

Science Glossary

- Unit** A defined quantity based on a standard. For example, in the value 100 meters, *meter* is the unit.
- Mass** The amount of matter in an object. Mass can also be defined as the property of matter that leads to gravitational attractions between objects and therefore gives rise to weight.
- Element** A substance that cannot be chemically converted into simpler substances; a substance in which all of the atoms have the same number of protons and therefore the same chemical characteristics.
- Metals** The elements that (1) have a metallic luster, (2) conduct heat and electric currents well, and (3) are malleable.
- Nonmetals** The elements that do not have the characteristics of metals. Some of the nonmetals are gases at room temperature and pressure, some are solids, and one is a liquid. Various colors and textures occur among the nonmetals.
- Metalloids or semimetals** The elements that have some but not all of the characteristics of metals.
- Representative elements** The elements in groups 1, 2, and 13 through 18 (the “A” groups) on the periodic table; also called *main-group elements*.
- Main-group elements** The elements in groups 1, 2, and 13 through 18 (the “A” groups) on the periodic table; also called *representative elements*.
- Transition metals** The elements in groups 3 through 12 (the “B” groups) on the periodic table.
- Inner transition elements** The 28 elements at the bottom of the periodic table.
- Periods** The horizontal rows on the periodic table.
- Atom** The smallest part of an element that retains the chemical characteristics of the element.
- Proton** A positively charged particle found in the nucleus of an atom.
- Electron** A negatively charged particle found outside the nucleus of an atom.
- Neutron** An uncharged particle found in the nucleus of an atom.
- Nucleus** The extremely small, positively charged core of the atom.
- Ion** Any charged particle, whether positively or negatively charged.
- Cation** An ion formed from an atom that has lost one or more electrons and thus has become positively charged.
- Anion** An ion formed from an atom that has gained one or more electrons and thus has become negatively charged.
- Isotopes** Atoms that have the same number of protons but different numbers of neutrons. They have the same atomic number but different mass numbers.
- Atomic number** The number of protons in an atom’s nucleus. It establishes the element’s identity.
- Mass number** The sum of the number of protons and neutrons in an atom’s nucleus.
- Covalent bond** A link between atoms that results from their sharing two electrons.
- Molecule** An uncharged collection of atoms held together with covalent bonds.
- Compound** A substance that contains two or more elements, the atoms of these elements always combining in the same whole-number ratio.

Chemical formula A concise written description of the components of a chemical compound. It identifies the elements in the compound by their symbols and indicates the relative number of atoms of each element with subscripts.

Pure substance A sample of matter that has constant composition. There are two types of pure substances, elements and compounds.

Mixture A sample of matter that contains two or more pure substances and has variable composition.

Chemical bond An attraction between atoms or ions in chemical compounds. Covalent bonds and ionic bonds are examples.

Polar covalent bond A covalent bond in which electrons are shared unequally, leading to a partial negative charge on the atom that attracts the electrons more and to a partial positive charge on the other atom.

Nonpolar covalent bond A covalent bond in which the difference in electron-attracting ability of two atoms in a bond is negligible (or zero), so the atoms in the bond have no significant charges.

Ionic bond The attraction between a cation and an anion.

Molecular compound A compound composed of molecules. In such compounds, all of the bonds between atoms are covalent bonds.

Ionic compound A compound that consists of ions held together by ionic bonds.

Polyatomic ion A charged collection of atoms held together by covalent bonds.

Lone pair Two electrons that are not involved in the covalent bonds between atoms but are important for explaining the arrangement of atoms in molecules. They are represented by pairs of dots in Lewis structures.

Lewis structure A representation of a molecule that consists of the elemental symbol for each atom in the molecule, lines to show covalent bonds, and pairs of dots to indicate lone pairs.

Enzyme A naturally occurring catalyst.

Substrate A molecule that an enzyme causes to react.

Active site A specific section of the protein structure of an enzyme in which the substrate fits and reacts.

Hydrocarbons Compounds that contain only carbon and hydrogen.

Organic chemistry The branch of chemistry that involves the study of carbon-based compounds.

Double bond A link between atoms that results from the sharing of four electrons. It can be viewed as two 2-electron covalent bonds.

Triple bond A link between atoms that results from the sharing of six electrons. It can be viewed as three 2-electron covalent bonds.

Isomers Compounds that have the same molecular formula but different molecular structures.

Energy The capacity to do work.

Kinetic energy The capacity to do work due to the motion of an object.

Potential energy A retrievable, stored form of energy an object possesses by virtue of its position or state.

Endergonic (endogonic) change Change that absorbs energy.

Exergonic (exogonic) change Change that releases energy.

Joule (J) The accepted international unit for energy.

calorie (with a lowercase c) A common energy unit. There are 4.184 joules per calorie (abbreviated *cal*).

Calorie (with an upper case C) The dietary calorie (abbreviated Cal). In fact, it is a kilocalorie, the equivalent of 4184 joules.

Temperature A measure of the average internal kinetic energy of an object.

Heat The energy transferred from a region of higher temperature to a region of lower temperature due to collisions between particles.

Radiant energy or electromagnetic radiation Energy that can be described in terms of either oscillating electric and magnetic fields or in terms of a stream of tiny packets of energy with no mass.

Photons Tiny packets or particles of radiant energy.

Wavelength (λ) The distance in space over which a wave completes one cycle of its repeated form.

Power The rate at which energy changes form or location.

Entropy A thermodynamic property that can be used to determine the energy not available for work in a thermodynamic process, such as in energy conversion devices, engines, or machines. Such devices can only be driven by convertible energy, and have a theoretical maximum efficiency when converting energy to work. During this work, entropy accumulates in the system, which then dissipates in the form of waste heat.

Heat capacity (C) amount of heat required to change a substance's temperature by a given amount. In the International System of Units (SI), heat capacity is expressed in units of joule(s) (J) per kelvin (K).

Specific heat capacity, often simply called **specific heat** The heat capacity per unit mass of a material.

Chemical reaction or chemical change The conversion of one or more pure substances into one or more different pure substances.

Reactants The substances that change in a chemical reaction. Their formulas are on the left side of the arrow in a chemical equation.

Products The substances that form in a chemical reaction. Their formulas are on the right side of the arrow in a chemical equation.

Coefficients The numbers in front of chemical formulas in a balanced chemical equation.

Solution A mixture whose particles are so evenly distributed that the relative concentrations of the components are the same throughout. Solutions can also be called homogeneous mixtures.

Aqueous solution A solution in which water is the solvent.

Solute The gas in a solution of a gas in a liquid. The solid in a solution of a solid in a liquid. The minor component in other solutions.

Solvent The liquid in a solution of a gas in a liquid. The liquid in a solution of a solid in a liquid. The major component in other solutions.

Exothermic change Change that leads to heat energy being released from the system to the surroundings.

Endothermic change Change that leads the system to absorb heat energy from the surroundings.

Oxidation Any chemical change in which at least one element loses electrons, either completely or partially.

Reduction Any chemical change in which at least one element gains electrons, either completely or partially.

Oxidation-reduction reactions The chemical reactions in which there is a complete or partial transfer of electrons, resulting in oxidation and reduction. These reactions are also called **redox** reactions.

Reducing agent A substance that loses electrons, making it possible for another substance to gain electrons and be reduced.

Oxidizing agent A substance that gains electrons, making it possible for another substance to lose electrons and be oxidized.