

AERATION:

Aeration removes odour and tastes due to volatile gases like hydrogen sulphide and due to algae and related organisms. Aeration also oxidise iron and manganese, increases dissolved oxygen content in water, removes CO₂ and reduces corrosion and removes methane and other flammable gases.

Principle of treatment underlines on the fact that volatile gases in water escape into atmosphere from the air-water interface and atmospheric oxygen takes their place in water, provided the water body can expose itself over a vast surface to the atmosphere. This process continues until an equilibrium is reached depending on the partial pressure of each specific gas in the atmosphere.

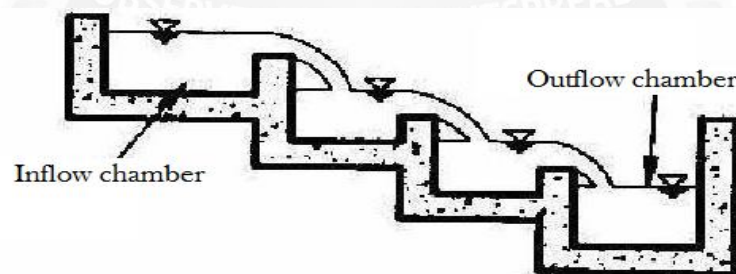
Principle of Aeration

Oxygen uptake depends on the area and duration of contact between water and air. For porous air diffusers this means that the size of the bubbles should be relatively small, since surface area is bigger in proportion to their volume and they rise slower, which gives a longer contact duration.

Types of Aerators

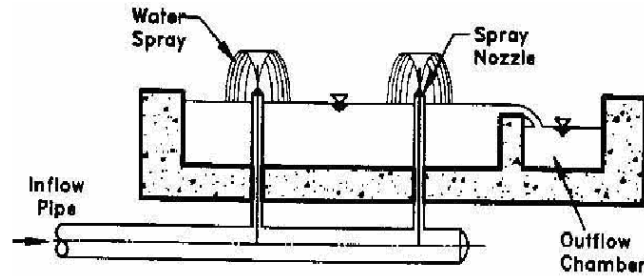
1. Gravity aerators
2. Fountain aerators
3. Diffused aerators
4. Mechanical aerators.

Gravity Aerators (Cascades): In gravity aerators, water is allowed to fall by gravity such that a large area of water is exposed to atmosphere, sometimes aided by turbulence.



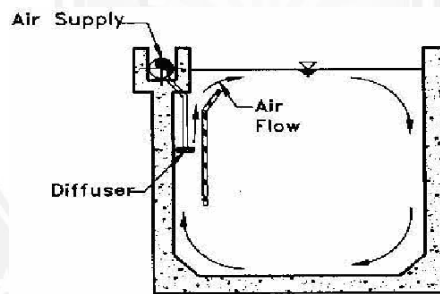
Cascade type Gravity Aerator

Fountain Aerators: These are also known as spray aerators with special nozzles to produce a fine spray. Each nozzle is 2.5 to 4 cm diameter discharging about 18 to 36 l/h. Nozzle spacing should be such that each m³ of water has aerator area of 0.03 to 0.09 m² for one hour.



Injection or Diffused Aerators :

It consists of a tank with perforated pipes, tubes or diffuser plates, fixed at the bottom to release fine air bubbles from compressor unit. The tank depth is kept as 3 to 4 m and tank width is within 1.5 times its depth. If depth is more, the diffusers must be placed at 3 to 4 m depth below water surface. Time of aeration is 10 to 30 min and 0.2 to 0.4 litres of air is required for 1 litre of water.



Mechanical Aerators:

Mixing paddles as in flocculation are used.

Paddles may be either submerged or at the surface.

FUNCTIONS OF AERATORS

1. Aeration brings water and air in close contact in order to remove dissolved gases (such as carbon dioxide) and oxidizes dissolved metals such as iron, hydrogen sulfide, and volatile organic chemicals (VOCs). Aeration is often the first major process at the treatment plant. During aeration, constituents are removed or modified before they can interfere with the treatment processes.
2. Aeration brings water and air in close contact by exposing drops or thin sheets of water to the air or by introducing small bubbles of air (the smaller the bubble, the better) and letting them rise through the water. The scrubbing process caused by the turbulence of aeration physically removes dissolved gases from solution and allows them to escape into the surrounding air.

3. Aeration also helps remove dissolved metals through oxidation, the chemical combination of oxygen from the air with certain undesirable metals in the water. Once oxidized, these chemicals fall out of solution and become particles in the water and can be removed by filtration or flotation.

4. Oxygen is added to water through aeration and can increase the palatability of water by removing the flat taste. The amount of oxygen the water can hold depends primarily on the temperature of the water. (The colder the water, the more oxygen the water can hold).

5. Water that contains excessive amounts of oxygen can become very corrosive. Excessive oxygen can also cause problems in the treatment plant i.e. air binding of filters.

