Glossary of Terminology - Water Treatment

Below is a list and explanation of terms commonly used in water treatment and filtration.

Absolute	Used most frequently to describe the micron-size rating of water filters. An absolute five-micron filter is one that will trap virtually all particles five microns and larger in size. Also see Nominal.
Acids	Chemicals that are low in pH. Acids are proton donors that yield hydronium ions in water solution or electron-pair acceptors that combine with electron-pair donors or bases. a substance with a sour taste.
Acid Demand	A measure of the amount of acid required to reduce pH to a predetermined level.
Activated Carbon	Granular activated carbon is a water treatment medium used to remove tastes, odours, chlorine, chloramines and chemicals in general from water. It is one of the most versatile and useful of all water treatment tools. Filter carbon is a manufactured product, made from coal, nut shells, wood, and other substances.
Adsorption	The process by which molecules or colloids physically adhere to the surfaces of solids. Filter carbon adsorbs organic compounds.
Aeration	The process of adding air to a water supply for the purpose of oxidation.
Air Stripping	A treatment process that removes or “strips” VOCs from contaminated water. Air is forced through the water, causing the contaminants to escape to the atmosphere.
Algae	Plant-like organisms that grow in water.
Alkalinity	Alkalinity is the measurement of resistance to pH change. Also see Total Alkalinity.
Anion	Negatively charged ion.
Aquifer	Any geological formation containing water.
Backwash	The reverse of a solution's flow through a system. Often used as a cleansing mechanism in tank-style filters with granular filter beds. Backwashing cleans and resettles the filter bed. In membrane filtration is used in conjunction with forward flush to recover flux rate.

Bacteria	Microbial organisms sometimes require control by sanitising agents. Any of a class of microscopic plants having round, rod-like spiral or filamentous single cell or non-cellular bodies, often aggregated into colonies or mobile by means of flagella. Living in soil, water, organic matter, or the bodies of plants and animals and being autotrophic (self-generative), saprophytic (digests chemicals already present in their environment), or parasitic.
Bactericide	Material capable of inhibiting or destroying bacteria.
Balanced Water	Water that is neither corrosive nor scaling (in relation to pH, total alkalinity, calcium hardness, and temperature factors). On the Langelier Index (q.v.), perfectly balanced water equals zero.
Base Demand	A measure of the amount of alkaline material required to raise pH to a predetermined level.
Binders	When used in reference to cartridge filters, refer to chemicals used to hold, or bind, short fibers together in a filter.
Blinding	The fouling or plugging of pores in a membrane, usually by a gel-like substance.
Bromine	Chemical sanitiser that kills bacteria and algae.
Buffer	A chemical that resists pH change, e.g. sodium bicarbonate.
Calcium Hardness	A measure of the calcium salts dissolved in water.
Cation	Positively charged ion. Sodium and calcium are prominent cations in water.
Chelating Resin	Chelating resins also known as specific exchangers or chelating sorbents are a subgroup of ion exchange resins. Chelating resins were developed to obtain higher selectivities of at least one particular counter-ion species. The interaction of a functional group (ligand) of chelating resin and metal (in form of cation or oxoanion) is selective with respect to the nature of the metal. The theory behind the choice of functional group is explained as such: An ion that forms strong complexes with, or is precipitated by, a certain reagent should thus be preferred by a resin into which this reagent has been incorporated.
Chemical Solution Feeder	A pump used to meter chemicals such as chlorine or polyphosphate into a water supply.
Chloramine	A combination of free chlorine and ammonia gas that retains its bactericidal qualities for a longer time than does free chlorine. It is less effective than chlorine as a disinfectant but is often used because it reduces the harmful by-product chemicals produced by free chlorine. It is becoming more common as the standard disinfectant used by municipal water supplies. In general, it is more difficult to remove from water than free chlorine.

Chlorine	Chemical sanitiser that kills bacteria and algae. A very toxic biocide. A halogen element isolated as a heavy irritating greenish-yellow gas of pungent odor used especially as a bleach, oxidising agent and disinfectant in water purification.
Chlorine, Combined	The reaction product of chlorine with ammonia or other pollutants; also known as chloramines.
Chlorine Demand	Amount of chlorine required to react on various water impurities before a residual is obtained.
Chlorine, Free	Chlorine available to kill bacteria or algae. Chlorine that has not been combined with other substances in water.
Colloid	A colloid is a mixture where at least two types of substances are placed together. The substances do not change; each substance retains its own properties. The substances, also called particles, do not settle out of the mixture and cannot be seen.
Colloidal-matter	A gelatinous or mucinous substance suspended in water that can pass through even the finest sediment filter.
Compaction	Decline in flux as a result of applied pressure compressing a reverse osmosis or ultrafiltration membrane.
Concentrate	The portion of a feed stream that retains the ions, organics and suspended particles that were rejected during the crossflow filtration process. (In other words, the rinse water from a reverse osmosis unit.)
Condensate	Water is obtained through evaporation and subsequent condensation.
Contaminant	An object that is a source of pollution.
Crossflow	Precise separation of the components of a fluid by a semi-permeable membrane through the application of pressure and flow.
Cyanuric Acid	Chemical used to prevent the decomposition of chlorine by ultra-violet (UV) light.
DI (Deionisation)	Use of ion exchange resin to remove salts from water. DI removes both anions and cations.
Demineralisation	The process of removing minerals from water, e.g. deionisation, reverse osmosis and distillation.
Disinfection	Destruction of bacteria and viruses in a water supply or distribution system. Chlorine or chloramine disinfection in public water supplies is usually referred to as secondary disinfection.
Dissolved Solids	Includes all solids dissolved in the water. Mainly, the mineral content of the water. Also see Total Dissolved Solids.

Distillation	Steam from boiling water is condensed on a cool surface, collected and stored. Most contaminants do not vaporise and therefore do not pass to the condensate. Removes nearly 100 percent of salts and those organics that do not have a vaporizing temperature near or below that of water.
EBCT	Stands for “empty bed contact time.” It is a measurement of the time that water stays in contact with the treatment medium. EBCT is calculated by the following formula: EBCT = Bed Volume in litres divided by the Flow Rate in litres/minute.
Effluent	The output stream exiting the system-often the waste stream.
Element	A basic building block of the system. Often used in reference to membrane element; part of a system containing the membrane for use in separations.
Feed	The input solution to a system is also called influent.
Filter Cube	The accumulate particles on a filter surface.
Filtrate	The portion of the feed stream that has passed through the membrane.
Flocculent	A chemical, when added to water, causes particles to coagulate into larger groupings (flogs), which settle from the water.
Flux	The membrane throughput is usually expressed in volume per unit time, such as litres per minute.
GAC	Granular Activated Carbon. See Activated Carbon.
GPD	Gallons per day.
GPG	Grains per gallon. Equal to 17.1 mg/ litre.
GPM	Gallons per minute.
Ground Water	Water is confined in semipermeable rock layers. Well water, in other words.
Half-Life	The time in which an item is being measured will be half gone. Ozone, for example, has a half-life of about 30 minutes. This means that the initial amount of ozone used in water treatment will be reduced by half in about 30 minutes.
Hardness	The concentration of calcium and magnesium salts in the water.
Heavy Metals	Metals having a high density or specific gravity. A generic term used to classify contaminants such as cadmium, lead and mercury.
Hydrogen Sulphide	A toxic gas (H2S) that is detectable by a strong “rotten egg” odour.

Hydrologic Cycle	The term is used to describe how water travels through the environment by evaporation, condensation and precipitation.
Ion Exchange	A chemical reaction in which ions are exchanged in solution. Water softening and deionisation are common applications of ion exchange.
Langelier Index	A mathematically-derived factor is obtained from the values of calcium hardness, total alkalinity, and pH at a given temperature. A Langelier Index of zero indicates perfect water balance (i.e., neither corroding nor scaling).
Magnesium Hardness	A measure of the magnesium salts dissolved in water. It is not a factor in water balance.
Membrane	Polymer film utilised as the semipermeable separation mechanism in reverse osmosis, ultrafiltration and microfiltration.
Mg./l	Milligrams per liter. Equivalent to parts per million (PPM).
Micron	10-4 centimeters. 25.4 microns = 0.001 inch = one mm. The most common measurement of filter size.
Microsiemens	Basically, a measurement of water conductivity and therefore a way to state “parts per million” of total dissolved solids. In general terms, 1.4 microsiemens = 1ppm (parts per million) of dissolved solids. However, for calcium carbonate, the relationship is 2.0 microsiemens = 1 ppm of calcium carbonate.
Module	The membrane element combined with membrane element housing.
Muriatic Acid	An acid is used to reduce pH and alkalinity. Also used to remove stain and scale.
Nominal	When used in reference to the micron rating of cartridge filters, refers to an approximate size particle that will not pass through a filter. Thus, a nominal one-micron filter is one that gets most of the particles larger than one micron. Also see Absolute.
Osmosis	The spontaneous flow of water from a less concentrated solution to a more concentrated solution through a semipermeable membrane occurring until energy equilibrium is achieved.
Osmotic Pressure	Measurement of the potential energy difference between the solutions on either side of a semipermeable membrane.
Oxidising Filters	Filters that use a catalytic media, such as manganous oxides, to oxidise iron, manganese and other impurities from water.
Ozone	A form of oxygen used to disinfect water.
Particulate	Minute, separate particles.

Permeable	Allowing some material to pass through.
Permeate	The portion of the feed stream that passes through the membrane. This term is applied to the "product water" of a reverse osmosis unit–the finished water that you drink.
pH	A measure of the acidity of water. The pH scale runs from 0 to 14 with 7 being the mid-point or neutral. A pH of less than 7 is on the acid side of the scale with 0 as the point of greatest acid activity. A pH of more than 7 is on the basic (alkaline) side of the scale with 14 as the point of greatest basic activity.
pH of Saturation	The ideal pH for perfect water balance in relation to a particular total alkalinity level and a particular calcium hardness level, at a particular temperature. The pH where the Langelier Index equals zero.
Phenol Red	A chemical reagent used for testing pH in the range of 6.8 – 8.4.
Polymers	A compound of high molecular weight is derived either by the addition of many smaller molecules, such as polyethylene, or by the condensation of many smaller molecules with the elimination of water, alcohol, or the like, such as nylon.
Polyphosphate	A chemical that is often injected to sequester problem contaminants like iron and hardness.
Pore	An opening in a membrane that allows certain components to pass through, but not others.
Porous	A material that allows certain substances to pass through its pores.
PPB	Parts per billion.
PPM	Parts per million.
PSI	Pounds per square inch (pressure). Various units are used to express pressure. Some of these derive from a unit of force divided by a unit of area; the SI unit of pressure, the pascal (Pa), for example, is one newton per square meter.
Regeneration	Is carried out using either an acid or alkali to remove the accumulated cations or anions, respectively. At the same time, the cation exchanger takes on hydrogen ions to restore themselves to the original hydrogen or hydroxide form, respectively. Regeneration refers to the process by which an ion exchanger (like a water softener) renews its ability to do its job.
Rejection	Material not being allowed to pass through a membrane. This is what a reverse osmosis unit does: it "rejects" contaminants and does not allow them to enter the permeate or product water.

Resin	Specially manufactured polymer beads used in the ion exchange process to remove dissolved salts from water.
Reverse Osmosis	The separation of one component of a solution from another component by means of pressure exerted on a semipermeable membrane. Utilises membrane pore sizes from 5A to 20A. Reverse osmosis is a popular and effective drinking water treatment that reduces “dissolved solids” that are often not filterable by other means.
Scale	A crust of calcium carbonate is the result of unbalanced pool water. In general, it refers to calcium build-up in pipes or the interior of appliances like hot water heaters.
Semipermeable	Able to allow certain size material to pass through while rejecting other size material. A reverse osmosis unit uses a semipermeable membrane.
Silt Density Index (SDI)	SDI is a measurement of the fouling potential of suspended solids. It's not measuring the quantity of particular matter, since the size, and shape vary. Turbidity is a measurement of the amount of suspended solids. They are not the same and there is no direct correlation between them. In practical terms, however, the membranes show very little fouling when the feed water has a turbidity of < 1 NTU. Correspondingly the membranes show very low fouling at a feed SDI of less than 5. The test measures the rate at which a 0.45-micrometer filter is plugged when subjected to a constant water pressure of 206.8 kPa (30 psi) The SDI gives the percent drop per minut in the flow rate of the water through the filter, averaged over a period of time such as 15 minutes.
Soda Ash	Chemical used to raise pH and total alkalinity (sodium carbonate).
Sodium Bisulphate	Chemical used to lower pH and total alkalinity (dry acid).
Soft Water	Water containing less than 17 PPM calcium or magnesium.
Solute	Dissolved particles in a solvent.
Stabiliser	Also see Cyanuric Acid.
Superchlorination	Application of large dosages of chlorine to destroy the build-up of undesirable compounds in water.
Suspended Solids	Suspended solids (SS) is the amount of tiny solid particles that remain suspended in water and act as a colloid. The measurement of suspended solids is one way of gauging water quality. Also see Total Suspended Solids (TSS).

Suspensions	Suspensions are also made up of particles and a solvent; however, the particles are larger than those found in a solution. The particles in a suspension can be distributed throughout the suspension evenly by shaking the mixture. However, the particles in a suspension do not remain distributed throughout the suspension – they will settle out. An example is oil and water. The water settles to the bottom and the oil rises to the top. You can mix them together, but in a few seconds after you stop mixing – the oil will rise to the top again. This is an example of a suspension.
TAC	Template Assisted Crystallisation. A scale control technique that uses a granular medium is deemed to combat the negative effects of hardness on plumbing without actually removing the hardness minerals.
Titration	A method of testing by adding a reagent of known strength to a water sample until a specific colour change indicates the completion of the reaction.
Total Alkalinity	A measure of the acid neutralising capacity of water that indicates its buffering ability, i.e., the measure of its resistance to a change in pH. Generally, the higher the total alkalinity, the greater the resistance to pH change.
Total Dissolved Solids	The accumulated total of all solids that might be dissolved in water. Usually called TDS.
Total Organic Carbon (TOC)	Total Organic Carbon (TOC) is an indirect measure of organic molecules present in water and measured as carbon. Organic molecules are introduced into the water from the source water, from purification, and from distribution system materials. TOC is measured for both process control purposes and to satisfy regulatory requirements.
Total Suspended Solids	Total suspended solids (TSS) is a water quality parameter used for example to assess the quality of wastewater after treatment in a wastewater treatment plant.
Turbidity	Muddy, clouded, stirred-up sediment, silt, clay, etc. Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in the air. The measurement of turbidity is a key test of water quality.
Ultrafiltration	Separation of one component of a solution from another component by means of pressure exerted on a semipermeable membrane. Utilises membrane pore sizes from 1 OA to 0.1.
Ultraviolet Disinfection	Ultraviolet germicidal irradiation (UVGI) is a disinfection method that uses short-wavelength ultraviolet (UV-C) light to kill or inactivate microorganisms by destroying nucleic acids and disrupting their DNA, leaving them unable to perform vital cellular functions.