

Glossary of Water and Wastewater Treatment Terms

Acidity: ability to neutralize alkaline (hi pH) substances.

Activated Carbon: a form of carbon processed to have small, low-volume pores that increase the surface area available for adsorption or chemical reactions.

Activated Sludge: Aerobic biological treatment process for domestic or industrial wastewater.

Aerobic: requiring free oxygen for respiration. Refers to types of bacteria commonly found in water and wastewater treatment systems.

Alkalinity: ability of substance to neutralize acids. Typically measured as ppm (mg/l) of CaCO_3 .

Anaerobic: requiring absence of free oxygen for respiration. Refers to types of bacteria commonly found in water and wastewater treatment systems.

Anionic Flocculant: negatively charged flocculant. Used in water treatment to aid solid / liquid separation.

Anoxic: the description of an environment without oxygen. In wastewater treatment anoxic processes are typically used for the removal of nitrogen from wastewater.

Antiscalent: a material used to control scale formation in water systems such as boiler or cooling water systems.

Back Wash: part of water filter, ion exchange or softener cycle that lifts up media bed to release and wash away dirt and other foulants.

Biochemical Oxygen Demand (BOD): common analytical test to determine organic (food) content of water. It measures oxygen consumption by microorganisms as they degrade the organic content in water. Most frequently used test method is a 5 day BOD: BOD₅

Biocide: chemical substance designed for killing living organisms in water. Often characterized by type of organism killed: bactericide, fungicide or algacide.

Blow Down (bleed-off): terms to describe the deliberate rejection of water from a system such as boiler or cooling water system. Typically done to control system's water total dissolved system or conductivity.

Cationic Flocculant: a positively charged high molecular weight polyelectrolyte water soluble organic polymer designed to agglomerate solids in water substrates.

Chemical Oxygen Demand (COD): common analytical test to determine the theoretical oxygen consumed in oxidizing all of the organic and any oxidizable inorganic content of water. It is used to measure the pollution strength of water.

Clean In Place (CIP): is a method of cleaning the interior surfaces of pipes, vessels, process equipment, filters and associated fittings, without disassembly.

Coagulant: positively charged electrolytes (chemicals) most commonly associated with coagulation. Coagulants are generally categorized as inorganic (alum, aluminum chloride, polyaluminum chloride, ferric chloride) or organic (epiamines, polyamines or DADMACs – diallyl dimethyl ammonium chloride).

Coagulation: the destabilization for repulsive electrical charges to permit agglomeration of colloid particles in water. This process aids the clarification of water.

Concentrate: the reject (high TDS) discharge from a reverse osmosis filtration process.

Condensate: steam that has lost heat and condensed into water.

Conductivity: the transmittance of an electric current through water. Usually measured in microsiemens per centimeter (uS/cm) or micromho per centimeter (umho/cm).

Co-precipitation: term to describe compound used in water treatment to aid precipitation of substances normally soluble under the conditions employed. Common co-precipitants used in water are iron, aluminum, calcium and magnesium.

Corrosion Inhibitor: chemical additive designed to control / minimize metal corrosion in water system.

Cycles of Concentration: the ratio of boiler or cooling water to make up (feed water). Typically measured by monitoring total dissolved solids, conductivity, silica or chlorides.

Demulsifier (Emulsion Breaker): chemical additive that destroys the emulsifying characteristics water. Typically used separate stabilized (emulsified) oil in water.

Denitrification: wastewater treatment process involved in the biological removal of nitrogen in which the nitrite (NO_2) is converted to nitrogen gas (N_2)

Dewatering: removing free water from a sludge or slurry to form a high solids cake. Recessed Chamber Filter presses, Belt Presses, centrifuges, rotary fan presses and vacuum presses are dewatering devices.

Dispersant: a non-surface active compound or an active substance added to a suspension, usually a mix, to increase the separation of particles and to prevent subsiding or clumping.

Dissolved Air Flotation Clarifier (DAF): a piece of equipment that used dissolved air to float suspended solids from water. Typically used when the suspended solids have a lower density than water.

Dissolved Oxygen (DO): the measurement of the gaseous oxygen (O₂) concentration in water.

Effluent: a liquid that flows from a containing space or source such as a factory, tank, pond or clarifier.

Electro Deionization (EDI): a water treatment technology that utilizes an electricity, ion exchange membranes and resin to deionize water and separate dissolved ions (impurities) from water.

Emulsion Breaker (Demulsifier): chemical additive that destroys the emulsifying characteristics water. Typically used separate stabilized (emulsified) oil in water.

Ferric Chloride: a metal salt (FeCl₃) commonly used as an coagulant in water clarification and as etching agent in chemical-etching.

Filter Press: a solids dewatering device that uses pressure differential applied to sludge within a series of plates with filter clothes. The plates (with clothes in them) are arranged in a plate pack with the sludge filling chambers created by recesses within each plate. Filter presses are often called Plate and Frame or Recessed Chamber Filter Presses.

Flocculant: high molecular weight polyelectrolyte water soluble organic polymer designed to agglomerate solids in water substrates. Characteristics of flocculants in water treatment are determined by their molecular weight, charge type (anionic, nonionic or cationic) and charge density.

Flocculation: the agglomeration of settleable solids through a bridging mechanism to produce larger particle that is more easily separated from water.

Flux: the permeate rate per unit area of membrane surface. Typical units are gals per foot of membrane per day (gfd) or liters of permeate per square meter of membrane per hour (lmh).

FOG (Fats Oil & Grease): a term to describe waste water contaminants that are commonly found in food or petroleum based effluents. EPA test 1664 is typically used to measure FOG.

Hardness: the typically the concentration of calcium and magnesium salts in water. However, it may include other metal salts such as Al, Mn, Sr and Zn. Normally measured as CaCO₃ equivalents.

Heterotroph: a type of bacteria that uses organic matter for energy and can use free oxygen, nitrates or sulfates as and oxygen source for respiration.

Inclined Plate Clarifier (IPC): a solids / liquid separation device (clarifier) that is filled with parallel (sometimes called Lamella) plates that are inclined at an angle between 45 and 55 degrees. The plates reduce (compared to a gravity clarifier) the foot print required to properly settle solids.

Influent: liquid flowing into a containing space or treatment system.

Ion Exchange: a process that removes dissolved ions from solution of a certain charge by absorption onto a resin that releases (exchanges) an ion of the same charge.

Membrane: a material layer that is a selective barrier between two phases and remains impermeable to specific particles, molecules or substances.

Membrane Bio Reactor (MBR): aerobic biological waste water treatment process that utilizes membrane filtration (rather than clarification) for solids / liquid separation. The membrane filters (ultra filters) can be either submerged or external to the biological mixed liquor tanks.

Micro Filtration (MF): a type of membrane filtration that separates suspended solids and solutes of high molecular from a liquid and low molecular weight solutes. This separation process is used in industry processes, water treatment and research for purifying and concentrating macromolecular solutions.

Mixed Bed Ion Exchange: is anion exchange process that uses a mixture of cation and anion resin combined in a single ion exchange column. With proper pretreatment, product water purified from a single pass through a mixed bed ion exchange column is the purest that can be made.

Moving Bed Bio Reactor (MBBR): aerobic biological waste water treatment process that utilizes the fixed film (media) process. High surface area media is suspended in biological mixed liquor and bacteria grow on the media (attached growth) surface. A clarifier is typically used downstream of the MBBR for solid / liquid separation.

Nephelometer Turbidity Units (NTU): a measurement of the clarity (turbidity) of a liquid.

Nitrification: waste water treatment process involved in the biological removal of ammonia in which the ammonia is converted to nitrates (NO_3)

Nonionic: a neutral charged high molecular weight polyelectrolyte water soluble organic polymer designed to agglomerate solids in water substrates.

Reverse Osmosis (RO): water purification technology that uses a semipermeable membrane to remove dissolved solids, molecules and larger particles from water. Applied pressure is used to overcome osmotic pressure and produce high purity water. Reverse osmosis is used to produce ultra pure water for a variety of applications.

Silt Density Index (SDI): a measurement of silt, colloids, bacteria and other foulants of Reverse Osmosis (RO) membranes. SDI is used to help determine the suitability of water or other liquids for the RO process.

Sludge Judge: a clear tubular device used to measure sludge depth in clarifiers or other tanks.

Surfactant: compounds that lower the surface tension (or interfacial tension) between two liquids or between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants.

Ultra Filtration (UF): is a type of membrane filtration that separates suspended solids and solutes of high molecular from a liquid and low molecular weight solutes. The ultra filtration separation process is used in industry processes, water treatment and research for purifying and concentrating macromolecular solutions.

References

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