

Name Abid Ullah Khan

ID 7737

Sec :- "A"

Subject :- Waste water Engg

Date 27 / 6 / 20

Iqra national University

Q No 1:-

Wastewater Treatment

Wastewater treatment is the means by which water that has been used or contaminated by human or nature is restored to a desirable quality. Treatment may consist of chemical, biological or physical processes or combination thereof, water may be treated to any level of quality desired: however as its purity increases, so does the cost of attaining that purity. The required quality of water is dictated by its intended use for example aquatic life, drinking water or irrigation. The purpose of this chapter is to describe wastewater treatment technologies predominantly in use today. Ultimately the technologies selected as appropriate for one application may not be the optimal for another. Selection will be based on site-specific factors, such as resources available, climate, land availability, economics etc.

Importance of wastewater treatment

The major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent is discharge back to the environment. As solid decays, it uses up oxygen which is needed by the plants and animals living in the water.

Rectangular tank Preferred over Circular tank.

The shape of the rectangular clarifiers provides a longer path for the wastewater flow and the suspended solids to travel, and subsequently longer detention time which warrants less short circuiting & more sludge setting compared to the center feed circular clarifier. In addition flow distribution among several clarifier is usually more even and often require less head loss for rectangular clarifiers.

Q No 2)

Difference B/w Aerobic and Anaerobic Wastewater treatment...?

→ Aerobic Process use bacteria that require oxygen. So air is circulated throughout the treatment tank.

→ Anaerobic Process bacteria transform organic matter in the wastewater into biogas that contain large amounts of methane gas and carbon dioxide.

→ These aerobic bacteria than break down the waste within the wastewater.

→ Anaerobic Energy-efficient Process.

→ Aerobic Some System utilize a Pretreatment Stage Prior to the main treatment to reduce the chance of clogging the System.

→ Electricity is required for System operation in aerobic wastewater treatment.

P(4)

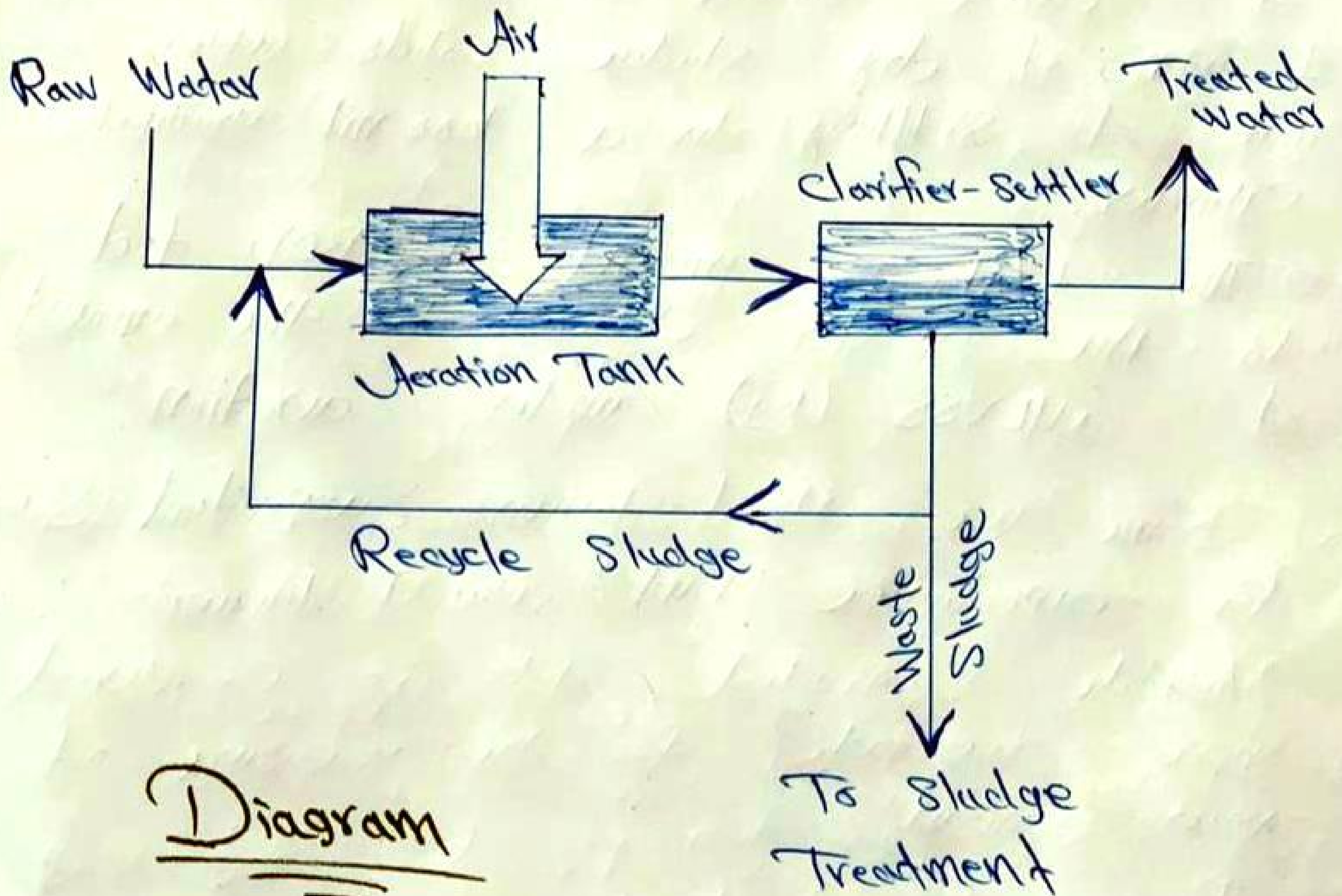
- Anaerobic often used to treat industrial wastewater that contains high level of organic matter in warm temp.
- Aerobic Electric is required for system operation.
- Anaerobic It can be used as a pretreatment prior to aerobic municipal wastewater treatment.
- Aerobic System It used when site or soil condition are not amenable for septic.
- Anaerobic System uses less energy & fewer chemical than aerobic treatment.
- In Aerobic System maintenance issues of electrical & mechanical parts require regular inspection and maintenance.
- In Anaerobic System maintenance issue have optimal operation of municipal anaerobic treatment system is dependent upon warmer temp that exist around 35° .

Activated Sludge Process

- The Sludge blanket is measured from from bottom of the clarifier.
- The Sludge Volume Index is the Volume of Settled Sludge in mm occupied by 1 gram of dry Sludge Solids after 30 min of Settling in a 1000 ml graduated Cylinder.
- The F/M is amount of BOD fed to the aerator divided by the amount of MLVSS (Kg) under aeration.
- Some use Mixed liquor Suspended Solid for expedience, but mixed liquor Volatile Suspended Solids is considered more accurate for the measure of microorganism.
- Process for treating Sewage or Industrial wastewater using aeration and a biological floc composed of bacteria and Protozoa.
- Is a biological Process that can be used for oxidizing carbonaceous biological matter, oxidizing nitrogenous matter (NH_3 and N_2) removing nutrients (N and P).

P(6)

→ Aeration methods - diffused aeration,
Surface aerators (cones) and
Pure oxygen aeration.



Diagram

Q No 3)

P(7)

Assimilative Capacity of Receiving Bodies.

→ Assimilative Capacity of receiving water bodies refer to the ability of a body of water to cleanse itself; its capacity to receive wastewater without deleterious effect and without causing damage to aquatic life or animal who consume the water toxicity without affecting the aquatic life.

→ Although wastewater is properly treated before it is disposed of to the natural water streams still it has impurities that need to be removed or make them less effective so that the receiving water bodies may not become unsuitable for use or cause damage to the aquatic life.

P(8)

How does it help in wastewater treatment ---- !!

There are following

" Dilution "

Dilution is the process of reducing the concentration of pollutants in receiving water, usually simply by mixing with more quantity of water.

" Dispersion "

Dispersion is the distribution of pollution in relatively large area of water. Dilution & dispersion are inter-related.

" Sun light "

Sunlight, facilitates biological decomposition of pollution and kills pathogens by ultraviolet radiation (UV).

Q No 4) What is Sludge Management? P(9)

Sludge treatment is the processes used to manage and disposal of sewage sludge produced during waste water and drinking water treatment.

Sludge is mostly water with lesser amounts of solids material moved from liquid sewage.

We can identify physical and chemical characteristics in sludge.

Sludge Disposal

→ Various options are available for proper disposal.

→ Incineration of sludge is an option that is becoming less attractive because of the high cost of building & operation of incineration, plus the creation of air pollution & need to land fill the ash.

Management Process

P(10)

"Thickening" :- Gravity and Flotation

"Digestion"

Aerobic, Anaerobic

"Mechanical Dewatering"

Vacuum Filtration, Centrifugation.

Dispose

land application, Burial

Advantages In Wastewater Engineering....!!

- It reduces Pathogens and Volume to be disposed
- Protect wild life, aquatic life and also Prevent diseases.

- Sustainable management of organic waste.
- Reduction of odors and diseases causing agents.
- Producing Bio gas.
- Diverse can be used for one household ^{up} a huge plant.
- Removes organics
- Oxidation and nitrification achieved.
- Biological nitrification without adding chemicals.
- Biological Phosphorous removal
- Solids/liquids separation
- Stabilization of sludge
- Capable of removing - 97% of suspended solids
- The most widely used wastewater treatment process.

Environmental Impact Assessment.

" A technique and a Process by which information about environment effects of a Project is collected, both by the developer and from other sources and taken into account by the planning authority in forming the judgement on whether the development should proceed "

EIA thus has three main functions.

- To Predict Problems.
- To find way to avoid / mitigate them.
- To enhance Positive effects.

" Parameter "

P(13)

There are some important Parameter
are following.....!!

① Biochemical Oxygen Demand (BOD)

The BOD is the amount of oxygen consumed by aerobic microorganisms to break down the organic matters present in the waste water. Its BOD which is the actual measured parameter and is an indicator of the amount of organic matter consumed within 5 days as from testing.

② Chemical Oxygen Demand (COD)

The COD is an alternate measure of the amount of organic matter. The amount of oxygen used up by strong oxidising agent is measured. This value of greater importance when evaluating wastewater from industries. Since these effluents tends to be toxic to microorganisms.

③ Total Suspended Solid (TSS)

The TSS is measured to indicate the amount by mass of fine suspended particles. Effluent discharge in the water courses most level of TSS since TSS causes turbidity.

④ Total Kjeldahl Nitrogen (TKN)

wastewater usually contain high levels of nitrogen containing compounds. the nitrogen exists mostly in free form, organic nitrogen, ammonia and reduced nitrogen. the TKN value hence indicates the amount of nitrogen of these 3 forms.