

ASSIGNMENT # 01

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Q1): → Hydraulic Retention Time (HRT):-

HRT, defined as the ratio between the reactor volume and the feed flowrate, represents the average time the cells and substrates stay inside the reactor. HRT is very important parameter for the hydrogen and methane production in continuous mode. Very low HRT compacts the washout of the reactor, which means all the active microorganisms escape out from the reactor. On the contrary, an adequate HRT results in abundant hydrogen and methane yields.

→ This parameter is linked to the specific and different growth rates of hydrogen and methane-producing bacteria. Low HRT favored the washout of methanogens, guaranteeing the survival of hydrogen producers. Thus low HRT and slight acid pH (6.0-6.5) represent the best condition for hydrogen production; on the contrary, the hydrogen fermentation pattern may

Shift to methanogenic one when HRT is increased.

* SOLID RETENTION TIME (SRT):

The Solid Retention time (SRT) is the time the solid fraction of the wastewater spends in a treatment unit. It is the quantity of solids maintained in the reactor divided by the quantity of solids coming out of the reactor each day: $SRT = V \times C_d / (Q_{out} \times C_{out})$. Where V is the digester volume; C_d is the solids concentration; Q_{out} is the volume wasted each day and C_{out} is the solids concentration of the effluent.

In a conventional, completely mixed, or plug flow reactor, the HRT equals the SRT. In retaining biomass reactors (eg anaerobic biogas scrubbers, septic tanks) the SRT exceeds the HRT.

2): Methods For Decoupling SRT and HRT:

Following are the methods used for Decoupling SRT and HRT.

- 1). Continuous Stirred Tank Reactor.
- 2). Anaerobic Contact Reactor
- 3). Upflow Anaerobic Sludge Blanket Reactor.
- 4). Anaerobic Sequencing Batch Reactor.
- 5). Plug Flow Reactor.
- 6). Induced Bed Reactor.

3): Advantages of Decoupling SRT From HRT:

- 1). Less space is required from an anaerobic treatment plant compared to an aerobic treatment plant.
- 2). Anaerobic treatment technology has relatively low equipment cost.
- 3). Anaerobic treatment is more suitable for the treatment of wastewaters of seasonal industries, because anaerobic sludge can be ~~preserved~~ preserved without serious deterioration in activity or settleability, provided the temperature is maintained below 15°C .
- 4). Chlorinated organic toxicity levels can be reduced.