_3.

Contains not less than 98.0 per cent of K_2CO_3.

Description—A white, granular, hydroscopic powder.

Solubility—very soluble in water, forming a clear solution.

Iron—1 g with addition of 1.5 ml of hydrochloric acid, complies with the limit test for iron.

Chloride—1 g with the addition of 5 ml of nitric acid, complies with the limit test for chlorides.

Sulphate—1 g with the addition of 5 ml of hydrochloric and complies with the limit test for sulphates.

Assay—Dissolve about 3 g, accurately weighed, in 50 ml water and titrate with 1 N hydrochloric acid, using solution of methyl orange or solution of bromophymol blue as indicator. At the first colour change, boil the solution and cool and complete the titration. Each ml of 1 N hydrochloric acid is equivalent to 0.06911 g K_2CO_3.

Potassium Carbonate, Solution of: A 10.0 per cent w/v solution of potassium carbonate in water.

Potassium Chromate, Solution: K_2CrO_4—A 5.0 percent w/v solution of Potassium chromate in water.

Potassium Curpi-tartrate, Solution of: (Fehling's solution)

(1) The copper sulphate solution—Dissolve 34.66 g of carefully selected small crystals of copper sulphate, showing no trace of efflorescence or of adhering moisture in sufficient water to make 500 ml. Keep this solution in small, well stoppered bottles.

(2) Alkaline Tartrate Solution—Dissolve 176 g of sodium potassium tartrate and 77 g of sodium hydroxide in sufficient water to produce 500 ml.

Mix equal volumes of the solutions No. 1 and No. 2 at the time of using.

Potassium Cyanide **:** KCN.

Contains not less than 95.0 percent of KCN.

Description—A white, crystalline powder, gradually, decomposing on exposure to air.

Solubility—Readily soluble in water, forming a clear, colourless solution.

Heavy metals—To 20 ml of a 5.0 percent w/v solution in water, add 10 ml of solution of hydrogen sulphide; no darkening is produced immediately, or on addition of 5 ml of dilute hydrochloric acid.

Assay—Dissolve about 0.5 g, accurately weighed, in 50 ml of water, 5 ml of dilute ammonia solution and one drop of solution of potassium iodide; titrate with 0.1 N silver nitrate until a faint permanent turbidity appears. Each ml of 0.1 N silver nitrate is equivalent to 0.01302 g of KCN.

Potassium Cyanide, Solution of: A 10.0 percent w/v solution of potassium cyanide in water.

Potassium Dichromate **:** $K_2 Cr_2 O_7$.

Contains not less than 99.8 percent of $K_2 Cr_2 O_7$.

Solubility—Soluble in water.

Chloride—To 20 ml of a 5 percent w/v solution of water, add 10 ml of nitric acid, warm to about 50° and add a few drops of solution of silver nitrate; not more than a faint opalescence is produced.

Assay—Dissolve about 2 g, accurately weighed, in freshly boiled and cooled water and dilute to 150 ml. Transfer 25 ml of this solution to a glass stopped flask, add 2 g of potassium iodide and 10 ml hydrochloric acid, and allow to stand in the dark for ten minutes. Add about 200 ml of freshly boiled and cooled water and titrate with 0.1 N sodium thiosulphate, using solution of starch, added towards the end of the titration as indicator. Each ml of 0.1 N sodium thiosulphate is equivalent to 0.004904 g of $K_2Cr_2O_7$.

Potassium Dichromate, Solution of: A 9.8 percent w/v solution of potassium dichromate in water.

Potassium Ferricyanide, Solution of—Wash about 1 g of potassium ferricyanide in crystals with a little water and dissolve the washed crystals in 100 ml of water. Solution of Potassium ferricyanide must be freshly prepared.

Potassium Ferrocyanide : $K_4Fe(CN)_6 3H_2O$.

Contains not less than 99.0 percent of $K_4Fe(CN)_6 3H_2O$

Description—A yellow crystalline powder, soluble in water.

Reaction—A 10.0 percent w/v solution in water is neutral to litmus paper.

Assay—Dissolve about 1 g accurately weighed in 200 ml of water, add 10 ml of sulphuric acid and titrate with 0.1 N potassium permanganate. Each ml of 0.1 N potassium permanganate is equivalent to 0.04224 g of $K_4Fe(CN)_6, 3H_2O$.

Potassium Ferrocyanide, Solution of: A 5.3 per cent w/v solution of potassium ferrocyanide in water.

Potassium Hydroxide : KOH

Potassium hydroxide contains not less than 85.0 per cent of total alkali; calculated as potassium hydroxide. It contains not more than 4.0 percent of K_2CO_3.

Description—Dry, white sticks, pellets or fused mass; hard, brittle and showing a crystalline fracture; very deliquescent, strongly and corrosive.

Solubility—Solution in *water, alcohol* and in *glycerin*.

Identification—Gives the reactions characteristic of *Potassium*, H.P.I.

Assay—Weigh accurately about 2g, and dissolve in 25 ml of *water*, add 5 ml of *solution of barium chloride*, and tittate with 1N *hydrochloric acid* using *solution of phenolphthalein* as indicator. To the solution of flask and solution of *bromophenol blue*, and continue the titration with 1N *hydrochloric acid*. Each ml of 1N *hydrochloric acid* used in the second titration is equivalent to 0.06911g of K_2CO_3 Each ml of 1N *hydrochloric acid* used in the combined titration is equivalent to 0.05611 g of total alkali calculated as KOH.

Potassium Hydroxide **:** KOH—Of the Indian Pharmacopoeia.

Potassium Hydroxide, Alcoholic of: A solution of potassium hydroxide in alcohol containing 10.0 percent w/v of KOH.

Potassium Hydroxide, Solution of—Of the Indian Pharmacopoeia.

Potassium Iodate : KIO_3.

Contains not less than 99.8 percent of KIO_3, calculated with reference to the substance dried at 110° for one hour.

Description—A white, crystalline powder.

Solubility—Soluble in water.

Reaction—A 5 percent w/v solution in water is neutral to litmus paper.

Chorate—To 2g the powdered salt add 2 ml of sulphuric acid; the salt remains white and no odour or gas is evolved.

Iodide—Dissolve 1 g in 20 ml of water, add 1 ml of 0.1N sulphuric acid and 2 ml of chloroform, and shake vigorously; no violet colour appears in the chloroform layer.

Sulphate—Dissolve 1 g in 25 ml of water, add 10 ml of hydrochloric acid, heat nearly to boiling, add 1 ml of solution of barium chloride and allow to stand for ten minutes; no turbidity or precipitate is produced.

Loss on drying—When dried at 105° for one hour, loses not more than 0.1 percent of its weight.

Assay—Dissolve about 1.5g accurately weighed, in water and dilute to 250 ml. To 25 ml of this solution add 3 g of potassium iodide, 10 ml of hydrochloric acid and 10 ml of water and titrate with 0.1 N sodium thiosulphate. Each ml of 0.1 N sodium thiosulphate is equivalent to 0.00356, g of KIO_3.

Potassium Iodate, Solution of: A 1.0 percent w/v solution of potassium iodate in water.

Potassium Iodide **:** Of the Indian Pharmacopoeia.

Potassium Iodide, Solution, of: A 10.0 per cent w/v solution of potassium iodide in water.

Potassium Iodide and Starch, Solution of **:** Dissolve 10 g of potassium iodide in sufficient water to produce 95 ml and add 5 ml of solution of starch. Solution of potassium iodide and starch must be recently prepared.

Potassium Iodobismuthate Solution (Dragendorff's Reagent) : Dissolve 100 g of tartaric acid in 400 ml of water and add 8.5 g of bismuthoxide nitrate. Shake during one hour, and 200 ml of a 40 per cent w/v potassium iodidesolution and shake well. Allow to stand for 24 hours and filter.

Potassium Mercuri-Ioidide Solution (Mayer's Reagent) : Add 1.36 g of mercuric chloride dissolved in 60 ml of water to a solution of 5g of potassium iodide in 20 ml of water, mix and add sufficient water to produce 100 ml.

Potassium Mercuri-Iodide, Alkaline Solution of (Nessler's Reagent) : To 3.5g of potassium iodide add 1.25g of mercuric chloride dissolved in 80ml of water, add a cold saturated solution of mercuric chloride in water, with constant stirring until a slight red precipitate remains. Dissolve 12 g of sodium hydroxide in solution, add a little more of the cold saturated solution of mercuric chloride and sufficient water to produce 100 ml. Allow to stand and decant the clear liquid.

Potassium Nitrate : KNO_3

Contains not less than 99.0 per cent of KNO_3.

Description—Colourless crystals or a white crystalline powder.

Heavy metals—Dissolve 1 g in 15ml of water and 2ml of dilute acetic acid, add water to produce 25ml, the limit of heavy metals is 10 parts per million, H.P.I.

Sodium—A 5 per cent w/v solution tested on a platinum wire imparts no distinct yellow colour to a colourless flame.

Chloride—1g complies with the limit test for chlorides, H.P.I.

Sulpahte—1g complies with the limit test for sulphates, H.P.I.

Assay—Weigh accurately about 0.4g and dissolve in 10ml of hydrochloric acid and evaporate to dryness on a water-bath. Dissolve the residue in 10ml of hydrochloric acid and re-evaporate to dryness, continuing the heating until the residue, when dissolved in water is neutral to litmus. Transfer the residue with the aid of 25 ml of water to a glass-stoppered flask and add exactly 50 ml of 0.1N silver nitrate, 3 ml of nitric acid and 3 ml of nitrobenzene. Shake vigorously; add ferric ammonium sulphate solution and titrate the excess of silver nitrate with 0.1N ammonium thiocyanate. Each ml of 0.1N silver nitrate is equivalent to 0.01011g of KNO_3.

Potassium Permanganate : $KMnO_4$.

It contains not less than 99.0 percent of $KMnO_4$.

Description—Dark purple, slender, prismatic crystals, having a metallic lusture; odourless; taste sweet and astringent.

Solubility—Soluble in *water*; very soluble in boiling *water*.

Identification—(i) A solution in *water*, acidified with *sulphuric acid* and heated to 70°, is decolourised by *solution of hydrogen peroxide.*

(ii) Heated to redness, it decrepitates, evolves oxygen, and leaves a black residue which with *water* forms potassium hydroxide solution; the resulting solution when neutralized with *dilute hydrochloride acid* gives the reactions, characteristic of *potassium*, H.P.I.

Assay—Weigh accurately about 0.8g, dissolve in *water* and dilute to 250ml. Titrate with this solution 25 ml of 0.1N *oxalic acid* mixed with 25 ml of *water* and 5 ml of *sulphuric acid*. Keep the temperature at about 70° throughout the entire titration. Each ml of 0.1N oxalic acid is equivalent to 0.00316g of $KMnO_4$.

Potassium Permanganate and Phosphoric Acid Solution : Dissolve 3g of potassium permanganate in a mixture of 15ml of phosphoric acid and 70ml of water, add sufficient water to produce 100 ml.

Potassium Permanganate Solution, **Acidic** : A 1 per cent w/v solution of potassium permanganate in water containing a few drops of sulphuric acid.

Potassium Permanganate : Of the Indian Pharmacopoeia.

Potassium Permanganate, Solution of **:** A 1.0 percent w/v solution of potassium permanganate in water.

Potassium Plumbite : Dissolve 1.7g of lead acetate, 3.4g of potassium citrate and

Solution 50g of potassium hydroxide in sufficient water to produce 100 ml.

Potassium Thicyanate : KCNS.

Contains not less than 99.0 per cent of KCNS, calculated with reference to the substance dried to constant weight at 105°.

Description—Colourless crystals. Deliquescent.

Solubility—Soluble in 0.5 part of water and in 15 parts of ethyl alcohol.

Alkalinity—A 10.0 per cent w/v solution in carbon-dioxide-free water is not alkaline to solution of bromothymol blue.

Ammonia—Boil 1 g with 5 ml of solution of sodium hydroxide, no ammonia is evolved.

Chloride—Dissolve 1 g in a solution of 1g of ammonium nitrate in 30 ml of solution of hydrogen peroxide containing not more than 1 part per million of chloride, add 1 g of sodium hydroxide, gently warm and when the vigorous reaction subsides add further 30 ml of the solution of hydrogen peroxide, and boil for two minutes, cool, add 5 ml of nitric acid and 1 ml of solution of silver nitrate: any opalescence produced is not greater than that produced by treating 1 ml of 0.01 N hydrochloric acid in the same manner.

Sulphate—0.5g complies with the test for sulphates.

Other sulphur compound—Dissolve 1g in 5 ml of water, add 2 ml of dilute hydrochloric acid, and titrate with the 0.1 N iodine; not more than 0.5 ml of 0.1 N iodine is required.

Loss on drying—When dried to constant weight at 105°, loses not more than 2.0 per cent of its weight.

Assay—Dissolve about 0.4 g accurately weighed in 50 ml of water, add 6 ml of nitric acid, 50 ml of 0.1 N silver nitrate, add 5 ml of solution of ferric ammonium sulphate and titrate the excess of silver nitrate with 0.1 N ammonium thiocynate. Each ml of 0.1 N silver nitrate is equivalent to 0.009718 g of KCNS.

Purified Water : Of the Homoeopathic Pharmacopoeia of India.

Resorcinol **:** $C_6H_4O_2$

Contains not less than 99.0 per cent of $C_6H_4O_2$.

Description—White or slightly yellowish-white. Crystalline powder with a faint, characteristic odour. Gradually turns pink on exposure to light and air.

Solubility—Very readily soluble in *water* and 95.0 percent *alcohol* readily soluble in *ether*; soluble in *glycerol* and fixed oils. Very elightly soluble in *chloroform*.

Identification—(i) Add 3 drops of *ferric chloride solution* to 10 ml of a 1:200 solution of the substance; a blue-violet colour appears which changes to brownish-yellow on addition of *ammonia solution*.

(ii) Fuse several crystals of the substance in a porcelain dish with an excess of *phthalic anhydride*, a yellowish red melt is produced. When the melt is dissolved in *sodium hydroxide* an intense green fluorescence appears.

Rhodamine B : $C_{28}H_{31}Cl_2O_3$

Syn.: Tetraethyl rhodamine.

Description—Green crystals or reddish-violet powder.

Solubility—Very soluble in water and in alcohol; slightly soluble in hydrochloric acid and in sodium hydroxide.

Residue in ignition—Not more than 0.2 per cent, H.P.I.

Rhodamine B Solution **:** A 0.2 per cent w/v solution of Rhodamine B in water.

Saline Solution **:** Saline solution contains 0.9 per cent w/v of *sodium chloride*, sodium chloride 9g and *water for injection*, sufficient to produce 1000 ml. Dissolve, filter and immediately sterilize by heating in an autoclave or by filtration.

Identification: Yields the reactions characteristic of *sodium*; H.P.I. and of *chlorides*, H.P.I.

Pyrogens—complies with the *test for pyrogens*.

Reaction—pH 4.5 to 7.0.

Assay—Carry out the assay described under NATRUM MURIATICUM, H.P.I.

Selenium : Se.

Description—A dark red to grayish black fine powder.

Melting range—200° to 222°.

Silver Nitrate Solution 20 percent : A 20 per cent w/v solution of silver nitrate in water.

Silica Gel : SiO_2

Description—Silica Gel is amorphous, partly hydrated SiO_2. It occurs as brownich glassy granules varying in size according to particular use.

Capacity for water absorption—When Silica Gel is exposed to air of 80 per cent relative humidity (sulphuric acid of Sp. Gr. 1.19 or 27 per cent H_2SO_4 in a dessicator), it absorbs not less than 31 per cent of its weight.

Residue on ignition—When ignited to constant weight at a temperature of 900_2 to 1000°, loss is not more than 6 per cent of its weight, H.P.I. Vol. I, 230.

Alcohol-ether-soluble substances—Place 5.0g of sample in a glass-stoppered flask or cylinder, add 25 ml of a mixture of equal volumes of alcohol and ether, shake well and allow to stand for 1 hour with frequent shaking. Measure 10 ml of the liquid, filter, if necessary, and evaporate in a tared vessel on a steam-bath and dry at 105° for 30 minutes. The weight of the residue does not exceed 0.05mg.

Silica Gel G **:** Normally it contains about 13 per cent of *Calcium sulphate hemihydrate*.

Description—A fine, white, homogeneous powder of an average particle size between 10 and 40 µm. Shake 1g for 5 minutes with 10 ml of *carbondioxide—free water*. The pH of the suspension is about 7.0; H.P.I.

Appearance of thin layer—Coated as a thin layer silica gel G shows homogeneous dispersion.

Adhesive power—Prepare a chromatographic plate, coated with silica gel G and dry it in an oven. Spray on to the plate a vertical jet of air of 1 mm diameter at a pressure of 2 atmospheres. The first particles of the gel should not be detached from the plate until the jet is at a distance not greater than 3 cm.

Chromatographic Separation—Apply on a layer of silica gel G 10 µl respectively of 0.01 percent w/v solutions in *benzene of indophenol blue, sudan red and dimethyl yellow*. Develop with the same solvent over a path of 10 cm. The migration time is about 20 minutes. The chromatogram shows three clearly separated spots, the spot of Indophenol blue near the starting point, that of dimethyl yellow in the middle of the *chromatogram*, and that of sudan red between the two.

Calcium Sulphate—Place about 0.25g, accurately weighed, in a flask with a ground glass stopper, and 3 ml of *dilute hydrochloric acid* and 100 ml of water and shake vigorously for half an hour. Filter through a sintered glass and wash the residue. Take the filtrate and washings, titrate with .05M *disodium edetate* to within a few ml of expected end point, add 4 ml of *concentrated sodium hydroxide solution* and 0.1g of *calcon triturate* and continue the titration until the colour changes from the pink to a full blue colour. Each ml of 0.05M sodium edetate is equivalent to 7.26 mg of calcium sulphate hemihydrate.

Silver Ammonio-nitrate, Solution: Dissolve 2.5 g Silver nitrate in 80 ml of water and cautiously add dilute ammonia solution until the precipitate first formed is nearly dissolved; set aside; decant and add sufficient water to produce 100 ml.

Caution—Dry silver ammonio-nitrate is very explosive

Silver Nitrate Solution 20 percent : A 20 per cent w/v solution of silver nitrate in water.

Silver Nitrate, Solution of: A 5.0 percent w/v solution of silver nitrate in water.

Sodium Acetate : $CH_3CO_2Na.\ 3H_2O$

Contains not less than 99.5 per cent and not more than the equivalent of 101.0 per cent of $C_2H_3NaO_2$, calculated with reference to the substance dried to constant weight at 105°.

Description—Colourless transparent crystals or white crystalline powder; odourless or with a very faint odour of acetic acid; taste, cooling, saline and slightly bitter.

Efflorescent in warm air.

Solubility—Very soluble in water; soluble in alcohol.

Identification—Yields the reactions characteristic of sodium and of acetates.

Arsenic—Not more than 2 parts per million.

Lead—Not more than 10 parts per million.

Chloride—1g complies with the limit test for chlorides, H.P.I.

Sulphate—1.0g complies with the limit test for sulphates, H.P.I.

Iron—4.0g complies with the limit test for iron, H.P.I.

Loss on drying—Loses not more than 40.5 per cent and not less than 39.0 per cent of its weight, when dried to constant weight at 130°.

Assay—Carry out the method for non-aqueous titration given in Appendix, using 0.4g and naphtholbenzein solution as indicator, adding 5 ml of acetic anhydride to the solution of the substance being examined, allowing to stand for fifteen minutes before titration. Each ml of 0.1 N per-chloric acid is equivalent to 0.008203g of $C_2H_3NaO_2$.

Sodium Acetate Solution,: 10 percent A 10 per cent w/v solution of sodium acetate in water.

Sodium Bi Carbonate : $NaHCO_3$.

Contains not less than 98.0 percent of $NaHCO_3$.

Description—A white, crystalline powder or small, opaque, monoclinic crystals; odourless; taste, saline.

Solubility—Soluble in *water*; practically insoluble in *alcohol*.

Reaction—pH of a 1 per cent w/v solution, not greater than 8.6.

Assay—Weigh accurately about 1g and dissolve in 20ml of *water* and titrate with 0.5N *sulphuric acid*, using *solution of methyl orange* as indicator. Each ml of 0.5N *sulphuric acid* is equivalent to 0.042g of $NaHCO_3$.

Sodium Bicarbonate, Solution, Saturated : A saturated solution of sodium bicarbonate in water.

Sodium Carbonate : Na_2CO_3, $10H_2O$

Contains not less than 99.0 per cent and not more than the equivalent of 105.0 per cent of Na_2CO_3, $10H_2O$, H.P.I.

Description—Transparent, colourless, rhombic crystals; odourless; taste, strongly alkaline, efflorescent.

Solubility—Soluble in 3 parts of water; practically insoluble in alcohol.

Note: It complies with the tests prescribed in H.P.I. under Natrum Carbonicum.

Sodium Carbonate, Anhydrous : Na_2CO_3

Contains not less than 98.0 per cent of Na_2CO_3.

Description—A white powder.

Solubility—Soluble in *water*.

Sulphate—Dissolve 2g in 3 ml of *hydrochloric acid* and 50 ml of *water*, add 1 ml of *solution of barium chloride* and allow standing for one hour; no turbidity is produced.

Assay—Dissolve about 3g, accurately weighed in 50 ml of *water* and titrate with 1N *hydrochloric acid* using solution of *methyl-orange* or *solution of bromophenol blue* as indicator. At the first colour change, boil the solution, cool and complete the titration. Each ml of 1N *hydrochloric acid* is equivalent to 0.053g of Na_2CO_3.

Sodium Chloride Solution, 20 per cent,: A 20 per cent w/v solution of sodium chloride in water.

Sodium Citrate : $C_6H_5Na_3O_7$, $2H_2O$

Contains not less than 99.0 per cent and not more than the equivalent of 101.0 per cent of $C_6H_5Na_3O_7$.

Description—White granular crystals, or crystalline powder odourless; taste, cool and saline. Slightly deliquescent in moist air.

Solubility—Freely soluble in water; insoluble in alcohol (95 per cent).

Identification—Yields the reactions characteristic of sodium and of citrates.

Arsenic—Not more than 2 parts per million.

Lead—Not more than 10 parts per million.

Assay—Heat 2g until carbonized, cool, and boil the residue with 50ml of water and 50 ml of 0.5N hydrochloric acid. Filter, wash the filter with water and titrate the excess of acid in the filtrate and washings with 0.5N sodium hydroxide using methyl orange solution as indicator. Each ml of 0.5 N hydrochloric acid is equivalent to 0.04902 g of $C_6H_5Na_3O_7$, $2H_2O$.

Sodium Cyanide : NaCN

Contains not less than 95 per cent of NaCN.

Description—Colourless granular powder; deliquescent.

Solubility—Soluble in water, slightly soluble in alcohol.

Chloride—2g complies with the limit test for chlorides.

Assay—Dissolve about 0.4g accurately weighed at 30ml of water. Add 2 drops of potassium iodide solution and 1ml of ammonium hydroxide. Titrate with 0.1 N silver nitrate to a slight permanent turbidity. Each ml of 0.1 N silver nitrate is equivalent to 0.009801g of NaCN.

Caution—Extremely poisonous, should be handled with care.

Storage—Should be kept in a well-closed container, protected from light, acid fumes and moisture.

Sodium Cyanide Solution : Dissolve 10g of sodium cyanide in sufficient water to make 200 ml, filter, if necessary.

Sodium Diethyldithiocarbamate Solution : A 0.1 per cent w/v solution of sodium diethyldithiocarbomate in carbon tetrachloride.

Sodium Hydroxide : Na OH

Contains not less than 95.0 per cent of total alkali calculated on NaOH, and not more than 2.5 per cent of Na_2CO_3.

Description—White sticks, pellets, fused masses, or scales; dry, hard, brittle and showing a crystalline fracture. Very deliquescent; strongly alkaline and corrosive.

Solubility—Soluble in 1 part of water; freely soluble in alcohol.

Identification—Yields the reactions characteristic of sodium. H.P.I. Vol. I, 224.

Insoluble substances and organic matter—A 5 per cent w/v solution is clear and colourless.

Aluminium, iron and matter insoluble in hydrochloric acid—Boil 5g with 50ml of dilute hydrochloric acid. Cool, make alkaline with dilute ammonia solution, boil filter, and wash with a 2.5 per cent w/v solution of ammonium nitrate; the insoluble residue after ignition to constant weight is not more than 5mg.

Arsenic—Not more than 4 parts per million, H.P.I.

Heavy metals—Dissolve 1g in 5ml of water and 1ml of dilute hydrochloric acid. Heat to boiling, add 1 drop of solution of phenolphthalein and add dropwise, sufficient dilute ammonia solution to obtain a faint pink colour. Add 2 ml of dilute acetic acid and dilute to 25 ml with water; the limit of heavy metals is 30 parts per million, H.P.I.

Chloride—0.5g dissolved in water with the addition of 1.8ml of nitric acid complies with the limit test for chlorides, H.P.I.

Potassium—Acidify 5ml of a 5 per cent w/v solution with acetic acid and add 3 drops of solution of sodium cobalt nitrate; no precipitate is formed.

Sulphates—1g dissolved in water with the addition of 3.5 ml of hydrochloric acid complies with the limit test for sulphates, H.P.I.

Assay—Weigh accurately about 2g, and dissolve in 25ml of water, add 5 ml of solution of barium chloride, and titrate with 1N hydrochloric acid, using solution of phenolphthalein as indicator. To the solution in the flask, add solution of bromophenol blue, and continue the titration with 1N hydrochloric acid. Each ml of 1N hydrochloric acid used in the second titration is equivalent to 0.06911 g of K_2CO_3. Each ml of 1N hydrochloric acid used in the combined titrations is equivalent to 0.04g of total alkali, calculated as NaOH.

Sodium Hydroxide Ammonia Free Solution : On boiling, no ammonia is evolved/recognized by its odour and by its reaction on moist red litmus paper.

Complies with additional tests given for Sodium hydroxide, H.P.I.

Sodium Nitrite : $NaNO_3$

Contains not less than 95.0 per cent of $NaNO_3$.

Description—Colourless or slightly yellow crystals or granular powder; odourless; deliquescent.

Solubility—Freely soluble in water; sparingly soluble in alcohol (95 per cent).

Chloride—0.5g complies with the limit test for chlorides, H.P.I.

Sulphate—0.25g with the addition of 3 ml of dilute hydrochloric acid, complies with the limit test for sulphates, H.P.I.

Heavy metals—Dissolve 1g in 6 ml of dilute hydrochloric acid and evaporate to dryness on a water-bath. Reduce the residue to a coarse power, and continue heating on a water-bath until the odour of hydrochloric acid is no longer perceptible. Dissolve the residue in 23 ml of water and add 2 ml of dilute acetic acid; the limit of heavy metals is 20 parts per million, H.P.I.

Assay—Dissolve 0.5g in sufficient water to produce 100 ml, and determine by titration the volume of the solution required to decolourise a mixture of 50ml of 0.1N potassium permanganate, 5 ml of sulphuric acid and 100 ml of water warmed to about 40°. Each ml of 0.1 N potassium permanganate is equivalent to 0.003450g of $NaNO_2$.

Sodium Nitrite, Solution of : A 1 per cent w/v solution of Sodium nitrite in water.

Sodium Nitrite, Solution of, Dilute : A 10 per cent w/v solution of sodium nitirite in water.

Sodium Nitroprusside : $Na_2Fe(CN)_5NO,2H_2O$

Description—Ruby red crystals.

Solubility—Readily soluble in water.

Ferricyanide—Dissolve 1g in 10 ml of water, and add 1 ml of a 10 per cent w/v ferrous sulphate solution; no blue colour is produced.

Ferrocyanide—Dissolve 1g in 10 ml of water, and add 0.2 ml of ferric chloride solution; no blue colour is produced.

Sodium Nitroprusside, **Solution of** : A 1.0 per cent w/v solution of sodium nitroprusside in water. Solution of sodium nitroprusside should be freshly prepared.

Sodium Plumbite Solsution: Dissolve 1.2g lead acetate, 3.4g sodium citrate, and 40g sodium hydroxide in water sufficient to produce 100 ml.

Sodium Potassium Tartrate : $C_4H_4O_6Na\ K, 4H_2O$

Contains not less than 99.0 per cent and not more than the equivalent to 104.0 per cent of $C_4H_4O_6Na\ K, 4H_2O$.

Description—Colourless crystals or a white crystalline powder, odourless; taste, saline and cooling.

Solubility—Soluble in water, almost insoluble in alcohol.

Acidity or alkalinity—Dissolve 1g in 10 ml of recently boiled and cooled water; the solution is not alkaline to phenolphthalein solution, and requires not more than 0.1ml of 0.1N sodium hydroxide to produce a pink colour.

Loss on drying—When dried to constant weight at 105° for three hours, loses not less than 21 per cent and not more than 28 per cent of its weight.

Assay—Weigh accurately about 2g and heat until carboniesd, cool, and boil the residue with 50ml of water, add 50ml of 0.5N sulphuric acid; filter and wash the filter with water; titrate the excess of acid in the filtrate and washings with 0.5N sodium hydroxide, using methyl orange solution as indicator. Each ml of 0.5N sulphuric acid is eauivalent to 0.07055g of $C_4H_4O_6Na$ K, $4H_2O$.

Sodium Sulphate, Anhydrous : Sodium sulphate rendered anhydrous by heat and complies with the requirements of sodium sulphate.

Sodium Tartrate : $Na_2C_4H_5O_6 . 2H_2O$

Contains not less than 84.34 per cent of $Na_2C_4H_4O_6$

Description—White crystals or granules.

Solubility-Soluble in 3 parts of cold water, 1.5 parts of boiling water; insoluble in alcohol.

Alkalinity—The aqueous solution is slightly alkaline to litmus, pH 7 to 8.

Sodium thio sulphate **:** $Na_2 S_2O_3 . 5 H_2O$.

Contains not less than 99.0 percent of $Na_2S_2O_3 . 5H_2O$.

Description—Colourless, transparent, monoclinic, prismatic crystals; odourless; taste, saline.

Solubility—Freely soluble in water; practically insoluble in *alcohol*.

Identification—Yields the reactions characteristic of *sodium*; H.P.I.. and of *thiosulphates*; H.P.I.

Reaction—A 10.0 percent w/v solution is neutral or faintly alkaline to litmus.

Assay—Weigh accurately about 1g and dissolve in 20 ml of *water*, and titrate with 0.1N *iodine*. Each ml of 0.1N iodine is equivalent to 0.02482 of $Na_2S_2O_3 . 5H_2O$.

Sodium Thiosulphate Solution : A 10% w/v solution of sodium thiosulphate in water.

Sodium Tungstate : Na_2WO_4, $2H_2O$

Description—Colourless crystals or a white crystalline powder.

Solubility—Readily soluble in water.

Reaction—pH of a 2 per cent w/v solution in recently boiled and cooled water, 8.0 to 9.0.

Nitrate—Dissolve 1g in 10 ml of water, add 1 ml of indigo carmine solution and 10 ml of sulphuric acid, nitrogen free and heat to boiling; the blue colour is not entirely discharged.

Residue on ignition—When ignited to constant weight, loses not less than 10.5 per cent and not more than 11.5 per cent of its weight, H.P.I.

Stannous Chloride :$SnCl_2$ $2H_2O$

Description: Colourless crystals. Contains not less than 97.0 percent of $SnCl_2$. $2H_2O$.

Solubility: Very soluble in *water*, freely soluble in *alcohol*, in *glacial acetic acid* and in *hydrochloric acid*.

Assay: Dissolve in stoppered flask about 0.5 g accurately weighed in 15 ml of *hydrochloric acid*, add 10 ml water and 5 ml *chloroform*. Titrate with 0.05 M *potassium iodate* until the chloroform layer is colourless. Each ml of 0.05 M *potassium iodate* is equivalent to 0.02256 g of $SnCl_2$. $2H_2O$.

Starch **:** $(C_6HO_{10}D_5)n$

Description—A fine, white powder, or irregular, angular masses, readily reducible to powder; odourless.

Maize starch—Consists of polyhedral or rounded granules, about 5 to 30 microns in diameter and exhibiting in the center a distinct cavity, or two to five rayed cleft.

Potato Starch—Consists principally of simple, granular, irregularly ovoid subspherical, often somewhat flattened, 30 to 100 microns subspherical granules, 10, concentric; to 35 microns, in diameter; hilum, a point near the narrower end; striations, well marked, compound granules.

Rice Starch—Consists of simple and-compound granules; single granules, polyhedral about 2 to 12 microns in diameter, and sometimes exhibiting a minute central hilum; compound granules, ovoid, usually about 12 to 30 microns in length and 7 to 12 microns in width.

Wheat Starch—Consists principally of simple, lenticular granules, outline circular, oval or subreniform; smaller granules,s 5 to 10 microns, large granules 20 to 25 microns in diameter, hilum a point near the narrower end; striations, faintly marked, concentric; compound granules.

Solubility—Practically insoluble in cold *water* and in *alcohol*.

Identification—Boil with 15 times its weight of water and cool; a transparent viscous fluid or jelly is produced which is deep blue coloured by *solution of iodine;* the colour disappears on warming and reappears on cooling.

Acidity—Add 10g to 100 ml of *alcohol* (70 percent) previously neutralized to *solution of phenolphthalein* shake well during one hour, filter and titrate 50 ml of the filtrate with 0.1N *sodium hydroxide*, using *solution of phenolphthalein* as indicator; not more than 2 ml of 0.1 N *sodium hydroxide* is required.

Ash—Not more than 0.3 percent (maize starch), 0.3 percent (potato starch), 0.6 percent rice starch), 0.3 percent (wheat starch); H.P.I.

Loss on drying—Loses not more than 14 per cent of it weight when dried to constant weight at 105° (For potato starch—loses not more than 20 percent of its weight when dried to constant weight at 105°).

Starch, Soluble : Starch, which has been treated with *hydrochloric acid* until, after being washed it form an almost clear limpid solution in hot water.
Description—A fine white powder.

Solubility—Soluble in hot water, usually forming a slightly turbid solution.

Reaction—Shake 2g with 20 ml of *water* for three minutes and filter; the filtrate is not alkaline, or more than faintly acid to the litmus paper.

Sensitiveness—Mix 1g with a little cold *water* and add 200 ml of boiling *water*. Add 5 ml of this solution to 100 ml of *water* and add 0.05 ml of 0.1N *iodine*. The deep blue colour is discharged by 0.05 ml of 0.1N *sodium thiosulphate*.

Ash—Not more than 0.3 percent, H.P.I.

Starch Solution of : Triturate 0.5g of soluble starch with 5ml of *water* and add this, with constant stirring sufficient *water* to produce about 100 ml, boil for a few minutes; cool and filter. Solution of starch must be freshly prepared.

Sucrose : $C_{12}H_{22}O_{11}$

Description—Colourless crystals or white granules; odourless; taste, sweet.

Solubility—Very soluble in water; sparingly soluble in alcohol.

Specific rotation— +66.4 to + 66.8°.

Heavy metals—Not more than 5 parts per million.

Iron—8g complies with the limit test for iron.

Sulphated ash—Not more than 0.02 per cent.

Sucrose Solution : A 10.0 per cent w/v solution of sucrose in water.

Sulphuric acid : $H_2N.\ C_6H_4.\ SO_3H$

Contains not less than 99.0 per cent of $C_6H_7O_3NS$.

Description—White or nearly white crystals or powder.

Solubility—Soluble in 33 parts of hot water, giving a clear and colourless solution, which deposits crystals on cooling.

Sulphated ash—Not more than 0.1 per cent.

Assay—Suspend about 5g, accurately weighed, in 100 ml of water and titrate with 1N sodium hydroxide using solution of phenolphthalein as indicator. Each ml of 1 N sodium hydroxide is equivalent to 0.1732 g of $C_4H_7O_3NS$.

Sulphosalicyclic Acid **:** $C_7H_6O_6S$

Description—Dihydrate, white crystals or crystalline powder.

Solubility—Very soluble in *water* or *alcohol*; soluble in *ether*.

Melting range—119° to 121°; H.P.I.

Sulphuric Acid
(1 per cent v/v) : Mix 1 volume of sulphuric acid with 99 volumes of water.

Sulphuric Acid (25 per cent v/v) : Mix 2 volumes of sulphuric acid with 8 volumes of water and cool.

Sulphuric Acid (50 per cent v/v) : Mix equal volumes of sulphuric acid and water and cool.

Sulphuric Acid, Dilute : Dilute sulphuric acid contains not less than 9.5 per cent, and not more than 10.5 percent w/w of sulphuric acid.

Wt. per ml at 25°, about 1.067 g, H.P.I.

Assay—Carry out the assay described under ACIDUM SULPHURICUM, H.P.I. using about 10 g accurately weighed.

Sulphuric Acid, Methanolic : A 5.0 per cent v/v solution of *methanol* in *sulphuric acid*.

Sulphuric Acid Nitrogen free : Sulphuric acid which contains 96.0 percent w/v of H_2SO_4, and complies with the following addition at lest.

Nitrate—Mix 45 ml with 5 ml of water, Cool and add 8mg of *dipleuyl benzidine*; the solution is colourless or not more than very pale blue.

Silver Nitrate, Solution of—A 5.0 percent w/v solution of silver nitrate in water.

Sodium Bicarbonate, Solution of: A 5.0 percent w/v solution of sodium bicarbonate in water.

Sodium Carbonate, Anhydrous: $Na_2 CO_3$.

Contains not less than 98.0 prcent of $Na_2 CO_3$.

Description—A white powder.

Solubility—Slowly soluble in water.

Chloride—5 g with an addition 6 ml of nitric acid, complies with the limit test for chlorides.

Sulphate—Dissolve 2 g in 3 ml of hydrochloric acid and 50 ml of water, add 1 ml of solution of barium chloride and allow to stand for one hour; no turbidity produced.

Assay—Dissolve about 3 g, accurately weighed in 50 ml of water and titrate with 1 N hydrochloric acid using solution of methyl orange or solution of bromophenol blue as indicator. At the first colour change, boil the solution, cool and complete the titration. Each ml of 1 N hydrochloric acid equivalent to 0.053 g of $Na_2 CO_3$.

Sodium Carbonate, Solution of: A 10.0 percent w/v solution of sodium carbonate in water.

Sodium Chloride : Of the Indian Pharmacopoeia.

Sodium Chloride, Solution of **:** (Synonym : Brine). A saturated solution of sodium chloride in water.

Sodium hydroxide : Of the Indian Pharmacopoeia.

Sodium Hydroxide, Solution of : A 20.0 percent w/v solution of sodium hydroxide in water.

Sodium periodate : $NaIO_4$

Description—white crystals or a white crystalline powder.

Solubility—soluble in water.

Assay—Dissolve about 0.5 g accurately weighed, in 100 ml of water. Add 3 g of sodium bicarbonate and 3 g of potassium Iodide and titrate the liberated iodine with 0.1N sodium arsenite; each ml of sodium arsenite is equivalent to 0.02139 g of sodium periodate.

Solubility—Insoluble in water; freely soluble in alcohol, benzene and ether. Boiling range—Not less than 95.0 per cent distils between 210°—212°.

Wt. Per ml—About 1.2 g.

Sodium Phosphate : Of the Indian Pharmacopoeia.

Sodium Phosphate Solution of: A 10.0 per cent w/v solution of sodium phosphate in water.

Sodium Sulphide **:** Na_9S_9 $9H_2O$.

Contains not less than 95.0 percent of Na_2S. $9H_2O$.

Description—Moist, colourless crystals.

Solubility—Readily soluble in water forming a clear colourless solution.

Reaction—A solution in water is strongly alkaline.

Assay—Dissolve about 0.5 g, accurately weighed in 30 ml of recently boiled and cooled water in a glass stoppered flask, add, with constant shaking, 50 ml of 0.1 N iodine followed by 2 ml of hydrochloric acid and titrate the excess of iodine with 0.1 N sodium thiosulphate, using solution of starch as indicator. Each ml of 0.1 N iodine is equivalent to 0.01201 g of Na_2, S. $9H_2O$.

Sodium Sulphide—Solution of (lead free): A 10.0 per cent w/v solution of sodium sulphide in water.

Sodium sulphate : Of the Indian Pharmacopoeia.

Sodium Thiosulphate : $Na_2S_2O_3$. $5H_2O$ of the Indian Pharmacopeia.

Stannous Chloride, Solution of : Dilute 60 ml of hydrochloric acid with 20 ml of water; and add 20 g of tin and heat gently until gas ceases to be evolved, add sufficient water to produce 100 ml, allowing the undissolved tin to remain with the solution.

Starch **:** Of the Indian Pharmacopoeia.

Starch Solution of **:** Triturate 0.5g of soluble starch with 5 ml of water and add this with constant stirring, to sufficient water to produce about 100 ml, boil for a few minutes, cool and filter. Solution of starch must be recently prepared.

Sulphur :Of the Indian Pharmacopoeia.

Sulphuric Acid **:**Of the Indian Pharmacopoeia.

Sulphuric Acid, Dilute :Of the Indian Pharmacopoeia.

Sulphuric Acid, Fuming:

Contains approximately 85.0 per cent w/w of total SO_3, equivalent to approximately 20.0 percent w/w of free $SO_{3.}$

Description—A colourless, or slightly coloured, viscous liquid.

Assay—Add about 1 ml, accurately weighed, to 50 ml of water. Titrate with 1N sodium hydroxide using solution of methyl orange as indicator. Each ml of 1 N sodium hydroxide is equivalent to 0.04003 g of SO_2.

Sulphurous Acid **:** H_2SO_3

Contains not less than 5.0 per cent w/w of **—SO_2**.

Description—A colourless solution with a pungent odour of sulphur dioxide.

Non-volatile matter—Evaporate to dryness and gently ignite; the residue weighs not more than 0.1 per cent.

Assay—Place 2 ml in an accurately weighed glass stoppered flask containing 50 ml of 0.1 N iodine solution and weigh again. Titrate the excess of iodine with 0.1 N sodium thiosulphate. Each ml of 0.1 iodine is equivalent to 0.003203 g of **SO_2**..

Tartaric Acid **:** $C_4H_6O_6$

Contains not less than 99.0 percent of $C_4H_6O_6$.

Description—Colourless crystals or white powder.

Solubility—Soluble in *water and alcohol*.

Chloride—To a solution of 1g in 20ml of *water* and 1 ml of *nitric acid* and 1 ml of *silver nitrate*. No opalescence is produced.

Assay—Dry about 3g of the powdered acid for 3 hours over an efficient desicant. Weigh accurately about 3g of the dried reagent and dissolve it in 50 ml of *water*. Add 0.1 ml of *phenolphthalein solution* and titrate with 1N *sodium hydroxide*. Each ml of 1N *sodium hydroxide* is equivalent to 0.07505g of $C_4H_6O_6$.

Thallium Nitrate :$TINO_3$

Description: White Crystals.

Solubility: Soluble in water. Insoluble in alcohol.

Thioglycollic Acid **:** HS. CH_2OOH.

Contains not less than 89.0 per cent w/v of $C_2H_4O_2S$ as described by both parts of the Assay described below.

Description—A colourless or nearly colourless liquid; odour strong and unpleasant.

Iron—Mix 0.1 ml with 50 ml. Of water, and render alkaline with ammonia solution. No pink colour is produced.

Assay—(1) Dissolve about 0.4 g accurately weighed, in 20 ml of water and titrate with 0.1 N sodium hydroxide, using solution of cresol red as indicator. Each ml of 0.1 N iodine is equivalent to 0.00921 g of $C_2H_4O_2S$

(2) To the above neutralized solution, add 2 g of sodium bicarbonate and titrate with 0.1 N iodine. Each ml of 0.1 N iodine is equivalent to 0.00921 g of $C_2H_4O_2S$.

Toluene **:** C_7H_8

Description—A clear, colourless, inflammable liquid.

Solubility—Insoluble in *water*; miscible with *ethyl alcohol*.

Boiling range—Not less than 95.0 percent distils between 109° to 111°, H.P.I.

Wt. per ml—At 25°, 0.870 g (approximately), H.P.I.

Tin **:** Sn. (Stannum metalicum) of the Homoeopathic Pharmacopoeia of India.

Trichloro Acetic Acid **:** CCl_3 COOH

Description—Colourless, very deliquescent crystals or crystalline masses; odour pungent and characteristic.

Solubility—Very soluble in *water,* in *alcohol* and in *solvent ether*.

Identification—Decomposes with liberation of chloroform when warmed with a *solution of sodium hydroxide*.

Melting range—55° to 57°, H.P.I.

Triethnol Anime **:** $(C_2H_4OH)_3N$

Description—Very hygroscopic, viscous liquid. Slight ammonical odour. Turns brown on exposure to air and light.

Solubility—Miscible with *water, methanol* and *acetone*.

Turmeric : Of the Indian Pharmacopoeia.

Turmeric Paper : Made by impregnating unglazed white paper with Turmeric Tincture.

Uranyl Acctate :

Description—A bright yellow, crystalline powder.

Alkali—Dissolve 2 g in 50 ml of water, heat to boiling and add dilute ammonia solution until precipitation is complete, filter, evaporate to dryness, moisten with sulphuric acid and ignite gently; the residue weighs not more than 6 mg.

Uranyl Zinc Acetate, Solution of: Dissolve 10 g of uranyl acetate by heating in 30 ml of water and 5 ml of acetic acid. Dissolve 30 g of zinc acetate by heating with 30 ml of water and 3 ml of acetic acid, mix the two solutions, cool and filter.

Urea : NH_2CONH_2

Contains not less than 99.5 per cent and more than the equivalent of 100.5 per cent of CH_4ON_2.

Description—Colourless to white, prismatic crystals or a white crystalline powder; odourless, but on longer standing, develops odour of ammonia; taste, cooling and saline.

Solubility—Soluble in 1.5 parts of water, 10 parts of alcohol; practically insoluble in chloroform, and in solvent ether.

Melting range—132° to 134°, H.P.I.

Reaction—Its solutions are neutral to litmus.

Sulphated ash—Not more than 0.1 per cent.

Assay—Weigh accurately about 1.07 g and transfer to a 300 ml long-necked flask. Add 25 ml of water, 2 ml of a 3 per cent w/v copper sulphate solution and 8 ml of sulphuric acid. Heat gently for fifteen minutes so that copious fumes are evolved, cool, and slowly add 100 ml of water and 0.2 g of granulated zinc. Connect the flask to an ammonia distillation apparatus. The delivery tube of the apparatus should be dipped in 50 ml of 2 per cent w/v solution of boric acid. Heat the flask and when the air is driven out, add slowly 75 ml of sodium hydroxide solution. Distil and collect the ammonia. Titrate the distillate with 0.2N hydrochloric acid, using methyl red solution as indicator. Repeat the experiment with the same quantities of the same reagents in the same manner omitting urea. The difference between the titrations represents the amount of ammonia evolved from urea. Each ml of 0.2 N hydrochloric acid is equivalent to 0.006006g of CH_4ON_2.

Water : Purified water of the Homoeopathic Pharmacopoeia of India.

Water Ammonia free: Water complies with the following additional test—To 50 ml add 2 ml of alkaline solution of potassium mercuri-iodide; no colour is produced.

Water Carbon dioxide Free : Of the H.P.I.

Water for injection : Distil potable water from a neutral glass or metal still fitted with an efficient device for preventing the entertainment of droplets. Reject the first portion of the distillate and collect the remainder in a suitable container. Immediately sterilise by heating in an autoclave or by filtration without the addition of a bacteriostatic.

Reaction—pH, 4.5 to 7.5.

Non-Volatile matter—leaves not more than 0.003 percent w/v of residue when evaporated to dryness on a water—bath and dried to constant weight at 105°.

Pyrogens—Complies with the test for pyrogens.

Water carbon dioxide-free: Water complies with the following additional test—To 50 ml add 2 ml of alkaline solution of potassium mercuri-iodide; no colour is produced.

Water carbon dioxide-free: Water which has been boiled vigorously for a few minutes and protected from the atmosphere during cooling and storage.

Zinc, Granulated : Zn.

Description—Bright silver grey, metallic granules.

Iron—Dissolve 0.5 g in 3 ml of dilute hydrochloric acid, add 8 ml of water and one drop of 0.1 N potassium permanganate, mix, add 5 ml of a 57.0 percent w/v solution of ammonium thiocynate in water, and 10 ml of mixture of equal volume of amyl alcohol and amyl acetate, shake vigorously and allow to separate; any colour produced in the upper layer is not greater than produced by treating 0.5 ml of standard solution of iron in the same manner.

Acid insoluble matter—Dissolve 5 g in a mixture of 20 ml of hydrochloric acid and 20 ml of water; the solution is clear, colourless, and free from more than traces of insoluble matter.

Oxidisable impurities—Dissolve 10 g in a mixture of 50 ml of water and 15 ml of sulphuric acid in a vessel from which air is excluded, and add 0.1 ml of 0.1 N potassium permanganate; the pink colour is not discharged within five minutes.

Zinc Powder : Zincum metallicum of H.P.I.

Zinc Sulphate : $ZnSO_4$, $7H_2O$

Contains not less than 55.6 per cent and not more than 61.0 per cent of $ZnSO_4$, corresponding to not less than 99.5 per cent and not more than the equivalent of 102.0 per cent of the hydrated salt, $ZnSO_4$, $7H_2O$.

Description—Colourless, transparent crystals or a crystalline powder; odourless, taste astringent and metallic.

Solubility—Soluble in 0.6 parts of water; practically insoluble in alcohol; soluble in 2.5 per cent of glycerin.

Aluminium, Copper, Magnesium and Nickel—Dissolve 1g in 20 ml of water, add dilute ammonia solution in excess, and allow to stand. The solution remains colourless, and no precipitate is produced within thirty minutes.

Assay—Weigh accurately about 1g and dissolve in about 100ml of water. Heat the solution to about 90° and add sodium carbonate solution to precipitate all of the zinc, taking care to avoid a large excess of sodium carbonate. Boil for about five minutes and set aside to allow the precipitate to subside. Collect the precipitate in a tared Gooch crucible and wash with hot water until free from alkali. Dry the residue, ignite, and weigh. Each g of residue is equivalent to 1.984g of $ZnSO_4$.

Zinc Sulphate Solution, Saturated : A saturated solution of zinc sulphate in water.

Zinc Powder **:** Of the H.P.I.

Zinc Solution **:** To 2g of zinc in a flask add 15 ml of *water* and 15 ml of *hydrochloric acid* and allow stand or heat gently on a steam-bath until the zinc is nearly all dissolved. Then add 1 ml of *nitric acid* and boil gently until all is dissolved. Cool, dilute to 100 ml and mix well.

Zinc Sulphate **:** $ZnSO_4 . 7H_2O$

Description—Colourless or white crystals. Efflorescent in dry air.

Solubility—Soluble in *water*; Slightly soluble in *glycerol*; Insoluble in *alcohol*.

Reaction—Dissolve 2g in 30 ml of *ether* and add 1 drop of *methyl orange*, no pink colour is produced.

Zinc Sulphate, Solution of **:** A 5.0 percent w/v solution of *zinc sulphate* in *water*.

APPENDIX II

SOLUTIONS EMPLOYED IN VOLUMETRIC DETERMINATIONS

Acetic Acid 1M : Of the HPI.

Acetic Acid, 1N : Dilute 57.5 ml of the glacial acetic acid with water sufficient to produce 1000 ml.

Acetic Acid, 1N, 2M, 6N **:** *Acetic acid* diluted with water to contain in 1000 ml the following quantities of CH_3COOH

1N ……….. Of the H.P.I.

For 2M 120.10g CH_3COOH

For 6N 345.0 ml CH_3COOH

Ammonia, 2 N : Ammonia solution diluted with water to contain in 1000 ml of 34.06 g of NH_3.

Ammonium Acetate, 3N **:** *Ammonium acetate* dissolved in *water* to contain in 1000 ml of the following quantities of NH_4COOH_3.

For 3N 231g NH_4COOCH_3.

Ammonium Nitrate, 9M **:** *Ammonium nitrate*, dissolved in *water* to contain in 1000 ml of the following quantities of NH_4HO_3.

Ammonium Thiocyanate, 0.1 N **:** Dissolved Ammonium Thiocyanate, in water to contain, in 100 ml. 7.612 g of NH_4SCN.

Bromine 0.1 N : Dissolve 3g potassium bromate and 15g of potassium bromide in sufficient water to produce 1000 ml. Ascertain its exact strength by adding potassium iodide and a slight excess of hydrochloric acid and titrating with 0.1N sodium thiosulphate. 0.1N Bromine should be kept in a dark amber-colour stoppered bottle.

Disodium Edetate, 0.1N, .05 M **:** for 0.1 N Dissolve 37.2 g of *disodium edetate* in sufficient *water* to make 1000 ml & standardize the solution as follows:—

Weigh accurately about 0.2g of *calcium carbonate*, transfer to a suitable container add 50 ml of *water* and sufficient *dilute hydrochloric acid* to dissolve the carbonate and dilute with *water* to 150 ml. Add 15 ml of *solution of sodium hydroxide,* 40 mg of *murexide indicator* preparation and 3 ml of *solution of naphthol green B* and titrate with *disodium edetate solution* until the solution is deep blue in colour. Calculate the molarily by the formula W/100. 1v where w is the weight of $CaCO_3$ in sample of $CaCO_3$ taken and v is the volume in al of *disodium edetate solution* consumed.

For .05 M………of the H.P.I.

Disodium ethylenediamine tetracetate, 0.05M.: Dissolve 10.6 g of disodium ethylenediamine tetracetate in sufficient water to make 1000 ml and standardize solution as follows:

Weigh accurately 0.2 g of calcium carbonate, transfer to a suitable container, add 50 ml of water and sufficient dilute hydrochloric acid to dissolve the carbonate and dilute with water to 150 ml. Add 15 ml of solution of sodium hydroxide, 40 mg of murexide indicator preparation and 3 ml of solution of napthol green B and titrate with disodium ethylenediamine tetracetate solution until the solution is deep blue in colour. Calculate the (100.1 V) molarity by formula w/(100.1V) where W is the weight of $CaCO_2$ in the sample of calcium carbonate taken, and V is the volume in ml of disodium ethylenediamine tetracetate solution consumed.

Ethylene Diamine Tetra Acetate, 0.1M : *Ethylene diamine tetracetate*, dissolved in *water* to contain in 1000 ml of the following quantities of EDTA.

For 0.1 M 29.2 g EDTA.

Ferric Ammonium Sulphate, 0.1 N.: Ferrous sulphate, dissolved in water to contain in 100 ml ferrous ion equivalent to 5.585 g of Fe.

Ferrous Sulphate, 0.1 N: Ferrous sulphate, dissolved in water to contain in 100 ml ferrous ion equivalent to 5.585 g of Fe.

Hydrochloric Acid, 1 N, 0.5 N, 0.1 N, 0.01 N: Hydrochloric acid, diluted with water to contain in 1000 ml the following quantities of HCI.

for 1 N	36.47 g HCI
for 0.5N	18.23 g HCI
for 0.1 N	3.647 g HCI
for 0.01 N	0.3647 g HCI

for 0.02 N…………………………….0.7293 g HCl
for 0.05 N…………………………………01.823 g HCl

Iodiae, 0.1 N: Iodine and potassium iodide, dissolved in water to contain in 1000 ml the following quantities of 1 and KI.

for 0.1 N..................................... 12.69 g I and

for 0.1 N... 18.00 g KI

for 0.02 N…………………………..2.538 g I add 3.60 g KI.

Magnesium sulphate, 0.1M, .05M: *Magnesium sulphate* dissolved in water to contain in 1000 ml the following quantity of Mg SO_4

for 0.1 M 24.648 g Mg SO_4
for 0.05 M 12.324g of the HPI.

Nitric Acid, 2N **:** *Nitric Acid* diluted with *water* to contain in 1000 ml the following quantities of HNO_3.

for 2N 126.02g HNO_3.

Oxalic Acid, 0.1 N **:** *Oxalic acid*, dissolved in *water* to contain in 1000 ml the following quantities of $H_2C_2O_4$ H_2O.

for 0.1 N 6.303 g $H_2C_2O_4$. H_2O

Perchloric Acid, .05 N : Cool 750 ml of *glacial acetic acid* to about 15° and add slowly, with continuous stirring, 6 ml of *perchloric acid* (60 percent w/w), adding 1 ml at a time so that the temperature does not rise. Cool the mixture to a temperature not lower than 10° but without freezing it and add an amount of *acetic anhydride* calculated to combine with the *water* in the perchloric acid. This addition is made drop-wise from a burette, the temperature being controlled so that it does not rise more than 0.5°. Allow the temperature to rise to 15° and add, with stirring sufficient *glacial acetic acid* to produce 1000 ml at 20°. Find out its exact strength by titrating with it with 50 ml of 0.1N *sodium acetate* using 1 ml of *solution of a naphthol benzene* as indicator.

Perchloric acid 0.1N : Cool 750 ml of glacial acetic acid to about 15° and add slowly, with continuous stirring, 11 ml of perchloric acid (60 per cent w/w) adding 1 ml at a time so that the temperature does not rise. Cool the mixture to temperature not lower than 10° but without freezing it and add an amount of acetic anhydride calculated to react with the water in perchloric acid. This addition is made dropwise from a burette, the temperature being controlled so that it does not rise to more than 0.5°. Allow the temperature to rise to 15° and add, stirring sufficient glacial acetic acid to produce 1000 ml at 20°. Ascertain its exact strength by titrating it with 150 ml 0.1N sodium acetate using 1 ml of solution of *Naphthol-benzene* as indicator. Each ml or 0.1N sodium acetate is equivalent to 0.010047 g of perchloric acid.

Potassium Bromate, 0.1 N : *Potassium bromate*, dissolved in *water* to contain in 1000 ml.

for 0.1 N 2.784 g $KBrO_3$.

Potassium Iodate, 0.05 M: Potassium iodate, dissolved in water to contain in 100 ml the following quantities of KIO_3.

for 0.05 M.. 10.70 g KIO_3

Potassium Permanganate, 0.1 N: Potassium permanganate, dissolved in water to contain in 100 ml the following quantities of $KMnO_4$.

for 0.1 N .... 3.161 g $KMnO_4$.

Silver Nitrate, 0.1 N: Silver nitrate, dissolved in water to contain in 1000 ml the following quantities of $AgNO_3$.

for 0.1 N .... 16.99 g $AgNO_3$

Sodium Chloride, 0.1 N : *Sodium chloride* dissolved in *water* to contain in 1000 ml the following quantities of NaCl.

For 0.1 N 5.884g NaCl.

Sodium Hydroxide, 2N, 1N, .5N, .1N, .05N, 02 N, .01N : *Sodium hydroxide* dissolved in *water* to contain in 1000 ml the following quantities of *sodium hydroxide*.

For 2 N	80.0g NaOH
For 1 N	40.0 g NaOH.
For .5 N	20.0 g NaOH
For .1 N	4.0 g NaOH.
For .05 N	2.0 g NaOH
For .02 N	0.80g NaOH

For .01 N 0.4 g NaOH.

Sodium Thiosulphate, .1N, 0.02 N : *Sodium thiosulphate* dissolved in *water* to contain in 1000 ml the following quantities of $Na_2S_2O_3$. $5H_2O$.

For 0.1 N 24.02g$Na_3S_2O_3$. $5H_3O$.
For .02 N 4.804g $Na_2S_2O_3$. $5H_2O$

Sulphuric Acid 1N, 0.5 N, 0.1 N, 0.02 N, :

Sulphuric acid, diluted with water to contain in 1000 ml the following quantities of H_2SO_4.

For 1 N ....49.04 g H_2SO_4

For 0.5 N ....24.52 g H_2SO_4

For 0.1 N ....4.904 g H_2SO_4

For 0.02 N……………………………0.9808g H_3SO_4

Zinc chloride, .05M : Dissolve 3.269 g of granulated zinc in the minimum amount of 2N hydrochloric acid and add sufficient water to produce 1000 ml.

APPENDIX III

(A) INDICATORS EMPLOYED IN VOLUMETRIC DETERMINATIONS AND IN pH DETERMINATIONS

Alizarin solution of :
A solution in *alcohol* approximately 1.0 percent w/v of *alizarin*.

Bromocresol Green, Solution of:
Warm 0.1 g of bromocresol green with 2.9 ml of 0.05 sodium hydroxide and 5 ml of alcohol; after solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Bromothymol Blue:
dibromothymol sulphonphthalein.

Bromothymol Blue, Solution of:
Warm 0.1 g of bromothymol blue with 3.2 ml of 0.05 N sodium hydroxide and 5 ml of alcohol (90 per cent); after the solution is effected, add a sufficient quantity of alcohol (20 per cent) to produce 250 ml.

Bromocresol purple, Solution of:
Warm 0.1g of *bromocresol purple* with 5 ml of *alcohol* (90 percent) until dissolved, add 100 ml of *alcohol* (20 percent), 3.7 ml of 0.05N *sodium hydroxide,* and sufficient *alcohol* (20 percent) to produce 250 ml.

Chloramine-T:
Dissolve 4 g of *chloramines-T* in sufficient *water* to produce 100 ml.

Crystal Violet, Solution of:
A 0.5 per cent w/v solution of crystal violet in glacial acetic acid.

Catechol Violet Solution:
Dissolve 0.1g in water and dilute with water sufficient to produce 100 ml.

**Dimethyl Yellow : ** $C_{14}H_{15}N_3$

Description: Small yellow crystals or yellow or orange flakes.

Solubility: Practically insoluble in *water*, soluble in *chloroform* and in *benzene,* very slightly soluble in *alcohol*.

Indophenol Blue :
Description: A violet, black powder.

Solubility: Practically insoluble in *water*, soluble in *benzene* and in *chloroform*.

Indigo Carmine, Solution of:
A solution of *indigo carmine* in a mixture of 10 ml of *hydrochloric acid* and 990 ml of 20.0 percent w/v solution of *nitrogen free sulphuric acid* in *water*, adjusted to comply with the following test:

Add 10 ml to a solution of 1.0 mg of *potassium nitrate* in 10 ml of *water,* add rapidly 20 ml of *nitrogen free-sulphuric acid* and heat to boiling point; the blue colour is just discharged in one minute.

Eriochrome black T:
Sodium 1-(1-Hydroxy-2-Naphthylazo)-5-nit-2- naphthol –3- sulphonate.

Eriochrome black T, solution of:
Dissolve 0.2 g of Eriochrome black T and 2 g of hydroxylamine hydrochloride in methyl alcohol to produce 50 ml.

Ferric Ammonium Sulphate, Solution of:
A 10.0 per cent w/v solution of ferric ammonium sulphate in water.

Ferrion, Solution of-(I-Phenanthroline):
A 1.5 per cent solution in 1.5 per cent ferrous sulphate solution, however, ferrous sulphate solution is to be freshly prepared. The colour changes from red to pale-green.

Leucomalachite Green, Solution of (1% w/v):
A 1.0 percent w/v solution of *Leucomalachite* green in *water*.

Litmus, Solution of:
Boil 10 g litmus with 50 ml of alcohol (90 per cent) for one hour, and pour away the clear liquid; repeat this operation twice with 30 ml of alcohol (90 per cent). Digest the washed litmus with 100 ml of water, and filter.

Methyl Orange:
Sodium 4 dimethylaminoazobenzebne-4’-sulphonate.

Methyl Orange, Solution of:
A 0.04 per cent w/v solution of methyl orange in alcohol (20 per cent).

Methyl Red-4:
Dimethylaminoazobenzene-2-carboxylic acid.

Methyl Red, Solution of:
Warm 25 mg of methyl red sodium with 0.95 ml of 0.05 sodium hydroxide and 5 ml of alcohol (90 per cent); after solution is effected add a sufficient quantity of alcohol (50 per cent) to produce 250 ml.

Murexide Indicator Preparation:
Add 0.4 g of murexide (Acid ammonium purpurate) to 40 g of powdered potassium sulphate and grind in a glass mortar to a homogeneous mixture.

1-Naththol Benzein Solution:
A 0.2 per cent w/v solution of 1-naphthol benzein in glacial acetic acid. When used for titration in non-aqueous media, it changes from blue or green-blue (basic) through orange (neutral) to dark green (acidic).

1, 10 Phenanthroline Solution :
A 0.2% w/v solution of 1, 10 phenanthroline in alcohol.

Phenolphthalein:
Forms a colourless solution in acid and weak alkaline solutions and gives a red colour in more strongly alkaline solutions.

Phenolphthalein, Solution of:
A 1.0 per cent w/v solution of phenolphthalein in alcohol.

Potassium Chromate, Solution of:
A 5.0 percent w/v solution of potassium chromate in water.

Starch, Solution of:
Triturate 0.5 g of starch, or 0.5 g of soluble starch, with 5 ml of water, and add this to sufficient water to produce about 100 ml. Boil for a few minutes, with constant stirring cool and filter.

Solution of starch must be recently prepared.

Xylenol orange, solution of:
Shake 0.1 g of xylenol orange with 100 ml of water and filter if necessary.

(B) pH RANGES AND COLOUR CHANGES OF INDICATORS

Indicator	**pH range**	**Colour change**
Bromophenol blue	2.8 to 4.6	Yellow to blue
Methyl orange	3.1 to 4.4	Red to Yellow
Bromocresol green	3.6 to 5.2	Yellow to blue
Methyl red	4.2 to 6.0	Red to yellow
Bromothymol Blue	6.1 to 7.6	Yellow to blue
Litmus	5.5 to 7.5	Red to blue
Phenophthalein	8.2 to 10.0	Colourless to red.

(C) DETERMINATION OF pH values

The pH value of an aqueous liquid may be defined as the common logarithum of the reciprocal of the hydrogen ion concentration expressed in g, per litre. Although this definition provides a useful practical means for the quantitative indication of the acidity or alkalinity of a solution, it is less satisfactory from a strictly theoretical point of view. No definition of pH as a measurable quantity can have a simple meaning which is also fundamental and exact.

The pH value of a liquid is determined potentiometrically by means of the glass, electrode and a suitable pH meter.

The reagents used in the determinations are described below:

Method

Operate the pH meter and electrode system according to the manufacturer's instructions. Standardise the meter and electrodes with 0.05 M potassium hydrogen phthalate (pH 4.00) when measuring an acid solution, or with 0.05 M sodium borate when measuring an alkaline solution. At the end of a set of measurement, take a reading of the solution used to standardize the meter and electrodes. This reading should not differ by more than 0.02 from the original value at which the apparatus was standardized. If the difference is greater than 0.05, the set of measurements must be repeated. The pH/ e.m.f. relationship of the particular glass electrode in use must be checked. The pH/follows; standardize with 0.05 M sodium borate. When the reading is higher by 0.02 or more, or over by 0.05 or more than the appropriate value in the Table, correct the pH values of all solutions measured on that day, assuming the e.m.f. of the glass electrode cell to be linearly related to the pH value of the solution which it contains. Unless otherwise stated all solution must be brought to laboratory temperature prior to measurement. Whilst the pH/temperature coefficient of 0.05 M potassium hydrogen phthalate may be neglected that of 0.05 M sodium borate must be taken into account in accordance with the value given in the Table. When measuring pH values above 10.0 make sure that the glass electrode is suitable for use at the alkaline and of the pH scale and apply any correction that is necessary.

TABLE

pH value of 00.5 M sodium borate

Temperature	10°	15°	20°	25°	40°
PH	9.29	9.26	9.22	9.18	9.14

Water used as the solvent in the determination of the pH of a solution is water having a pH of 5.5 to 7.0

SOLUTION OF STANDARD pH

Solutions from pH 1.2 to pH 2.2 are prepared by mixing 50 ml of 0.2 M potassium chloride with quantities of 0.2 N hydrochloric acid, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml:-

PH	ml of 0.2 N hydrochloric acid
1.2	64.5
1.3	41.5
1.6	26.3
1.7	16.6
2.0	10.6
2.2	6.7

solution from pH 2.2 to pH 3.8 are prepared by mixing 50 ml of 0.2 M potassium hydrogen phthalate with the quantities of 0.2 N hydrochloric acid, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml:-

pH	ml of 0.2 N hydrochloric acid
2.2	46.70
2.3	39.60
2.6	32.95
2.7	26.42
3.0	20.32
3.2	14.70
3.3	9.90
3.6	5.97
3.7	2.62

Solutions from pH 4.0 to pH 6.2 are prepared by mixing 50 ml of 0.2 M potassium hydrogen phthalate with the quantities of 0.2 N sodium hydroxide, specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml:-

PH	ml of 0.2 N sodium hydroxide
4.0	0.40
4.2	3.70
4.4	7.50
4.6	12.15

4.7	17.70
4.9	20.75
5.0	23.85
5.1	26.95
5.2	29.95
5.3	35.45
5.4	26.45
5.6	39.95
5.8	43.00
6.0	45.45
6.2	47.00

Solutions from pH 5.8 to pH 8.0 are prepared by mixing 50 ml of 02. M potassium hydrogen phosphate with the quantities of 0.2 N sodium hydroxide specified in the following table, and diluting with freshly boiled and cooled water to produce 200 ml:-

PH	Ml of 0.2 N sodium hydroxide
5.8	3.72
6.0	5.70
6.2	8.60
6.4	12.60
6.6	17.80
6.8	23.65
7.0	29.63
7.2	35.00
7.4	39.50
7.6	42.80
7.8	45.20
8.0	46.80

Solutions from pH 7.8 of pH 10.0 are prepared by mixing 50 ml of 0.2 M boric acid-potassium chloride with the quantities of 0.2 N sodium hydroxide, specified in the following table, and diluting with freshly boiled and cooled water to produce 20 ml:-

pH	ml of 0.2 N sodium hydroxide
7.8	2.61
8.0	3.97
8.2	5.90

8.4	8.50
8.6	12.00
8.8	16.30
9.0	21.30
9.2	26.70
9.4	32.00
9.6	36.85
9.8	30.80
10.0	43.90

Solutions of Standard pH must be kept in glass stopped bottles of alkali-free glass preferably coated with paraffin internally.

APPENDIX IV

DETERMINATION OF MELTING RANGE AND BOILING RANGE

(A) DETERMINATION OF MELTING RANGE

The melting-range of a substance is the range between the corrected temperature at which the substance begins to form droplets and the corrected temperature at which it completely melts, as shown by formation of a meniscus.

Apparatus:

(a) A capillary tube of soft glass, closed at one end, and having the following dimensions:

(i) thickness of the wall, about 0.10 to 0.15 mm.

(ii) length about 10 cm or any length suitable for apparatus used.

(iii) internal diameter 0.9 to 1.1 mm for substances melting below 100° or 0.8 to 1.2 mm for substances melting above 100°.

Thermometers:

Accurately standardized thermometers covering the range 10° to 300°, the length of two degrees on the scale being not less than 0.8 mm. These thermometers are of the mercury-in-glass, solid-stem type; the bulb is cylindrical in shape, and made of approved thermometric glass suitable for the range of temperature covered; each thermometer is fitted with a safety chamber. The smallest division on the thermometer scale should vary between 0.1° to 1.5° according to the melting point of the substance under test.

The following form of heating apparatus is recommended.

A glass heating vessel of suitable, construction and capacity fitted with suitable stiring device, capable of rapidly mixing the liquids.

Suitable liquids for use in the heating vessel:

Glycerin	Upto 150
Sulphuric acid to which a small crystal of potassium nitrate or 4 Drops of nitric acid per 100 ml has been added	Upto 200°
A liquid paraffin of sufficiently high boiling range	Upto 250°
Seasame oil	Upto 300°
30 parts of potassium sulphate, dissolved by heating in 70	

parts of sulphuric acid	Upto 300°

Any other apparatus or method, preferably, the electric method may be used subject to a check by means of pure substances having melting temperature covering the ranges from 0° to 300° and with suitable intervals.

The following substances are suitable for this purpose.

Substance	Melting range
Substance	
Vanillin	81° to 83°
Acetanilide	114° to 116°
Phenacetin	134° to 136°
Sulphanilamide	164° to 166.5°
Sulphapyridine	191° to 193°
Caffeine (Dried at 100°)	234° to 237°

PROCEDURE

Method I—Transfer a suitable quantity of the powdered and thoroughly dried substance to a dry capillary tube and pack the powder by tapping the tube on a hard surface so as to form a tightly packed column of 2 to 4 mm in height. Attach the capillary tube and its contents to a standardized thermometer so that the closed end is at the level of the middle of the bulb; heat in a suitable apparatus (preferably a round-bottom flask) fitted with an auxiliary thermometer regulating the rise of temperature in the beginning to 3° per minute. When the temperature reached is below the lowest figure of the range for the substance under examination, the heating of the apparatus is adjusted as desired; if no other directions are given, the rate of rise of temperature should be kept at 1° to 2° per minute. The statement 'determined by rapid heating' means that the rate of rise of temperature is 5° per minute during the entire period of heating.

Unless otherwise directed, the temperature at which the substance forms droplets against the side of the tube and the one at which it is completely melted as indicated by the formation of a definite meniscus, are read.

The following emergent stem corrections should be applied to the temperature readings.

Before starting the determination of the melting temperature the auxiliary thermometer is attached so that the bulb touches the standard thermometer at a point midway between the graduation for the expected melting temperature and the surface of the heating material. When the substance has melted, the temperature is read on the auxiliary thermometer. The correction figure to be added to the temperature reading of the standardized thermometer is calculated from the following formula:—

0.00015 N (T—t)

Where ‘T’ is the temperature reading of the standardized thermometer.

‘t’ is the temperature reading of the auxiliary thermometer.

‘N’ is the number of degrees of the scale of the standardized thermometer between the surface of the heating material and level of mercury.

The statement “melting range, a° to b°” means that the corrected temperature at which the material forms droplets must be at least a°, and that the material must be completely melted at the corrected temperature, b°.

Method II—The apparatus employed for this test is the same as described for method I except for such details as are mentioned in the procedure given below:—

Procedure—A capillary tube open at both ends is used for this test. Melt the material under test at as low a temperature as possible. Draw into the capillary a column of the material about 10 mm high. Cool the charged tube in contact with ice for at least 2 hours. Attach the tube to the thermometer by means of rubber band and adjust it in the heating vessel containing water so that the upper edge of the material is 10 mm below the water level. Heat in the manner as prescribed in Method I until the temperature is about 5° below the expected melting point and then regulate the rate of rise of temperature to between 0.5° to 1° per minute. The temperature at which the material is observed to rise in the capillary tube is the melting temperature of the substance.

(B) DETERMINATION OF BOILING-RANGE

The billing-range of a substance is the range of temperature within which the whole or a specified portion of the substance distils.

Apparatus:

The boiling-range is determined in a suitable apparatus, the salient features of which are described below:

(a) *Distillation flask*—The flask shall be made of colourless transparent heat-resistant glass and well annealed. It should have a spherical bulb having a capacity of about 130 ml. The side tube slopes downwards in the same plane as the axis of the neck at angle of between 72° to 78°. Other important dimensional details are as under:

Internal diameter of neck	15 to 17 mm

Distance from top of neck to center of side tube	72 to 78 mm
Distance from the center of the side tube to surface of the Liquid when the flask contains 100 ml liquid	87 to 93 mm
Internal diameter of side tube	3.5 to 4.5 mm
Length of side tube	97 to 103 mm

(b) *Thermometer*—Standardised thermometers calibrated for 100 mm immersion and suitable for the purpose and covering the boiling range of the substance under examination shall be employed; the smallest division on the thermometer scale may vary between 0.2° to 1.0° according to requirement.

(c) *Draught Screen*—A suitable draught screen, rectangular in cross section with a hard asbestos board about 6 mm thick closely fitting horizontally to the sides of the screen, should be used. The asbestos board shall have a centrally cut circular hole, 110 mm in diameter. The asbestos board is meant for ensuring that hot gases from the heat source do not come in contact with the sides or neck of the flask.

(d) *Asbestos Board*—A 150 mm square asbestos board 6 mm thick provided with a circular hole located centrally to hold the bottom of the flask, shall be used. For distillation of liquids boiling below 60° the hole shall be 30 mm in diameter; for other liquid it should be 50 mm in diameter. This board is to be placed on the hard asbestos board of the draught screen covering its 110 mm hole.

(e) *Condenser*—A straight water-cooled glass condenser about 50 cm long shall be used.

Procedure—100 ml of the liquid to be examined is placed in the distillation flask, and a few glass beads or other suitable substance is added. The bulb of the flask is placed centrally over a circular hole varying from 3 to 5 cm in diameter (according to the boiling range of the substance under examination), in a suitable asbestos board. The thermometer is held concentrically in the neck of the flask by means of a well fitting cork in such a manner that the bulb of the thermometer remains just below the level of the opening of the side-tube. Heat the flask slowly in the beginning and when distillation starts, adjust heating in such a manner that the liquid distils at a constant rate of 4 to 5 ml per minute. The temperature is read when the first drop runs from the condenser, and again when the last quantity of liquid in the flask is evaporated.

The boiling ranges indicated, apply at a barometric pressure of 760 mm of mercury. If the determination is made at some other barometric pressure, the following correction is added to the temperatures read:

K- (760—p)

Where p is the barometric pressure (in mm) read on a mercury barometer, without taking into account the temperature of the air;

K is the boiling temperature constant for different liquids having different boiling ranges as indicated below:—

Observed Boiling range	'K'
Below 100°	0.04
100° to 140°	0.045
141° to 190°	0.05
191° to 240°	0.055
above 240°	0.06

If the barometric pressure is below 760 mm of mercury the correction is added to the observed boiling-range; if above, the correction is substracted.

The statement 'distils between a° and b°, means that temperature at which the first drop runs from the condenser is not less than a° and that the temperature at which the liquid is completely evaporated is not greater than b°.

Micro-methods of equal accuracy may be used.

APPENDIX V

(A) DETERMINATION OF REFRACTIVE INDEX

The refractive index of a substance is the ratio of the velocity of light in vacuum to its velocity in the substance. It may also be defined as the ratio of the sine of the angle of incidence to the sine of the angle of refraction.

The refractive index of any substance generally varies with the wave-length of the refracted light and with the temperature.

In this pharmacopoeia refractive indices are given for sodium light at the temperature specified in the text in a suitable apparatus.

(B)DETERMINATION OF OPTICAL ROTATION AND OF SPECIFIC ROTATION.

Optical Rotation:

Certain substances, in a pure state, in solution and in tinctures posses the property of rotating the plane of polarized light, i.e., the incident light emerges in a plane forming an angle with the plane of the incident light. These substances are said to be optically active and the property of rotating the plane of polarized light is known as Optical Rotation. The optical rotation is defined as the angle through which the plane of polarized light is rotated when polarized light obtained from sodium or mercury vapour lamp passes through one decimeter thick layer of a liquid or a solution of a substance at a temperature of 25° unless as otherwise stated in the monograph. Substances are described as dextrorotatory or laevoretatory according to the clockwise or anticlockwise rotation respectively of the plane of polarized light. Dextrorotation is designated by a plus (+) sign and laevorotation by a minus (—) sign before the number indicating the degrees of rotation.

Apparatus:

A polarimeter on which angular rotation accurate 0.05° can be read may be used.

Procedure:

For liquid substances, take a minimum of five readings of the rotation of the liquid and also for a empty tube at the specified temperature. For a solid dissolve in a suitable solvent and take five readings of the rotation of the solution and the solvent used. Calculate the average of each set of five readings and find out the corrected optical rotation from the observed rotation and the reading with the blank (average).

Specific Rotation:

The apparatus and the procedure for this determination are the same as those specified for optical rotation.

Specific rotation is denoted by the expression

$$[\alpha]\overset{t}{\underset{x}{—}}$$

denotes the temperature of rotation; α denotes the wave length of light used or the characteristic spectral line. Specific rotations are expressed in terms of sodium light of wave length 589.3 mw (D line) and at a temperature of 25°, unless otherwise specified.

Specific rotation of a substance may be calculated from the following formulae: For liquid substances

$$[\alpha]^{t}= \overset{a}{---}$$

$$ld$$

For solutions of substances

$$[\alpha]^t \leftrightarrow = \frac{a \times 100}{lc.}$$

Where a is the corrected observed rotation in degrees
1 is the length of the polarimeter tube in decimeters.
d is the specific gravity of the liquid
c is the concentration of solution expressed as the number of g of the substance in 100 ml of solution.

Specific Rotation:
1. Apomorphinum muriaticum

Determined in a solution containing the equivalent of 0.15g of anhyd. Apomorphine in 10ml of 0.02N HCI. The optical rotation should be not less than –49° and not more than 52°.

2. Chinium muriaticum

Dissolve 0.5g in 0.1 N hydrochloric acid and dilute to 25ml with the same solvent. The optical rotation should be not less than—240° and not more than –258°.

3. Codeinum
Dissolve 0.5g in alcohol and dilute to 25 ml with the same solvent. The optical rotation should be in between –142° and –146°.

Optical Rotation:
Copaiba Officinalis—Essential oil—optical rotation should be in between –7° and –35°.

(C) DETERMINATION OF LIGHT ABSORPTION

When radiation is passed through a homogeneous solution containing an absorbing substance, part of the radiation is absorbed and the intensity of the radiation emerging from the solution is less than the intensity of the radiation entering it. The extent to which radiation absorbed in passing through a layer of an absorbing substance is expressed in terms of the extinction, E, defined by the expression where I is the intensity of the radiation entering the absorbing layer I, is the intensity of the radiation emerging from the absorbing layer.

$$E = \log_{10} \frac{(I_0)}{I}$$

The extent of absorption in case of each absorbing substance depends on its concentration in the solution and the thickness of the absorbing layer taken for measurement. For convenience of reference and for each in calculations, the Extinction of a 1 cm layer of a 1 percent w/v solution of the substance has been given in this pharmacopoeia in the case of a few substances. For each absorbing substance there is one wavelength, or there are a few wavelengths, at which maximum absorptions take place and the values differ from one wavelength to another. It is therefore necessary to specify the wavelength at which the measurement is made. The composite method of expression is thus—

E(1 per cent, 1 cm)at mu

The quantitative relationship between this value and extinction determined (for the same wavelength) at other concentrations is given by the formula

$$E(1 \text{ per cent, } 1 \text{ cm}) = \frac{E}{lc}$$

Where E is the observed extinction of a solution, l is the thickness in cm of the absorbing layer of the solution, c is the number of groups of the absorbing substance in 100ml of solution. This property of light absorption is at times utilized for identifying substances, and assays where solutions on be obtained free from interfering materials and simpler methods were not found satisfactory.

The measurement of light absorption is made with spectrophoto-meters. The wavelength at which measurement is to be made may be in the visible or in the ultra-violent region as specified in the main text of the monograph. An instrument should be used which is suitable for the desired wavelength. Care should be taken to see that the solvent used for making solutions is free from fluorescence at the desired wavelength or wavelengths. The solvent which is used in the solvent cell must be from the same batch as the one used for preparing the solution for test.

APPENDIX VI

DETERMINATION OF WEIGHT PER MILLILITRE AND SPECIFIC GRAVITY

Weight per Millilitre

Weight per milliliter of a liquid is determined by dividing the weight in air, expressed in grammes, of the quantity of the liquid which fills a pycnometer at 20° or 25° by the capacity of the pycnometer at 20° or 25° respectively, expressed in milliliters. The capacity of the pycnometer at these temperatures is ascertained from the weight in g of quantity of water required to fill the pycnometer. The following data are assumed:—

Wt. of 1 ml of water in air at

20°	0.99719 g
25°	0.99602 g

Ordinary deviations in the density of air do not affect the result of a determination significantly for pharmacopoeial purposes.

Specific Gravity

The specific gravity of a substance is the weight of a given volume of that substance at a stated temperature as compared with the weight of an equal volume of water at the same temperature, all weighings being taken in air. A suitable pycnometer may be used for the determination.

APPENDIX VII

QUALITATIVE REACTIONS OF SOME COMMON SUBSTANCES AND RADICALS

Acetates: Acetates, when warmed with sulphuric acid, yield acetic acid which has a characteristic odour; when warmed with sulphuric acid and a small quantity of alcohol, they yield ethyl acetate, which has a characteristic odour.

Neutral acetates are decomposed by heating, yielding a characteristic acetous odour.

With neutral or slightly acid solutions of acetates, solution of ferric chloride gives a deep-red colour, and the resulting liquid on boiling yields a reddish-brown precipitate. On adding hydrochloric acid, the red solution turns yellow. Acetates, when heated with calcium oxide, yield acetone, detected by the indigo blue colour obtained when the vapours impinge on filter paper, which has been moistened with a 2.0 per cent w/o solution of 0-nitro benzaldehyde in alcohol, dried and then moistened with solution of sodium hydroxide.

Aluminium; Solutions of aluminium salts yield with dilute ammonia solution or with solution of ammonium sulphide, a white gelatinous precipitation soluble in hydrochloric acid, in acetic acid, and in solution of sodium hydroxide but nearly insoluble in dilute solution of ammonia and in solution of ammonium salts and quite insoluble in these solutions when the mixture is boiled.

Solution of aluminium salts to which have been added five drops of a freshly prepared 0.05 per cent w/v solution of quinalizarin in a 1 per cent w/v solution of sodium hydroxide heated to boiling, cooled and acidified with excess of acetic acid, yield a reddish-violet colour.

Ammonium Salt:

Many ammonium salts volatilise, when strongly heated, leaving no residue. When they are heated with solution of sodium hydroxide, ammonia is evolved recognized by its odour, by its reaction on moist red litmus paper and by its ability to produce a black stain on filter paper impregnated with solution of mercurous nitrate.

Antimony:

Slightly acid solutions of antimony compounds yield with hydrogen sulphide an orange-coloured precipitate soluble in solution of sodium hydroxide, in solution of ammonium sulphide, and in warm hydrochloric acid with evolution of hydrogen sulphide but almost insoluble in solution of ammonium carbonate.

Solution of antimony compounds react with nascent hydrogen generated by the interaction of granulated Zinc and dilute sulphuric acid to yield stibine. 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.

Solutions of antimony compounds acidified with dilute nitric acid, and filtered if necessary, yield a white micro-crystalline precipitate with a 5.0 per cent w/v solution of pyrogallol in water.

Arsenic:

Solution of arsenic compounds, containing hydrochloric acid, yield with hydrogen sulphide a yellow precipitate, soluble in solution of sodium hydroxide, in solution of ammonium sulphide and in solution of ammonium carbonate, but precipitated on the addition of hydrochloric acid Solution of arsenic compounds, treated with nascent hydrogen generated by the interaction of granulated zinc and dilute sulphuric acid, yield arsine. A cold porcelain title held in the flame of this gas acquires a dark metallic deposit, which is readily dissolved by solution of chlorinated soda.

Solution of arsenic compounds yield with solution of stannous chloride, a brown precipitate.

Solution of arsenious compounds, treated, with nascent hydrogen generated by the interaction of granulated zinc and solution of sodium hydroxide, slowly yield hydrogen arsenide; this gas gives a black stain to a filter paper moistened with solution of silver nitrate and placed as a cap over the tube in which the test is being performed.

Arsenites:

Solution of arsenites to which sodium bicarbonate has been added, decolorizes solution of iodine.

Solution of arsenites yield a yellow precipitate with solution of silver ammonio-nitrate.

Barium:

Solution of barium salts yield a white precipitate with dilute sulphuric acid. This precipitate is insoluble in hydrochloric acid and in nitric acid.

Barium salts impart a yellowish green colour to a non-luminous flame appearing blue when viewed through green glass.

Benzoates:

Benzoates do not char when heated with sulphuric acid but yield a white sublimate on the sides of the tube.

Solutions of benzoates yield a white crystalline precipitate with dilute hydrochloric acid readily soluble, on shaking in solvent ether or chloroform.

Neutral solutions of benzoates yield with test-solution of ferric chloride a buff coloured precipitate which is soluble in hydrochloric acid with the simultaneous separation of a white crystalline precipitate of benzoic acid.

Neutral solutions of benzoates do not decolorise a few drops of solution of bromine.

Bromides:

When a bromide is heated with sulphuric acid and manganese dioxide or potassium dichromate, bromine is liberated; the vapour gives an orange-yellow colour to filter-papers moistured with solution of starch.

Solutions of bromides give, with solution of silver nitrate, a yellowish curdy precipitate somewhat soluble in ammonia solution but almost insoluble in dilute ammonia solution and dilute nitric acid.

From solutions of bromides, bromine is liberated by solution of chlorine. The bromine is soluble in two or three drops of Carbon disulphide or chloroform forming a reddish solution. Addition of a saturated solution of phenol to the aqueous solution containing liberated bromine yields a white precipitate.

In testing for bromides in the presence of iodides, all iodine must first be removed by boiling the aqueous solution with excess of Lead dioxide.

Calcium :

Solution of calcium salts yield with solution of ammonium carbonate, a white precipitate which after boiling and cooling the mixture, is insoluble in solution of ammonium chloride.

Solutions of calcium salts yield, with solution of ammonium oxalate, a white precipitate soluble in hydrochloric acid but insoluble in acetic acid.

With solution of potassium chromate, strong solution of calcium salts yield a yellow, crystalline precipitate on shaking, the precipitate being soluble on diluting well with water or on adding acetic acid.

Solutions of calcium salts yield no immediate precipitate with solution of potassium ferrocyanide, but on the addition of an excess of the reagent in the presence of an excess of ammonium chloride, yields a white precipitate.

Carbonate and Bicarbonates :

Carbonates and bicarbonates effervesce with dilute acids liberating carbon-dioxide; the gas is colourless and produces a white precipitate in solution of calcium hydroxide.

Solutions of carbonates produce a brownish-red precipitate with solution of mercuric chloride; solution of bicarbonates produce a white precipitate.

Solutions of carbonates yield, with solution of silver nitrate, a white precipitate which becomes yellow on the addition of an excess of the reagent and brown on boiling the mixture. The precipitate is soluble in dilute ammonia solution and dilute nitric acid.

Solutions of carbonates produce, at room temperature a white precipitate with solution of magnesium sulphate. Solution of bicarbonates yield no precipitate with the reagent at room temperature but on boiling the mixture, a white precipitate is formed.

Solutions of bicarbonates, on boiling, liberate carbon-dioxide which produces a white precipitate in solution of calcium hydroxide.

Chlorides :

Chlorides, when heated with manganese-dioxide and sulphuric acid, yield chlorine, recognizable by its odour and by giving a blue colour with potassium iodide and solution of starch.

Solutions of chlorides yield, with solution of silver nitrate, a white, curdy precipitate soluble in dilute ammonia solution but insoluble in nitric acid.

Citrates:

Citrates, on heating with sulphuric acid in a tube placed in a tube placed in a boiling water-bath, give only a pale yellow colour and evolve carbon dioxide and carbon-monoxide.

Neutral solutions of citrates boiled with an excess of solution of calcium chloride yield a white granular precipitate soluble in acetic acid.

Neutral solutions of citrates yield, with an excess of solution of silver nitrate a white precipitate soluble in nitric acid and in dilute ammonia solution. No mirror is formed on the sides of the test tube when this ammoniacal solution is warmed.
Solution of citrates boiled with an excess of solution of mercuric sulphate, and filtered if necessary, yield a solution which after boiling and addition of a few drops of solution of potassium permanganate, decolourises the reagent and yields a white precipitate.

***Evaporation Residue for Benzene*:-**

Evaporate 115 ml on the steam-bath and dry at 105° for 30 minutes. The weight of the residue does not exceed 1.0 mg.

Copper :

Solutions of copper salts yield a brownish-black precipitate with hydrogen sulphide insoluble in dilute hydrochloric acid and solution of sodium hydroxide, almost insoluble in solution of ammonium sulphide but decomposed and dissolved by boiling nitric acid.

Solutions of copper salts, yield with solution of sodium hydroxide, almost insoluble in solution of ammonium sulphide but decomposed and dissolved by boiling nitric-acid.

Solutions of copper salts, yield with solution of sodium hydroxide a light blue precipitate which becomes brownish black on boiling.

Solutions of copper salts yield with solution of potassium iodide a brownish precipitate and a brown aqueous liquid giving a deep blue colour with solution of starch.

Strong solutions of copper salts yield with solution of ammonium thiocyanate a black precipitate becoming white on the addition of sulphurous acid.

Solution of copper yield with dilute ammonia solution a greenish blue precipitate which readily dissolves in excess of the precipitate forming a deep blue solution.

Cupric salts in solution produce with solution of potassium ferrocyanide a reddish-brown precipitate or in a very dilute solution reddish-brown colour.

Cadimum compounds:

Cadmium salts yield with hydrogen sulphide or potassium sulphide, a yellow precipitate, insoluble is excess of sodium sulphide.

Gold:

Metallic gold is soluble in mixture of 3 volumes of hydrochloric acid and one volume of nitric acid yielding a solution of chloroauric acid, and is insoluble in concentrated mineral acids.

Solution of gold compounds yield, with hydrogen sulphide, a black precipitate insoluble in dilute hydrochloric acid, but soluble in solution of ammonium polysulphide, from which it is precipitated on the addition of dilute hydrochloric acid.

Auric compounds in neutral or weakly acid solution yield, with solution of stannous chloride, a purple colour, and with solution of hydrogen peroxide and solution of sodium, hydroxide, a precipitate which appears brownish-black by reflected light and bluish-green by transmitted light.

Iodides :

Iodides heated with sulphuric acid and manganese-dioxide or potassium dichromate evolve violet vapours of iodine.

Solutions of iodides yield with solution of silver nitrate, a yellow curdy precipitate in soluble in dilute ammonia solution and in dilute nitric acid.

Solutions of iodides with solution of potassium iodate and dilute acetic acid liberate iodine, which colours chloroform reddish-violet and solution of starch, blue.

A small quantity of solution of chlorine added to solutions of iodides liberate iodine which colours chloroform reddish-violet and solution of starch deep blue.

Iron :

Reactions common to Ferrous and ferric salts.

Solutions of iron salts in dilute hydrochloric acid after the addition of a sufficient quantity of solution of potassium permanganate to produce a faint pink colour, give with solution of ammonium thiocyanate a blood red colour, which is extracted by solvent ether, or amyl alcohol and which is discharged on the addition of solution of mercuric chloride or of phosphoric acid.

(a) Ferric Salts :

Solutions of ammonium nitrosophenyl hydroxylamine in the presence of hydrochloric acid gives a reddish-brown precipitate soluble in solvent ether.

Solution of potassium ferricyanide produces a reddish-brown colour but not precipitate.

Solution of sodium hydroxide produces, in the absence of citrates and tartrates reddish-brown precipitate soluble in solution of citric acid in water or of tartaric acid in water.

Solutions of ferric salts, strongly acidified with acetic acid, give with a 0.2 per cent w/v solution of 7-iodo-8-hydroxyquinoline-5, sulphonic acid in water, a stable green colour.

(b) Ferrous Salts :

Solutions of ferrous salts when treated with the solution of potassium ferrocyanide produces a white, precipitate rapidly turning blue, and insoluble in dilute hydrochloric acid.

Solution of ferrous salts when treated with the solution of potassium ferrocyanide produces a dark blue precipitate insoluble in dilute hydrochloric acid and decomposed by solution of sodium hydroxide.

Solution of sodium hydroxide produces a dull green precipitate which on filtering and exposing to the atmosphere, changes to a brownish colour.

Lead :

Strong solutions of lead salts yield with hydrochloric acid a white precipitate soluble in boiling water and redeposited as crystals when the solution is cooled.

Solution of lead salts which are not very strongly acid yield with hydrogen sulphide, a black precipitate, insoluble in dilute hydrochloric acid and in solution of ammonium sulphide but soluble in hot dilute nitric acid.

Solutions of lead salts yield with dilute sulphuric acid a white precipitate almost insoluble in water, more nearly insoluble in dilute sulphuric acid and in alcohol (90 per cent), but soluble in dilute solution of ammonium acetate.

Solution of lead salts yield with solution of potassium iodide, a yellow precipitate which dissolves on boiling and reprecipitates as glistening plates on cooling.

Solutions of lead salts yield with solution of potassium chromate, a yellow precipitate readily soluble in solution of sodium hydroxide and in hot nitric acid, sparingly soluble in dilute nitric acid and insoluble in acetic acid.

Solutions of lead salts to which has been added solution of potassium cyanide and made alkaline with ammonia solution produce a brick-red coloured lower layer on shaking with lead-free solution of diphenyl thiocarbazone.

Magnesium :

Solutions of magnesium salts yield a white precipitate with solution of ammonium carbonate, especially on boiling but yield no precipitate in the presence of solution of ammonium chloride.

Solutions of magnesium salts yield a white crystalline precipitate with solution of sodium phosphate in the presence of ammonium salts and dilute ammonia solution.
Solution of magnesium salts yield with solution of sodium hydroxide a white precipitate insoluble in excess of the reagent but soluble in solution of ammonium chloride.

Mercury :

Reaction common to mercurous and mercuric salts.

Hydrogen sulphide produces a black precipitate, insoluble in solution of ammonium sulphide and in boiling dilute nitric acid.

Bright copper foil immersed in a solution free from excess of nitric acid becomes coated with a deposit of mercury, which on rubbing becomes bright; the mercury may be volatilized from the foil by heat obtained in globules. Solution of stannous chloride added in excess gives white precipitate rapidly turning grey with excess of the reagent.

Mercuric Salts :

Solution of sodium hydroxide yields a yellow precipitate.

Solution of potassium iodide added to a neutral solution produces a scarlet precipitate, soluble in excess of the precipitant and in a considerable excess of the solution of the mercuric salt.

Nitrates :

Nitrates liberate red fumes when warmed with sulphuric acid and copper.

Solution of nitrates do not yield a brown colour is with sodium of ferrous sulphate but when, to a mixture of the reagent and solution being tested, sulphuric acid is cautiously added to form a lower layer, a brown colour is produced, at the junction of the two liquids.

When solutions of nitrates are mixed eautiously with sulphuric acid and a crysta of bromine is added a red colour is produced.

Solutions of nitrates previously boiled with solution of sodium hydroxide to free them from traces of ammonium compounds on boiling being with zine powder and solution of sodium hydroxide liberate ammonia, detected by its action on moistened red litmus and by the darkening produced on a filter paper previously impregnated with solution of mercurous nitrate.

Phosphate :

Solution of ortho-phosphates give the following reactions.

Solution of silver ammonia-nitrate yields a light yellow precipitate, readily soluble in dilute ammonium solution and in cold dilute nitric acid.

Solution of magnesium ammonio-sulphate yields a white, crystalline precipitate.

Solution of ammonium molybdate with an equal volume of nitric acid yields on warming a yellow precipitate.

On adding to a dilute solution of a phosphate, one fifth of its volume of solution of ammonium molybdate with sulphuric acid, followed by one fifth of its volume of solution of methylamion phenol with sulphite, and heating for 30 minutes in a water bath a blue colour is produced.

Potassium :

Potassium compounds moistened with hydrochloric acid and introduced on platinum wire into the flame of a Burner, give a violet colour to the flame.

Moderately strong solution of potassium salts, which have been previously ignited to free them from ammonium salts give a white, crystalline precipitate with perchloric acid.

Solution of potassium salts which have been previously ignited ti free them from ammonium salts and from which iodide has been removed give a yallow precilitate with solution of sodium cobaltinitrite and acetic acid.

Sodium :

Sodium compounds moistened with hydrochloric acid and introduced on a platinum wire into the flame of a Bunsen Burner, give a yellow colour to the flame.
Solution of sodium salts yield, with solution of uranyl zine acetate, a yellow crystalline precipitate.

Sulphates :

Solutions of sulphates yield, with solution of barium chloride, a white precipitate insoluble in hydrochloric acid.

Solution of sulphates yield, with solution of lead acetate, a white precipitate soluble in solution of ammonium acetate and in solution hydroxide,

Tartrate :

Tartrates, heated with sulphuric acid in boiling water-bath char rapidly evolving Carbon monoxide and Carbon dioxide.

Neurtal solutions of tartrates produce with excess of solution of Calcium chloride in the cold, a white, granular precipitate soluble in acetic acid.

Neutral solution of tartrates yield, with excess of solution of Calcium chloride in the cold a white granular precipitate soluble in acetic acid.

Neutral solutions of tartrates yield, with excess of solution of silver nitrate, a white precipitate soluble in nitric acid and dilute ammonia solution, the ammonia cal solution containing just enough ammonia-hydroxide to dissolve the silver precipitate, on heating deposits metallic silver as a mirror on the side of the test tube.

On adding to a solution of Tataric acid in water or a tart rate acidified with acetic acid a drop of solution of ferrous sulphate, a few drops of solution of hydrogen peroxide and an excess of solution of sodium hydroxide, a purple or violet colour is produced.

Thiosulphates :

Solutions of thiosulphates give with hydrochloric acid a white precipitate of sulphur which soon turns yellow and evolves sulphur dioxide, a colourless gas with a pungent smell of burning sulphur.

Strong solutions of thiosulphates give with solution of barium chloride a white precipitate which is a soluble in hydrochloric acid with separation of sulphur and evolution of sulphur dioxide.

Solution of thiosulphate decolorise solution of todion : the decolorized solution do not give the reactions for sulphates.

Solutions of thiosulphate decoloriced solution of bromine: the decolorized solution give the reactions for sulphates.

Solutions of thiosulphate give with solution of lead acetate a white precipitate soluble in excess of the reagent; on boiling the suspension, a black precipilate is obtained.

Zine:

Natural solutions of zine salts yield with solution of ammonium sulphide or with hydrogen sulphide and solution of sodium hydroxide, a white precipitate soluble in hydrochloric acid but insoluble in acetic acid.

Solutions of zine salts yield with solution of potassium ferrocyanide a white or with precipitate insoluble in dilute hydrochloric acid.

Solutions zine salts acidifled with phosphoric acid and mixed with 0.05 ml of 0.1 per cent w/v solution of copper sulphate and 2 ml of solution of mercuric ammonium thiocyanate yield a violet precipitate.

APPENDIX VIII

LIMIT TESTS

A. LIMIT TEST FOR CHLORIDES

Dissolve the specifled quantity of the substance in water or prepare a solution as directed in the text, and transfar to a Nessler glass, Add 1 ml of nitric acid except when nitric acid is used in the preparation of the solution; dilute to 5 ml with water and and add 1 ml of solution of silver nitrate. Stir immediately with a glass rod, and set aside for five minutes. The opalescence producd is not greater than the standard Opalesence.

Standard Opalesence – Measure 1 ml or the quantity specifled in the monoraph, 0.01N hydrochloric acid and 1 ml of nitric acid into a Nessler glass. Dilute to 5 ml with water and add 1 ml of solution of silver nitrate. Stir immediately with a glass rol, and set aside for five minutes.

Limit test for Iron

Dissolve the specifled quantity of the substance in 4 ml of water or prepare a solution as directed in the text, add 2ml of a 20 percent w/v solution of ironfree critie asid in water and 2 drops of thioglycolic acid, mix, make alkaline with iron free solution of ammonia, dilute to 5ml with water, and allow to stand for five minutes. Compare the colour in a Nessler glass with the standard colour, by viewing transversely. The colour is not deeper than the standard colour.

Standard colour- Dilute 2 ml of standard solution of Iron with 4ml of water, add 2 ml of a 20 percent w/v solution of iron free critic asid in water and 2 drops of thioglycolic asid mix, render alkaline with iron free solution of ammonia dilute to 5 ml with water and allow to stand for five minutes.

REAGENTS AND SOLUTIONS

Standard solution of iron –add 0.173 g of ferr ic ammoniun sulphhate to 1.5ml of hydrochloric acid and add sufficient water to prouce 1000ml 1ml contains 0.02mg of iron.

Iron-free Citric Acid:

Citric acid which complies with the following additional test—Dissolve 0.5 g in 40 ml of water, add 2 drops of thioglycolic acid, mix, make alkaline with iron-free solution of ammonia and dilute to 50 ml with water, no pink colour is produced.

Iron-free Hydrochloric Acid:

Hydrochloric acid which complies with the following additional test—Evaporate 5 ml on a water-bath nearly to dryness, add 40 ml of water, 2 ml of a 20 percent, w/v solution of iron-free citric acid in water and 2 drops of thioglycolic acid, mix, made alkaline with iron-free solution of ammonia and dilute to 50 ml with water, no pink colour is produced.

Iron-free solution of ammonia:

Dilute ammonia solution which complies with the following additional test—Evaporate 5 ml nearly to dryness on a water-bath add 40 ml of water, 2 ml of a 20 percent w/v solution of iron-free citric acid in water and 2 drops of thioglycolic acid, mix, make alkaline with iron-free solution of ammonia and dilute to 50 ml with water, no pink colour is produced.

Limit test for Sulphates:

Dissolve the specified quantity of the substance in water or prepare a solution as directed in the text, and transfer to a Nessler glass add 1 ml of hydrochloric acid, except when hydrochloric acid is used in the preparation of the solution, dilute to 50 ml with water, and add 1 ml of solution of barium chloride. Stir immediately with a glass rod, and set acids for five minutes. The turbidity produced is not greater than the standard turbidity.

B. LIMIT TEST FOR ARSENIC

Select all the reagents used in this Test to have as low a content of arsenic as possible so that a blank test results in either no strain or one that is barely discernible.

Apparatus- Prepare a generator (see the illustration) by fitting a perforated rubber stopper into wide mouth bottle of about 50 ml capacity. Through the perforation insert a vertical exit tube about 12 cm in total length and 1 cm in diameter along the entire upper portion (for about 8 cm) and constricted at its lower extremity to a tube about 4 cm in length and about 5 mm in diameter. The smaller portion of the tube should extend to just slightly below the stopper. Place washed sand or a pledget of purified cotton in the upper portion to about 3 cm from the top of the tube. Moisten the sand or cotton uniformly with mixture of equal volume, of lead acetate solution and water. Remove any excess or adhering droplets of lead acetate solution from the walls of the tube by applying gentle suction to the constricted end of the tube, into the upper end of thick tube fit a second glass tube 12 cm in length having an internal diameter of 2.5 to 3 mm, by means of a rubber stopper. Just before running the test, place a strip, of mercuric bromide test paper in this tube crimping the upper end of the strip so that it will remain in position about 2 cm above the rubber stopper. Clean and dry the tube thoroughly each time it is used.

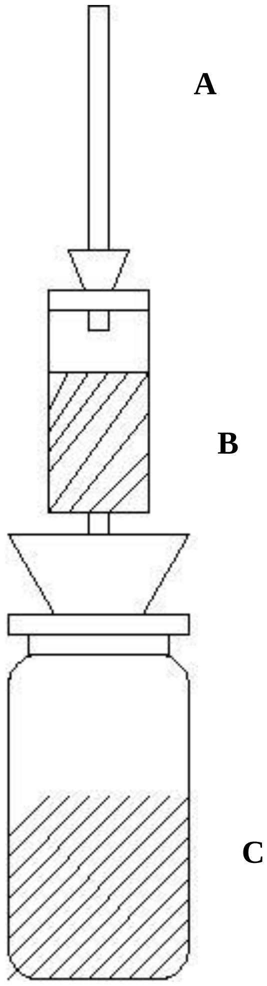

Fig. 1. Arsenic test apparatus

Standard Arsenic Solution:

Dissolve 100 mg of arsenic trioxide that has been finally pulverized, dried over sulphuric acid and accurately weighed, in about 5 ml of sodium hydroxide solution (1 in 5) in a 1000 ml volumetric flask. Neutralise the solution with dilute sulphuric acid, add 10 ml more of dilute sulphuric acid, then add recently boiled water to volume. Pipette 10 ml of this solution into

1000 ml volumetric flask, add 10 ml of dilute sulphuric acid, and then add recently boiled water to volume. Use this solution, which contains 1 mcg of arsenic trioxide in each ml in preparing the standard stain. Keep this solution in a glass stoppered bottle. Make fresh solution when new standard stains are to be prepared.

Test Preparation:

Add 1 ml of sulphuric acid to 5 ml of a solution of the chemical substance (1 in 25), unless otherwise quantity is directed in the monograph. Omit its addition entirely in the case of inorganic acids. Unless especially directed otherwise, add 10 ml of sulphurous acid. Evaporate the liquid in a small beaker, on a steam-bath, until it is free from sulphurous acid and has been reduced to about 2 ml in volume. Dilute with water to 5 ml to obtain the test preparation.

The Standard Stain:

Place in the generator bottle; 5 ml of potassium iodide solution, 2 ml of standard arsenic solution, 5 ml of acid stannous chloride solution and 28 ml of water. Add 1.5 g of granulated zinc (in No. 20 powder) and immediately insert the stopper containing the exit-tube. Keep the generator bottle immersed in water at 25° during the period of the test to moderate the reaction so that the stain will take the form of distinctive band to facilitate the comparison of colour intensity. When evolution of hydrogen has continued for 1 hour, remove the mercuric bromide test paper and place it in a clean, dry tube for comparison. This stain represents 2 mcg of arsenic trioxide. Since light, heat and moisture cause the stain to fade rapidly, make comparisons promptly. Stamped test papers may be preserved by dipping in melted paraffin or by keeping them over phosphorus pentoxide, protected from light.

Procedure:

Place in the generator bottle 5 ml of potassium iodide solution and 5 ml of Test preparation, and add 5 ml of acid stannous chloride solution. Set the apparatus aside at room temperature for a period of 10 minutes, then add 25 ml of water and 1.5 g of granulated zinc (in No. 20 powder), and proceed as directed under the standard stain. Remove the mercuric bromide test paper, and compare the stain upon it with the standard stain. The stain produced by the chemical test does not exceed the standard stain in length or intensity of colour indicating not more than 10 parts of arsenic trioxide per million parts of the substance being tested.

Interfering Chemicals

Antimony**:** if present in the substance being tested produces a grey stain.

Sulphites, sulphides; thiosulpahtes and other compounds that liberate hydrogen sulphide or sulphur dioxide when treated with sulphuric acid must be oxidized by means of nitric acid and then reduced by means of sulphur dioxide as directed under. The Preparation before they are placed in the apparatus.

C. LIMIT TEST FOR LEAD

Select all the reagents for this test to have as low a content as practicable, and store all reagent solutions in containers of borosilicate glass. Rinse thoroughly all glassware with warm dilute nitric acid (1 in 2), followed by water.

Special Reagents:

Ammonium cyanide solution:

Dissolve 2 g of potassium cyanide in 15 ml of strong ammonia solution, and dilute with water to 100 ml.

Ammonia citrate solution:

Dissolve 40 g of citric acid in 90 ml of water. Add 2 or 3 drops of phenol red solution, then cautiously add stronger ammonia solution until the solution acquires a reddish colour. Remove any lead that may be present by extracting the solution with 20 ml portions of Dithizone Extraction Solution (see below), until the dithizone solution retains its orange green colour.

Diluted standard Lead solution:

Dilute exactly 10 ml of standard lead solution. (Test for heavy metals) (containing 10 mcg of lead per ml) with sufficient dilute nitric acid (1 in 100) to make 100 ml. This solution contains 1 mcg of lead per ml.

Dithizone Extraction solution:

Dissolve 30 mg of dithizone in 1000 ml in chloroform, and add 5 ml of alcohol. Store the solution in a refrigterator.

Before use, shake a suitable volume of the Dithizone extraction solution with about half its volume of dilute nitric acid (1 in 100), discarding the nitric acid.

Hydroxylamine Hydrochloride Solution:

Dissolve 20 g of hydroxylamine hydrochloride in sufficient water to make approximately 65 ml. Transfer to a separator, add a few drops of thymol blue indicator, then add stronger ammonia solution until the colour assumes a yellow colour. Add 10 ml of sodium diethyldithiocarbamate solution (1 in 25), mix and add, allow to stand for five minutes. Extract this solution with successive 10 to 15 ml portions of chloroform until a 5 ml portion of the chloroform extract does not assume a yellow colour when shaken with a dilute copper sulphate solution. Add diluted hydrochloric acid until the solution is pink (if necessary, add 1 or 2 drops more thymol blue indicator), and then dilute with purified water to 100 ml.

Potassium Cyanide Solution:

Dissolve 50 g of potassium cyanide in sufficient purified water to make 100 ml. Remove the lead from this solution by extraction with successive portions of Dithizone Extraction solution, as described under Ammonium Citrate solution above, then extract any dithizone remaining in the cyanide solution by shaking with chloroform. Finally dilute the cyanide solution with sufficient water so that each 100 ml contains 10 g of potassium cyanide.

Standard Dithizone Solution:

Dissolve 10 mg of dithizone in 1000 ml of chloroform. Keep the solution in a glass—stoppered, lead-free bottle, suitably wrapped to protect it from light, and store in a refrigerator.

Procedure**:** Transfer the volume of the prepared sample directed in the monograph to a separator, and unless otherwise directed in the monograph add 6 ml of ammonium citrate solution, 2 ml of potassium cyanide solution and 2 ml of hydroxylamine hydrochloride solution (For the determination of lead in iron salts use 10 ml of ammonium citrate solution). Add 2 drops of phenol red solution, and make the solution just alkaline (red in colour) by the addition of stronger ammonia solution. Immediately extract the solution with 5 ml portions of Dithizone Extraction solution draining off each extract into another separator, until the dithizone solution retains its green colour. Shake the combined dithizone solutions for 30 seconds with 20 ml of dilute nitric acid (1 in 100), and discard the chloroform layer. Add to the acid solution 50 ml of standard Dithizone solution and 4 ml of ammonia cyanide solution, and shake for 30 seconds, the colour of the chloroform layer is of no deeper shade of violet than that of a control made with a volume of Diluted standard Lead solution equivalent to the amount of Lead permitted in the sample under examination, and the same quantities of the same reagents and in the same manner as the test with the sample.

D. LIMIT TEST FOR HEAVY METALS

The Heavy Metals Test is designed to determine the content of those metallic impurities in official substances that are coloured by hydrogen sulphide under the conditions of the test. In substances the proportion of any such impurity is expressed as the quantity of lead required to produce a colour of equal depth as in a standard comparison solution, this quantity being stated as the Heavy Metals Limit expressed as parts of lead per million parts of the substance (by weight). Reagents and solutions used in this test are designated as ‘Sp’.

Reagents

Dilute Acetic Acid Sp:

Dilute acetic acid which complies with the following additional test—Evaporate 20 ml in a porcelain dish nearly to dryness on a water-bath. Add to the residue 2 ml of the acid and dilute with water to 2 ml; then add to 10 ml of solution of hydrogen sulphide. Any dark colour produced is not darker than a control made with 0.04 mg of Pb and 2 ml of the dilute acetic acid (2 parts per million).

Hydrochloric Acid Sp:

Hydrochloric acid which complies with the following additional test—Evaporate 17 ml of the acid in a breaker to dryness on a water-bath. Dissolve the residue in 2 ml of dilute acetic acid Sp; dilute to 40 ml with water and add 10 ml of solution of hydrogen sulphide, any darkening produced is not greater than in a blank to which 0.02 mg of Pb has been added (1 part per million).

Acetic Acid Sp.:

Acetic acid which complies with the following additional test: Make 25 ml alkaline with dilute ammonia solution Sp., add 1 ml of solution of potassium cyanide Sp., dilute to 50 ml with water, and add two drops of solution of sodium sulphide, no darkening is produced.

Dilute Ammonia Solution Sp.:

Dilute ammonia solution which complies with the following additional test—To 20 ml add 1 ml of solution of potassium cyanide Sp., dilute to 50 ml with water, and add two drops of solution of sodium sulphide, no darkening is produced.

Stock Solution of Lead Nitrate:

Dissolve 159.8 mg of lead nitrate in 100 ml of water to which has been added 1 ml of nitric acid, then dilute to 1000 ml with water. This solution must be prepared and stored in glass containers free from soluble lead salts.

Standard Lead Solution:

Dilute to 10 ml of the stock solution of lead nitrate accurately measured, to 100 ml with water. This solution must be freshly prepared. Each ml of this standard lead solution contains the equivalent of 0.01 mg of lead. When 0.1 ml of standard lead solution is employed to prepare the solution to be compared with a solution of 1 g of the substance being tested, the comparison solution thus prepared contains the equivalent of 1 part of lead per million parts of the substance being tested.

Bromide Solution Sp.:

Bromine	30 g
Potassium bromide	30 g
Water, sufficient quantity to produce	100 ml

Dissolve and mix. Evaporate 10 g in a porcelain dish to dryness on a water-bath. Add 10 ml of water and again evaporate to dryness. Repeat the process till all the bromine is driven off. Add 10 ml of water and 2 ml of dilute acetic acid Sp. And make up to 25 ml with water. Add 10 ml of solution of hydrogen sulphide; the resulting solution is not darker than a blank to which 0.01 mg of Pb has been added.

Procedure for Testing Chemicals:

Solution A: Introduce into a 50 ml Nessler tube 2 ml of dilute acetic acid Sp. and exactly the quantity of the standard lead solution containing the lead equivalent of the heavy metals limit specified for the substance to be tested and make up to 20 ml with water.

Solution B: This consists of 25 ml of solution prepared for this test according to the specific directions in each monograph.

Transfer solution A and B to matching 50 ml Nesslers tubes and add 10 ml of solution of hydrogen sulphide to each tube, mix, allow to stand for ten minutes then view downwards over a white surface, the column of Solution B is no darker than that of Solution A.

APPENDIX IX

A. DETERMINATION OF ASH

Take about 2 or 3 g, accurately weighed of the ground drug in a tared platinum or silica dish previously ignited and weighed. Scatter the ground drug in a fine even layer on the bottom of the dish. Incinerate by gradually increasing the heat, not exceeding dull red heat until free from carbon, cool and weigh. If a carbon-free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ashless filter-paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness and ignite at a low temperature. Calculate the percentage of ash with reference to the air-dried drug.

B. DETERMINATION OF SULPHATED ASH

Take about 2 or 3 g of the drug, accurately weighed, moisten with sulphuric acid, ignite gently, again moisten with sulphuric acid, re-ignite, cool and weigh. Calculate the percentage of sulphated ash with reference to the air-dried drug.

C. DETERMINATION OF RESIDUE ON IGNITION

Take a quantity of the powered substance which may be expected to yield a residue of about 0.001g. weigh accurately, and proceed as directed for the 'Determination of Ash' as mentioned above.

D. DETERMINATION OF WATER SOLUBLE ASH

Boil the ash for five minutes with 25 ml of water; Collect the insoluble matter in a Gooch crucible, or on an ashless filter-paper; wash with hot water, and ignite to constant weight, at a low temperature. Subtract the weight of insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash. Calculate the percentage of water-soluble ash with reference to the air-dried drug.

APPENDIX X

MOISTURE CONTENT

DETERMINATION OF MOISTURE CONTENT FOR CHEMICALS

Gravimetric Method:

Loss in Drying : Unless otherwise directed in the monograph, conduct the determination on 1 to 2 g of the sample, accurately weighed. If the sample is in the form of large crystals, reduce the particle size to about 2 mm by quickly crushing. Take a glass-stoppered, shallow weighing bottle that has been dried for 30 minutes under the same conditions to be employed in the determination. Put the sample in the bottle, replace the cover, and weigh the bottle and the contents. By gentle, sidewise shaking distribute the sample as evenly as practicable to a depth of about 5 mm generally, and not over 10 mm in the case of bulky materials. Place the loaded bottle in the drying chamber, removing the stopper and leaving it also in the chamber, and dry the sample at the temperature and for the time specified in the monograph. Upon opening the Chamber, close the bottle promptly and allow it to come to room temperature before weighing.

If the substance melts at a lower temperature than that specified for the determination of Loss on drying, expose the bottle with its contents for 1 to 2 hours to a temperature 5° to 10° below the melting temperature, then dry at the specified temperature.

APPENDIX - XI

SPRAY REAGENTS FOR DRUG COMPONENTS

P-Anisaldehyde Spray : Dissolve 0.5 ml of *p-anisaldehyde* in 50 ml of *acetic acid* and 1 ml of *hydrochloric acid*.

Antimony trichloride Spray : Dissolve 10 g of *antimony trichloride* in 100 ml *chloroform* or *carbon tetra chloride*.

Anilline Pthalate Spray : Dissolve 1 g of *aniline pthalate solution* in *ethanol*.

Dragendorff's reagent : A. Mix together 2 g of *bismuth subnitrate*, 25 ml of *acetic acid*, and 100 ml of *water*.

B. Dissolve 40 g of *potassium iodide* in 100 ml of *water*. Mix together 10 ml of (A) 10 ml of (B), 20 ml of *acetic acid*, and 100 ml of *water*.

Ferric chloride : Dissolve 5 g of *ferric chloride* in 0.5 N *hydrochloric acid* in 100 ml.

Iodoplatinate (Potassium): 3 ml of 10 per cent *hexa chloroplatinic acid* (iv) solution are mixed with 97 ml water and 100 ml 6 per cent *Potassium iodide solution* in water are added: the reagent is freshly prepared before use.

Ninhydrin : 0.3 g *ninhydrin* is dissolved in 100 ml *n-butanol* and 3 ml *acetic acid* added.

Vanillin-Sulphuric Acid : Dissolve 1 g of *Vanillin* in 100 ml *conc. Sulphuric acid*.

Bromothymol blue-Spray reagent : 0.04 g *bromothymon blue* is dissolved in 100 ml 0.01N *Sodium hydroxide*.

Ceric ammonium-Sulphate : 1 per cent solution of *ammonium ceric sulphate* in 85 per cent *phosphoric acid*.

Ceric Sulphate-Sulphuric acid: 0.1 g *ceric sulphate* is suspended in 4 ml *water*, 1 g *trichloroacetic acid* is added dropwise until turbidity disappears.

Ceric-Sulphate-Sulphuric acid : Saturated solution of *ceric sulphate* in 65 per cent *sulphuric acid*.

Chloramine T-trichloracetic acid : Sol (a) Freshly prepared 3% *aqueous solution of chloramines*-T.
Sol (b) 25 per cent *ethanolic solution of trichloroacetic acid*.

Spray reagent : 10 ml (a) and 40 ml (b) are mixed before use.

Cupric Sulphate-Citrate (Sodium) : 1.73 g *cupric sulphate* $CuSO_4$. $5H_2$), 17.3g *sodium citrate* and 10 g *anhydrous sodium carbonate* are dissolved in *water* and the volume made upto 100 ml. With *water*.

Dit hyzone : (i) 0.05 per cent solution of *dithizone* in *carbon tetrachloride*.

(ii) 25 per cent *ammonium hydroxide solution* or an atmosphere of *ammonia* into which the plate can be introduced.

Iodine (Potassium)-hydrogen: 2 percent. The plate is dried after spraying with 2 per cent aqueous potassium iodide solution, and placed in a chamber containing 25 per cent *ammonium hydroxide* for some minutes. It is then transferred to a second chamber into which *hydrogen sulphide* is passed from a kipp's apparatus.

Iodine-iodide (potassium): Dissolve 1 g *Iodine* and 10 g *Potassium-iodide* in warm *water* and add 2 ml *glacial acetic acid* to produce 100 ml.

Lead acetate reagent : 25 percent aqueous solution of basic lead acetate. The spots fluoresce in long wave *U.V.* light.

Mangesium acetate reagent : 0.5 per cent methanolic solution of magnesium acetate.

Nitroprusside (Sodium) ammonia : (i) 1 per cent *aqueous sodium nitroprusside solution*.

(ii) 10 per cent *ammonium hydroxide*.
The chromatogram is sprayed with I, then II.

Naphthol-Sulphuric acid : A mixture is made of 10.5 ml 15 per cent *ethanolic naphthol*, 6.5 ml *sulphuric acid* 40.5 ml *ethanol* and 4 ml *water*.

Silver nitrate (ammonical) : Reagent: *0.1N silver nitrate* one part and 5N5 parts *ammonium hydroxide* together. Heat the plate for 5 to 10 minutes at 105° unitl dark coloured spots appear.

Chloroform Layer/ Chloroform : Extract: Evaporate 20 ml Mother Tincture on water bath to remove alcohol, transfer the remaining aqueous portion to separating funnel and extract with *chloroform* (3 x 20ml), concentrate the chloroform layer to 1 ml and carry out TLC with it (Add *ammonia solution* only where it is mentioned in the tests).

Ethyl acetate/Ether Layer : Evaporate 20 ml mother tincture on water bath to remove alcohol and extract the remaining aqueous part with *ethyl acetate* ether layer to 1 ml and carry out TLC with it.

Rf value : It has been observed that climatic factor like temperature and humidity have great impact on Rf values. So tolerance limit 0.05 is allowed.

It has been observed that slight difference in the ratio of solvent system materially affects the absorption co-efficients and as such if the number of spots with similar colours (where colour is given) and in same order with uniform per cent variation in Rf values be oveserved then it may be assigned due to above factor. In case of variation, CO-TLC done with standard sample obtained from Homoeopathic Pharmacopoeia Laboratory, Ghaziabad may be done.

APPENDIX - XII

Determination of Lambda Max by U.V. Spectrophotometer

(A) For single beam instruments—

(1) Take blank reading of solvent (distilled water/dispensing alcohol).

(2) Take 0.5 – 1.0 ml sample (Mother Tincture) in the cuvette and add the solvent and adjust till the absorption is below 2.00 Optical Density (O.D.) using UV spectrophotometer. Then take 2.0 – 2.5 ml of the above sample solution in other cuvette and take reading in UV region i.e. 360 to 200 mm and record the absorption maxima.

(3) Tolerance limit in lambda max is ± 4nm for sharp peaks and ± 7 nm for broad peaks.

(B) For double beam instruments—Corresponding adjustments can be made.