

# **Sessional Assignment 1**

## **Wastewater Engineering**



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Two basic design parameters of Wastewater Treatment Systems are Hydraulic Retention Time (HRT) and Solids Retention Time (SRT).

1) Briefly describe each one of these parameters?

## Hydraulic Retention Time

→ It is the residence time used to calculate the solubility of a particular substance kept in a bio reservoir with respect to time. Simply HRT is the amount of time spend by the particle inside a tank.

→ Simpler wastes that are easily biodegradable have

shorter hydraulic retention time, but HRT must be longer for more complex wastes that are more difficult for microbes to metabolize.

→ Hence HRT is an important parameter in wastewater treatment which directly affects the design, operational/investment cost and energy requirements.

## Solids Retention Time

→ The solids retention time (SRT) is the average time the activated sludge solids are in the system.

→ The solids retention time controls the concentration of bacteria throughout the treatment system. A higher SRT contributes to a higher



bacterial concentration in the reactor and which gives rise to;

- Smaller reactor size
- Larger separator size
- Reduced sludge production
- Higher aeration requirement.

→ Hence the SRT is an important design and operating parameter for waste water treatment plants and is usually expressed in days.

2) What are methods used for decoupling SRT from HRT?

→ The need of decoupling SRT from HRT arises when in a situation where growth rate of slow growing anaerobic microbes must exceed washout rate (or dilution rate)

During anaerobic digestion treatment process. Such process/decoupling requires a large digester and maintains a high SRT with a relatively short HRT.

→ Following are the methods used for decoupling SRT from HRT.

- Biomass immobilization in attached growth systems.
- Granulation and floc formation.
- Biomass recycling.
- Biomass retention.
- Partial recirculation of the digester effluent.



3) What are the advantages of decoupling SRT from HRT?

## Advantages

- Efficient treatment can be carried out at high organic loading rates.
- During decoupling process, the natural turbulence caused by the rising of biogas bubbles provides efficient substrate and biomass contact, thus mechanical mixing is not required, which significantly reduces the energy demand and associated cost.
- Decoupling SRT from HRT reduces capital expenditure and increases biogas production.