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Section

A

Subject

Waste water engineering

Assignment No

02

① Hydraulic Retention time (HRT). The hydraulic retention time (HRT) is a measure of the average length of time that a soluble compound remains in a constructed bioreactor. The volume of the aeration tank divided by the influent flowrate is hydraulic retention time.

Importance of HRT:- The HRT is closely related to the amount of substrate that can be handled per unit time and has a direct impact on the economic feasibility of a bioprocess. A short HRT yields a higher hydrogen production rate and lowers capital outlay by reducing the size of the bioreactor.

② HRT in wastewater treatment: The HRT in wastewater ~~treatment~~ treatment plant is a measure

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at an average length of time holding the wastewater in a tank. it is ~~mainly~~ also known as hydraulic residence time. The wastewater plant is mainly designed to handle the wastewater at normal load and also during shock loads.

How to calculate HRT The HRT of a aeration tank is determined by dividing the volume of aeration tank (gallons) by flow rate through the aeration tank. it is expressed in gallon per hours. it is calculated by dividing reactor volume by the flow rate of influent

$$HRT = \frac{V}{Q}$$



Solid Retain time:- The Solid Retain time is the average time activated sludge <sup>solids</sup> ~~are~~ ~~mainly~~ are in the system. The SRT is an important design and operating ~~para~~ parameter for the activated sludge process and is usually expressed in days.

How SRT is calculated in wastewater treatment

The SRT is equal to both mass of MLSS in the aeration tank, plus the mass of solids in the final clarifiers divided by the mass of solids wasted each day.

How to calculate SRT:- it is the quantity of solids maintained in reactor divided by quantity of solids out of reactor each day.

$$SRT = \frac{V * C_d}{Q_{out} * C_{out}}$$

## Advantage of decoupling SRT from HRT.

- ① The decoupling of SRT from HRT not increased glucose
- ② it can maintain high  $\frac{SRT}{HRT}$  ratio
- ③ it can prevents washout of slow-growing ~~anaerobes~~ anaerobes.
- ④ it can enhances the organic loading rate and enables reactor size reductions.
- ⑤ Decoupling SRT from HRT the liquid ~~rate~~ wastewater can be processed faster retain time

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.

Some of the more common digester types are given below.

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