Secondary Clarifier

Secondary clarifier are used to remove the settlable suspended solids created in biological treatment processes such as the activated sludge and trickling filter process



Advanced Waste Water Treatment Methods

The effluent from a typical secondary treatment plant still contains 20-40 mg/L BOD which may be objectionable in some streams. Suspended solids, in addition

to contributing to BOD, may settle on the stream bed and inhibit certain forms of aquatic life.

The BOD if discharged into a stream with low flow, can cause damage to aquatic life by reducing the dissolved oxygen content. In addition the secondary effluent contains significant amounts of plant nutrients and dissolved solids. If the waste water is of industrial origin, it may also contain traces of organic chemicals, heavy metals and other contaminants.

Different methods are used in advanced waste treatment to satisfy any of the several specific goals, which include the removal of

- 1- Suspended Solids
- 2-BOD
- **3-Plant nutrients**
- 4-Dissolved solids
- 5-Toxic substances

These methods may be introduced at any stage of the total treatment process as in the case of industrial waterways or may be used for complete removal of pollutants after secondary treatment.

1-Removal of suspended solids:

This treatment implies the removal of those materials that have been carried over from a secondary treatment settler. Many methods were proposed of which two methods were commonly used.

The two methods are micro staining and chemical coagulation followed by settling and mixed media filtration:

Micro staining:

It is a special type of filtration process which makes use of filters oven from stainless steel wires with very fine pores of 60-70 microns size. This filter helps to remove very fine particles. High flow rates and low back pressures are achieved

Coagulation and flocculation:

The object of coagulation is to alter these particles in such a way as to allow them to adhere to each other. Most colloids of interest in water treatment remain suspended in solution because they have a net negative surface charge that causes the particles to repel each other. The intended action of the coagulant is to neutralize that charge, allowing the particles to come together to form larger particles that can be more easily removed from the raw water. The usual coagulant is alum [AI2(S04)2[•] 18H20], though FeCI3, FeS04 and other coagulants, such as polyelectrolytes, can be used. Alum when added to water, the aluminium in this salt hydrolyses by reactions that consume alkalinity in the water such as:

A1 (HO)6] + 3 3HC03 — AI(OH)3(s) + 3Co2 + 6H2o (1(

The gelatinous hydroxide thus formed carries suspended material with it as it settles. Metal ions in coagulants also react with virus proteins and destroy upto 99% of the virus in water. Anhydrous ion (III) sulphate can also act as effective coagulant similar to aluminium sulfate. An advantage with iron (III) sulfate it that it works over a wide range of pH.

To separate the dissolved and suspended particles from the water coagulation and flocculation processes are used. <u>Coagulation</u> and flocculation is relatively simple and cost-effective, provided that chemicals are available and dosage is adapted to the water composition. Regardless of the nature of the treated water and the overall applied treatment scheme, coagulation-flocculation is usually included, either as pre-treatment (e.g. before <u>rapid sand filtration</u>) or as post-treatment step after <u>sedimentation</u> (see also <u>centralised water purification plants</u>).

Most solids suspended in water possess a negative charge; they consequently repel each other. This repulsion prevents the particles from agglomerating, causing them to remain in suspension. <u>Coagulation</u> and flocculation occur in successive steps intended to overcome the forces stabilizing the suspended particles, allowing particle collision and growth of flocs, which then can be settled and removed (by sedimentation) or filtered out of the water. <u>Coagulation-Flocculation</u> is also a common process to treat industrial and domestic wastewater in order to remove suspended particles from the water.







