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Section 'B'

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Two basic design Parameters of Waste Water treatment system are hydraulic Retention time (HRT) and Solid Retention Time (SRT).

(i) Briefly describe each one of these parameters.

Hydraulic Retention Time (HRT).

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

The wastewater treatment plant is mainly designed to handle the waste water at normal load and also during shock loads. The waste water is retained in different treatment units at a particular time to achieve the desired parameters.

2

The HRT followed in the Homogenization tank is 12 to 24 hours, 24 to 48 hours, in aeration tanks, 72 to 120 days in Anaerobic reactors, 5 to 12 hours in secondary clarifiers, 3 to 5 hours in primary clarifiers, 30 minutes in chlorine contact tanks, 5 to 10 minutes in deep media filters etc.

During the design stage 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.

For Example, If we assume the HRT is 5 days and the total volume of reactor is 500 MLD then the per day influent feeding amount is 100 MLD.

3
(2) What are methods used for de-coupling SRT from HRT.

The de-coupling the SRT from HRT reduces capital expenditure and increase Bio gas production for CHP Utilization.

The waste water treatment facility is producing 95% of its own electrical demand through a combined heat & Power CHP process fueled by an aerobic bio gas.

The average SRT for the primary digester was reported to be 13.4 day and continue to decrease in the foreseeable future as high strength dairy whey loading increased.

The influence of solid retention time SRT on continuous H_2 production in submerged membrane bio reactor was investigated using mixed mesophilic microflora.

4

(3) What are the advantages of decoupling SRT from HRT.

Advantages of decoupling from SRT to HRT in bihydrogen production system validated the the promise of using a gravity settle after CSTR.

IBRCS decreased biomass washout by maintaining a high biomass reaction time.

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

Average yield > 3 mol/mol hence was achieved

CO_2 sequestration had a significant impact on the microbial culture.