



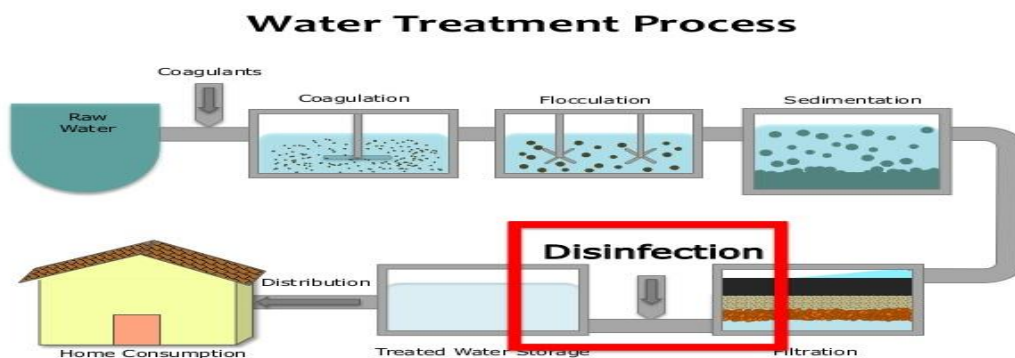
Municipal water treatment

(Treatment of water for domestic purpose)

Water treatment for domestic purpose: The water obtained from natural sources like rivers, lakes and ponds will have impurities. Water for drinking and other domestic uses should be free from disease producing bacteria, chemicals or other substances. Hence water is treated before using for drinking or other domestic purpose. There are mainly two stages involved in water treatment for domestic purpose:

- Removal of suspended impurities.
- Disinfection or Sterilisation.

The various stages of water treatment are as follows



Screening

The process of removing floating matter from the water is known as screening. In this process, water is passed through a screen, having large number of holes, which retains the floating matter and allows the water to pass



Aeration

The process of mixing water with air is known as aeration. The main purpose of aeration is

- To remove gases like CO_2 , H_2S and other volatile impurities causing bad taste and odour to water.
- To remove ferrous and manganous salts as insoluble ferric and manganic salts

Sedimentation:

This is the process of removing big sized suspended solid particles from water. The principle involved is to slow down the flow of water so that substances held up by the turbulence of fast moving water can fall gravitationally to the bottom of the tank when water flow is stilled. In this process, the water is stored in huge tanks for several hours. 70% of solid particles settle down due to the force of gravity. Periodically the accumulation of the debris is scraped away and the floating impurities are continuously cleaned using screens (Bar screen, Band and drum screens and micro strainers etc.)

Coagulation:

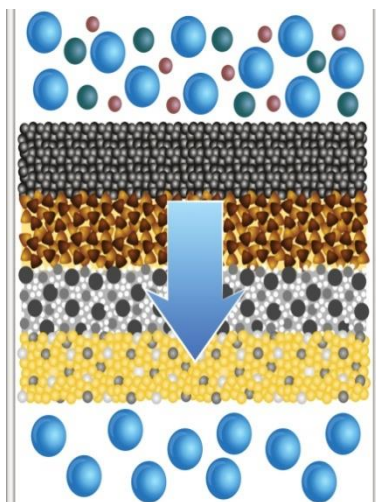
Finely divided clay silica particles do not settle down easily and hence cannot be removed by sedimentation. This is the process of removal of suspended colloidal impurities by using coagulants like alum, ferrous sulphate etc.

When a coagulant is added to water, floc formation takes place due to hydroxide $[\text{Al}(\text{OH})_3]$ formation which can gather tiny particles together to form bigger particles and settle down quickly.



Filtration:

This process helps in removal of the colloidal and suspended impurities not removed by sedimentation. Usually the water is passed through filters or suitable porous material so as to remove the suspended impurities and some microorganisms.



Sterilisation

a. Disinfection:

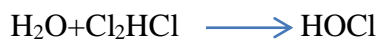
The process of destroying/killing the disease producing bacteria, micro organisms, etc, from the water and making it safe are, is called Disinfection.

b. Boiling:

Water for 10 -15 min, boiled, all the disease producing bacteria are killed and water become safe for use.

c. Bleaching powder:

It is used to purify the drinking water from micro organisms. The purification process is achieved by dissolving 1 kg of bleaching powder in 1000 kilo litres of water. This dissolved water solution is left undisturbed for many hours when bleaching powder is mixed with water, the result of chemical reaction produces a powerful Germicide called Hypochlorous acid. The presence of chlorine in the bleaching powder produces disinfection action, kills germs and purifies the drinking water effectively.

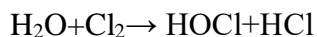


$\text{HOCl} + \text{germs} \rightarrow \text{germs are killed} \rightarrow \text{water purified.}$



d.Chlorination:

Chlorination is the process of purifying the drinking water by producing a powerful Germicide like hypochlorous acid. When this chlorine is mixed with water it produces Hypochlorous acid which kills the Germs present in water.



Chlorine is basic (means PH value is more than 7) disinfectant and is much effective over the germs. Hence chlorine is widely used all over the world as a powerful disinfectant. Chlorinator is an apparatus, which is used to purify the water by chlorination process.

e.Ozonisation:

Ozone is powerful disinfectant and is readily dissolved in water. Ozone being unstable decomposes by giving nascent oxygen which is capable of destroying the Bacteria. This nascent oxygen removes the colour and taste of water and oxidizes the organic matter present in water.

