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Assignment ; 01

Submitted to ; Engr-Nadeem

Subject ; Waste-Water Engineering.

Q1; Briefly describe each one of hydraulic retention time (HRT) and Solid retention time (SRT)?

Ans; Hydraulic retention Time;

The hydraulic retention time (HRT) in wastewater treatment plant is a measure at a average length of time holding the wastewater in a tank. It is also known as hydraulic residence time

* The wastewater treatment plant is mainly designed to handle the wastewater at normal load and also during shock loads.

* The wastewater is retained in different treatment units at a particular time to achieve the desired parameters. The HRT followed in the homogenization tank is 12 to 24 hours, 24 to 48 hours in aeration tank is 72 to 120 days in an aerobic reactors 5 to 12 hours in secondary clarifiers etc. 3 to 5 hours in primary clarifier, 30 minutes in chlorine contact tanks, 5 to 10 minutes in deep media filters etc. During the design stages itself the HRT of waste water in various stages are calculated in order to achieve the outlet parameters.

* If HRT is not properly maintained at various stages we may not get the desired parameters for discharge / reuse.

* Solid Retention time (SRT);

* The solid retention time or SRT controls the concentration at bacteria throughout the treatment system. A higher SRT contributes to a higher bacterial concentration in the reactors which give rise to

* Smaller reactor size.
* Large separator size.
* Reduced Sludge size
* Higher aeration requirement due to the extra oxygen required for endogenous

respiration.

* Clearly an optimum SRT exists resulting from a trade-off between the gain and losses in the various cost terms.

* For municipal treatment plants performing combined nitrification denitrification typical wasting ratios generally fall in the range 0.025 - 0.10 for hydraulic retention time of 12 — to 24 hours.

Q2; What are the methods used for decoupling SRT from HRT?

Ans; Algal membrane bioreactor system and Decoupled A Aquaponics system is used these two methods are used for decoupling SRT from HRT.

Question #03

Q3; What are the advantages of decoupling SRT From HRT?

* Advantages of $\bar{S}^{x}_{i}$ decoupling SRT from HRT is $\dot{X}^{x}_{s}$ in biohydrogen production system validated the promise of using a gravity settler after CSTR.

* IBRCs decreased biomass washout by maintaining a high biomass retention time.

* IBRCs showed stable performance over a period of 100 days using glucose as a synthetic waste & corn syrup as a real waste.

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* Average yields of > 3 mol/mol$_{hexose}$ was achieved.

* Headspace CO_2 sequestration increased H_2 yield by 23% to 3.1 mol/mol$_{hexose}$ was achieved. & decreased buffer consumption.

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* CO_2 sequestration had a significant impact on the microbial culture.