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PESHAWAR

Q No:1

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.

Wastewater treatment involves collecting the wastewater in a centralized or decentralized location (Wastewater Treatment Plant) and subjecting the wastewater to various treatment processes.

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.

Importance of Wastewater:

The 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 and animals living in the water.

Why Rectangular Tank are preferred over circular tank for removal of settle able solids during preliminary treatment?

The shape of the rectangular clarifiers provides a longer path for the wastewater flow and the suspended solids to travel, and subsequently longer detention time which warrants less short circuiting and more sludge settling compared to the centre-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 NO: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 Treatment:

- *Anaerobic bacteria* (bacteria that live in environments that contain no oxygen) 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:

The activated sludge process is the biological process by which non-settle able substances occurring in dissolved and colloidal forms are converted into settle able sludge which is removed from the liquid carrier (water).

Activated sludge refers to a mixture of microorganisms and suspended solids. The bacterial culture is cultivated in the treatment process to break down organic matter into carbon dioxide, water, and other inorganic compounds.

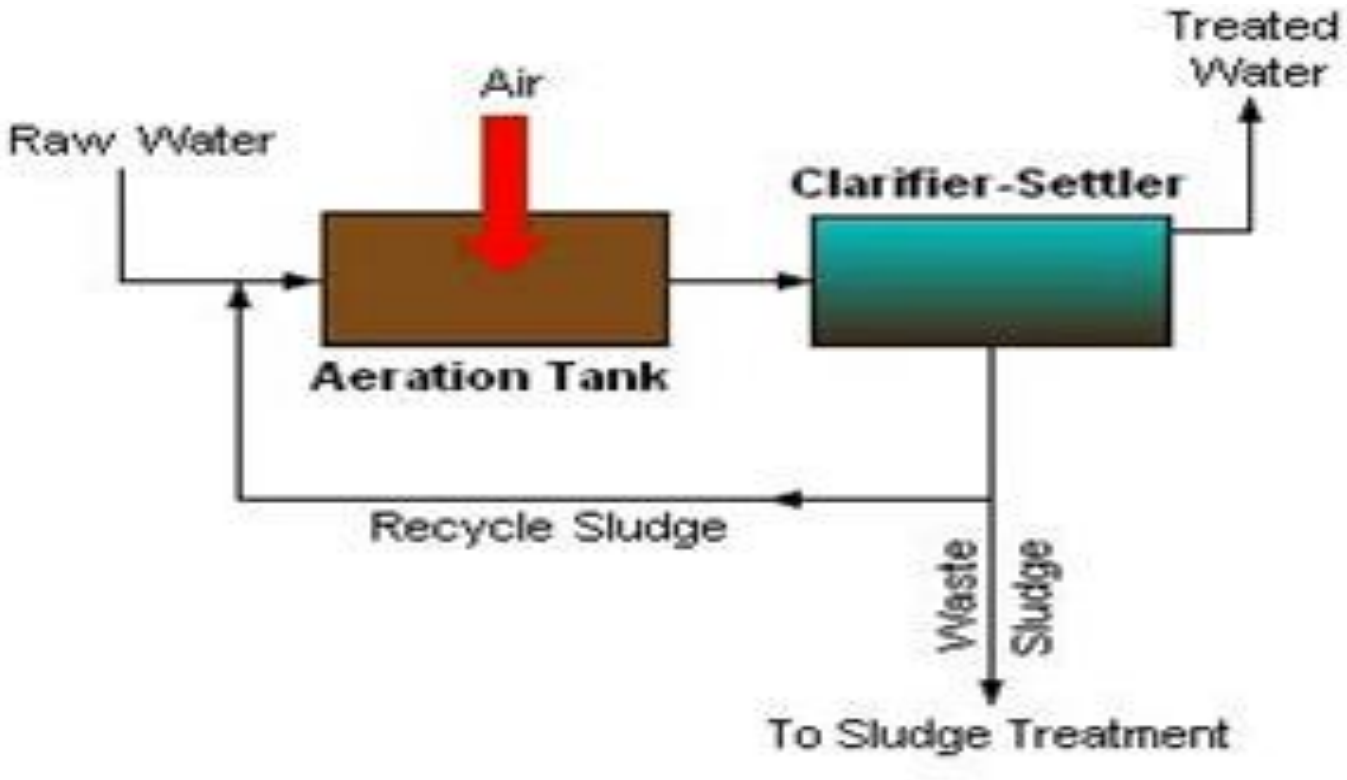
Activated Sludge Process involves production of activated mass of microorganisms capable of stabilizing waste under aerobic conditions;

- 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 APS is its high electricity consumption particularly for aeration.

The typical activated sludge process has following basic components:

- Primary Clarifier to separate the solids carried along with Sewage/Effluent
- A reactor in which the microorganisms are kept in suspension, aerated, and in contact with the waste they are treating.
- liquid-solid separation; and
- a sludge recycling system for returning activated sludge back to the beginning of the process.

Diagram of activated sludge process:



Q NO:3

ANS:

Assimilative capacity of receiving water bodies:

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 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?

When wastewater or contaminated water meets fresh water or natural water bodies, then because of the assimilative capacity of natural water bodies two processes are done on the contaminated water, one delusion and second dispersion, in delusion when contaminated water meets greater amount of fresh water then the concentration of contaminated water decrease, while in dispersion the contaminated water disperse on a greater area and its concentration gets low. And of these 2 processes assimilative capacity treats wastewater.

Q NO:4

ANS

Sludge management:

Sludge treatment and management is a growing challenge for countries globally. Sludge refers to the residual, semi-solid material left from, municipal wastewater or industrial wastewater treatment processes.

Sludge management, including production, characterization, stabilization, digestion, thickening, dewatering, thermal processing, agricultural reuse, production of usable materials, and ultimate disposal.

Sludge Handling Processes:

Sustainable sludge handling 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.

1) Primary operations:

This process includes:

- Grinding: It includes particles size reduction
- Screening: It includes removal of fibrous materials.
- DE gritting: It includes removal of sand or other inorganic materials.
- Blending: It includes making the sludge homogenous.
- 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.

The objective is that to remove water before stabilization and decrease volume.

Processes:

- Gravity thickening (same equipment as sedimentation, but smaller)
- Dissolved air flotation (DAF)
- Centrifuge

3) Sludge Stabilization:

Sludge Stabilization is undertaken to reduce pathogens, eliminate offensive odors, minimize production of usable gas (methane).

Methods of stabilization are:

I. Alkaline Stabilization
II. Anaerobic Digestion

i) Alkaline stabilization:

- Lime is added to untreated sludge, to raise the pH to 12 or higher.
- Retards microbial reaction. Materials such as cement kiln dust, fly ash are used instead of lime.

II) Anaerobic Digestion:

- A biological process that uses bacteria in an oxygen free environment.
- These bacteria converts volatile solids into carbon dioxide, methane and ammonia.

4) Dewatering:

- Dewatering is undertaken to reduce the moisture content of sludge.
- Compared to thermal (evaporative processes) for water reduction, mechanical dewatering is often selected due to its low energy requirement.
- Centrifugation is the method used for separating liquids of different densities, thickening slurries.

5) Heat Drying

- It involves the application of heat to evaporate water and to reduce the moisture content of biosolids.
- Advantage of this method is to reduce product transportation costs, improve storage capability, and marketability.
- Direct drying involves the wastewater solids come into contact with hot gases, which cause evaporation of moisture. Dryers such as rotary dryers and fluidized bed dryers are used.

Advantages:

- High treatment efficiencies possible foe BOD, COD, TSS , N, P.
- High flexibility in operating condions.
- Possibility of producing electric energy from biogas.
- Low land requirement of CAS, somewhat higher land requirement for EA.
- High effluent quality.

Q NO:5

ANS:

Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

OR

"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."

In our opinion, the following parameters should be considered while conducting EIA for newly proposed wastewater treatment plant:

Although legislation and practice vary around the wourld, the fundamental components of an EIA would necessary of the following stages:

- Screening to determine which project or developments require a full or partial impact assessment study,
- Scoping to identify which potential impact are relevant to asses (based on legislative requirements, international convention) to identify alternative solutions that avoid, mitigate or compensate adverse impacts on biodiversity (including the option of not proceeding with the development, finding alternative designs or sites which avoid the impacts incorporating safeguards in the design of the project, or providing compensation for adverse impacts) and finally to derive teams of reference for the impact assessment.
- Assessment and evaluation of impacts and development of alternatives, to predict and identify the likely environmental impacts of a proposed project or development, including the detailed elaboration of alternatives.

- Reporting environmental impact Statement (EIS) or EIA report, including an environmental management plan (EMP) and non-Technical summary for the general audience.
- Review of Envirmental impact statement (EIS) based on the term of reference (Scoping) republic participation.

Air pollution:
During the treatment process it may affects the air.
Water pollution:
During the treatment process, the waste particles meet with natural particle and and as a result it will affects the water and marine life.
Land pollution: affects the land, destroying life and the environment.
Noise Pollution: that can affect our hearing ¬ Visual/aesthetic pollution.

THE END