Section Review 2-1

1. protons; neutrons **2.** electrons **3.** neutrons **4.** electrons **5.** ionic **6.** The two main types of chemical bonding are ionic and covalent bonding. Ionic bonds are formed when a transfer of electrons takes place from one atom to another, and covalent bonds are formed when electrons are shared between atoms. **7.** An atom becomes an ion when it gains or loses one or more electrons. **8.** Electrons and protons are both components of atoms; however, they have different charges and locations within the atom. Electrons are negatively charged and found outside the nucleus, while protons are positively charged and found inside the nucleus. Electrons are also much smaller than protons. **9.** When atoms are joined together by covalent bonds, the structure that results is a molecule. **10.** The property of radioactive isotopes that is useful for dating is the constant rate of decay.

Section Review 2-2

1. a **2.** b **3.** c **4.** c **5.** a **6.** b **7.** c **8.** Polarity in a water molecule is caused by an uneven distribution of electrons between the oxygen and hydrogen atoms. **9.** The concentration of H^+ ions determines whether a solution is acidic or basic. **10.** Capillary action is the effect of water rising in a narrow tube against the force of gravity. Cohesion holds the molecules of water together as they rise. **11.** Two types of mixtures are solutions and suspensions. In a solution, all the components are evenly distributed throughout the solution. In a suspension, small particles mixed with water are not dissolved but are kept suspended by the movement of water molecules. **12.** A base is a compound that can form a basic solution when dissolved. **13.** Acidic solutions have a lower pH than water. This is due to their greater concentration of H^+ ions than pure water. Pure water has a pH of 7 and contains equal concentrations of H^+ and OH^- ions. **14.** Strong acids and bases are dangerous to cells. Buffers are dissolved compounds that help prevent sharp, sudden swings of pH.

Section Review 2-3

1. carbohydrates **2.** proteins **3.** lipids **4.** nucleic acids **5.** proteins **6.** proteins **7.** carbohydrates **8.** nucleic acids **9.** glycerol **10.** monosaccharides **11.** ribonucleic acid (RNA), deoxyribonucleic acid (DNA) **12.** Proteins **13.** saturated **14.** Carbon atoms have 4 outer electrons and therefore can form 4 strong, stable, covalent bonds. Carbon can also bond with other carbon atoms, which gives it the ability to form chains and rings. These carbon–carbon bonds can be single, double, or triple bonds. **15.** Both plastics and polysaccharides are organic polymers, or chains of carbon-containing molecules. Polysaccharides are naturally occurring molecules found in the body, while plastics are synthetic molecules made in factories or labs.

Section Review 2-4

1. release **2.** changed **3.** activation energy **4.** substrates **5.** A catalyst lowers the activation energy. An enzyme is an example of a catalyst. It works by attaching to the substrate. **6.** A chemical reaction involves reactants changing to products. A catalyst is often needed to begin the chemical reaction. **7.** Path A has the greatest activation energy. **8.** Graph 1 shows a reaction that absorbs energy. **9.** Pathway B is the reaction pathway without enzyme, and Pathway C is the reaction pathway with enzyme. The enzyme lowers the activation energy. **10.** This imaginary enzyme would work best when the body temperature is elevated. Therefore, students' answers should mention a function involving recovery from fever, or reduction of body temperature after exercise.

Chapter Vocabulary Review

1. nucleus **2.** element **3.** compound **4.** ionic, covalent **5.** van der Waals forces **6.** A sodium atom is a neutral particle that contains equal numbers of protons and electrons. A sodium ion is a sodium atom that has a positive charge because it has lost an electron. **7.** Cohesion is an attraction between molecules of the same substance, and adhesion is an attraction between different substances. **8.** Water is the solvent because it is the substance that the salt is dissolved in, and salt is the solute because it is the substance that is dissolved. **9.** Acids are compounds that have higher concentrations of H^+ ions than water and have pH values below 7. Bases are compounds that have lower concentrations of H^+ ions than water and have pH values higher than 7. **10.** A catalyst is a substance that speeds up the rate of a chemical reaction by lowering the activation energy. The substrate is the reactant in an enzyme-catalyzed reaction. **11.** c **12.** e **13.** g **14.** a **15.** b **16.** h **17.** d **18.** f **19.** i **20.** nucleotide **21.** amino acid **22**. reactants **23.** activation energy **24.** products

Enrichment

1. Student answers should include blood. Many substances in the environment are colloids, such as smoke, fog, and dust. **2.** Particles in a colloid are usually much smaller than particles in a suspension. Suspension particles tend to settle out after a period of time, and colloid particles will continue to mix with the liquid or gas that they are suspended in. They both can be made up of solids, liquids, or gases in some combination.

Graphic Organizer: Concept Map

1. hydrogen **2.–4.** oxygen, nitrogen, phosphorus **5.** lipids **6.** proteins **7.** nucleic acids

8. polysaccharides **9.–10.** to store energy; to form biological membranes **11.** amino acids **12.–13.** DNA; RNA

Design an Experiment

Analyze and Conclude

1. Catalase catalyzes a reaction that releases oxygen gas. Bubbles of oxygen form around the filter-paper disk, lifting it to the surface of the liquid. The more active the enzyme, the more quickly bubbles sufficient to lift the disk are produced. **2.** A possible student answer would be that temperature directly affected the catalase activity. A student's prediction that an increase in temperature would lead to an increase in catalase activity would be correct. Correct student data should also show the catalase activity dropping off at temperatures beyond 45°C.
3. Student answers should show that the graph did indicate the catalase being most active around 37°C.