Water Words: A Glossary of Water Treatment Terms

A

Acid
A substance that dissolves in water with the formation hydrogen ions (H+).

Acidic Solution
A solution that contains significant numbers of (H+) ions.

Algae
The simplest of all plant forms, having neither root, stem, nor leaves. Most are microscopic consisting of single cells or colonies of cells. They are present in all natural surface waters. Certain types of algae (particularly the Blue-Green Algae) produce objectionable tastes or odors in drinking water supplies.

Alkaline Solution
A basic solution that contains significant numbers of hydroxyl (OH-) ions.

Alkalinity
The capacity of water to neutralize acids. A property primarily imparted by the water's content of carbonates, bicarbonates and hydroxides. Alkalinity is expressed in milligrams per liter of equivalent calcium carbonate.

Ammonia
A chemical combination of hydrogen (H) and nitrogen (N) occurring extensively in nature. The combination used in water and wastewater engineering is expressed as NH3.

Anion
A negative ion (for example, chloride, Cl-).

B

Base
A substance that has a pH of more than 7, which is neutral. A base has less free hydrogen ions (H^+) than hydroxyl ions (OH^-).

Biocide
a poisonous substance, especially a pesticide

Blowdown
When water evaporates from a cooling tower, dissolved solids (e.g., calcium, magnesium, chloride, and silica) are left behind. As more water evaporates, the concentration of dissolved solids increases. If the concentration gets too high, the solids can cause scale to form within the system, or the dissolved solids can lead to corrosion problems. The concentration of dissolved solids is controlled by blowdown. Carefully monitoring and controlling the quantity of

blowdown provides the most significant opportunity to conserve water in cooling tower operations.

C

Commercial Water Use
Water used for motels, hotels, apartment buildings, restaurants, office buildings, other commercial facilities, and institutions.

Condensation
The process of water vapor in the air turning into water; for instance, water drops on the outside of a cold glass of water are condensed water.

Conveyance Loss
Water that is lost in transit from a pipe, canal, or ditch by leakage or evaporation. Generally, the water is not available for further use; however, leakage from an irrigation ditch, for example, may percolate to a ground-water source and be available for further use.

Corrosion
A natural process that converts refined metal to its more stable oxide (also described as the gradual destruction of metals by a chemical reaction in its environment). Corrosion typically refers to electrochemical oxidation of metal with an oxidant such as oxygen. The formation of iron oxides or what most know as the rusting process is an example of electrochemical corrosion. Many structural alloys corrode merely from exposure to moisture in the air. The process can be affected by exposure to certain substances. It can be in the form of a localized pit or crack, or it can extend across a more uniform area of a metal surface. Corrosion is a natural process that converts refined metal to its more stable oxide. Also known as the gradual destruction of metals by a chemical reaction in its environment. Corrosion typically refers to electrochemical oxidation of metal with an oxidant such as oxygen. The formation of iron oxides or what most know as the rusting process is an example of electrochemical corrosion. Many structural alloys corrode merely from exposure to moisture in the air. The process can be affected by exposure to certain substances. It can be in the form of a localized pit or crack, or it can extend across a more uniform area of a metal surface.

Types of Corrosion
Generalized Corrosion *is uniform corrosion over the entire metal surface.*
Pitting Corrosion *is a term that describes localized pits or indentations caused by corrosion on metal. Pits and indentations can vary considerably in size and depth.*
Localized Corrosion *is usually the result of under-deposit corrosion, typically characterized by an intense attack of an isolated area on the metal surface.*
Copper Plating Corrosion *is deposition of soluble copper plating out on mild steel or other non-copper alloys.*
Under-Deposit Corrosion *is an aggressive attack of the metal that occurs under a layer of contaminants on the metal.*
Galvanic Corrosion *is usually the result of two dissimilar metals attacking one another. Corrosion is accelerated more greatly on the less noble metal.*
Erosion Corrosion *is the accelerated deterioration or attack on the metal that is typically related to excessive or improper flow and/or fouled systems.*

D

Desalination
The removal of salts from saline water to provide freshwater.

De-scaling
The removal of scale.

Discharge
The volume of water that passes a given location within a given period of time (usually expressed in cubic feet per second).

Drip Irrigation
A common irrigation method where pipes or tubes filled with water slowly drip onto crops. Drip irrigation is a low-pressure method of irrigation and less water is lost to evaporation than high-pressure. spray irrigation.

Drawdown
A lowering of the ground-water surface caused by pumping.

E

Erosion
The process by which a material is worn away by a stream of liquid (water) or air, often due to the presence of abrasive particles in the stream. *See types of corrosion.*

F

Fouling
The accumulation of unwanted material on a solid surface; in the water treatment industry, that surface refers to a heat-transfer component fouled by ingredients contained in cooling water or gases.

G

Greywater
Wastewater from clothes washing machines, showers, bathtubs, hand washing, lavatories and sinks. Read more about how this pertains to your industry …

H

Hard Water
Hard water is high in mineral content and forms when water percolates through deposits of limestone and chalk-containing minerals such as calcium and magnesium. Hard drinking water is generally not harmful to one's health but can pose serious problems in the industrial setting where water hardness is monitored to avoid costly breakdowns in boilers, cooling towers, and

other equipment that handles water.

Hydroelectric Power Water Use
The use of water in the generation of electricity at plants where the turbine generators are driven by falling water.

I

Irrigation
The controlled application of water for agricultural purposes through manmade systems to supply water requirements not satisfied by rainfall. Irritation water is used to assist in the growing of crops and pastures or to maintain vegetative growth in recreational lands, such as parks and golf courses.

L

Leaching
The process by which soluble materials in the soil, such as salts, nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

Legionella
The name for the genus of bacteria. Legionellae (the plural, referring to more than one Legionella bacterium) are aerobic, non-spore forming, rod-shaped, typically flagellated, gram-negative bacteria. They are common to aquatic, especially warm water, environments and some soils. There are 43 or more identified species of Legionella, with more than half being linked to human disease. Some Legionella species are made up of multiple serogroups, with over 60 serogroups presently identified for the genus. Many of the species serogroups are further differentiated into numbers of subtypes.

Legionellosis
The collective term describing any illness caused by exposure to the bacterial pathogen Legionella. Legionnaires' disease and Pontiac fever are the two most common types of legionellosis, with Legionnaires' disease being the more serious and primary one of focus. **It is an environmental disease–with the causative agent (Legionella) transmitted from an environmental source (water or soil) to a host.** It is not transmitted from person to person–thus, it is not a communicable disease.

Read more about Legionella and how it affects your industry . . .

M

Maximum Contaminant Level (MCL)
The designation given by the U.S. Environmental Protection Agency (EPA) to water-quality standards promulgated under the Safe Drinking Water Act. The MCL is the greatest amount of a contaminant that can be present in drinking water without causing a risk to human health.

mining water use--water use during quarrying rocks and extracting minerals from the land.
municipal water system--a water system that has at least five service connections or which regularly serves 25 individuals for 60 days; also called a public water system.

N

Nephelometric Turbidity Unit (NTU)
Unit of measure for the turbidity of water. Essentially, a measure of the cloudiness of water as measured by a nephelometer. Turbidity is based on the amount of light that is reflected off particles in the water.

Nonpoint Source (NPS) Pollution
Pollution discharged over a wide land area, not from one specific location. These are forms of diffuse pollution caused by sediment, nutrients, organic and toxic substances originating from land-use activities, which are carried to lakes and streams by surface runoff. Non-point source **pollution is contamination that occurs when rainwater, snowmelt, or irrigation washes off plowed** fields, city streets, or suburban backyards. As this runoff moves across the land surface, it picks up soil particles and pollutants, such as nutrients and pesticides.

O

Osmosis
The movement of water molecules through a thin membrane. The osmosis process occurs in our bodies and is also one method of desalinating saline water.

Oxygen Demand
The need for molecular oxygen to meet the needs of biological and chemical important in biological and chemical processes.

P

pH
A measure of the relative acidity or alkalinity of water. Water with a pH of 7 is neutral; lower pH levels indicate increasing acidity, while pH levels higher than 7 indicate increasingly basic solutions. View a diagram about pH.

Permeability
The ability of a material to allow the passage of a liquid, such as water through rocks. Permeable materials, such as gravel and sand, allow water to move quickly through them, whereas unpermeable material, such as clay, don't allow water to flow freely.

Point-Source Pollution
Water pollution coming from a single point, such as a sewage-outflow pipe.

Polychlorinated Biphenyl (PCB)
A group of synthetic, toxic industrial chemical compounds once used in making paint and

electrical transformers that are chemically inert and not biodegradable. PCBs were frequently found in industrial wastes, and subsequently found their way into surface and groundwaters. As a result of their persistence, they tend to accumulate in the environment. In terms of streams and rivers, PCBs are drawn to sediment, to which they attach and can remain virtually indefinitely. Although virtually banned in 1979 with the passage of the Toxic Substances Control Act, they continue to appear in the flesh of fish and other animals.

Potable Water
Water of a quality suitable for drinking.

Primary Wastewater Treatment
The first stage of the wastewater-treatment process where mechanical methods, such as filters and scrapers, are used to remove pollutants. Solid material in sewage also settles out in this process.

R

Reclaimed Wastewater
Wastewater-treatment plant effluent that has been diverted for beneficial uses such as irrigation, industry, or thermoelectric cooling instead of being released to a natural waterway or aquifer.

Recycled Water
Water that is used more than one time before it passes back into the natural hydrologic system.

Reverse Osmosis
Desalination: The process of removing salts from water using a membrane. With reverse osmosis, the product water passes through a fine membrane that the salts are unable to pass through, while the salt waste (brine) is removed and disposed. This process differs from electrodialysis, where the salts are extracted from the feedwater by using a membrane with an electrical current to separate the ions. The positive ions go through one membrane, while the negative ions flow through a different membrane, leaving the end product of freshwater.

Water Quality: An advanced method of water or wastewater treatment that relies on a semi-permeable membrane to separate waters from pollutants. An external force is used to reverse the normal osmotic process resulting in the solvent moving from a solution of higher concentration to one of lower concentration.

S

Scale
Hard water forms deposits (scale) that clog pipes. This scale is composed primarily of calcium carbonate carbonate ($CaCO_3$), magnesium hydroxide ($Mg(OH)_2$), and calcium sulfate ($CaSO_4$). Calcium and magnesium carbonates tend to be deposited as off-white solids on the inside surfaces of pipes and heat exchangers. This precipitation (formation of an insoluble solid) is principally caused by thermal decomposition of bicarbonate ions but also happens in cases where the carbonate ion is at saturation concentration. The resulting build-up of scale restricts the flow

of water in pipes. In boilers, the deposits impair the flow of heat into water, reducing the heating efficiency and allowing the metal boiler components to overheat. In a pressurized system, this overheating can lead to failure of the boiler. De-scaling
https://en.wikipedia.org/wiki/Hard_water

Secondary Wastewater Treatment
Treatment following primary wastewater treatment involving the biological process of reducing suspended, colloidal, and dissolved organic matter in effluent from primary treatment systems and which generally removes 80 to 95 percent of the Biochemical Oxygen Demand (BOD) and suspended matter. Secondary wastewater treatment may be accomplished by biological or chemical-physical methods. Activated sludge and trickling filters are two of the most common means of secondary treatment. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This treatment removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment.

Sediment
Uusually applied to material in suspension in water or recently deposited from suspension. In the plural the word is applied to all kinds of deposits from the waters of streams, lakes, or seas.

Sedimentation Tanks
Wastewater tanks in which floating wastes are skimmed off and settled solids are removed for disposal.

Surface Tension
The attraction of molecules to each other on a liquid's surface. Thus, a barrier is created between the air and the liquid.

Suspended Solids
Solids that are not in true solution and that can be removed by filtration. Such suspended solids usually contribute directly to turbidity. Defined in waste management, these are small particles of solid pollutants that resist separation by conventional methods.

T

Tertiary Wastewater Treatment
Selected biological, physical, and chemical separation processes to remove organic and inorganic substances that resist conventional treatment practices; the additional treatment of effluent beyond that of primary and secondary treatment methods to obtain a very high quality of effluent. The complete wastewater treatment process typically involves a three-phase process: in the primary wastewater treatment process that incorporates physical aspects, untreated water is passed through a series of screens to remove solid wastes; in the secondary wastewater treatment process, typically involving biological and chemical processes, screened wastewater is then passed a series of holding and aeration tanks and ponds; and the tertiary wastewater treatment process consists of flocculation basins, clarifiers, filters, and chlorine basins or ozone or ultraviolet radiation processes.

Thermal Pollution
A reduction in water quality caused by increasing its temperature, often due to disposal of waste heat from industrial or power generation processes. Thermally polluted water can harm the environment because plants and animals can have a hard time adapting to it.

Turbidity
The amount of solid particles that are suspended in water and that cause light rays shining through the water to scatter. Thus, turbidity makes the water cloudy or even opaque in extreme cases. Turbidity is measured in nephelometric turbidity units (NTU).

W

Wastewater
Water that has been used in homes, industries, and businesses that is not for reuse unless it is treated.