

Assignment No # 01

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Section

B

Department

B

BE (Civil)

Subject

waste water  
Engineering

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Submitted to

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Briefly describe each of one of hydraulic Retention Time (HRT) and Solid Retention Time (SRT) ?

## Hydraulic Retention Time

The hydraulic Retention Time (HRT) in waste water treatment plant is a measure of at an average length of time holding the waste-water in a tank. It is also known as hydraulic residence time.

The waste water treatment plant is mainly designed to handle the waste water at normal load and also during shock loads.

The waste water is retained in different treatment units at a particular time to achieve the desired parameters. The HRT followed in the homogenization tank is 12 to 24 hours, 24 to 48 hours in aeration tanks is 72 to 120 hours days in An aerobic Reactors 5 to 12 hours in secondary clarifiers etc. 3 to 5 hours in Primary clarifier, 30 minutes in chlorine contact tanks, 5 to 10 minutes in deep media filters etc.



During the design stages itself, the HRT of waste water in various stages are calculated in order to achieve the outlet parameters.

If HRT is not properly maintained at various stages, we may not get the desired parameters for discharge/reuse.

## Solid Retention Time (SRT)

The solids retention time or SRT controls the concentration of bacteria throughout the treatment system. A higher SRT contributes to a higher bacterial concentration in the reactor which give rise to:

- Smaller reactor size
- Large separator size
- Reduced sludge production
- Higher aeration requirements due to the extra oxygen required for endogenous respiration.

Clearly an optimum SRT exists, resulting from a trade-off between the gain and losses



in the various cost terms.

For municipal treatment plants performing combined nitrification-denitrification, typical wasting ratios generally fall in the range 0.025-0.10 for hydraulic retention time of 12- to 24 hours.

Q2

What are methods used for decoupling SRT from HRT?

Methods used for decoupling SRT from HRT

The following methods used for decoupling SRT from HRT.

- ① Algal membrane bioreactor system
- ② Decoupled Aquaponic system

The above method is used for decoupling SRT from HRT



Q3

what are the advantages of decoupling SRT from HRT

Ans:

### Advantages of decoupling SRT from HRT

- Decoupling of SRT from HRT in bihydrogen production system validated the promise of using a gravity settler after a CSIR
- IBRCs decreased biomass washout by maintaining a high biomass retention time
- IBRCs showed stable performance over a period 100 days using glucose as a synthetic waste and corn syrup as a real waste.
- average yields of  $> 3 \text{ mol/mol}_{\text{hexose}}$  was achieved
- Head space  $\text{CO}_2$  sequestration increased  $\text{H}_2$  yield by 23% to  $3.1 \text{ mol/mol}_{\text{hexose}}$  and decreased butyrate consumption

→ CO<sub>2</sub> sequestration had a significant impact on the microbial culture

→ SRT had the most important effect on process performance biodegradability with 61% removal of volatile suspended solids and 84% removal of total carbohydrates at 64 days

→ The decoupling SRT from HRT not only increased glucose conversion from 29-50% in the CSTR to 99.9% in IBRRs but also the volumetric hydrogen production from 0.55-1.8 in the CSTRs to 2.4-9.6 L/L-d