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Sessional Assignment No 1 Wastewater Engineering

Two basic design parameters of waste water treatment system are Hydraulic Retention time (HRT) and Solids Retention time (SRT).

- 1) Briefly describe each one of these parameters?
- 2) What are methods used for decoupling SRT from HRT?
- 3) What are the advantages of decoupling SRT from HRT?

SOLIDS RETENTION TIME (SRT).

Solids retention time also known as the mean cell residence time or MCRT is the amount of time in days that solids or bacteria are maintained in the activated sludge system.

To calculate the SRT of an activated sludge process it is necessary to know the amount or pounds of solids or suspended solids in the activated sludge system and the amount to determine the pounds of suspended solids in the activated sludge system the pounds of

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mixed liquor suspended solids (MLSS) must be calculated. The MLSS consist of all solids in the aeration tanks and secondary clarifiers. Therefore the pounds of MLSS in an activated sludge systems consists of the concentration (mg/l) of MLSS times the volume (MG) of the aeration tank (s) and clarifier (s) times the weight constant of 8.34

pounds of MLSS = MLSS mg/l x (Volume of aeration tanks + clarifiers MG) x 8.34 pounds/gal wastewater.

To determine the suspended solids leaving the activated sludge process the amount or pounds of suspended solid loss through wasting and discharge in the secondary effluent must be calculated. Therefore the pounds of suspended solids leaving the activated sludge process consist of pounds of activated sludge wasted per day and the pounds of activated sludge or secondary effluent suspended solid discharged per day.

Pounds of suspended solids leaving activated sludge process = wasted sludge (mg/ltr) x wasted sludge flow (MGD) x 8.34

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pounds / gal wastewater + secondary effluent
Suspended Solids mg / ltr x Effluent
Flow (MGD) x 8.34 pounds / gal wastewater
The solid retention time of an
activated sludge process can be
calculated by dividing the pounds
of suspended solids or MLSS in
the activated sludge system by
the pounds per day of suspended
solids leaving the activated sludge
system.

$$\text{SRT} = \frac{\text{(Suspended Solids in System)}}{\text{(Suspended Solids leaving System per day)}}$$

HYDRAULIC RETENTION TIME (HRT).

The hydraulic retention time or
HRT is the amount of time
in hours for wastewater to pass
through a tank, such as aeration
tank changes in the HRT of an
activated sludge process can effect
biological activity. For example
decreasing HRT adversely effects
nitrification, while increasing HRT
favors nitrification and the solubilization
of colloidal BOD and particulate BOD.
The HRT of an aeration tank
is determined by dividing the

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of the aeration tank in million gallons by the flow rate through the aeration tank.

The flow rate through the aeration tank must be expressed as gallons per hour (gph)

$$\text{HRT (hours)} = \frac{\text{Volume of aeration tank, gal}}{\text{Flow rate, gph}}$$