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Subject

Waste water
Engineering

Q No 01

Wastewater treatment

- * Wastewater treatment consists of applying known technology to improve or upgrade the quality of wastewater.
- * Wastewater treatment involves collecting the wastewater in a centralized or decentralized location (wastewater treatment plant) and subjecting the wastewater to various treatment processes.

importance of wastewater treatment

- * the principal objective of wastewater treatment is generally to allow human and

Industrial effluents to be disposed off without causing danger to human health or unacceptable damage to the natural environment.

* 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.

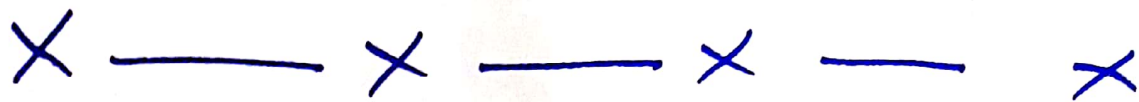
⊗ wastewater treatment can also generate biogas as final product which is a potential source of energy.

Rectangular tanks are preferred over circular tanks for removal of settleable solids during preliminary treatment;

Rectangular tanks are preferred over circular tanks because the rectangular tank has a large horizontal distance as compared to circular tanks due to which the settleable solids gets more detention time and it settles down before reaching the outlet and in rectangular tanks

to higher vertical velocity the settleable solids can easily be settle as compare to circular tanks which has less horizontal distance due to which in circular tanks settleable solids do not settle down well and reach to outlet.

Also the rectangular tanks are easy to operate and low maintenance cost and rectangular tanks require less surface area - for construction as compare to circular tanks.



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Difference b/w aerobic and anaerobic wastewater treatment.

* Aerobic wastewater treatment

- (i) Aerobic processes use bacteria that require oxygen so, air is circulated throughout the treatment tank.
- (ii) these aerobic bacteria then break down the waste within the waste water.
- (iii) Some systems utilize a pretreatment stage prior to the main treatment to reduce the chance of clogging the system.
- (iv) Electricity is required for system operation.

* Anaerobic wastewater treatment

- (i) Anaerobic bacteria transform organic matter in the wastewater into biogas that contains large amounts of methane gas and carbon dioxide.
- (ii) Energy efficient process

- (iii) often used to treat industrial waste water that contains high levels of organic matter in warm temperature
- (iv) it can be used as a pretreatment prior to aerobic municipal waste water treatment.

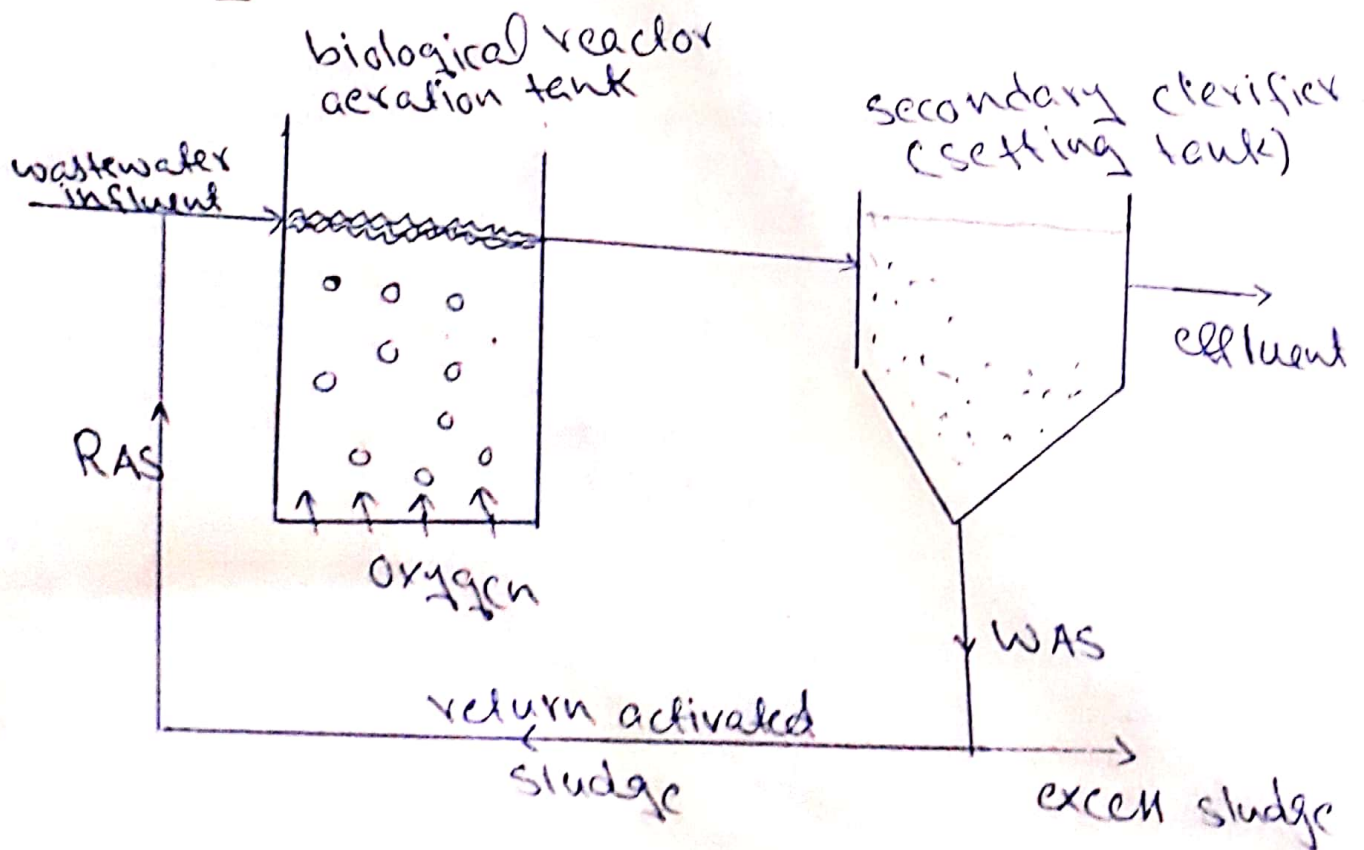
Activated Sludge Process

- * Process for treating sewage or industrial wastewaters using aeration and a biological floc composed of bacteria and protozoa.
- * is a biological process that can be used for oxidizing carbonaceous matter, oxidizing nitrogenous matter (NH_3 and NO_2), removing nutrients (N and P).
- * Aeration method: diffused aeration, surface aerators (cones) and pure oxygen aeration.
- * the sludge blanket is measured from the bottom of the clarifier.

* the sludge volume index is the volume index is the volume of settled sludge in mm occupied by 1 gram of dry sludge solids after 30 mins of ~~sed~~ setting in a 1000 ml graduated cylinder

* Some use mixed liquor suspended solids for expedience but mixed liquor volatile suspended solid is considered ~~as~~ more accurate for the measure of microorganisms.

Diagram



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Assimilative capacity of receiving water bodies ::

Refers to the ability of a body of water to cleanse itself its capacity to receive wastewaters without deleterious effects 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.

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 does it help in wastewater treatment ::

The assimilative capacity helps in wastewater treatment in the following aspects.

* Dilution:: in this dilution occurs which is a process in which the concentration of pollutants are reduce in receiving water, usually simply by mixing with more quantity of water.

* Dispersion::

Another help of assimilative capacity in wastewater treatment is the dispersion which is the distribution of pollutants in relatively large area of water. Dilution and dispersion are inter related to help for treatment.

* Sunlight::

Another importance of Assimilative treatment is sunlight which facilitates biological decomposition of pollutants and kills pathogens by ultraviolet radiation.

* Temperature..

= in assimilative capacity the temperature plays an important role with increases in temperature of receiving water the biological decomposition of organics and thus assimilative capacity will ~~and~~ improve. increase in temperature also increase thus dilution process.

* Flow velocity..

Assimilative capacity of receiving water also help in terms of flow velocity. higher than flow velocity will encourage quick dilution and dispersion of pollutants.

* Depth of flowing water..

Assimilative capacity is directly related to the depth of receiving ~~related to the~~ water bodies. increase in depth relates UV radiation and turns pathogens are killed.



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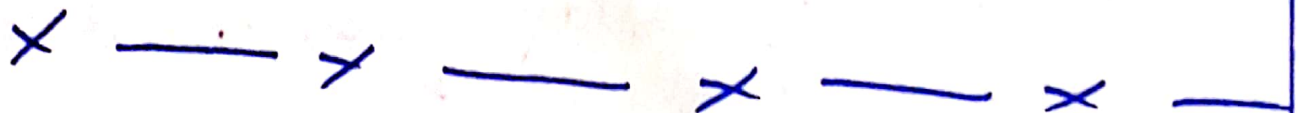
* Sludge management:

Sludge refers to the residual semi-solid material left from municipal wastewater or industrial wastewater treatment processes. Sustainable sludge handling, managing may be defined as a socially acceptable cost effective method that meets the requirement of efficient recycling of resources while ensuring that harmful substances are not transferred to humans or the environment (i-e) water, air or soil.

Advantages of sludge management in wastewater engineering:

- * As wastewater engineering is directly related to environment sludge management is approach towards a better environment.
- * Due to excess of new problems in sludge management every years new techniques and professional/experts are emerges in waste water engineering industry to face the challenges and finding the solutions.

* Residual waste from hospitals research facilities and other industries can be hazardous to our health and the environment. these 'harmful' elements may require thermal treatment to control the spread of diseases or toxins. Sewage sludge incineration reduces volume (up to 90%) and weight (up to 75%) and breaks down dangerous substances such as pathogens and toxic chemicals. Flue gases from exhaust pipes must be handled properly by utilizing a complex treatment system to prevent hazardous emission and ashes from contaminating the environment.



Q No = 05

Environmental Impact Assessment (EIA)

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.

Parameters to be Consider;

Environmental damages should be minimum such as do not affect water body greenery and energy consumption which affect the environment should be controlled. environmental Benefites should be maximum and water life should be protected.

Ensures that Development is according to;

- * National Quality Standard (NQS)
- * the project should not conflict with Govt. Policies.

* international obligations should be strictly followed,

most treatment plants have primary treatment (physical removal of floatable and settleable solid) and secondary treatment (the biological removal of dissolved solids). Some other treatment option. the purpose of tertiary treatment is to provide a final quality before it is discharged to the receiving environment (sea, river, lake, ground etc). more than one treatment process may be used at any treatment plant.

