

Name : Syed Waleed Shah

I.D : 7497

Semester : 10th

Subject : Wastewater engineering

Submitted to : Engr. Nadeem Ullah.

Q What is wastewater treatment & its importance?
Why tanks.....?

Ans: Waste water treatment:

It is a process through which we remove contaminants from wastewater or sewage and convert it into an effluent that can be returned to the cycle of water with minimum impact on the environment, or directly reused.

Importance:

Major aim of wastewater treatment is to remove as much of the suspended solids as possible before the remaining water called effluent, is discharged back to the environment. As solid material decays, it uses up oxygen, which is needed by the plants & animals living in the water. Important parameters ~~out of~~ ^{of} Plankton are BOD, COD, TSS, TKN which are described in end of question.

Rectangular tanks are preferred over circular?

→ It is because Provision of channels with common walk in between in the case of rectangular tanks will save the space & will be economical for large treatment plants.

While circular tank is preferred in the case of a small treatment plant for simplicity of sludge removal.

→ Surface area greater. surface area. A cylindrical water tank has the least possible ratio of circumference to area i.e. less surface area than a bowl-shaped water tank

Importance of wastewater treatment:

- Principle objective is that treatment allows human & industrial effluent to be disposed off without causing damage to human health or unacceptable damage to natural environment.
- If properly treated can be used for many purposes such as irrigating, lawn watering, car washing, flushing toilets & landscaping.
- It can also generate biogas which is a by product that can be use as an important source of energy.

Question no 2

Q - What is the difference between aerobic & anaerobic wastewater treatment? Briefly describe activated sludge process with diagram.

Ans. Difference:

- Both depends upon the decomposition of microbe that treats wastewater, main difference is that aerobic systems require oxygen while anaerobic systems don't.
- System design: Aerobic system require some means of supplying oxygen to the biomass while anaerobic system must be designed to prevent the exposure of the biomass sludge to air.
- Suitability for waste stream characteristics: Aerobic treatment system best suited for streams with relatively low BOD/COD while anaerobic systems are typically used for treatment of waste ~~water~~ streams with high concentration of organic contaminants.
- Waste Product & bi-product: Anaerobic treatment offers some benefits over aerobic treatment system as they result in less overall sludge production as well generation of valuable byproducts.

Activated sludge process:

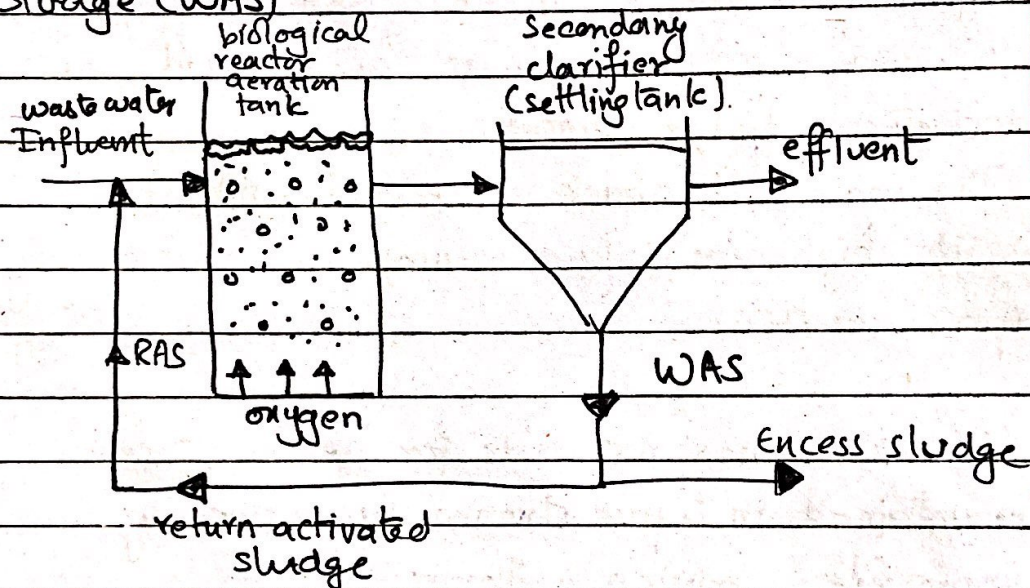
- APS involves production of activated mass of microorganisms capable of stabilizing waste under aerobic conditions.
- In aeration tank, contact time is provided for mixing & aerating influent wastewater with microbial suspension, generally referred to mixed liquor suspended solids (MLSS).
- Typically 99% of suspended solids & up to 90% of dissolved organics are removed by activated sludge process.
- The main drawback associated with APS is its high electricity consumption particularly for aeration.
- Microorganisms responsible for treatment are maintained in liquid stream suspension by appropriate mixing methods.
- Main constituent of ASP are aeration tank in which oxygen is provided for the micro-organisms to grow. This aeration also helps to keep micro-organisms in suspension.
- Aeration tank is followed by clarifier/settler in which the microorganisms form flocs & settled down at the bottom.
- Formation of flocs particles ranging in size from 50 to 200 μm , removed by gravity settling leaving relatively clear liquid as treated effluent.

Date: _____

Day: M T W T F S S

→ A part of settled bio flocs are recycled back to the aeration tank to maintain certain amount of micro-organisms in the system for efficient operation of the system. This is known as recycled activated sludge (RAS).

→ Remaining settled bio flocs are removed from the system & is termed as wasted activated sludge (WAS).



Difference chart :-

	Aerobic	Anaerobic
• Application =	low to medium strength wastewater (< 1000 ppm) eg municipal sewage, refinery	Medium to high strength (> 4000 ppm) food & beverage industry
◦ Capital investment :	high then anaerobic	low with Payback
• Energy consumption:	Relatively high	Relatively low
◦ Foot-Print :	Relatively large	small & compact
◦ Sludge-yield :	" high	" low
• Post-treatment :	Typically direct discharge	Required to fulfill wastewater standard discharge requirement.

Q
.....

Answer no 3: Assimilative capacity of receiving bodies:

→ It refers to the ability of a body of water to cleanse itself, its capacity to receive wastewater without deleterious effects & not damaging the life ^{forms} in water & humans drinking it. It is level to which waterbody or nature control the 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/pollutants 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.

How it helps:

Disposal of wastewater in a stream could be thus resulted with both quality & concentration in order to safeguard the aquatic life and desirable water use. Thus there is a limit on the amount of liquid wastewater that could be disposed of in a water body, which is called the assimilative capacity of that water body.

Q --

Answer Sludge management :

Sludge management describes the processes used to manage and dispose of sewage sludge produced during sewage treatment. Sludge is mostly water with lesser amounts of solids material removed from liquid sewage.

Primary sludge includes settleable solids removed during primary treatment in primary clarifiers. Secondary sludge separated in secondary clarifiers includes treated sewage. Includes treated sewage sludge from secondary treatment bioreactors.

Advantages:

- 1) Diverse it can be ^{used} for ~~more~~ one household up a huge plant
- 2) Remove organics
- 3) Oxidation & nitrification achieved
- 4) Biological nitrification without adding chemicals
- 5) Biological Phosphorus Removal
- 6) Solid / liquid separation
- 7) Stabilization of sludge
- 8) Capable of removal 97% of suspended solids
- 9) The most widely used wastewater treatment process.

Date: _____

Day:

M	T	W	T	F	S	S
---	---	---	---	---	---	---

Question no 5

Ans: EIA: It is technique by which data is collected about ~~and~~ ~~a project~~ an impact of ~~on~~ a project ~~about~~ upon environment by developer and by source and then it is taken in account by the planning authority in forming the judgement on whether the development should proceed.

It is also a process of identifying, predicting, evaluating & mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions being taken and commitments made.

It has three functions:

- 1) To predict problems
- 2) To find ways to avoid/mitigate them &
- 3) To enhance positive effects.

↳ Importance

- 1) BOD: It is amount of oxygen consumed by aerobic microorganisms to break down organic matter present in water. Value is used to measure the efficiency of a treatment plant in terms of organic matter removal.
- 2) COD: It is an alternate measure of organic matter. The amount of oxygen used up by a strong oxidising agent is measured.
- 3) TSS Total suspended solids: To indicate the amount by mass of fine suspended particles.
- 4) Total kjeldahl Nitrogen (TKN): w.w contains high levels of nitrogen containing compounds. It exists in 3 forms, organic nitrogen, ammonia & reduced nitrogen. The TKN values indicate amount of nitrogen of all these 3 forms.