Wastewater Terms for Permit Applications

Activated Sludge

The term "activated sludge" refers to a brownish flocculent culture of organisms developed in aeration tanks under controlled conditions. It is also Sludge floc produced in raw or settled waste water by the growth of zoological bacteria and other organisms in the presence of dissolved oxygen. Activated sludge is normally brown in color.

Alkalinity

The capacity of water to neutralize acids, a property imparted by the water's content of carbonates, bicarbonates, hydroxides, and occasionally borates, silicates, and phosphates. Alkaline fluids have a pH value over 7.

Anaerobic

A biological environment that is deficient in all forms of oxygen, especially molecular oxygen, nitrates and nitrites. The decomposition by microorganisms of waste organic matter in wastewater in the absence of dissolved oxygen is classed as anaerobic.

Anoxic

A biological environment that is deficient in molecular oxygen, but may contain chemically bound oxygen, such as nitrates and nitrites.

Bacteria

Bacteria are microscopic living organisms. They are a group of universally distributed, rigid, essentially unicellular, microscopic organisms lacking chlorophyll. They are characterized as spheroids, rod-like, or curved entities, but occasionally appearing as sheets, chains, or branched filaments.

Biochemical Oxygen Demand (BOD)

The BOD test is used to measure the strength of wastewater. The BOD of wastewater determines the milligrams per liter of oxygen required during stabilization of decomposable organic matter by aerobic bacteria action. Also, the total milligrams of oxygen required over a five-day test period to biologically assimilate the organic contaminants in one liter of wastewater maintained at 20 degrees Centigrade.

Bulking Sludge

A phenomenon that occurs in activated sludge plants whereby the sludge occupies excessive volumes and will not concentrate readily. This condition refers to a decrease in

the ability of the sludge to settle and consequent loss over the settling tank weir. Bulking in activated sludge aeration tanks is caused mainly by excess suspended solids (SS) content. Sludge bulking in the final settling tank of an activated sludge plant may be caused by improper balance of the BOD load, SS concentration in the mixed liquor, or the amount of air used in aeration.

Chemical Oxygen Demand (COD)

The milligrams of oxygen required to chemically oxidize the organic contaminants in one liter of wastewater.

Composite Sample

To have significant meaning, samples for laboratory tests on wastewater should be representative of the wastewater. The best method of sampling is proportional composite sampling over several hours during the day. Composite samples are collected because the flow and characteristics of the wastewater are continually changing. A composite sample will give a representative analysis of the wastewater conditions.

Denitrification

A biological process by which nitrate is converted to nitrogen gas.

Digestion

The biological decomposition of organic matter in sludge resulting in partial gasification, liquefaction, and mineralization of putrescible and offensive solids.

Disinfection

The killing of pathogenic organisms is called disinfection.

Dissolved Oxygen (DO)

The oxygen dissolved in water, wastewater, or other liquid. DO is measured in milligrams per liter. If the DO of a sample of water is 2 mg/L, it means that there are 2lbs of oxygen in 1 mil lb of water.

Dissolved Solids

Solids that cannot be removed by filtering are dissolved solids.

Extended Aeration

A modification of the activated sludge process which provides for aerobic sludge digestion within the aeration system.

Floc

Clumps of bacteria and particles that have come together to form clusters, or small gelatinous masses. The floc mass in an activated sludge aeration tank generally consists of microorganisms.

Grease

In wastewater, a group of substances, including fats, waxes, free fatty acids, calcium and magnesium soaps, mineral oils, and certain other non-fatty materials.

Milligrams per Liter (mg/L)

A unit of concentration of water or wastewater constituent. It is 0.001 g of the constituent in 1000 ml of water. The unit parts per million is identical to milligrams per liter.

Mixed Liquor (ML)

The mixture of activated sludge, wastewater, and oxygen, wherein biological assimilation occurs.

Mixed Liquor Suspended Solids (MLSS)

The milligrams of suspended solids per liter of mixed liquor that are combustible at 550 degrees Centigrade. An estimate of the quantity of MLSS to be wasted from the aeration tank of an extended aeration plant may be determined by the rate of settling and centrifuge tests on the sludge solids.

Nitrification

The conversion of nitrogen matter into nitrates by bacteria.

Nitrogen

Nitrogen is present in wastewater in many forms: total Kjeldahl nitrogen, ammonia nitrogen, organic nitrogen.

Nitrogen Cycle

The cycle of life, death, and decay involving organic nitrogenous matter is known as the nitrogen cycle. In the nitrogen cycle ammonia is produced from proteins.

Orthophosphate

A simple compound of phosphorous and oxygen that is soluble in water.

Oxic

A biological environment which is aerobic.

Polyphosphate

A large compound formed of several orthophosphate molecules connected by phosphate-storing microorganisms.

Raw Wastewater

Wastewater before it receives any treatment.

Reactor

A tank where a wastewater stream is mixed with bacterial sludge and biochemical reactions occur.

Return Sludge

Settled activated sludge returned to mix with incoming raw or primary settled wastewater. When the return sludge rate in the activated sludge process is too low, there will be insufficient organisms to meet the waste load entering the aerator.

Return Activated Sludge

Activated return sludge is normally returned continuously to the aeration tank. Recycling of activated sludge back to the aeration tank provides bacteria for incoming wastewater. It should be brown in color with no obnoxious odor and is often also returned in small portions to the primary settling tanks to aid sedimentation. Settled activated sludge is generally thinner than raw sludge. Some activated sludge will be wasted to prevent excessive solids build up.

Sludge Age

In the activated sludge process, a measure of the length of time a particle of suspended solids has been undergoing aeration, expressed in day. It is usually computed by dividing the weight of the suspended solids in the aeration tank by the weight of excess activated sludge discharged from the system per day.

Sludge Digestion

The purpose of sludge digestion is to separate the liquid from the solids to facilitate drying. The proper pH range for digested sludge is 6.8 - 7.2.

Sludge Index

Properly called sludge volume index (SVI). It is the volume in millimeters occupied by 1 g of activated sludge after settling of the aerated liquid for 30 minutes.

Sludge Reaeration

The continuous aeration of sludge after initial aeration for the purpose of improving or maintaining its condition.

Splitter Box

A division box that splits the incoming flow into two or more streams. A device for splitting and directing discharge from the head box to two separate points of application.

Wastewater

Domestic wastewater is 99.9% water and 0.1% solids. Fresh wastewater is usually slightly alkaline. If the pH of the raw wastewater is 8.0, it indicates that the sample is alkaline. If wastewater has a pH value of 6.5, it means that it is acid. Wastewater is said to be septic when it is undergoing decomposition.