

# Key Terms

# Water Quality Education Test Kit

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**Acid** a solution with a high concentration of hydrogen ions. On the pH scale, it has a value less than 7.

**Acidity** the quantitative capacity of water to be neutralized by a base to a set pH.

**Acid Rain** any form of wet precipitation that has a pH of less than 5.6. The term "acid rain" was coined by an English chemist, Robert Angus Smith, in 1852.

**Algae** simple rootless plants that grow in sunlit waters in relative proportion to the amounts of nutrients available.

**Algal blooms** sudden spurts of algal growth often caused by increased nutrients or increased temperature.

**Alkaline** a substance that has the properties of a base.

**Alkalinity** the quantitative capacity of water to be neutralized by an acid to a set pH.

**Anion** a negatively charged ion.

**Aquifer** groundwater-bearing rock that easily transports water to wells and springs, due to the physical characteristics of the rock. Wells are often drilled into underground aquifers.

**Artesian water** groundwater that is able to rise to a level higher than the level at which it is found. This occurs because artesian water is under pressure. In artesian wells, the water rises without the need for pumping.

**Base** a solution with a low concentration of hydrogen ions. On the pH scale, it has a value greater than 7.

**Buffer** a series of chemical species in solution that resist pH changes when either a base, such as hydroxide ions, or an acid, such as hydrogen ions, are added to a solution. It keeps the pH almost constant by acting as a holding area for hydrogen ions, adding them to the solution when the hydrogen ion concentration falls and taking them from the solution when the concentration rises.

**BOD** biochemical oxygen demand. A measure of the amount of oxygen consumed by aquatic organisms in the decomposition of organic matter in a water sample. Also known as biological oxygen demand.

**Carbonate Rocks** a carbonate is a rock comprised of greater than 50% carbonate ( $\text{CO}_3$ ). They form through various chemical and biochemical processes, and comprise 10 to 20% of all sedimentary rocks.

**Cation** a positively charged ion.

**Chemical oxidation** breaking down of organic waste or chemicals in water through the addition of an oxidizing agent.

**Coagulation** another name for flocculation.

**Condensation** the process of water vapor cooling to water droplets which form clouds when combined.

**Cultural eutrophication** increases in the rate of eutrophication caused by man-made activities, such as increased nitrate levels due to runoff of fertilizer used for lawn maintenance.

**Decomposition** the breakdown of matter that results in changes to the chemical makeup and physical appearance of materials.

**Detergent** a cleansing substance that emulsifies dirt. Different from soap in that it is not made from fats or lye.

**Disinfection** cleansing of water by destroying microorganisms through the use of means such as chemicals, heat treatment, or ultraviolet light.

**Distillation** cleansing of water by heating it to a vapor state, then cooling the vapor to condense it into purified water.

**Estuary** a place where fresh and salt water mix together, such as where a river enters an ocean. This mix of fresh and salt water is commonly referred to as brackish water.

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**Eutrophication** high growth of aquatic plant and animal life caused by an excessive supply of nutrients.

**Evaporation** the process of moisture being released into the atmosphere through sun heating surface water to a vapor that then rises into the atmosphere.

**Flocculation** the process by which clumps of solids in water or sewage are made to increase in size by biological or chemical action so that they can be separated from the water. The process generates floc that falls to the bottom of a container of water, capturing small matter as it falls. This helps to reduce the turbidity of water.

**Flow** a measure of the volume of a river obtained by observing how much water passes by a point, or between two points, over a measured period of time.

**Groundwater** water below the Earth's surface. Through infiltration, this water saturates soil and rock. This water eventually is a supply for wells, springs, and streams. Groundwater is distinguished from surface water because groundwater completely fills the pores in soil, and in cracks of the Earth's bedrock. Groundwater in rock formations with certain characteristics result in aquifers, which are an important source of water for human consumption.

**Hard water** contains large quantities of calcium, magnesium, or iron ions. The presence of these ions has the effect of hindering lathering properties of detergents and soaps.

**Infiltration** the process of precipitated water entering the soil through small pores.

**Ion** an atom or radical group of atoms that has entirely different properties than the element that is its foundation. Can take the form of cations or anions.

**Neutral solution** the hydrogen ion concentration of pure water at room temperature is equal to the concentration of hydroxide ions. The measurement of either ion in this situation is  $1.0 \times 10^{-7}$  molar, or 7 using the pH scale. If the hydrogen ions are increased, the solution becomes more acidic and the pH measurement drops below 7. If the hydrogen ions are decreased, the solution becomes more basic and the pH measurement rises above 7.

**Nitrate** an ion consisting of one nitrogen atom and three oxygen atoms.

**Non-point source** a contributor to pollution that is not easily identified as coming from a discrete source, such as agricultural or sewage runoff resulting from rainwater or melting snow.

**Organic matter** contains living organisms or non-living material derived from decomposing plant or animal matter, characterized by a carbon-hydrogen structure.

**pH** a measurement of the relative concentration of hydrogen ions and hydroxide ions in water. Originally defined by Danish biochemist Soren Peter Lauritz Sorensen in 1909. Expressed as the negative base-10 logarithm of hydrogen ions in moles per liter of solution. The scale ranges from 0 to 14, with 0 being a strong acidic solution and 14 being strongly basic.

**Phenolphthalein** an acid-base indicator that is colorless in an acidic solution. The indicator turns pink to red as the solution becomes alkaline.

**Phosphate** an ion composed of one phosphorus atom and four oxygen atoms.

**Photosynthesis** the conversion in plant cells of carbon dioxide and water into carbohydrates and oxygen. Chlorophyll captures the light energy that is used in the conversion.

**Point source** a contributor to pollution that can be identified as coming from a discrete location, such as a waste pipe from a manufacturing plant.

**Potable** suitable for drinking.

**Precipitate** solute that comes out of a solution at the saturation point.

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**Precipitation** condensed water vapor that falls as rain, hail, or snow.

**Respiration** the process by which an organism takes in oxygen from air or water, and consumes it. In consumption, the process gives off carbon dioxide.

**Reverse osmosis** a water purification process that reverses the water flow that occurs in osmosis with an opposing pressure that exceeds osmotic pressure. This causes water to be forced out of a concentrated solution, leaving impurities behind.

**River** a natural stream of water of considerable volume. The water in the river travels from a higher altitude to a lower altitude.

**Saturation** the level at which a solvent has dissolved the maximum amount of solute that can be held in the solution. Since cold water can hold more dissolved oxygen than warm water, the saturation point of oxygen in warm water is reached quicker than in cold water.

**Scale** the mineral deposits that can coat the insides of boilers or the surfaces of reverse osmosis membranes. It consists mainly of calcium carbonate, which precipitates out of solution under certain conditions of pH, alkalinity, and hardness.

**Secchi Disk** a black-and-white disk that is immersed in water to provide a visual indication of the turbidity of water. The turbidity is calculated by measuring the depth at which the disk disappears from sight.

**Sedimentation** a primary step in municipal water treatment. Water is allowed to stand long enough for solids to settle by gravity. Also called settling.

**Softener** water treatment equipment that uses a sodium-based ion-exchange resin, principally to remove cations.

**Soft water** contains little or no quantities of calcium, magnesium, or iron ions. The lack of these ions allows detergents and soaps to lather easily.

**Solubility** a statement of the ability of a substance to dissolve in another substance.

**Solute** a substance that dissolves to form ions in a solution.

**Solution** a liquid that contains dissolved solute.

**Solvent** a liquid capable of dissolving a solute.

**Stream** a general term for a body of flowing water. It does not necessarily have to contain water year-round, but should contain water at least part of each year. Includes water that flows at volumes less than a river, such as brooks or creeks.

**Surface water** water that is on the Earth's surface. Examples include rivers, streams, lakes, and reservoirs.

**TDS** Total Dissolved Salts, or Total Dissolved Solids. Directly relates to EC since conductivity increases as the level of salts increases.

Conductivity measurements can be converted to parts per million to get a direct reading of dissolved salts concentration in a solution.

**Thermal pollution** discharge of large amounts of warm water from industrial plants that has the effect of raising the temperature in water bodies.

**Thermistor** a semiconductor device that indicates temperature changes through a measurement of changes in resistance.

**Transpiration** the process of moisture being released into the atmosphere from plant leaves after the plant has absorbed water through its root system and transported it to its leaves. Transpiration can also take place through animal pores.

**Total Solids** all solid matter that is either suspended or dissolved in water.

**Watershed** distinct land areas where water drains into a particular lake, stream, or river. They vary in size from small enough to feed a single stream to large enough to feed a large river.

**Water table** the point below the land surface where groundwater starts and surface water ends. This interface occurs at different levels depending on geologic conditions.