

Break point chlorination

L.No: 04

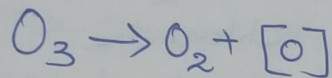
Topic: Municipal water Treatment - Disinfection

Sterilisation (or) Disinfection

* The process of destroying the harmful **bacterias** is known as Sterilisation (or) Disinfection.

* The chemicals used for this purpose are called **disinfectants**.

1) By using ozone



Ozone is a powerful disinfectant and is readily absorbed by water.

Ozone is highly unstable and breaks down to give nascent oxygen.

The nascent oxygen is a powerful oxidising agent and kills the bacterias.

Disadvantages

* This process is costly and cannot be used in large scale.

* Ozone is unstable and cannot be stored for long time.

2) By using ultraviolet (UV) radiations

UV rays are produced by passing electric current through mercury vapour lamp.

This is particularly used for sterilizing

Water in Swimming pool.

Disadvantages

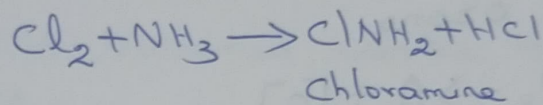
* It is Costly

* Turbid water cannot be treated.

3) By chlorination

The process of adding chlorine to water is called chlorination.

a) By adding chloramine



When chlorine and ammonia are mixed in the ratio 2:1 a compound chloramine is formed.

Chloramine compounds decompose slowly to give chlorine. It is a better disinfectant than chlorine.

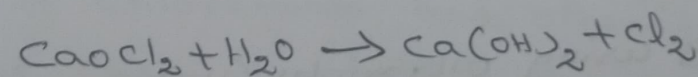
b) By adding chlorine gas

Chlorine gas can be bubbled in the water as a very good ~~is~~ disinfectant.

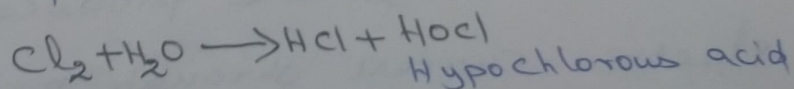
c) By adding bleaching powder

When bleaching powder is added to water, it produces hypochlorous acid (HOCl).

HOCl is a powerful germicide.



Bleaching
powder



HOCl + Bacteria → Bacteria are killed.

Break point Chlorination

Water contains

- * Bacteria
- * Organic impurities
- * Reducing Substances (Fe^{2+} , H_2S)
- * Free ammonia

→ Chlorine may be added to water directly as a gas or in the form of bleaching powder.

→ When chlorine is applied to water, the results obtained can be depicted graphically

→ The graph shows the relationship between the amount of chlorine added to water and the residual chlorine.

→ It is observed from the graph that initially the applied chlorine is used to kill the bacteria and oxidises all the reducing substances present in the water and there is no free residual chlorine.

→ As the amount of applied chlorine increases, the amount of Combined residual chlorine also increases.

→ This is due to the formation of chloramine and other chloro compounds.

→ At one point, on further chlorination, the oxidation of chloramines and other impurities starts and there is a fall in the Combined Chlorine Content.

→ Break point chlorination is the point at which the Combined residual chlorine decreases to a minimum point where oxidation of chloramines

and other impurities Complete and free residual chlorine begins to appear.

→ Thus, the break point chlorination eliminates bacterias, reducing substances, Organic Substances responsible for the bad taste and odour from the water.