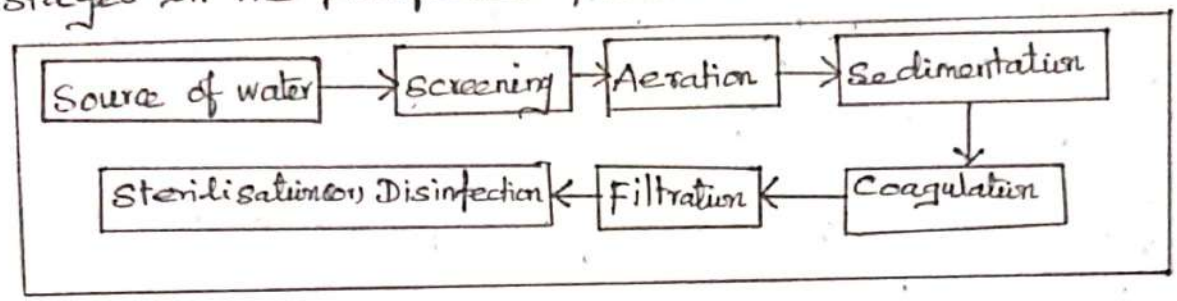
Municipal Water Treatment (or) Domestic Supply (or) Potable Water Treatment

River and lakes are the most common source of water used by municipalities. These water should be free from colloidal impurities, domestic sewage, industrial effluent and disease producing bactorias. Hence domestic supply of water involves the following stages in the purification processes.



Primary Treatment

Screening:

* It is a process of removing the floating material like Leaves, wood pieces, etc... from water.
* The raw water is allowed to pass through a screen, having large number of holes, which retains the floating materials.

Aeration:

* The process of mixing water with air is known as aeration
* To remove gases like CO_2, H_2S & Volatile impurities causing bad taste and odour to water.
* To remove the impurities like Fe & Mn

Sedimentation:

* It is a process of removing suspended impurities by following the water to stand undisturbed for 2-6 hours in a big tank.
* Most of the suspended particles settle down at the bottom, due to forces of gravity, and they are removed.
* Sedimentation removes only 75% of the suspended impurities.

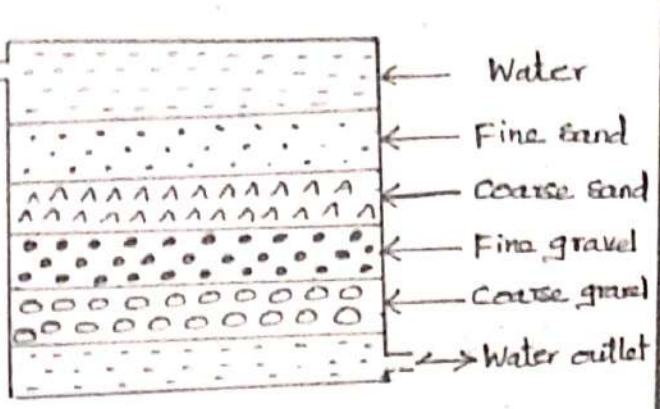
Coagulation:

Finely divided clay, silica, etc... donot settle down easily and cannot be removed by sedimentation. Such impurities are removed by coagulation method.

$$Al_2(SO_4)_3 + 6H_2O \longrightarrow 2Al(OH)_3 \downarrow + 3H_2SO_4$$

Filtration:

* It is the process of removing bacteria, colour, taste, odour and suspended particles.
* By passing the water through filter beds containing fine sand, coarse sand and gravel.



Disinfection (or) sterilisation:

The process of destroying the harmful bacteria is known as sterilisation (or) disinfection. The chemicals used for this purpose are called disinfectants.

(a) By Ozonation:

* Ozone is a powerful disinfectant and is readily absorbed by water. Ozone is highly unstable and breaks down to give nascent O_2

$$O_3 \longrightarrow O_2 + [O]$$

Nascent oxygen

* The nascent oxygen is a powerful oxidising agent and kill the bacteria

Disadvantages:

* This process is costly and cannot be used in large scale.
* Ozone is unstable and cannot be stored for long time.

(b) By using Ultraviolet radiations:

* UV rays are produced by passing electric current through mercury vapour lamp.
* This is particularly useful for sterilizing water in swimming pool

Disadvantages:

* It is costly
* Turbid water cannot be treated.

(c) Chlorination:

By adding chlorine to the water is called chlorination

$$CaOCl_2 \longrightarrow CaO + Cl_2$$

Bleaching powder

$$Cl_2 + H_2O \longrightarrow HOCl + HCl$$

Hypochlorous acid [kill bacteria]