



IQRA NATIONAL UNIVERSITY PESHAWAR

ASSIGNMENT NO 01

DEPARTMENT OF CIVIL ENGINEERING

SUBJECT: WASTER WATER ENGINEERING
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Q:- Briefly discuss each one of these parameters?

⇒ Hydraulic Retention Time:- HRT defined as the ratio b/w 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. Very low HRT comports the washout of the reactor which means all the active micro-organisms escape out from the reactor. On the contrary an adequate HRT results in abundant hydrogen and methane yields.

⇒ 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 $SRT = \frac{V \times C_{sl}}{Q_{out} \times C_{out}}$. where V is the digester volume, C_{sl} 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, the SRT exceeds the HRT. The SRT controls the concentration of bacteria throughout the treatment system.

⇒ Smaller reactor size.

⇒ Larger separator size.

⇒ Reduced sludge production.

Q2:- What are the methods used for decoupling SRT from HRT.

Ans:- By decoupling the SRT and the HRT the sewage wastewater can be processed

Hydraulic Retention Time (HRT) is the time water is retained within the digester and is equal to reactor volume divided by the average volumetric flow rate. In many instances a short HRT will reduce capital and operation costs. There may be some advantages for a simple design like a complete mix digester where SRT is equal to HRT. The simple design are generally reliable and easily managed, although modern control permit 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 contact reactor.
- ⇒ Upflow HRT sludge blanket reactor.
- ⇒ Anaerobic sequencing batch reactor.
- ⇒ Plug flow reactor.
- ⇒ Induced bed reactor.

Q3:- What are the advantages of decoupling SRT from HRT?

Ans:- Less space required for an HRT treatment plant compared to an aerobic treatment plant.

⇒ HRT treatment technology has relatively low equipment cost.

⇒ Available HRT treatment systems can be applied at small as well as large scale.

⇒ The HRT treatment technology does not require the import of expensive equipment.

⇒ Waste biomass disposal cost are low.

⇒ Nitrogen and phosphorus supplementation costs are low.

⇒ Management required is low.

⇒ Foaming of surfactant containing wastewater can be avoided.

