Water treatment & Analysis
Lec 03

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Municipal water

Surface water like river water is used for domestic purposes ,However it is contaminated with large number of impurities such as organic matter,suspended impurities etc.

First step:Screening

It is the process of removing floating material from water.In this process ,water is passed through screens having large number of pores .such that only floating materials remains on the screen.

Step 2 :Sedimentation

It is the process of removing suspended impurities by allowing the water to stay undisturbed for some time in large tanks when most of the suspended particles settle down due to force of gravity.

Retention period in settling tank may range from hours to days

After sedimentation,the clear water can be taken out from the tank with the help of pump.

Step 3:Coagulation

It is the process of removing colloidal particles from water by the addition of certain chemicals known as coagulants.

Actually the colloidal particles do not settle down or take too long to settle,in order for quick settling,certains chemicals known as coagulants or flocculants are used.

The commonly used coagulants are Alum,ferrous sulphate which reacts with bicarbonates present in water to form bulky gelatinous ppt called “Flock” As this flocks descend through water they adsorb and entangle fine suspended particles and form bigger flocks which settle down quickly

Step 4:Filtration

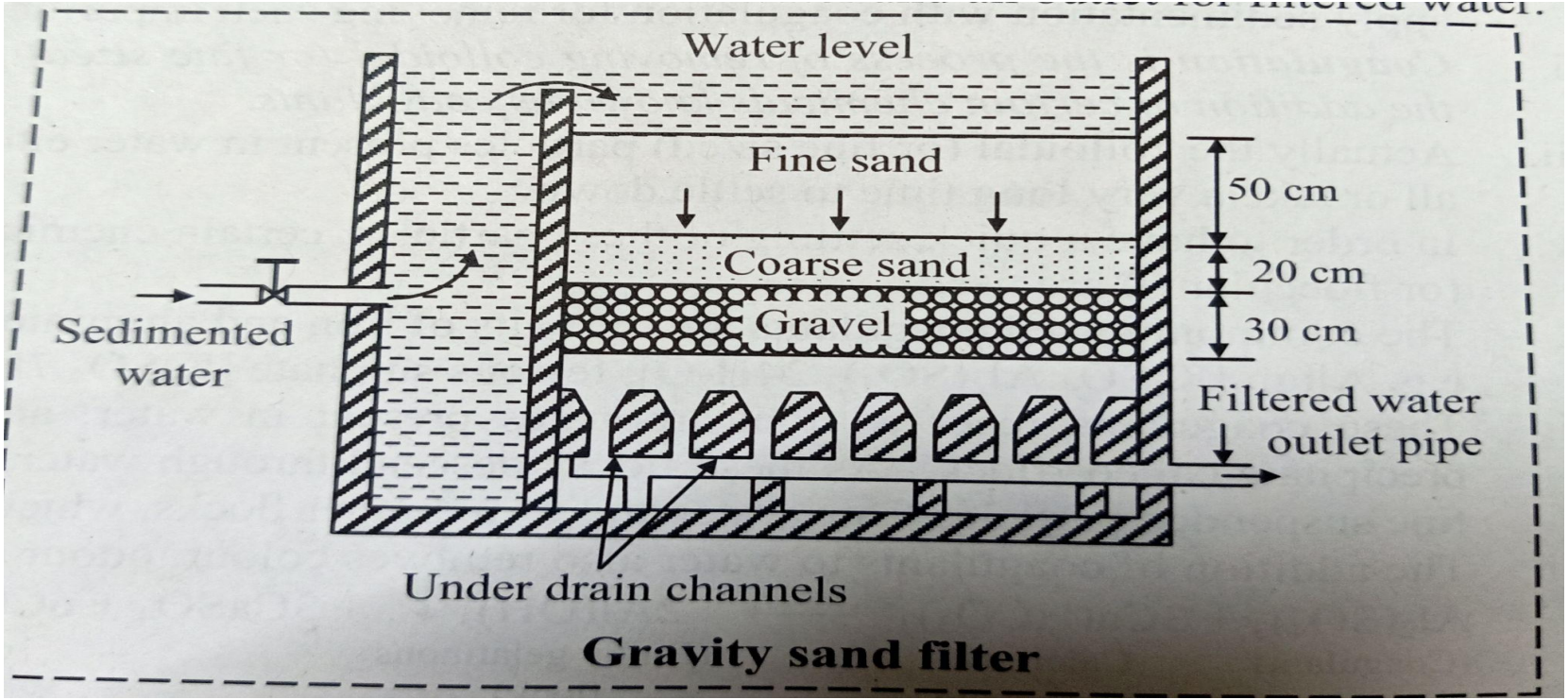
It is a process of removing insoluble colloidal matter and micro-organisms by passing water through a bed of fine sand and other proper sized material.

There are two types of Filters

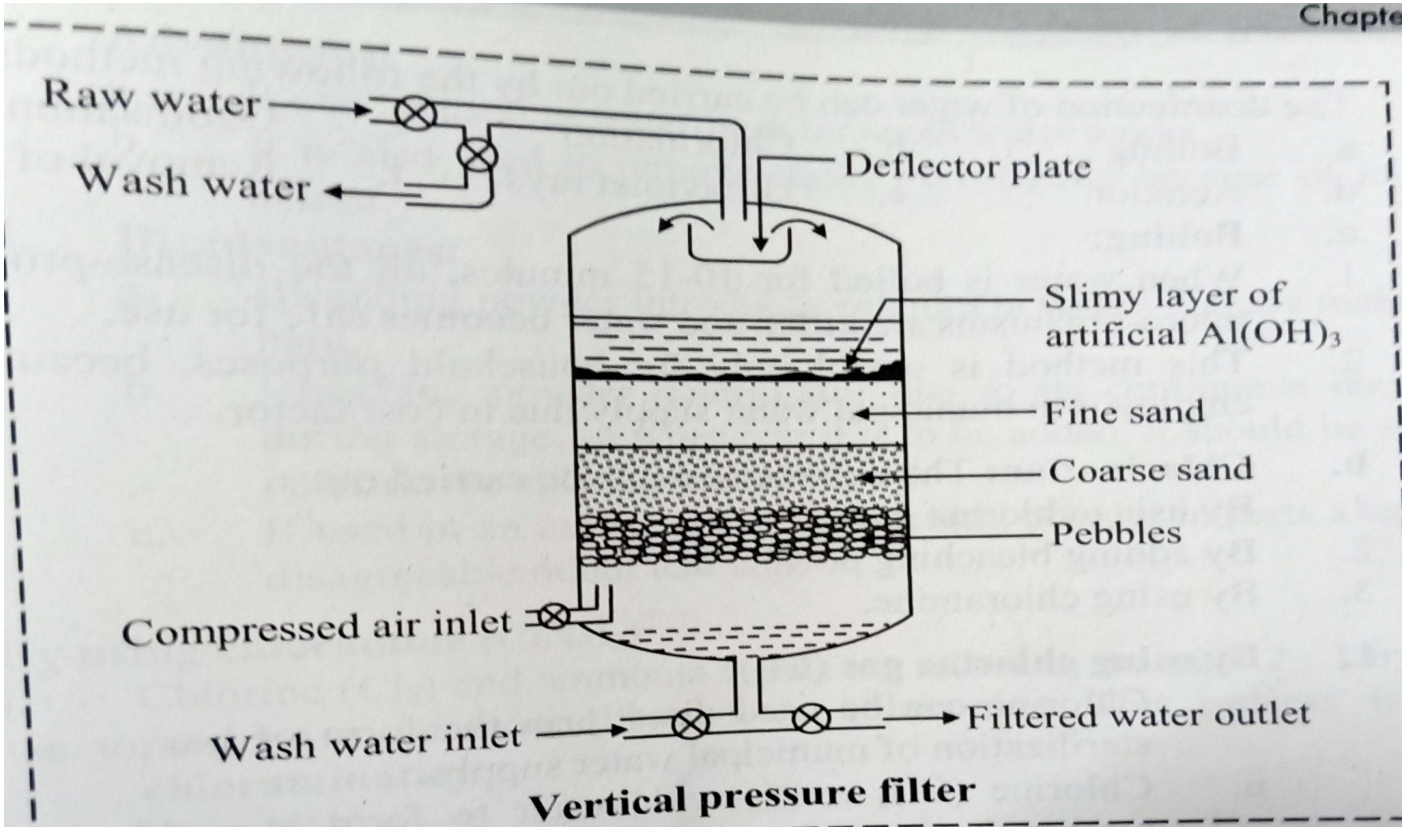
a)Gravity sand filter

b)Pressure Filter

Gravity sand filter



Pressure filter



Vertical pressure filter

Step 5:Sterilization

The process of destroying disease causing bacteria and microorganisms from the water and making it safe for use is known as disinfection or sterilization.

It can be carried out by

1)Boiling

2)Chlorination

3)Ozonisation

4)Aeration

5)UV rays

Boiling :when water is boiled for 10-15 min all disease causing bacteria and micro organisms are killed and water becomes safe for use.This method is employed for household purposes only.

Chlorination :it is carried out by

1)Chlorine gas

2)Bleaching powder

3)Chloramine

Chlorine water can be used as gas or chlorine water for sterillization

$Cl_2 + H_2O$----------$HOCl + HCl$

HOCl----------HCl +(O) Nascent oxygen

Germs +(O)-------- Germs are killed

Bleaching powder ($CaOCl_2$) works as a good sterilizer for small water works

$CaOCl_2 + H_2O$------ $Ca(OH)_2 + Cl_2$

$Cl_2 + H_2O$----------$HOCl + HCl$

HOCl--------H_2O + (O)

Chloramine(ClNH2)

ClNH2 +H2O------HOCl +NH3

HOCl------HCl + (O)

(O) +GERMS--------GERMS KILLED

2) Ozone

6) **By adding $KMnO_4$:** It is generally used to disinfect surface water systems containing bad taste and odour. It is generally used in rural areas where well water is supplied.

7) **Aeration :** This process is the modern method of purifying water for town supply.

"The process of spraying water in the form of fine droplets into the atmosphere is called as aeration".

In this method, water is forced under pressure through a perforated pipe. As water sprays into air, it comes in intimate contact with atmospheric oxygen and is exposed to the UV-rays of the sun. UV-rays kills bacteria and oxygen oxidises organic matter present in the water. The pure water is collected in another tank.

Disadvantage : The desirable effect may not be obtained as the exposure time is too short.

8) **Ultra-violet rays :** UV-rays are effective in killing all the types of bacteria. In this method UV-rays are simply focused on flowing water.

Disadvantage : This method is costly and cannot be used in sterilization of muncipal water supply.

good taste to treated water.

5) **Ozonization :** Ozone is produced by passing silent electric discharge through cold and dry oxygen.

Ozone is passed through water in a sterilizing tank. The contact period is 10 - 15 minutes and dose is 2 - 3 ppm.