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Q #02

Ans:-

Aerobic wastewater	Anaerobic
Aerobic wastewater treatment is a biological wastewater treatment process which uses an oxygen rich environment.	Anaerobic wastewater treatment is a process where anaerobic organism break down organic material in an oxygen absent environment.
(Bacteria)	
Bacteria involved the aerobic wastewater treatment are aerobes	Bacteria involved the anaerobic wastewater treatment are anaerobic
(Air circulation)	
Air is circulated in aerobic wastewater treatment tanks.	Air is not circulated in anaerobic wastewater treatment tanks.
(production of biogas:)	
Aerobic wastewater treatment does not produce methane and carbon-dioxide.	Anaerobic wastewater treatment produces methane and carbon dioxide.

=> Activated sludge process (ASP)

(1) Microorganisms responsible for treatment are maintained in liquid suspension by appropriate mixing method.

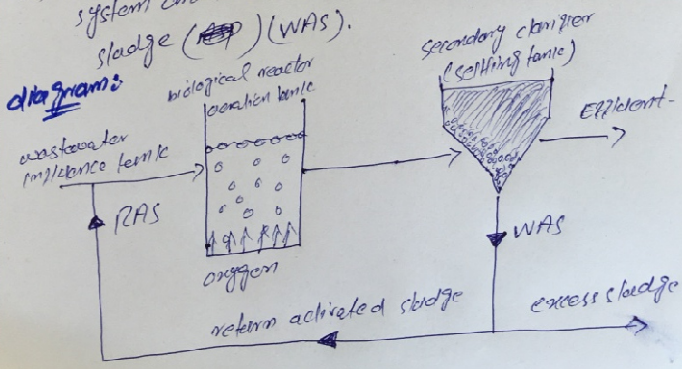
(2) Main constituents of ASP are Aeration tank in which oxygen is provided for the microorganism to grow. This aeration also helps to keep micro-organism in suspension.

(3) Aeration tank is followed by clarifier / settler in which the micro-organism from flocs and settled down at the bottom.

(4) Formation of floc particles ranging in size 50 to 200 um. remove by gravity settling leaving relatively clear liquid as treated effluent.

(5) Remaining settled bio flocs are removed from the system and is termed as wasted Activated sludge (~~ASP~~) (WAS).

diagram:



(6) ASP involves production of activated mass of micro-organisms capable of stabilising waste under aerobic conditions.

(7) Typically 99% of suspended solids are and up to 90% of dissolved organism are removed by activated sludge process.

(8) The main drawbacks associated with (ASP) is its high electricity consumption particularly for aeration.

Q#03

Ans:

Assimilative capacity of receiving bodies:

(1) 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 effects and without causing damage to aquatic life or humans who consume the water. it's the level to which water body or nature controll the toxicity without effecting the aquatic life.

(2) Although wastewater is properly treated before it is disposed of the natural water streams still it has impurities (pollution and pollutant that need to 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

=> **Assimilative capacity of receiving bodies helps in wastewater treatment through the following factors:**

1) **Temperature:** Temperature play an important role in assimilative capacity of receiving water. Increase in temperature will increase the biological decomposition of organics and thus assimilative capacity will improve, increase in temperature also cause to increase the dilution process and thus increases the assimilative capacity.

(2) Flow velocity:

Flow velocity is also critical to assimilative capacity of receiving water bodies. Higher the flow velocity will encourage quick dilution and dispersion of pollutants.

(3) Dissolved oxygen (DO):

Rate of biological decomposition is directly related to the amount of dissolved oxygen. DO is replenished by re-aeration. Re aeration may be provided by maintaining sufficient flowing velocity

(4) Depth of flowing water:

Assimilative capacity is indirectly related to the depth of receiving water bodies. Increase in depth cause to decrease dissolved oxygen in the water and thus it reduces the pollution process. Also the effect of UV radiation from sunlight which help to kills the pathogens, decrease will increase in depth.

Q # 1 :- page # 6 :-

Ans :-

wastewater treatment :-

wastewater treatment consist of applying known technology to improve or upgrade the quality of a water.

A process to convert wastewater which is water no longer needed or suitable for its most recent use into an effluent that can be either returned to the water cycle with minimal environment issues or reused.

=> wastewater treatment involved collecting the wastewater in a centeralized or decenterlized location (wastewater treatment plant) and subjecting the wastewater to various treatment process.

Importance :-

=> wastewater if properly treated, is an important resource and can be used for various purposes including irrigation, lawn watering, car washing, flushing toilets and landscaping etc.

=> water's scarcity is the major problem that is faced all across the world. Although the 2/3rd of the earth crust is made up of water but all of this water is not available for drinking and for other human activities. it has been found that 97% of the total water is salty that is not good for the human health and animal's and remaining 3% of the water is fresh water and will be used for drinking.

page # 7:

The demand of fresh water and clear water deliver to our homes is increasing day by day all there is more established day by day. in the comming sitiation there will be. the demand of fresh and clean water. if there will be very shortage coming of freshwater.

objective:

The principle objective of wastewater treatment is generally to allow humam and industrial effluents to be disposal off without causing danger to human health or unacceptable damage to the natural environment

=> Condition of this Question:

floating solids is almost always easier with removed of scum and clarifiers which are longum to provide more effective scum/foam trapping via rotating scum throughs. it is generally accepted that scarper speed greater than 6 feet (1800)mm)/min can cause re sespension of settled solids.

Q #04:-

Sludge :-

Sludge refers to the residual-solid material left from municipal wastewater or industrial wastewater treatment process.

=> Sustainable sludge handling may be defined as a socially acceptable, cost-effective method that meets the requirements of effluent, recycling of sources while ensuring that harmfull substance are not transfered to human or the environment i.e water, air or soil.

=> Sludge management process :

(1) primary operation.
(2) Thickening.
(3) Stabilization.
(4) Dewatering.
(5) Thaal drying.

(1) Primary operation :

The process includes.

(1) Grinding :- it includes particles size reduction.
(2) Screening :- it includes removal of fibrous materials.
(3) Degritting : it includes removal of sand or other inorganic material.
(4) Blending :- it include ~~removal~~ making the sludge homogenous.
(5) Storage :- it ensures flow equalization in the system

(2) Sludge Thickening:

=> Sludge thickening is undertaken to increase percentage of solid content in sludge by removing a portion of liquid fraction

=> volume reduction of approximately 30-80% can be reached with sludge thickening.

=> various methods of sludge thickening are:

(1) Gravity thickening
(2) Flotation thickening
(3) Rotatory drum thickening.

(1) Gravity thickening:

Gravity thickening employ gravity to do the job of sludge thickening. The sludge solution is made to flow under a baffle and up through a sludge blanket. a layer of sludge laying on the bottom of a container. the sludge is filtered out as soon as it contacts or strikes the sludge blanket.

(3) Sludge stabilization:

Sludge stabilization is undertaken to reduced pathogens eliminate offensive odors minimize production of disable gas (methane.)

(a) => alkaline stabilization:

(1) Lime is added to entreated sludge, to raise the pH to 12 or higher.

(3) Anaerobic Digestion:

① A biological process that uses bacterial in an oxygen free environment

② These bacteria converts volatile solids carbon dioxide methane and ammonia.

(4) Dewatering:

① Dewatering is taken under to reduced to moisture content of sludge.

② Compared to Thermal (evaporative processes) for water reduction mechanical dewatering is often selected date to its low energy.

(5) Heat Drying:

=> it involves the application of heat to evaporate water and to reduced the moisture content of biosolids.

=> Advantage of this method is to reduced product transportation costs. Improve storage capability and marketability.

=> Advantages of sludge management is wastewater treatment are the following.

(1) The product can be used as fertilizer as it contain nitrogen-phosphorus, potassium, and micro-elements and its improves soil properties.

(2) Utilized and utillization of nutrients contained in the sludge, i.e. phosphorus and Nitrogen.

(3) utillization of organic substances contained in the sludge for improvement of the humans.

(4) Soil improvement.

(5) The cheapest disposal route total destruction of organic matter and total mineralization of sewage sludge.

(6) Sewage sludge mass and volume reduction

(7) Energy recovery.

(8) possitive effects for the soil.

(9) possitive outcome for the crops.

Q#05

Ans:

EIA:

Def:

A technique and a process by which information about environmental 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.

=> Environmental Impact Assessment (EIA)

in your opinion, what parameter should be considered while conducting EIA for newly proposed wastewater treatment plant.?.

=> EIA is an environmental study comprising collection & data, prediction, of qualitative and quantitative impacts. Comparison of alternative, evaluation of preventive migratory and Compensatory management and training plans and monitoring arrangements, and framing of recommendations and seek as other components as may be prescribed.

(Pakistan Environmental protection Act. 1997

(012)

=> A formal process to predict the environmental consequences of human development activities and to plan appropriate measure to eliminate or reduced adverse effect and to enhance possitive effects.

The following consideration should keep in mind while conducting EIA for the newly proposed wastewater treatment plant.

Environmental damages should be minimum such as do not effect water body greenery and energy consumption which effect the environment should be controlled.

=> Environmental benefits should be maximum and water life should be protected.

For National Quality standards (NEQs)

The project should not conflict with

Govt. polices

- International obligation should be strictly followed.

most treatment plant have primary treatment (physical removal or floated) and settled able solids)

=> and secondary treatment

(The biological removal of dissolved solids).

Some other treatment plant have tertiary option. The purposes of tertiary treatment to provide a final treatment stage to raise the effluent quality before it is discharged to the receiving environment (sea, river, lakes, ground, etc.) more than one treatment process may be used at any treatment plant.