19CH101– ENGINEERING CHEMISTRY

Unit-1 WATER AND ITS TREATMENT

DESALINATION

The process of removal of extra common salt (NaCl) from the water is known as desalination.
Depending up on the quantity of dissolved salts the water is graded as,

1. Freshwater

It contains less than (<)1000 ppm of dissolved salts

2. Brackish water

It contains1000–35,000 ppm of dissolved salts

3.Seawater

It contains greater (>) than35,000 ppm of dissolved salts.

Brackish water

Water containing dissolved salts with a peculiar salty (or) brackish taste is called brackish water. It is totally unfit for drinking purposes. Sea water and brackish water can be made available as drinking water through desalination process.
Desalination is carried out by the following methods

- Reverse osmosis
- Electro–dialysis
- Freezing method
- Distillation method

REVERSE OSMOSIS

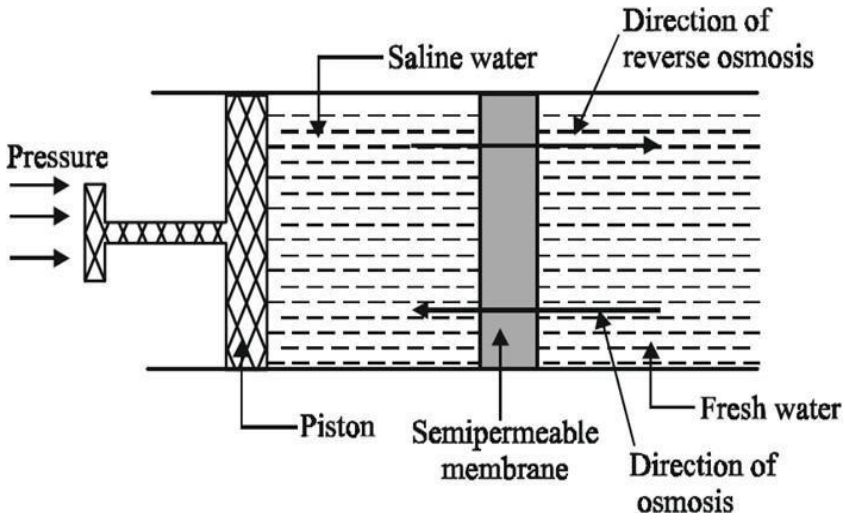
Osmosis

When two solutions of different concentrations are separated by a semi permeable membrane, flow of solvent takes place from the region of low concentration to high concentration until the concentration is equal on both the sides. This process is called osmosis. The driving force in this phenomenon is called osmotic pressure.

Principle of reverse osmosis

If a hydrostatic pressure in excess of osmotic pressure is applied on the higher concentration side, the solvent flow reverse. That is solvent is forced to move from higher concentration to lower concentration. This is the principle of reverse osmosis.

Using this method pure water is separated from sea water. This process is also known as super – filtration (or) hyper– filtration.



Process

In this method, pressure (15 – 40 kg/cm2) is applied to the sea water to force its pure water out through the semi permeable membrane leaving behind the dissolved salts. Earlier, cellulose acetate membrane, cellulose butyrate membrane was used for this purpose. Now – a – days a number of synthetic semi permeable membranes such as polyamide, polysulphones, etc., are used.

Advantages

(i) It removes ionic, non–ionic, colloidal and high molecular weight organic matters.
(ii) It also removes colloidal silica which is not removed by demineralization process.
(iii) The process is cheap, simple and does not require skilled labour.
(iv) The maintenance cost depends on the replacement of the semi–permeable membrane, usually once in three years.