

Assignment '2'

Submitted to : Engr Nedoon

Submitted by: Mudasir

Id - No : 7755

Subject: Hydraulic Structure

Section: "B"

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a) Hydraulic Retention Time:

The hydraulic retention time is a measure of the average length of the time that a soluble compound remains in a constructed bioreactor.

The volume of the reaction tank divided by the influent flow rate is $T(\tau)$ the hydraulic retention time.

The hydraulic retention time is closely related to the amount of substrate that can be handled per unit time, and thereby has a direct impact on economic feasibility of bioprocess.

A short 'Hydraulic Retention' time yields a higher hydrogen production rate and lowers capital outlay by reducing the size of the bioreactor.

According to bolzonella David 2019 "The hydraulic Retention time as the ratio between the reactor volume and the feed flow rate, represents the average time the cells and substrates stay inside the reactor

HRT is a very important parameter for the hydroge and methane production in continuous mode.

⇒ **Solid Retention time,**

The solid retention time (SRT) is the time of the solid fraction of the wastewater spend in a treatment unit.

It is quantity of solid maintained in the reactor divide by the quantity of solids coming out of the reactor each day

$$SRT = \frac{V_{cd} / Q_{out}}{V_{out}}$$

Count is the solids concentration of the effluent in a convectional completely mixed or plug the flow reactor, the HRT equal the SRT

The solid retention time (SRT) controls the concentration of bacteria through the treatment system

⇒ small reactor size

⇒ large separate

⇒ Reduce sludge production.

Q2 Ans: / Methods used for decoupling SRT from HRT

By decoupling the SRT and HRT, the liquid ~~concentration~~ 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 instance a short HRT will reduce capital operation cost. There may have some advantages for a simple design generally reliable and easily managed.

Through modern control permits it hands off management of more complex design that decouple HRT and SRT

Some of the more common digester types are given below

- Continuous stirred tank reactor
- HRT contract reactor
- HRT sequencing batch reactor
- Plug flow reactor
- Unduced load reactor

Q3 Ans: / Advantages of decoupling SRT From HRT

- HRT treatment technology is a 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
- ⇒ Management requirement is low
- ⇒ Off gas air pollution can be eliminated
- ⇒ Forming of surfactant contains wastewater can be avoided
- ⇒ The HRT treatment technology does not require the import of expensive equipments
- ⇒ HRT nondegradable organics can be degraded
- ⇒ less space is required for an HRT treatment plant compared to an HRT treatment plants