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**Assignment #2**

**Course Environmental management**

**Q: Discuss activated sludge process with the help of schematics.**

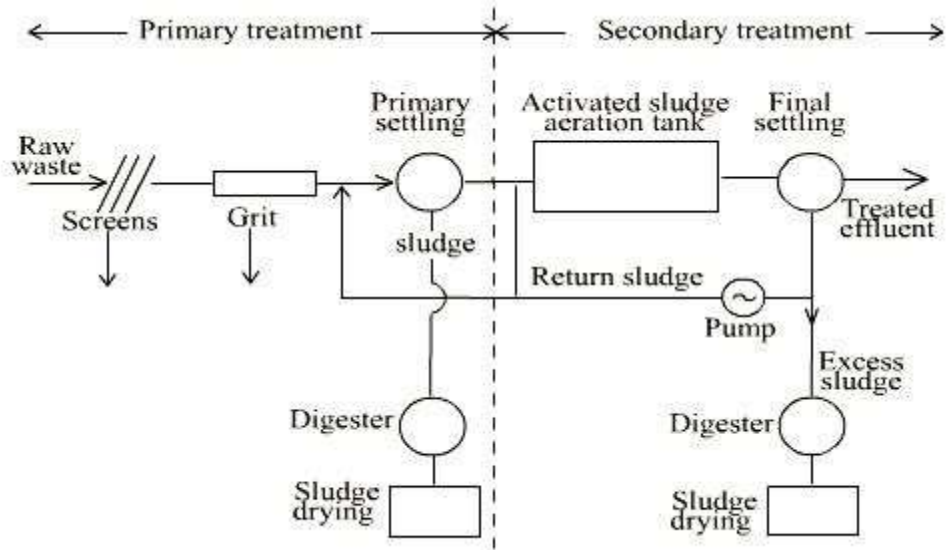
- Process for treating sewage or industrial wastewaters using aeration and a biological floc composed of bacteria and protozoa is a biological process that can be used for oxidizing carbonaceous biological matter, oxidizing nitrogenous matter ( $\text{NH}_3$  and  $\text{N}_2$ ), Removing nutrients (N and P).
- Aeration methods - diffused aeration, surface aerators (cones) and pure oxygen aeration.
- The sludge blanket is measured from the bottom of the clarifier
- The Sludge Volume Index is the volume of settled sludge in mm occupied by 1 gram of dry sludge solids after 30 minutes of settling in a 1000 ml graduated cylinder.
- The Mean Cell Residence Time is the total mass(kg) of mixed liquor suspended solids in the aerator and clarifier divided by the mass flow rate (kg/day) of MLSS effluent
- The F/M is amount of BOD fed to the aerator (kg/day) divided by the amount of MLVSS (kg) under aeration
- Some use Mixed Liquor Suspended Solids for expedience, but Mixed Liquor Volatile Suspended Solids is considered more accurate for the measure of microorganisms

**Process:**

- Pre-treatment stage to remove large solids and other undesirable substances
- Aeration stage, where aerobic bacteria digest biological wastes
- Settling stage allows undigested solids to settle, forms a sludge that must be periodically removed from the system
- Disinfecting stage, where chlorine or similar disinfectant is mixed with water, to produce an antiseptic output

The activated sludge process is a process for treating sewage and industrial wastewaters using air and a biological floc composed of bacteria and protozoa.

The most common suspended growth process used for municipal wastewater treatment is the activated sludge process as shown in figure:



Activated sludge plant involves:

1. wastewater aeration in the presence of a microbial suspension,
2. solid-liquid separation following aeration,
3. discharge of clarified effluent,
4. wasting of excess biomass, and
5. return of remaining biomass to the aeration tank.

In activated sludge process wastewater containing organic matter is aerated in an aeration basin in which micro-organisms metabolize the suspended and soluble organic matter. Part of organic matter is synthesized into new cells and part is oxidized to  $\text{CO}_2$  and water to derive energy. In activated sludge systems the new cells formed in the reaction are removed from the liquid stream in the form of a flocculent sludge in settling tanks. A part of this settled biomass, described as activated sludge is returned to the aeration tank and the remaining forms waste or excess sludge.