DRIED FERROUS SULPHATE

Dried ferrous sulphate is ferrous sulphate deprived of part of its water of crystallization by drying at 40°. It contains from 80 to 90 per cent of $FeSO_4$. It is a greyish-white to buff-coloured powder; taste is metallic and astringent. Its aqueous solution gives the reactions of ferrous salts and of sulphates. It is slowly but completely soluble in freshly boiled and cooled water; practically insoluble in alcohol; stored in tightly closed containers. It is tested for copper, zinc, lead, manganese and oxysulphate. Assay is carried out as for Ferrous sulphate.

Uses : Ferrous sulphate is a haematinic agent. Compounds of iron are used in the treatment of iron deficiency, e.g. anaemia.

The oral administration of iron preparations sometimes produces gastro-intestinal irritation and abdominal pain with nausea, vomiting, diarrhoea, or constipation.

FERROUS FUMARATE

$(\bar{O}OC\text{-}CH{=}CH\text{-}COO^-)\ Fe^{2+}$; Mol. Weight = 169.91
$C_4H_2FeO_4$ $FeC_2H_4\ (CO_2)_2$

Ferrous fumarate contains not less than 93.0 per cent of $C_4H_2FeO_4$. It is a fine reddish-orange to reddish-brown powder, tasteless or slightly astringent; odourless or with a slight odour; slightly soluble in water; very slightly soluble in alcohol. It is prepared by mixing hot aqueous solution of ferrous sulphate and sodium fumarate and separating the resulting slurry by filtration. The hot solution of sodium fumarate is preferably added to the ferrous sulphate solution. The commercial material contains a minimum of 31.3% total Fe and not less than 2.0% ferric iron.

It is stored in well-closed containers.

Ferrous fumarate dissolves in dilute hydrochloric acid with the precipitation of fumaric acid.

$$FeC_2H_2(CO_2)_2 + 2HCl \longrightarrow Fe^{-2} + 2Cl^- + C_2H_2\ (COOH)_2$$

Tests for Purity : Tests for arsenic; heavy metals; lead; sulphate; ferric iron; and loss on drying (1%).

For determining heary metals, the salt is ignited, dissolved in hydrochloric acid and nitric acid, extracted with solvent ether and heated. Citric acid is added and the reaction mixture made alkaline with ammonia. Potassium cyanide solution and sodium

ALCOHOLIC IODINE SOLUTION (B.P.)

Potassium iodide (25 g) and iodine (25 g) are dissoled in the purified water and sufficient ethanol (90%) added to produced 1000 ml. It contains the content of iodine from 2.4 to 2.7%, content of potassium iodide from 2.4 to 2.7% and ethanol content from 83 to 88%.

Assay for Iodine : 10 ml of the solution is dissolved in water (20 ml) and titrated with 0.1 N sodium thiosulphate. Each ml of 0.1N sodium thiosulphate is equivalent to 12.69 mg of I.

Assay for Potassium Iodide : Assay is carried out as for aqueous iodine solution. Each ml of the remainder is equivalent to 16.60mg of KI.

The solution should be kept in a well-closed container, the materials of which are resistant to iodine.

The Label States

1. The date after which the solution is not intended to be used.
2. The conditions under which it should be stored.

IODIZED OIL FLUID INJECTION (B.P.)

Iodized oil fluid injection is a sterile iodine addition product of the ethyl esters of the fatty acids obtained from poppy-seed oil. It contains content of combined iodine from 37.0 to 39.0% w/w.

Characters : It is a straw-coloured or yellow, oily liquid; odour, not more than slightly alliaceous. It is practically insoluble in water; soluble in chloroform, ether and petroleum spirit.

Tests for Identification : The substance (0.05 ml) is boiled with glacial acetic acid (2 ml) and zinc powder (0.1 g) for 2 minutes; water added, shaked, decanted from any undissolved zinc and hydrogen peroxide solution (1 ml). Iodine vapour is evolved.

Tests for Purity : Acidity; weight per ml; free iodine.

Assay : The substance (1 g) is refluxed with glacial acetic acid (10 ml) and zinc powder (1 g) for 1 hour. Hot water (30 ml) is added, the solution is filtered, washed, hydrochloric acid (25 ml) and potassium cyanide solution (8 ml) added and titrated with 0.05 N potassium iodate until the dark brown solution, which is produced, becomes light brown. Starch mucilage (5 ml) is added and the titration continued until the blue colour disappears. Each ml of 0.05 N potassium iodate is equivalent to 12.69 mg of combined iodine.

cathode than the movement of electrons towards the anode. Hence, an interval of time elapses before the heavier positive ions which are left as a sheath surrounding the anode. Though the collection of the electrons at the anode is completed in a fraction of a microsecond, a fresh discharge cannot take place until the sheath of positive particles has moved sufficiently away from the anode. The counter, therefore, will not respond to any further ionizing radiation. The interval of time, during which the counter is inactive; is called *dead time* or *paralysis* for which the counter is to be corrected. In addition this, the positive ions, in the absence of a quenching agent, produce secondary electrons on reaching the cathode (cylinder wall), which in turn generate another pulses. Each such pulse must be quenched. The quenching agent, consists of polyatomic organic molecules or halogen molecules, is introduced into the counter. It has a lower ionization potential than the ionizable gas. During the movement of the positive ions towards the cathode, their energy is dissipated on collision with the molecules of the quenching agent which are then neutralized by secondary elections.

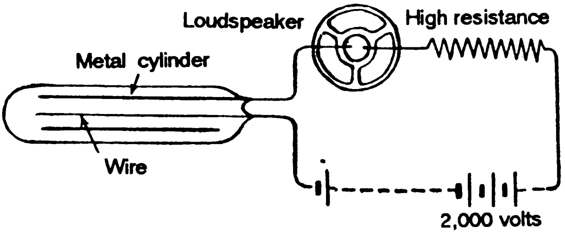

Fig. 13.1 : Schematic representation of Geiger Muller Counter.

Comparative measurements are generally carried out against a standard source using a Geiger-Muller (G.M.) counter, a proportional counter, a scintillation counter or an ionization chamber. A G.M. Counter is used to measure β-and β,γ-emitters. The scintillation and semiconductor counters are used for measuring γ-rays. Low-energy β-emitters are measured by a liquid-scintillation counter.

For measuring radioactivity it is essential to work under well-defined geometrical conditions so that the radioactive source is always at the same position in the apparatus and its distance from the measuring device is constant and remains the same when the sample being measured is replaced by the standard preparation. Solutions of radiopharmaceutical preparadiluted with water, filtered and the filtrate acidified with dilute hydrochloric acid. The solution gives the reactions of sulphates.

2. The residue of test 1 is washed with water; dilute hydrochloric acid added to the residue, filtered and to the filtrate dilute sulphuric acid added. A white precipitate is formed which is insoluble in dilute hydrochloric acid.

Assay : A mixture of the substance (0.6 g), sodium carbonate, and potassium carbonate is heated to 1000° for 15 minutes. It is cooled, water added, filtered by decantation and the residue washed with sodium carbonate solution. Dilute hydrochloric acid, ammonium acetate, potassium dichromate and urea are added to the residue, heated in an oven at 80-85° for 16 hours, filtered, the precipitate washed with potassium dichromate and finally with water and dried at 105°; 1.0 g of the residue is equivalent to 0.9213 g of $BaSO_4$.

Uses : Barium sulphate is a diagnostic aid (radio-opaque medium) used as a contrast medium for x-ray examination of the gastro-intestinal tract. It is not soluble in acidic gastric juice and hence does not produce the systemic effects of soluble toxic barium salts. It is given in the form of a suspension.

Constipation may occur after oral or rectal barium sulphate administration, Barium ion will produce a stimulation of all muscles. It stimulates smooth muscles causing vomiting, severe cramps, diarrhoea and haemorrhage : stimulation of the heart muscle can produce cardiac arrest and causes death.