7. Solid particles in air that can harm organisms directly or make the environment harmful are called smog. _____

ANS: particulates DIF: B OBJ: 6-3

8. The planned management of a natural area to prevent its exploitation or destruction is landfilling. _____

ANS: conservation DIF: B OBJ: 6-5

9. Acid precipitation is rainwater or snow that has a lower pH than unpolluted rainwater. _____

ANS: true DIF: B OBJ: 6-3

10. Materials that can be broken down by natural processes are renewable. _____

ANS: biodegradable DIF: B OBJ: 6-4

11. A species whose numbers have become so low that it could become extinct is a(n) endangered species. _____

ANS: true DIF: B OBJ: 6-5

12. The process whereby heat is retained by gases in the atmosphere is the ozone effect. _____

ANS: greenhouse DIF: B OBJ: 6-3

13. Conservation is the act of protecting an area or organism from harm or destruction. _____

ANS: Preservation DIF: B OBJ: 6-5

14. The part of the atmosphere that protects organisms on Earth's surface from harmful ultraviolet radiation is the troposphere. _____

ANS: ozone layer DIF: B OBJ: 6-3

CHAPTER 7—THE CHEMISTRY OF LIFE

MULTIPLE CHOICE

1. Which of the following compounds may be polymers?
   a. carbohydrates
   b. nucleic acids
   c. proteins
   d. all of these

   ANS: D DIF: B OBJ: 7-8

2. Which of the following does NOT describe a polymer?
   a. Polymers are made of monomers.
   b. Polymers are large molecules.
   c. Polymers usually form by covalent bonding.
   d. Polymers are broken down by the process of hydrogenation.

   ANS: D DIF: B OBJ: 7-7

3. The first carbon compounds that scientists studied were called _____ compounds because they came from living organisms.
   a. water
   b. organic
   c. homogeneous
   d. biological

   ANS: B DIF: B OBJ: 7-6

4. How many electrons can a carbon atom share?
   a. one
   b. two
   c. three
   d. four

   ANS: D DIF: B OBJ: 7-6

5. Which of the following is a chemical reaction?
   a. tearing paper into strips
   b. burning paper
   c. picking up iron filings with a magnet
   d. mixing salt and sugar in the same container

   ANS: B DIF: B OBJ: 7-4

6. _____ represents a formula for a chemical compound.
   a. H
   b. C
   c. P
   d. H_2O

   ANS: D DIF: B OBJ: 7-4

7. The nucleus of an atom contains _____.
   a. protons and neutrons
   b. neutrons and electrons
   c. protons and electrons
   d. protons, neutrons, and electrons

   ANS: A DIF: B OBJ: 7-1

8. Electrons move about the nucleus of an atom in regions called _____.
   a. electron clouds
   b. nuclei
   c. air
   d. isotopes

   ANS: A DIF: B OBJ: 7-1

9. What are the basic building blocks of proteins?
   a. nucleic acids
   b. peptide bonds
   c. amino acids
   d. glycerol and fatty acids

   ANS: C DIF: B OBJ: 7-8

10. Water dissolves many ionic and molecular compounds because of its _____.
    a. ionic bonding
    b. polarity
    c. covalent bonding
    d. hydrogen bonding

    ANS: B DIF: B OBJ: 7-5

11. When molecules of glucose and fructose combine to form sucrose, they do so by _____.
    a. hydrolysis
    b. electron clouds
    c. condensation
    d. radiation

    ANS: C DIF: B OBJ: 7-7

12. A chlorine atom becomes a chloride ion when it _____.
    a. gains an electron
    b. loses an electron
    c. gains a neutron
    d. loses a proton

    ANS: A DIF: B OBJ: 7-3

13. The various enzymes in our bodies are _____.
    a. lipids
    b. carbohydrates
    c. nucleotides
    d. proteins

    ANS: D DIF: B OBJ: 7-8

14. Glucose and fructose, with the formula $C_6H_{12}O_6$, differ in _____.
    a. numbers of atoms
    b. arrangement of atoms
    c. kinds of atoms
    d. arrangement of electrons

    ANS: B DIF: B OBJ: 7-8

15. A very strong base might have a pH of _____.
    a. 3
    b. 5
    c. 9
    d. 13

    ANS: D DIF: B OBJ: 7-5

16. Carbon-12, carbon-13, and carbon-14 are _____.
    a. isotopes
    b. polymers
    c. radioisotopes
    d. macromolecules

    ANS: A DIF: B OBJ: 7-2

17. The total number of atoms in a molecule of sucrose, $C_{12}H_{22}O_{11}$, is _____.
    a. 11
    b. 12
    c. 22
    d. 45

    ANS: D DIF: B OBJ: 7-4

18. An atom of fluorine has nine electrons. Its second energy level has _____.
    a. two electrons
    b. eight electrons
    c. seven electrons
    d. nine electrons

    ANS: C DIF: B OBJ: 7-1

19. An unsaturated lipid contains _____.
    a. more oxygen than hydrogen
    b. double bonds
    c. ionic bonds
    d. only one fatty acid

    ANS: B DIF: B OBJ: 7-8

20. Unlike carbohydrates and fats, proteins contain _____.
    a. nitrogen
    b. carbon
    c. hydrogen
    d. oxygen

    ANS: A DIF: B OBJ: 7-8

COMPLETION

1. An organic compound with a ratio of about two hydrogen atoms and one oxygen atom for each carbon atom is a(n) _____.

   ANS: carbohydrate DIF: B OBJ: 7-8

2. The smaller subunits that make up nucleic acids are _____.

   ANS: nucleotides DIF: B OBJ: 7-8

3. Any substance that forms hydrogen ions in water is a(n) _____.

   ANS: acid DIF: B OBJ: 7-5

4. Two atoms that share electrons are held together by _____ bonds.

   ANS: covalent DIF: B OBJ: 7-3

5. Atoms of two or more elements chemically combined are _____.

   ANS: compounds DIF: B OBJ: 7-3

6. Atoms of the same element with different numbers of neutrons are _____.

   ANS: isotopes DIF: B OBJ: 7-2

MATCHING

Match each item with the correct statement below. Write the answer in the space provided.

a. cellulose	e. polymer
b. polar molecule	f. solution
c. nucleus	g. enzyme
d. peptide bond	h. metabolism

1. _____ glucose polymer that forms the cell walls of plants
2. _____ large molecule formed when many smaller molecules bond together
3. _____ molecule with unequal distribution of charge
4. _____ protein that speeds up a chemical reaction
5. _____ bond formed between amino acids
6. _____ all the chemical changes that occur within an organism
7. _____ mixture in which one substance is distributed evenly in another
8. _____ center of an atom

1. ANS: a DIF: B OBJ: 7-8
2. ANS: e DIF: B OBJ: 7-7
3. ANS: b DIF: B OBJ: 7-3
4. ANS: g DIF: B OBJ: 7-8
5. ANS: d DIF: B OBJ: 7-8
6. ANS: h DIF: B OBJ: 7-4
7. ANS: f DIF: B OBJ: 7-5
8. ANS: c DIF: B OBJ: 7-1

SHORT ANSWER

1. Describe the atomic structure of a carbon atom, including the electron energy levels.

   ANS: A carbon atom has six neutrons and six protons in its nucleus and two electrons in the first energy level and four electrons in the second energy level.

   DIF: A OBJ: 7-1

2. Explain how polymers may be broken down in living things.

   ANS: Polymers may be broken down by hydrolysis, the reverse of condensation. Hydrogen is added to one part of the molecule, and hydroxide is added to another. This separates the two into smaller molecules, eventually forming monomers.

   DIF: A OBJ: 7-7

3. Explain how polymers may be made in living things.

   ANS: Polymers may be formed from a variety of monomers by condensation. Condensation is the combining of a hydrogen atom from one monomer with a hydroxide from a second monomer, forming water. As the water is formed, the two monomers are linked.

   DIF: A OBJ: 7-7

4. Explain the importance of carbon's ability to form covalent bonds in straight chains, branched chains, or rings.

   ANS: Carbon's ability to form covalent bonds is important in allowing for a wide variety of organic molecules. Living things require such a variety to carry out life processes.

   DIF: A OBJ: 7-6

5. Why is the polar property of water important?

   ANS: Answers may include: Polarity allows water to dissolve many materials but not react with them chemically in the process.

   DIF: A OBJ: 7-5

6. Explain how sodium and chlorine combine to form a stable compound in a chemical reaction.

   ANS: Sodium (Na) atoms each lose one electron. Chlorine (Cl) atoms each gain one electron. When sodium chloride (NaCl) is formed by ionic bonding, the resulting molecule is stable.

   DIF: A OBJ: 7-3

7. Explain how isotopes can be utilized in medicine.

   ANS: Some isotopes are radioactive and can be used to diagnose a disease, such as measuring the function of the thyroid gland using radioactive iodine. They can also be used to treat some diseases such as cancer.

   DIF: A OBJ: 7-2