

Department of B.E Civil Engineering



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Assignment # sessional assignment 1|
Date: 30-June-2020
Semester: 8th
Section: "C"
Subject: Wastewater Engineering
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Two basic design parameters of wastewater treatment system are Hydraulic Retention time (HRT) and Solids Retention time (SRT).

② Briefly describe each one of these parameters:

↳ Hydraulic Retention Time (HRT) :-

↳ The number of days the material stays in the tank

$$HRT = V/Q$$

↳ It establishes the quantity of time available for bacterial growth and subsequent conversion of the organic material to gas.

↳ Solids Retention Time (SRT) :-

↳ Digester stability

↳ It is the quantity of solids maintained in the digester divided by the quantity of solids wasted each day.

Methods Used for decoupling SRT from HRT:-

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Type of Anaerobic Reactor	Biomass-suspended or attached growth	How the reaction works	Typical HRT hours	Me Bi
Anaerobic Filter (AF) / Packed bed reactor (PBR)	Attached	The reactor contains support media on which bio mass grow in a biofilm. Common support media include synthetic plastic or ceramic tubes or rings, with a high void volume and specific surface area. Since the AF retains biomass, a long SRT can be maintained regardless of HRT.	24-48 ²⁹	(N)
Fluidized Expanded-bed Reactor (EBR)	Attached	Microbes are attached to small media, such as sand or granular activated carbon. The media is expanded by the upflow velocity of the wastewater feed, which must be about 20 ml/h for 100% bed expansion. ¹⁸	3-1000	
Anaerobic contact (AC)	Suspended	A CSTAR with an external tank to settle biomass. Settled biomass is recycled back to maintain a long SRT.	12-120	
Sequencing batch reactor (SBR)	Suspended	All stages of wastewater treatment (filling, reaction, sedimentation, and decanting) happen sequentially in one tank.	6-11	

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Membrane Bioreactor (MBR)	Suspended	A membrane, either within the reactor or in an external loop, is used to aid solids/liquid separation. Since the membrane retains biomass, extremely long SRTs are possible regardless of HRT.	12-360
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The Advantages of decoupling SRT from HRT :-

- ↳ A significant advantage of the membrane bioreactor process is that
- ↳ the solids retention time (SRT) in the bioreactor can be controlled independently from the hydraulic retention time (HRT).
- ↳ The SRT is a key parameter in biological wastewater treatment.
- ↳ Increasing the SRT time the biological solids are increase the concentration of biological solids.