

Q1 waste water treatment <sup>1010</sup> and importance.

Ans Waste water treatment:

Waste water treatment is a process used to remove contaminants from wastewater or sewage and convert it effluent that can be returned to water cycle with minimum impact on the Environment or directly reused. The treatment process takes place in wastewater treatment plant (WWTP)

Importance of water water Treatment:-

- 1) It is important to produce an environmentally safe fluid waste stream and a solid waste suitable for disposal or reuse.
- 2) It is very important to provide some degree of treatment to waste water before it can be for agricultural or for irrigation
- 3) It is important to produce an environmentally safe fluid waste stream and a solid waste suitable for disposal or reuse.
- 4) The major aim of wastewater treatment is remove the suspended solids as possible before the remaining water called effluent is discharge back to the environment.
- 5) Waste water treatment is fundamental to protect the health of many different eco systems.  
Good waste water Treatment allows the maximum amount of water to be reused instead going to waste.

Why rectangular tank are preferred over circular tank for removal of settleable solids

Rectangular tank requires less land than circular tank

Require less head loss for rectangular tank.

7648

The shape of the rectangular clarifiers provide a less longer path for waste water flow and the suspended solids to travel and subsequently longer detention time which was less short circulating and more sludge setting compared to the centre-feed/peripheral overflow circular clarifiers/tank.

Flow distribution configuration for rectangular tank require simpler and less expansive pipework layout while circular require complicated and expensive pipe work.

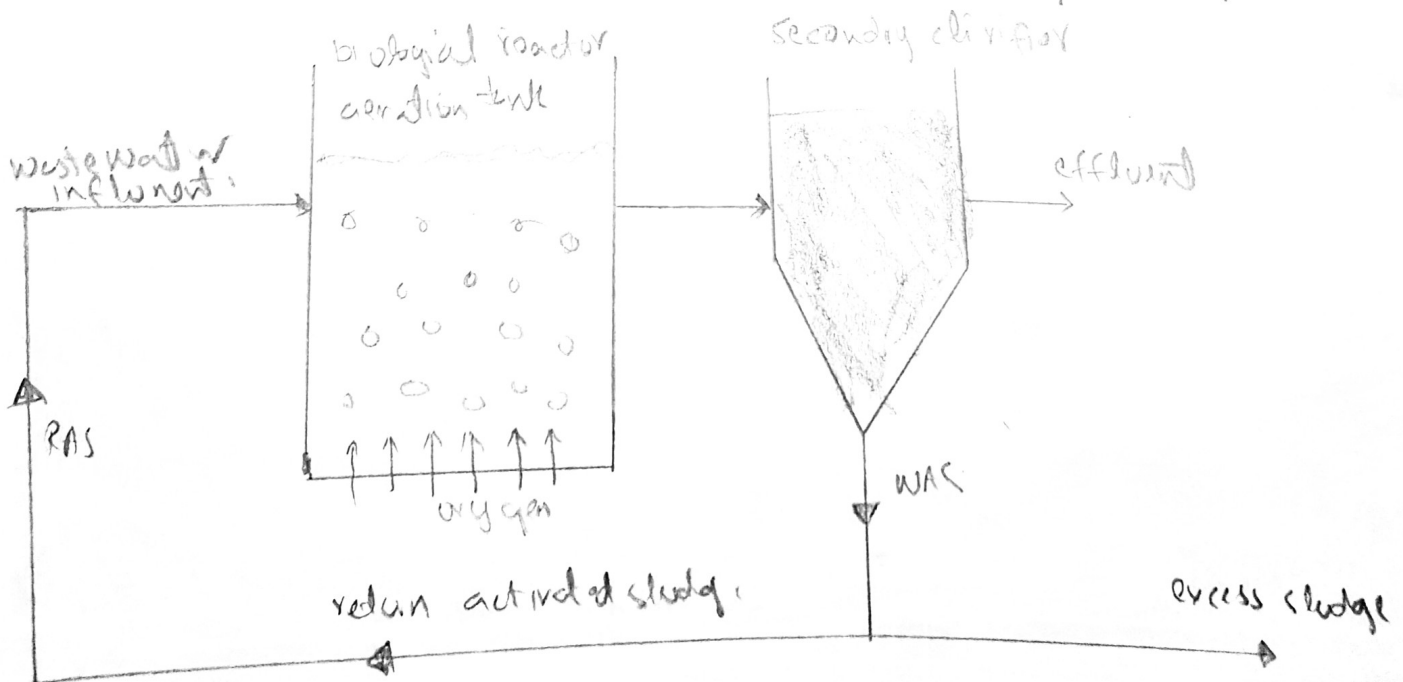
Q2: What is the difference b/w aerobic and anaerobic waste water treatment? Briefly describe Activated Sludge Process with diagram.

Ans.

Parameter	Aerobic Treatment	Anaerobic Treatment
Application	Low to medium strength wastewater (< 1000 ppm) e.g. municipal sewage, refinery wastewater etc.	Medium to high strength wastewater (> 4000 ppm) e.g. food and beverage industry wastewater.
Capital Investment	Relatively high	Relatively low with pay back-
Energy Consumption	Relatively high	Relatively low
Foot Print	Relatively large	Relatively small and compact
Net Sludge Yield	Relatively high	Relatively low
Post Treatment	Typically direct discharge	Required to fulfill wastewater standard discharge requirement
Example Technologies	Activated Sludge Process (ASP), Trickling Filter, and Rotating Biological Contactors (RBC)	Anaerobic Digester (AD), continuous stirred Tank Reactor (CSTR), sequencing Batch Reactor (SBR), up flow Anaerobic Sludge Blanket (UASB) Reactors.

## Activated sludge Process (ASP)

- ▶ Microorganisms responsible for treatment are maintained in liquid suspension by appropriate mixing methods.
- ▶ Main constituents 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 micro-organisms form flocs and settle down at the bottom.
- ▶ Formation of floc particles, ranging in size from 50 to 2000  $\mu$ m, removed by gravity settling, leaving relatively clear liquid as treated effluent.
- ▶ The 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 and is termed as Wasted Activated sludge (WAS).



Q3. What is meant by assimilative capacity of receiving water bodies?  
How does it help in wastewater treatment?

Ans: Assimilative capacity of receiving water bodies refers to the ability of a body of water to cleanse itself. It capacity to receive waste water without deleterious effect and without causing damage to aquatic life or humans who consume the water. It is level to which water body or nature control the toxicity without affecting the aquatic life.

Physical forces helping Assimilative capacity of Receiving water:

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

(2) Dispersion: Dispersion is the distribution of pollutants in relatively large area of water. Dilution and dispersion are inter related.

(3) Sunlight: Sunlight facilitates biological decomposition of pollutants and kills pathogens by ultraviolet radiation (UV).

## Q4) Sludge Treatment

7648

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

Sludge is mostly water with lesser amount of solid material removed from liquid sewage.

We can identify physical and chemical characteristics in sludge

⇒ Treatment processes:

Thickening — Gravity and floatation

Digestion — Aerobic, Anaerobic

Mechanical Dewatering — Vacuum filtration, centrifugation

Disposal — Land application, Burial

⇒ 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 & operating incinerators, plus the creation of air pollution & need to landfill the ash

Advantages of sludge treatment.

- It reduces pathogens and volume to be disposed
- Protects wild life, aquatic life and also prevents diseases.
- Sustainable management of organic waste
- Reduction of odors and disease causing agents
- Producing Biogas.

Q. Define Environmental Impact Assessment (EIA)? In your opinion what parameter should be considered while conducting EIA for newly proposed wastewater treatment plant?

Ans.

Environmental Impact Assessment:

A formal process to predict the environmental consequences of human development of human development activities and to plan appropriate measure to eliminate or reduce adverse effect and to enhance positive effect:

EIA has three main function

- ▶ To predict problems.
- ▶ To find way to avoid/mitigate them and
- ▶ To enhance positive effects.

How EIA helps us?

- ▶ EIA provides a unique opportunity to demonstrate way in which the environment may be improved as part of the development process
- ▶ EIA are predict the conflicts and constraints b/w the proposed project, program or plan and its environment.
- ▶ It provides an opportunity for mitigation measure to be incorporated to minimize problems.
- ▶ It enables monitoring program to be established to assess future impacts and provide data on which managers can take informed decisions to avoid environmental damage.

## Aims and objectives of EIA

- ▶ To provide decision-makers with an analysis of all aspects of the environment so that decisions can be made based on as nearly complete and balanced information as possible:
- ▶ To improve the design of new developments and safeguard the environment through the application of measures to avoid and mitigate negative impacts:
- ▶ To provide information to the public on the planned development proposal:
- ▶ To formalize the consideration of alternatives

The most important parameters to be considered for a local waste water treatment plant are:

### (1) Biochemical Oxygen Demand (BOD):

The (BOD) is the amount of oxygen consumed by aerobic microorganism to break down the organic matter present in the waste water. It is (BOD) which is the actual measured parameter and is an indication of the amount of organic matter consumed within 5 days of from testing. This value is used to measure the efficiency of a treatment plant in terms of ~~oxygen~~ organic matter removal. High BOD values are undesirable and would affect the ecological cycle by reducing the normal dissolved oxygen to critical levels for sustaining aquatic life:

### (2) Chemical Oxygen Demand:

The (COD) is an alternative measure of the amount of organic matter. The amount of oxygen used up by a strong oxidising agent is measured. This value is of greater importance when evaluating wastewater from industries since there evolved tend to be toxic to microorganisms thereby affecting the validity of BOD result.



### (3) Total Suspended Solids (TSS):

The (TSS) is measured to indicate the amount by mass of fine suspended particles. Effluent discharged in the water courses must contain low level of (TSS) since TSS cause turbidity affecting the amount of light to aquatic plants and also cause visual pollution.

### (4) Total Kjeldahl Nitrogen (TKN):

Waste water usually contain high level of nitrogen containing compounds. The nitrogen exists mostly in three forms organic nitrogen, ammonia and reduced nitrogen. The TKN value hence indicate the amount of nitrogen of all these 3 forms. TKN is useful in monitoring the plant.