

**Aufbau principle** the principle that states that the structure of each successive element is obtained by adding one proton to the nucleus of the atom and one electron to the lowest-energy orbital that is available (111)

**autotroph** an organism that produces its own nutrients from inorganic substances or from the environment instead of consuming other organisms (766)

**average atomic mass** the weighted average of the masses of all naturally occurring isotopes of an element (81)

**Avogadro's law** the law that states that equal volumes of gases at the same temperature and pressure contain equal numbers of molecules (379)

**Avogadro's number**  $6.02 \times 10^{23}$ , the number of atoms or molecules in 1 mol (83)

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## B

**barometer** an instrument that measures atmospheric pressure (363)

**benzene** the simplest aromatic hydrocarbon (729)

**beta particle** a charged electron emitted during certain types of radioactive decay, such as beta decay (686)

**binary acid** an acid that does not contain oxygen, such as hydrofluoric acid (468)

**binary compound** a compound composed of two different elements (222)

**boiling** the conversion of a liquid to a vapor within the liquid as well as at the surface of the liquid at a specific temperature and pressure; occurs when the vapor pressure of the liquid equals the atmospheric pressure (344)

**boiling point** the temperature and pressure at which a liquid and a gas are in equilibrium (344)

**boiling-point elevation** the difference between the boiling point of a liquid in pure state and the boiling point of the liquid in solution; the increase depends on the amount of solute particles present (450)

**bond energy** the energy required to break the bonds in 1 mol of a chemical compound (181)

**Boyle's law** the law that states that for a fixed amount of gas at a constant temperature, the volume of the gas increases as the pressure of the gas decreases and the volume of the gas decreases as the pressure of the gas increases (370)

**Brønsted-Lowry acid** a substance that donates a proton to another substance (478)

**Brønsted-Lowry acid-base reaction** the transfer of protons from one reactant (the acid) to another (the base) (479)

**Brønsted-Lowry base** a substance that accepts a proton (479)

**buffered solution** a solution that can resist changes in pH when an acid or a base is added to it; a buffer (606)

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## C

**calorimeter** a device used to measure the energy as heat absorbed or released in a chemical or physical change (531)

**capillary action** the attraction of the surface of a liquid to the surface of a solid, which causes the liquid to rise or fall (335)

**carbohydrate** any organic compound that is made of carbon, hydrogen, and oxygen and that provides nutrients to the cells of living things (751)

**carboxylic acid** an organic acid that contains the carboxyl functional group (734)

**catabolism** the chemical decomposition of complex biological substances, such as carbohydrates, proteins, and glycogen, accompanied by the release of energy (768)

**catalysis** the acceleration of a chemical reaction by a catalyst (570)

**catalyst** a substance that changes the rate of a chemical reaction without being consumed or changed significantly (570)

**catenation** the binding of an element to itself to form chains or rings (712)

**cathode** the electrode on whose surface reduction takes place (656)

**cation** an ion that has a positive charge (159)

**chain reaction** a continuous series of nuclear fission reactions (697)

**change of state** the change of a substance from one physical state to another (8)

**Charles's law** the law that states that for a fixed amount of gas at a constant pressure, the volume of the gas increases as the temperature of the gas increases and the volume of the gas decreases as the temperature of the gas decreases (372)

**chemical** any substance that has a defined composition (4)

**chemical bond** the attractive force that holds atoms or ions together (175)

**chemical change** a change that occurs when one or more substances change into entirely new substances with different properties (9)

**chemical equation** a representation of a chemical reaction that uses symbols to show the relationship between the reactants and the products (261)

**chemical equilibrium** a state of balance in which the rate of a forward reaction equals the rate of the reverse reaction and the concentrations of products and reactants remain unchanged (590)

**chemical equilibrium expression** the equation for the equilibrium constant,  $K_{eq}$  (592)

**chemical formula** a combination of chemical symbols and numbers to represent a substance (178)

**chemical kinetics** the area of chemistry that is the study of reaction rates and reaction mechanisms (568)

**chemical property** a property of matter that describes a substance's ability to participate in chemical reactions (8)

**chemical reaction** the process by which one or more substances change to produce one or more different substances (9)

**chemistry** the scientific study of the composition, structure, and properties of matter and the changes that matter undergoes (3)