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Section : C

Assignment : 01

Subject : Wastewater Engg

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Q No. 1

(1)

→ Hydraulic Retention Time:

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

The volume of the aeration tank divided by the influent flow rate is τ (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

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capital outlay by reducing the size of the bioreactor.

According to Bolzonella David 2019 "The hydraulic Retention Time is 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 hydrogen and methane production in continuous mode.



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=> Solid Retention Time:

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

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

$$SRT = V \times c_d / Q_{out} \times C_{out}$$

C_{out} is the solids concentration of the effluent. in a conventional, completely mixed or plug flow reactor, the HRT equal the SRT.

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

- ⇒ small reactor size
- ⇒ large separate size.
- ⇒ Reduce sludge production.

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Q NO: 2

Ans: Methods Used For
Decoupling SRT from HRT.

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

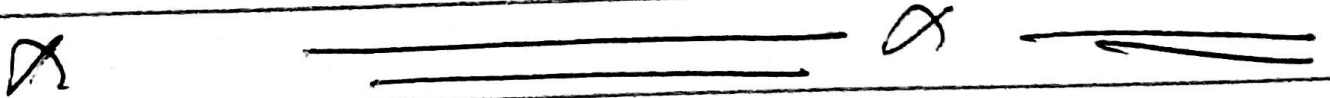
reduce capital operation
cost. There may have some
advantages for a simple
design generally reliable
and easily managed.

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

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Some of the more common digester types are given below.

- Continuous stirred tank reactor
- HRT contract Reactor.
- HRT sequencing Batch reactor.
- Plug flow reactor.
- induced load Reactor.



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Q NO: 3

Ans: Advantages of
Decoupling SRT from HRT.

⇒ 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.

⇒ Management 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.

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\Rightarrow HRT nondegradable organics can be degraded.

\Rightarrow less space is required for an HRT plant compared to an HRT treatment plant.

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