

Appendix E: Glossary

A

Adsorption

The mechanism whereby ions or compounds within a liquid or gas adhere to a solid surface upon contact.

Anion

A negatively charged ion.

Azeotrope A mixture of two or more liquids that displays the same level of concentration in the liquid and vapor phase. The mixture can have either a higher or lower boiling point than the individual components.

B

Biochar

A carbon-rich, porous solid synthesized by heating biomass, such as wood or manure, in a low-oxygen environment (that is, pyrolysis).

Biomaterials

Materials derived from plants or animals created for use as sorption materials.

C

Cation

A positively charged ion.

Coagulation

The process of destabilizing a colloid or suspension that unbalances the forces that separate the particles, often by neutralizing the charges on the particles and allowing the particles to clump or settle.

Cometabolism

The process in which a contaminant is fortuitously degraded by an enzyme or cofactor produced during microbial metabolism of another compound. Typically, there is no apparent benefit to the microorganism involved.

D

Dispersion

(1) Pollutant or concentration mixing due to turbulent physical processes; (2) A distribution of finely divided particles in a medium.

The spreading of a solute from the expected groundwater flow path as a result of mixing of groundwater.

E

Electro precipitation/Electrocoagulation

The use of an electrical current to enhance the coagulation and precipitation of ionic compounds. The electrical current may attract the compounds to an anode or cathode, create coagulating ions from a sacrificial anode, or both.

F

Fate and transport

Term used to describe how chemicals entering the subsurface from point or nonpoint sources relate to groundwater concentrations elsewhere.

Flocculation

A process where the suspended particles of a destabilized colloid or suspension form groups or clumps (known as a "floc").

Coagulation and flocculation work together to separate solids and liquids containing colloids and suspensions.

Fluorotelomer substance

A polyfluoroalkyl substance produced by the telomerization process.

H

Henry's law

The principle that the amount of a gas dissolved at equilibrium in a certain quantity of liquid is proportional to the pressure of the gas in contact with the liquid. Using the ideal gas constant and temperature, the Henry's law constant can be converted to a dimensionless form that is the ratio of concentration in air to the concentration in water at equilibrium at a given temperature and pressure. Use of the Henry's law constant assumes a linear relationship between the partial pressure of a substance and its concentration in water up to saturation, which is generally true only in dilute solutions.

Hydrophilic

Materials that have an affinity for water; water spreads across the surface to maximize its contact.

Hydrophobic

Materials that naturally repel water and cause droplets to form.

Hydroxyl radical ($\cdot\text{OH}$)

The neutral form of the hydroxide ion (OH^-). Hydroxyl radicals are highly reactive and are short-lived.

I

Incineration

Thermal destruction process typically characterized by oxidation at temperatures in excess of 1,000 degrees Celsius.

Industrial-grade product

1,4-Dioxane product that is technical grade >95% 1,4-dioxane or American Chemical Society (ACS) reagent grade >99% 1,4-dioxane. Also referred to as "pure phase product."

Isomers

Chemicals with the same chemical formula but different molecular structures.

M

Matrix diffusion

A term used to describe the diffusion of contaminants both into and out of lower-permeability zones (e.g., clays, silts, bedrock) of an aquifer.

Mineralization/Decomposition/Destruction

The breakdown of a chemical compound into its constituent elements and carbon dioxide and water.

O

Octanol-air coefficient (K_{oa})

The ratio of a chemical's concentration in octanol to the concentration in air at equilibrium. It is useful for predicting the partitioning behavior between air and environmental matrices such as soil, vegetation, and aerosol particles.

P

Perfluorinated chemicals

A subset of PFAS, they have carbon chain atoms that are totally fluorinated. Examples are perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS).

Perfluoroalkyl substances

Fully fluorinated alkane (carbon-chain) molecules. They have a chain (tail) of two or more carbons atoms with a charged functional group (head) attached at one end.

Permeability (K)

(1) Characteristic of a material or membrane that allows liquids or gases to pass through it. (2) The rate of flow of a liquid or gas through a porous material. Materials with high permeability will allow fluids to move more rapidly through the material.

Permeate

The water treated by a membrane filtration technology, which has passed through the membrane, and from which PFAS have been removed. The contaminants that do not pass through the membrane accumulate in the filtrate, which also does not pass through the membrane.

Photodegradation

A term typically used to refer to the decomposition of a material by sunlight and air. Photodegradation usually consists of oxidation (absorption of a photon typically lying in the 290–700 nm wavelength range) and hydrolysis (split of chemical bonds by adding water).

Polyfluorinated chemicals

A subset of PFAS, they have at least one carbon chain atom that is not totally fluorinated.

Polyfluoroalkyl substance

The molecule has a nonfluorine atom (typically hydrogen or oxygen) attached to at least one, but not all, carbon atoms, while at least two or more of the remaining carbon atoms in the carbon chain tail are fully fluorinated.

Polymer

Large molecules formed by combining many identical smaller molecules.

Pure phase product

1,4-Dioxane product that is technical grade >95% 1,4-dioxane or American Chemical Society (ACS) reagent grade >99% 1,4-dioxane. Also referred to as an "industrial product."

R

Reactivation

The process of treating regenerated granular activated carbon (GAC) to restore treatment properties.

Raoult's law

The principle that the vapor pressure of an ideal solution at equilibrium is directly dependent on the vapor pressure of each chemical component and the mole fraction of each component in the solution.

Rhizodegradation

The degradation of contaminants in the rhizosphere by microbial activity.

S

Stabilization

A process to reduce mobility of compounds in the environment through physical or chemical means.

T

Thermal desorption

Thermal treatment process intended to remove the contaminants from a solid media (such as soil, sediment, or carbon) and drive them into the vapor phase.

V

Vapor pressure

Vapor pressure is the pressure exerted by the vapor phase of a substance at equilibrium with the pure condensed (solid or liquid) phase in a closed system. Vapor pressure data are used in predicting the equilibrium partitioning constants between the gas phase and liquid or solid phases.

Volatility

Represents the tendency of a chemical constituent to evaporate into the vapor phase. Volatility is typically measured by

vapor pressure.