

Chemistry 105, Glossary

Acceleration: a change in velocity

Anion: an atom that has gained one or more electrons and has a negative charge.

Atom: the smallest part of an element that retains the chemical characteristics of that element.

Avogadro's Law: for a gas at constant temperature and pressure, the volume is directly proportional to the number of moles of gas.

Balanced equation: one which satisfies the law of conservation of mass.

Boiling point: the temperature at which the vapor pressure equals the prevailing pressure.

Bond-dissociation energy (bond energy): the energy required to break a bond per mole (while substances are in the gaseous state).

Boyle's Law: the volume of a fixed quantity of gas at constant temperature is inversely proportional to pressure.

calorie: the amount of energy required to raise the temperature of 1 gram one water 1°C.

Calorimeter: a device used to measure the heat associated with a chemical reaction.

Calorimetry: the science of measuring heat.

Cation: an atom that has lost one or more electrons and has a positive charge.

Charles's Law: the volume of a fixed quantity of gas at constant pressure is directly proportional to the absolute temperature (Kelvin).

Chemical change: transforms a substance into a chemically different substance.

Chemical energy: the energy stored in chemical compounds.

Chemical properties: describe the way a substance may change or react to form other substances.

Chemical reaction: a reorganization of atoms in the way they are bonded together.

Chemistry: the science concerned with the properties, composition, structure, and transformations of matter.

Compound: a substance composed of two or more elements chemically combined; a substance that can be decomposed into simpler substances by chemical means.

Core electrons: the inner electrons.

Covalent bond: a bond formed by sharing electrons in order for the atoms to obtain noble gas electron configurations.

Crystal: a regular three dimensional arrangement of particles (atoms, ions, or molecules).

Dalton's law of partial pressure: For a mixture of gases, the total pressure is the sum of the pressures that each gas would exert if it were alone.

Diamagnetic: all electrons are paired. Diamagnetic elements are weakly attracted to a magnet.

Diffusion: the mixing of gases.

Effective nuclear charge: the net positive charge attracting an electron.

Effusion: the passage of a gas through a tiny hole into an area of lower pressure.

Electrical energy: the energy associated with motion of electrons.

Electrolyte: a substance that conducts electricity when dissolved in water.

Electromagnetic Spectrum: the complete range of radiant energy.

Electronegativity: the ability of an atom to attract electrons to itself in a chemical bond.

Element: matter composed of only one kind of atom; matter that can not be decomposed into simpler substances by chemical means.

Empirical formula: shows the simplest atom ratio per molecule.

Endothermic reaction: a reaction that absorbs energy from the surroundings.

Energy: the ability to do work or produce heat.

Enthalpy (heat) of formation: the heat released when one mole of a species is formed from the elements.

Enthalpy: heat change at constant pressure.

Excited state atom: one or more e^- 's have moved to a higher energy state.

Exothermic reaction: a reaction that has a net release of energy.

Extensive (Extrinsic) properties: properties that depend on the amount of matter present.

Frequency: the number of waves that pass a given point each second.

Gas Laws: equations that show the relationships between temperature, pressure, volume and moles of a gas.

Ground state atom: lowest energy state for the atom; all electrons are in the lowest energy states possible.

Heat: the energy transferred from a body at a higher temperature to a body at a lower temperature.

Heat of fusion (ΔH_{fus}): the heat required to melt 1 g of substance (assuming it's already at its melting point temperature.)

Heat of vaporization (ΔH_{vap}): the heat required to vaporize 1 g of substance (assuming it's already at its boiling point temperature.)

Hess's Law: If a reaction is the sum of two or more reactions, ΔH for the overall process is the sum of the ΔH 's for the individual steps.

Heterogeneous mixtures: mixtures that do not have the same composition throughout.

Homogeneous mixtures (solutions): mixtures that have the same composition throughout.

Hund's rule: each degenerate orbital will have one electron before pairing of electrons begins.

Ideal gas: one that behaves the ideal gas law exactly.

Intensive (Intrinsic) properties: properties that do not depend on the amount of sample; can often be used to identify a substance.

Ionic bond: the attraction between cations and anions.

Ionization: occurs when one or more electrons are completely removed from an atom.

Ions: atoms that have lost or gained one or more electrons.

Isoelectronic: atoms or ions with the same electron configuration.

Isotopes: atoms of the same element containing different numbers of neutrons.

Kinetic energy: the energy associated with motion.

Lattice (or crystal lattice): a three dimensional system of points (lattice sites) designating the centers of the particles.

Law of Conservation of Mass: Atoms are neither created nor destroyed in a chemical reaction.

Law of Conservation of Energy (First Law of Thermodynamics): energy can be neither created nor destroyed, but it can be converted one type to another.

Law of constant composition: a pure compound always consists of the same elements combined in the same proportions.

Law: a statement of a relation that is always the same under the given conditions.

Light: a form of energy known as radiant energy or electromagnetic radiation.

Mass: a measure of the amount of matter in an object.

Matter: anything that occupies space and has mass.

Mixture: a combination of two or more substances.

Molar volume: the volume of one mole of gas at standard temperature and pressure.

Molecular formula: shows the true number of atoms per molecule.

Molecule: the smallest unit of a compound that retains the chemical characteristics of the compound; a chemical combination of two or more atoms.

Network (Covalent) Solids: solids in which atoms are joined by a continuous network of covalent bonds.

Octet rule (duet rule): atoms tend to gain, lose, or share electrons until they have a noble gas electron configuration.

Orbital: an allowed energy state for an e^- or a region of space where the probability of finding an e^- is high.

Oxidation: the loss of electrons; the oxidation number for a species gets larger.

Oxidation-Reduction Reaction (redox): a reaction that involves a transfer or shift of electrons between two species.

Paramagnetic: unpaired electrons exist. Paramagnetic elements are weakly attracted to a magnet.

Pauli Exclusion Principle: no two e^- 's can have the same set of four quantum numbers in an atom.

Photon: a particle of radiant energy.

Physical change: changes a substance's physical appearance only.

Physical properties: can be measured without changing the chemical identity of the substance.

Potential energy: stored energy.

Precipitate: an insoluble solid that forms in and separates out of a solution.

Pressure: The amount of force exerted on a given area.

Pressure: the force that acts on a given area.

Reduction: the gain of electrons: the oxidation number for a species gets smaller.

Resonance: occurs when more than one Lewis structure can be written for a given species.

Science: A system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena.

Single bond: a covalent bond consisting of one shared pair of electrons.

Specific heat: the heat needed to raise the temperature of 1 gram of substance 1°C.

Spectrum: sequence of colors.

Standard atmospheric pressure: average at sea level.

State function (property): a property that describes the present state or condition of a system; it doesn't involve a change.

Stoichiometry: the relationship between the quantities of reactants and products in a chemical reaction.

Structural formula: shows how atoms are joined together.

Substances: Matter that has a fixed composition.

Surroundings: in thermodynamics, this is the part of the universe that is not under study; everything outside the system.

System: in thermodynamics, this is the part of the universe under study.

Temperature: a measure of atomic and molecular motion.

Theoretical yield: the amount of product formed when the limiting reagent is completely converted to products.

Theory (Model): an explanation for why something happens (or happened).

Thermal energy: the energy associated with atomic and molecular motion.

Thermochemistry: the study of the relationship between energy changes and chemical reactions.

Thermodynamics: the study of energy and its transformations.

Titration (Volumetric analysis): a procedure for determining the amount of a substance by reacting it with a second substance in a solution of known concentration.

Valence electrons: the electrons in the outer most shell (principle quantum level of an atom).

Valence shell: the outer most shell of an atom.

Vapor Pressure: pressure exerted by molecules evaporating from a surface.

Wavelength: distance between crests.

Weight: the force that an object exerts against something else because of gravity.