

Sessional Assignment 1

Wastewater Engineering



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SECTION A

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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
- large 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 the 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 an 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 the 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