Iodine: (I_2)

Molecular weight: 126.9 g/mol

Standards: It contains not less than 99.5% and not more than 100.5% of iodine.

- Iodine compounds are very common in nature. Most of the sea-weeds contains iodine, the largest portion of iodine is present in *Laminariadigitata*
- 0.2% of iodine is present in the form of sodium iodate in crude *chile saltpeter*

Properties:

- **Appearance:** bluish black small crystals with metallic lusture
- **Odor:** irritating odor
- **Taste:** bitterly pungent taste.
- **Solubility:** slightly soluble in water, insoluble in alcohol.
- **Nature:** It is volatile at room temperature and its vapour attacks both cork and rubber.

Preparation:

1. **From sea weeds:** iodine in the form of iodide is present in sea weeds such as *Laminariadigitata* and *Fucusvesiculosis.*
   - These sea weeds are dried and burnt.
   - Their ash which is also called 'Kelp' is extracted with water.
   - This extract is purified to remove chlorides, sulphates, sulphides or thiosulphates.
   - The purified extract is treated with exact amount of chlorine for the precipitation of iodine.

$$\underset{\text{(Sodium Iodide)}}{\mathbf{2NaI}} + \mathbf{Cl_2} \longrightarrow \underset{\text{(Sodium chloride)}}{\mathbf{2NaCl}} + \underset{\text{(iodine)}}{\mathbf{I_2}}$$

2. **From *chile saltpeter*:** Crude *chile saltpeter* which is found in *Chile* (South America) contains disodium nitrate and sodium iodate.
   - During its crystallization, sodium sulphate seperates out as crystals whereas sodium iodate remains in mother liquor.
   - Iodine is obtained by treating mother liquor with sodium hydrogen sulphite.

$$\underset{\text{(Sodium iodate)}}{2NaIO_3} + \underset{\text{(Sodium hydrogen Sulphite)}}{5NaHSO_3} \longrightarrow \underset{\text{(Sodium sulphate)}}{2Na_2SO_4} + \underset{\text{(Sodium hydrogen Sulphate)}}{3NaHSO_4} + \underset{\text{(Iodine)}}{I_2} + H_2O$$

Mode of action: Iodine in aqueous solution act as a mild oxidizing agent which is mediated through the formation of hypoiodous acid (HIO), which further release the nascent oxygen [O], which oxidizes the micro organisms proteins.

Uses:

- It is topical anti-infective, has a powerful bactericidal action.
- It is also used as local germicide.
- Iodine ointment is generally used as counter-irritant ad disinfectant.
- Iodine is an essential element for human body, deficiency of iodine leads to the development of goiter.

Storage: It should be stored in ground glass stoppered bottles.

Preparations of iodine:

1. **Povidone iodine:** Povidone iodine is a complex of iodine and povidone (Polymer) also known as Polyvinylpyrrolidone (PVP) and iodopovidone.

Uses:

- It is an antiseptic used for skin disinfection before and after surgery and on the hands of healthcare providers.
- It is used for minor wounds.
- It is applied to the skin as liquid or powder.
- The complex contains 9% to 12% iodine.

Properties:

- **Appearance:** The complex is yellowish-white brown amorphous powder.
- Povidone iodine solution is a transparent liquid having a reddish brown color.
- **Solubilty:** Soluble in water and alcohol.

2. **Lugol solution:**

Lugol solution is first made in 1829 by French physician Jean lugol.
Lugol's iodine is a liquid make up of two parts of Potassium iodide (KI) for every one part of iodine (I_2) in water. Lugol's iodine is available as a generic medication and over the counter

Uses: Lugol's iodine also known as aqueous iodine and strong iodine solution.

- It is used to treat thyrotoxicosis prior to surgery.
- It helps to protect the thyroid gland from harmful effects of radioactive iodine and to treat iodine deficiency.
- When applied to the cerbix, used in screening cervical cancer.
- As a disinfectant, applied to small wounds.
- A small amount may also be used for emergency disinfectant of drinking water.

3. **Potassium iodide:**

It is a chemical compound, medication and a dietary supplement.

Uses:

- It is used to treat hyperthyroidism.
- Used in radiation emergencies, to protect the thyroid gland when certain types of radiopharmaceuticals are used.
- It is used to treat skin sporotrichosis and phycomycosis.
- As a supplement, it is used to those who have low intake of iodine in the diet.