



Submitted by:

Faraz Ahmed

ID: 7751

Section: (C)

Submitted to:

Sir Nadeem

IQRA NATIONAL UNIVERSITY PESHAWAR

Q no 1

Briefly describe each one of these parameters? (1)

⇒ Hydraulic Retention Time: - HRT defined as the ratio of the reactor volume and feed flow rate, represents the average time the cells and substrates stay inside the reactor. HRT is very important parameter for hydrogen and methane production in continuous methanol mode. very low HRT comforts the washout of the reactor, which means all the active micro-organisms escape out from the reactor. On the contrary an adequate HRT result in abundant hydrogen and methane yields. Low HRT favored the washout of methanogens, guaranteeing the survival of hydrogen producers.

⇒ Solid Retention Time: -

The solid Retention time (SRT) is the time the solid fraction of the wastewater spend in a treatment unit. It is quantity of solids maintained in the reactor divided by the quantity of solids coming out of the reactor each day.

$$SRT = \frac{V \times C_d}{Q_{out} \times C_{out}}$$

C_{out} is the solid concentration of the effluent.

In a conventional, completely mixed or plug flow reactor, the HRT equals the SRT.

The solids retention time or SRT controls the concentrations of bacteria through the treatment system.

- * Smaller reactor size.
- * Larger separator size.
- * Reduced sludge production.

Q No # 02

What are the methods used for decoupling SRT from HRT.

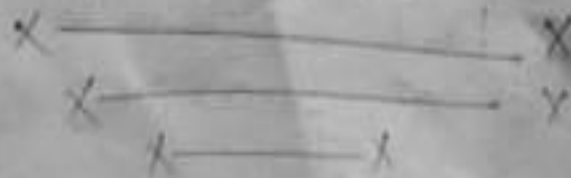
Ans: By decoupling the SRT and HRT, the liquid wastewater can be processed faster. HRT is the time water is retained within the digester and is equal to reactor volume divided by the average volumetric flowrate. In many instances a short HRT will reduce capital operation cost. There may be some advantages

for a simple design, generally reliable and easily managed.

Although modern controls permit it hands off management of more complex designs that decouple HRT and SRT.

Some of the more common digester types are given below.

- * Continuous Stirred tank reactor
- * HRT Contact Reactor
- * HRT Sequencing Batch reactor
- * Plug flow reactor
- * Fluidized bed reactor.



QNO #03 = what are the advantages of decoupling SRT from HRT.

Ans. HRT treatment Technology has relatively low equipment cost.

- ⇒ Available HRT treatment system can be applied at small as well as larger scale.
- ⇒ HRT Process stability can be easily achieved.
- ⇒ Managment requirement is low.
- ⇒ off-gas air pollution can be eliminated
- ⇒ Foaming of surfactant containing wastewater can be avoided.
- ⇒ The HRT treatment technology does not require the import of expensive equipment.
- ⇒ HRT nonbiodegradable organics can be degraded.
- ⇒ Less space is required for an HRT treatment plant compared to an

HRT treatment plant.

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