

Desalination:

Desalination is a process that extracts minerals from saline water. More generally, desalination refers to the removal of salts and minerals from a target substance, as in soil desalination, which is an issue for agriculture. Water is one of the earth's most abundant resources, covering about three-quarters of the planet's surface. The reason for this apparent contradiction is, of course, that 97.5% of the earth's water is salt water in the oceans and only 2.5% is fresh water in groundwater, lakes and rivers and this supplies most human and animal needs. The process of removing dissolved salts from water, thus producing fresh water from seawater or brackish water.

Methods of Desalination

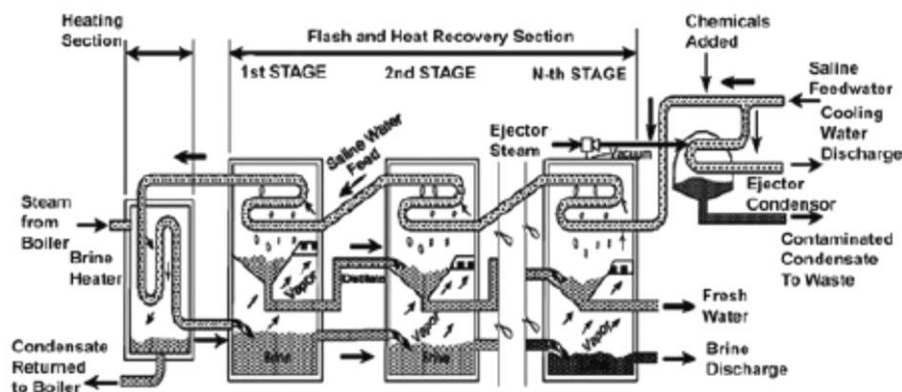
1. Desalination by evaporation & distillation
2. Electro dialysis method
3. Reverse Osmosis method
4. Freezing process
5. Solar distillation method

1. Desalination by evaporation & distillation:

Thermal desalination, often called distillation, is one of the most Thermal most ancient ways of treating seawater and brackish water to convert them ancient them into potable water. It is based on the principles of boiling or into or evaporation and condensation. Water is heated until it reaches the evaporation the evaporation state. The salt is left behind while the vapor is evaporation condensed to produce fresh water.

In this process, the liquids are separated by evaporating and capturing them at various points in their cooling cycle, and then immediately channeled into a condenser.

•Simple distillation is used for a mixture in which the boiling point of the components differ by at least 158°F (70°C).

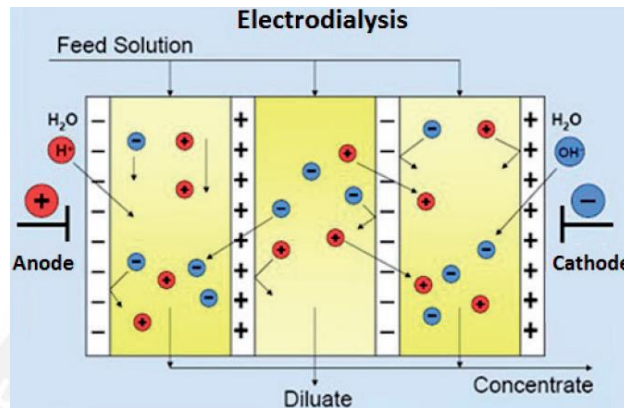


•It is also followed for the mixtures contaminated with nonvolatile particles (solid or oil), and those that are nearly pure with less than 10 percent contamination.

2. Electro dialysis method:

Electrodialysis desalination process is in some way similar to “ion exchange” treatment process, but it differs in utilizing both cation and anion selective membranes to separate charged ions.

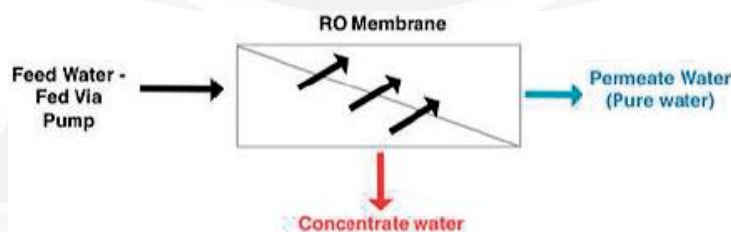
Electrodialysis (ED) is used to transport salt ions from one solution through ion-exchange membranes to another solution under the influence of an applied electric potential difference.



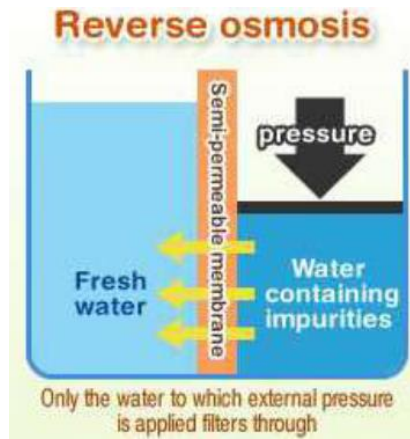
Water is handed between a negative electrode and a high-quality electrode. Ion exchange membranes permit solely high-quality ions to transfer toward the negative electrode from the feed water and negative ions to the positive electrode.

3. Reverse Osmosis method:

Reverse osmosis (RO) membrane is known as hyper filtration and is the supreme filtration known. Reverse osmosis allows the removal of small particles and dissolved organic matter. It is also employed to purify different fluids including glycol and ethanol, rejecting other ions and contaminants preventing them from passing through the membrane. Reverse osmosis is commonly used in water treatment.



Reverse osmosis membrane is a semipermeable membrane allowing fluid that is to be purified to permit through the membrane and rejecting contaminants in the reject stream. Most reverse osmosis systems use cross flow mechanism to decrease membrane cleaning periods. As the fluid flows through the reverse osmosis membranes, the downstream, remove the reject away from in concentrated reject water (brine).



When a semipermeable membrane is used to separate two water (or other solvent) volumes, water is going to flow from the low solute concentration side to the high solute concentration side. By applying an external pressure on the higher concentration side, the flow could be stopped or reversed. In such a case, the phenomenon is called “reverse osmosis.” If there are solute molecules only on one side of the system, then the pressure that stops the flow is called the osmotic pressure. The movement of a “solute molecule” within a solvent is over damped by the solvent molecules that surround it.

4. Freezing process:

The basic principles of freezing desalination are simple. During the process of freezing, dissolved salts are excluded during the formation of ice crystals. Seawater can be desalinated by cooling the water to form crystals under controlled conditions. Before the entire mass of water has been frozen, the mixture is usually washed and rinsed to remove the salts in the remaining water or adhering to the ice crystals. The ice is then melted to produce fresh water.

Advantages and disadvantages:

The advantages include a lower theoretical energy requirement, minimal potential for corrosion and little scaling or salt precipitation.

It can produce very pure potable water, and it has special advantages to produce water for irrigation.

The disadvantage is that it involves handling ice and water mixtures that are mechanically complicated to move and process

5. Solar distillation method:

Solar desalination using humidification and dehumidification is a promising technique for producing fresh water, especially in remote and sunny regions. It has the potential to make a significant contribution to providing humans with fresh water using a renewable, free and environmentally friendly energy source. Solar energy can be used to convert saline water into fresh water with simple, low cost and economical technology and thus it is suitable for small communities, rural areas and areas where the income level is very low.

