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Sec A

Subject Wastewater engineering

Submitted to Sir Nadeem

Date 27/06/2020

Q#01

Ans:- WASTEWATER TREATMENT:-

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

IMPORTANCE:-

→ It is very important to provide some degree of treatment to wastewater before it can be used for agriculture or landscape irrigation or for aquaculture.

→ According to a research, a large number of people die from water born disease in most of the developing countries.

→ its objective is to produce an environmently safe fluid waste stream and a solid waste suitable for disposal or reuse.

Why Rectangular tanks are Preffered over Circular tanks for removal of Settleable Solids during Preliminary treatment?

* The Shape of the Rectangular Clarifiers provides a longer path for the wastewater to flow and the Suspended Solids to travel, and subsequently longer detention time which warrants less Short Circuiting and more Sludge Setting Compared to the Center feed/peripheral overflow Circular Clarifiers. In addition, flow distribution among several Clarifiers is usually more even and often requires less head loss for Rectangular Clarifiers.

Q#2

Ans:: AEROBIC WASTEWATER TREATMENT::

- Aerobic processes use bacteria that require oxygen. So air is circulated throughout the treatment tank.
- These aerobic bacteria then break down the waste within the wastewater.

- Some systems utilize a pretreatment stage prior to the main treatment to reduce the chance of clogging the system.
- Electricity is required for system operation.

## ANAEROBIC WASTEWATER TREATMENT:

- Anaerobic bacteria transform organic matter in the wastewater into biogas that contains large amounts of methane gas and Carbon dioxide.
- Energy-Efficient Process.
- Often used to treat industrial wastewater that contains high levels of organic matter in warm temperatures.
- It can be used as a pretreatment prior to aerobic municipal wastewater treatment.

# Activated Sludge Process (ASP)

→ APS involves production of activated mass of microorganisms capable of stabilizing waste under aerobic conditions;

→ In aeration tank contact time is provided for mixing and aerating influent wastewater with microbial suspension, generally referred to mixed liquor suspended solids (MLSS).

→ Typically 99% of suspended solids and up to 90% of dissolved organics are removed by Activated Sludge Process

→ The main drawback associated with ~~AS~~ APS is its high electricity consumption particularly for aeration.

→ 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

# Activated Sludge Process (ASP)

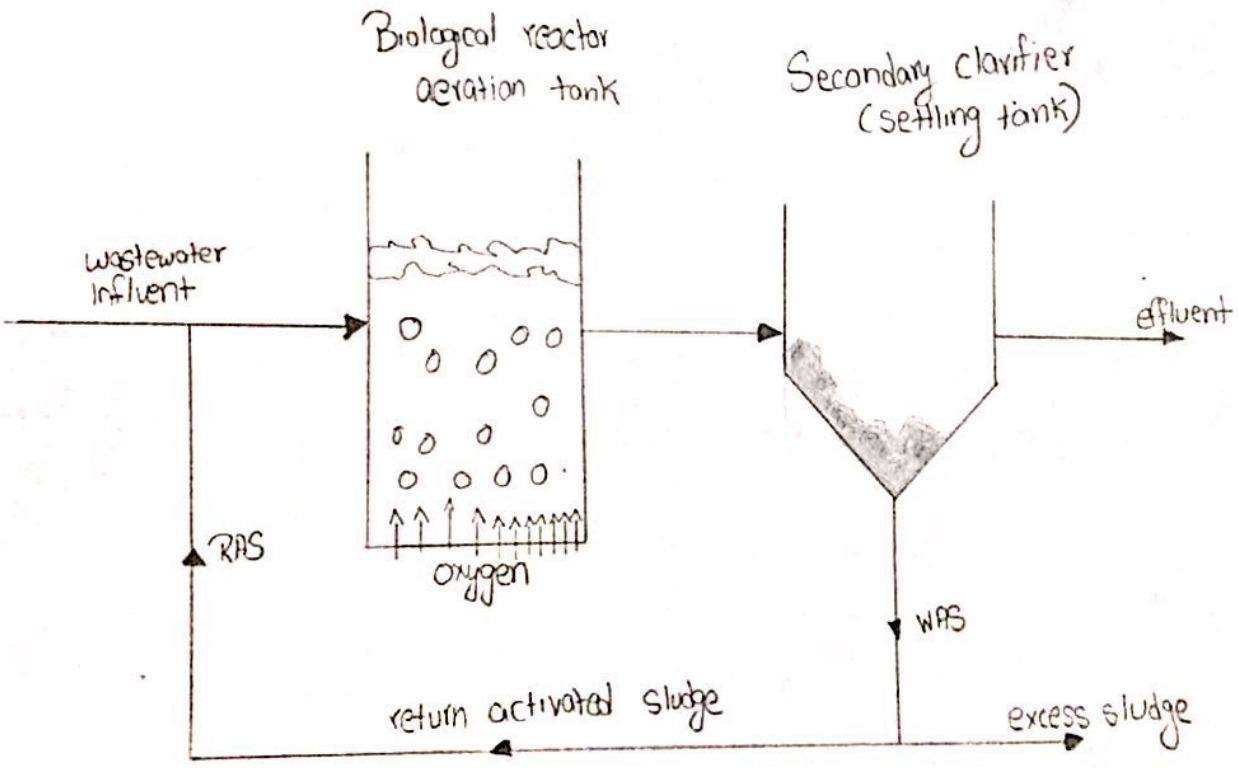
→ Aeration tank is followed by clarifier Settler in which the micro-organism form flocs and settled down at the bottom.

→ Formation of floc particles, ranging in size from 50 to 200 μm, removed by gravity settling, leaving relatively clear liquid as treated effluent;

→ A part of settled bio flocs are recyled back to the aeration tank to maintain certain amount of micro-organisms in system for efficient operation of system. This is know as Recycled Activated Sludge (RAS).

→ Remaining settled bio flocs are removed from the system and is termed as Wasted Activated Sludge (WAS).

# Activated Sludge Process (ASP)



Q#3

Ans:- Assimilative Capacity:-

This Capacity refers to the ability of a body of water to cleanse itself. It's Capacity to receive wastewaters or toxic substances without deleterious effects and without 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.

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

It helps in wastewater treament in the following ways;

i) Dilution:

Dilution is the process of reducing the Concentrated of Pollutants in receiving water, usually simply by mixing it with more quantity of water.

ii) Dispersion:

Dispersion is the distribution of pollutants in relatively large area of water. Dilution and dispersion are interrelated.

iii) Sunlight:

Sunlight facilitates biological decomposition of pollutants and kills pathogens by ultraviolet radiation.

Q#4

Ans: **Sludge Management:**

Sludge treatment is the processes used to manage & dispose of Sewage Sludge produced during waste water and drinking water treatment. Sludge is mostly water with lesser amounts of solid material removed from liquid Sewage.

**Treatment Processes:**

- Thickening - Gravity and floatation.
- Digestion - Aerobic, Anaerobic
- Mechanical Dewatering - Vacume filtration, Centrifugation
- Disposal - Land application, Burial.

**Advantages of Sludge treatment.**

- It reduces Pathogens & volume to be disposed.

- Protects wild life, aquatic life & also Prevents diseases.

- Sustainable management of organic waste.

- Reduction of odurs & disease Causing agents.

- Producing Bio gas.

Q#5

Ans: Environmental Impact Assessment: An Environmental Study Comprising Collection of data, prediction of qualitative and quantitative impacts, Comparison of alternatives, evaluation of preventive, miligatory and Compensatory measure, formulation of Environmental management and training plans and monitoring arrangements and framing of recommendations & such other Components as may be prescibed.

## Parameters of importance:

Wastewater Contains a large number of Contaminants and they are Categorized as Physical, Chemical & biological contaminants, Different parameters have been established from experience & theory to define such characteristics.

The most important Parameters to be Considered for a local wastewater treatment Plant are;

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

The BOD is the amount of oxygen Consumed by aerobic microorganisms to break down the organic matter present in the wastewater. it is the BOD, which is the actual measured parameter & is an indication of the amount of organic matter Consumed within 5 days as from testing. This value is used to measure the efficiency of a treatment plant in terms of organic matter removal.

2) Chemical Oxygen Demand (COD):

The COD is an alternate measure of the amount of the amount of organic matter. The amount of oxygen used up by a strong oxidising agent is measure. This value is of greater importance when evaluating wastewater from industries since these effluents tend to be toxic to microorganisms thereby affecting the validity of BOD results.

3) Total Suspended Solids (TSS):

The TSS is measured to indicate the amount by mass of fine suspended particles. Effluent discharge in the water course must contain low levels of TSS cause turbidity, affecting the amount of light to aquatic plants and also causes visual pollution.

4) Total Kjeldahl Nitrogen (TKN):

Wastewater usually contains high levels of nitrogen containing compounds. The nitrogen exists mostly in free forms, organic nitrogen ammonia and reduced nitrogen. The TKN value hence indicates the amount of nitrogen of all these 3 forms.