



Self Purification

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What is Self Purification of Stream ?

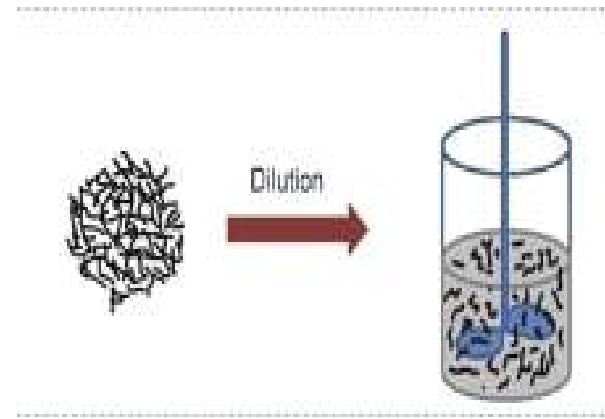
- When sewage is discharged into the river , the receiving water gets
polluted due to waste products present in sewage effluent.
- But the conditions do not remain same forever, because the
natural
forces of purification go on acting up on the pollution elements
and bring back the water into its original condition.
- This automatic purification in due course of time is called the
'Self Purification' phenomena.



ACTIONS INVOLVED IN SELF PURIFICATION OF STREAM

1. DILUTION
2. DISPERSION
3. SEDIMENTATION
4. OXIDATION
5. REDUCTION
6. TEMPERATURE
7. SUNLIGHT

Dilution and Dispersion :



- When the perishable organic matter is discharged into river-stream, it gets rapidly dispersed and diluted.
- This results in lowering of waste concentration and thus reduces the potential nuisance of sewage.
- The concentration 'C' of the resulting mixture is given by

$$C = \frac{C_s.Q_s + C_r.Q_r}{Q_s + Q_r}$$

Where, C_s = concentration of sewage

Q_s = flow rate of sewage

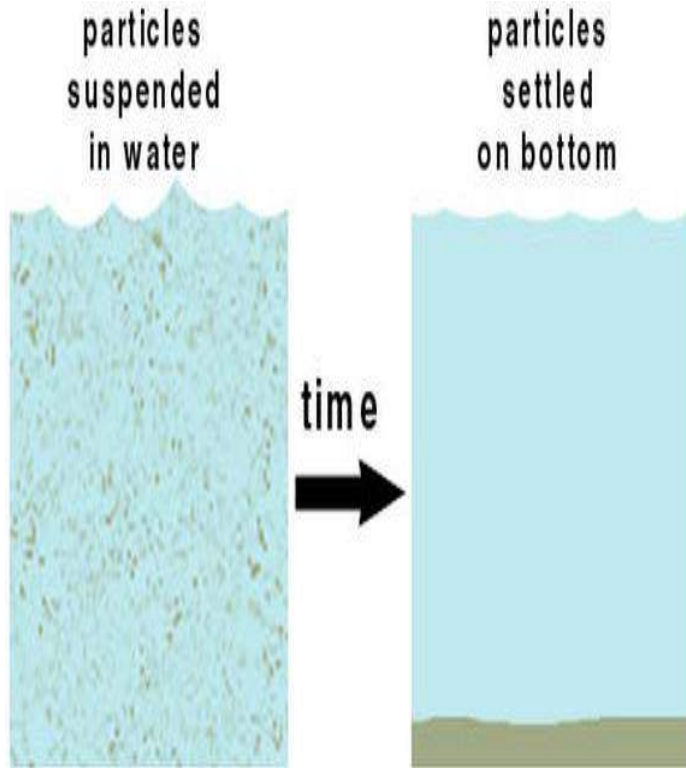
C_r = concentration of river

Q_r = flow rate of river

This equation is applicable separately to concentrations of different impurities such as oxygen content, BOD, suspended sediments etc.

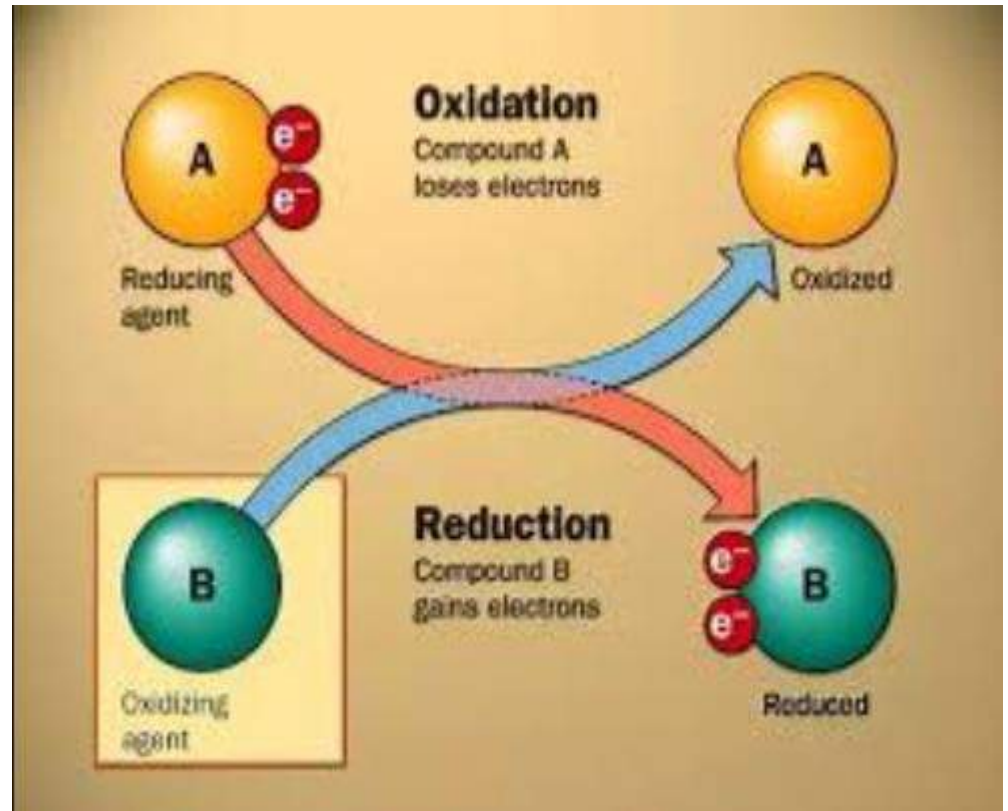
Sedimentation :

- The settleable solids present in effluents will settle down into the river bed, thus helping in the self purification process.



A

A. Sedimentation



B

B. Oxidation and Reduction

Oxidation :

- The oxidation of the organic matter present in the sewage effluent, will start as soon as the sewage outfalls into the river water containing dissolved oxygen.
- The deficiency of oxygen so created , will be filled up by the atmospheric oxygen.
- This is the most important action responsible for affecting self purification of rivers.

Oxidation Pond



Reduction :

- Reduction occurs due to hydrolysis of organic matter settled at the bottom either chemically or biologically.
- Anaerobic bacteria will help in splitting the complex organic constituents of sewage in liquids and gases, thus paving the way for their ultimate stabilization by oxidation.

Sunlight :

- The sun light has a bleaching and stabilizing effect of bacteria.
- Algae produces oxygen in the presence of sunlight due to photosynthesis.
- Therefore sunlight helps in purification of stream by adding oxygen through photosynthesis.



Factors Effecting Natural Forces :

- TEMPERATURE
- TURBULENCE
- HYDROGRAPHY
- DISSOLVED OXYGEN
- RATE OF REAERATION

TEMPERATURE :

- At higher temperature concentration of dissolved oxygen is low while the rate of biological and chemical activities are high. This is likely to lead to anaerobic condition, the pollution is heavy.

TURBULENCE :

- The turbulence in the body of water helps in breaking the surface of the stream or lake and helps in rapid reaeration from the atmosphere.
- Too much of turbulence scours the bottom sediment and stops algae growth.

HYDROGRAPHY :

- Hydrography affects the velocity and surface expanse of the river-stream.
- High velocity cause turbulence and rapid aeration , while surface expanse will also have the same effect.

DISSOLVED OXYGEN :

- The larger the amount of dissolved oxygen present in water the better and earlier is the self purification process.

RATE OF REAERATION :

- The rate at which dissolved oxygen is restored will considerably govern the self purification process.
- The greater is this rate, the quicker will self-purification.

THANK YOU