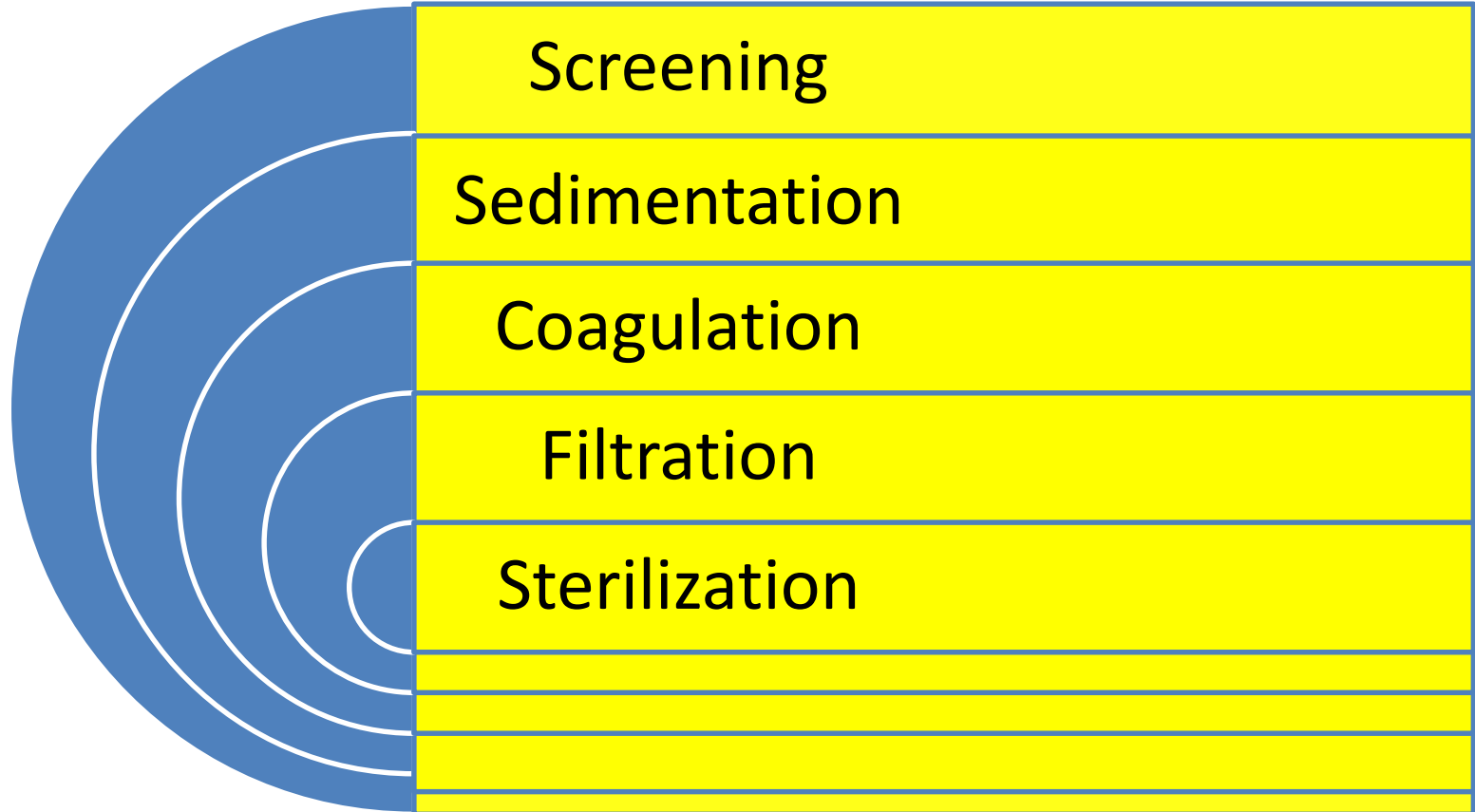


Water quality standards

1. should be clear and odourless.
2. It should be pleasant to taste
3. It should be perfectly cooled.
4. It should be free from disease producing bacteria
5. Its turbidity should not exceed 10 ppm.
6. It should be free from dissolved gases like H₂S.
7. It should be free from minerals such as Pb, As, Cr and Mn salts.
8. pH should be in the range of 7 – 7.5
9. Chloride and Sulphate content should be less than 250 ppm.
10. Fluoride content should be less than 1.5 ppm
11. Total dissolved solids should not be more than 500ppm.

Domestic water treatment



Screening

Removal of floating matter through screens

Sedimentation

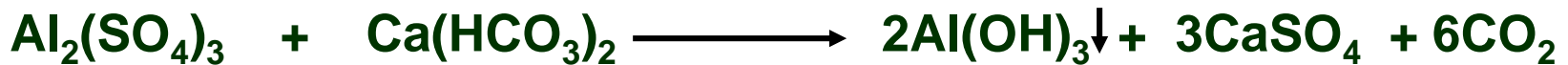
The process of allowing water to stand undisturbed for some time in order to facilitate the settling down of co-suspended particles under the action of gravity is called sedimentation

It removes approximately 70-75% of impurities

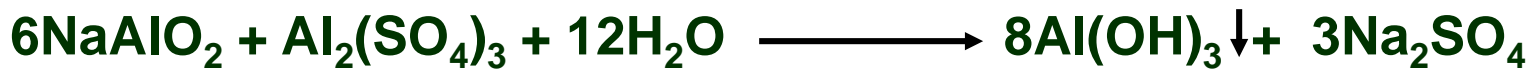
Coagulation

Process by which the fine suspended and colloidal particles are removed from the water by the addition of suitable chemicals (coagulants)

Aluminium sulphate (Potash Alum ($\text{K}_2\text{SO}_4\text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$))



Sodium Aluminate (NaAlO_2)



Ferrous Sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$)



Filtration

Process of removing the remaining colloidal matter, most of bacteria and other micro organisms by passing the sedimented water through suitable filters.

Commonly used filter: Rapid sand gravity filter

Two types of filters

a) Gravity type filters and b) Pressure type filters

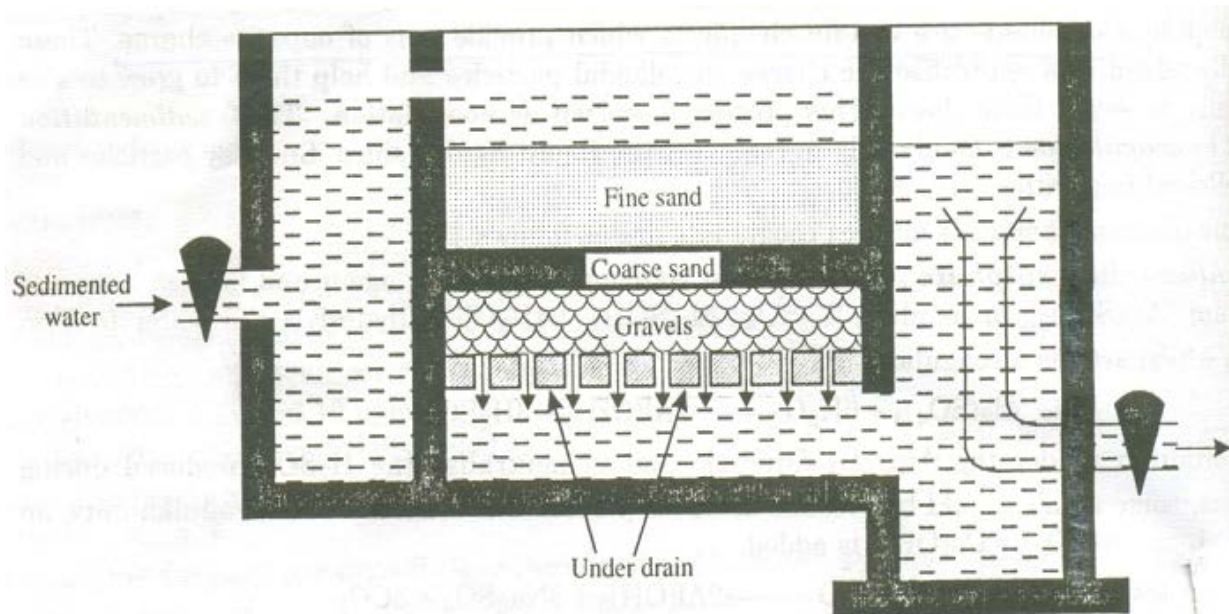


Fig. 4.1. Sand Filter.

Sterilization (Disinfection)

- Boiling
- Chlorination
- By ozone
- By Ultra-violet radiation

1. Boiling:

- ❑ Simple Sterilization method
- ❑ Harmful bacteria are killed

Limitations

- Expensive for municipal supply
- Taste of water changes
- Large quantity of fuel is required
- Kills pathogenic bacteria during boiling but does not protect the water against future infection

2. Chlorination

Chlorine used

(i) As a gas or concentrated aqueous solution



(ii) As bleaching powder

Hypochlorous acid is formed which kills the enzyme which is essential for the metabolic processes of the micro organisms present in water.



Drawbacks

- Introduces Ca in water thereby increasing hardness
- Excess amount produces bad smell in water
- Storage is difficult because it is unstable

(iii) As Chloramine (NH₂Cl)



Better germicidal than chlorine



Advantages

1. Gives good taste to water
2. Does not produce bad smell in water
3. Removes irritating smell due to excess of chlorine
4. Provides a greater lasting effect than chlorine

Super chlorination

Addition of excess amount of chlorination for disinfection of water

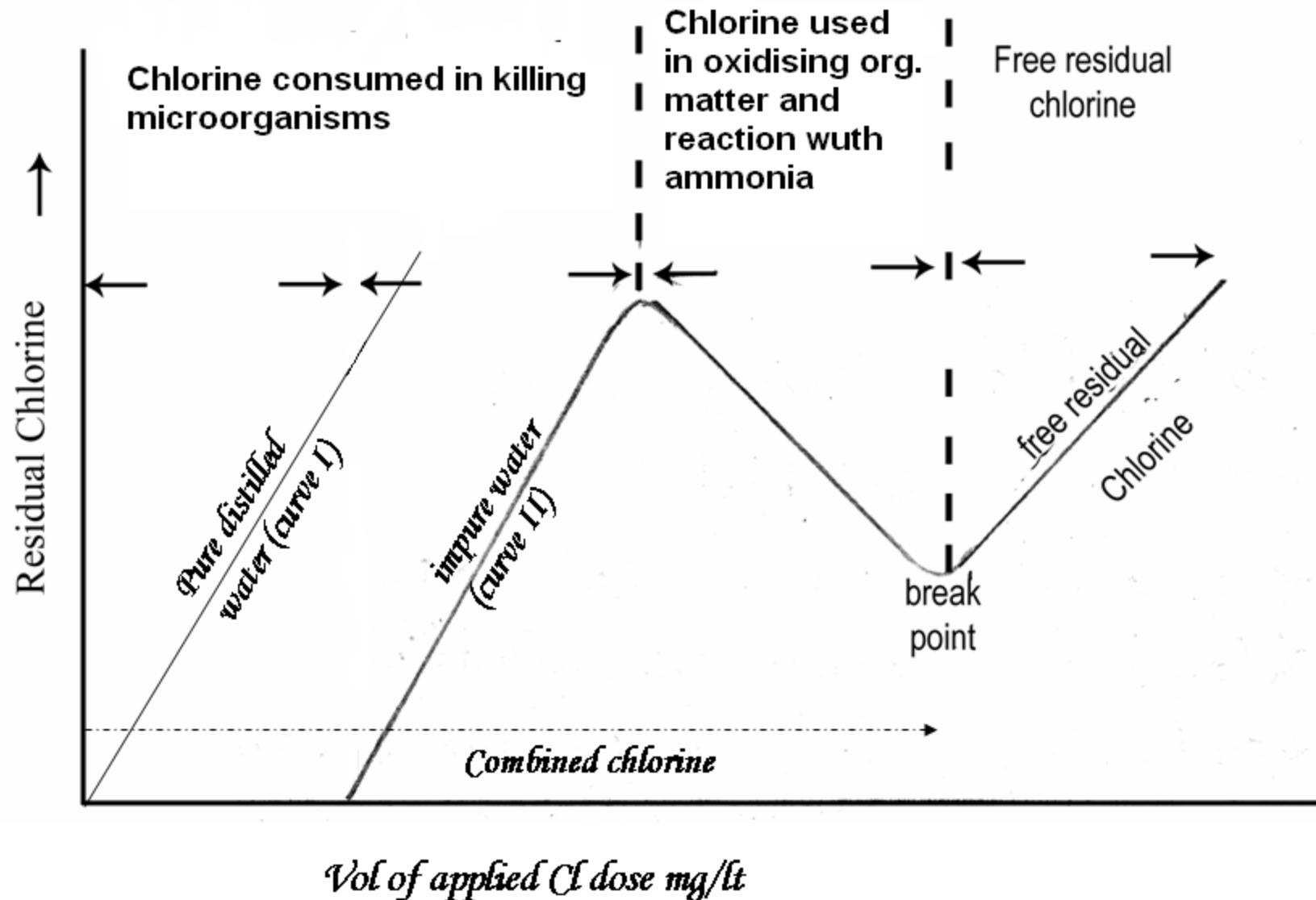
-removed by treating with calculated amount of NH_3

Break point chlorination

Break point chlorination refers to the addition of chlorine to water in amounts sufficient to

1. kill all the micro organisms
2. to completely destroy organic matter by oxidation
3. Oxidation of free ammonia, if present
4. and to leave behind some free chlorine to continue the disinfecting action during storage (against further contamination by disease causing bacteria.)

A plot of the dosage of chlorine against the residual chlorine in water gives a curve



3. By Ozone

Process is called ozonisation



Advantages

- (i) It removes colour, odour and taste of water simultaneously
- (ii) It does not produce any residue
- (iii) Excess dose is not harmful because it is unstable and decomposes into oxygen

4. By Ultra-violet radiation

Exposed to UV rays from an electric mercury vapour lamp immersed in water

Advantages

- (i) No chemical is required
- (ii) No bad effect during treatment
- (iii) Produce no odour in water
- (iv) Takes very small time But very expensive

Assignment

- What are the different methods for domestic water treatment?
- Describe shortly sterilization of water?