Chapter 02 - Chemistry of Life

Multiple Choice

1. A pure substance that cannot be broken down into another substance is known as a(n) ____.
   a. proton
   b. electron
   c. compound
   d. element
   e. isotope

ANSWER: d
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.1 Atoms and Elements
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

2. Which element is not one of the four most common elements found in organisms?
   a. hydrogen
   b. oxygen
   c. carbon
   d. helium
   e. nitrogen

ANSWER: d
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.1 Atoms and Elements
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

3. The atomic number denotes the number of ____ in an atom of a particular element.
   a. electrons
   b. neutrons
   c. energy levels
   d. protons
   e. isotopes

ANSWER: d
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.1 Atoms and Elements
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

4. Isotopes of an element are different from the most common standard form due to differences in the ____.
   a. atomic number
   b. position of the element in the periodic table
   c. number of neutrons in the nucleus
   d. number of protons in the nucleus
   e. size of the electron cloud

ANSWER: c
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.1 Atoms and Elements
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

5. Radioisotopes ____.
   a. are unstable and emit energy and particles to stabilize themselves.
   b. are different elements from the "standard" elements.
   c. are very stable and do not change over time.
   d. are so unstable that they rarely exist in nature
   e. exist only for carbon and oxygen

ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.1 Atoms and Elements
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

6. A tracer is a substance with what attached to it?
   a. a radioisotope
   b. water
   c. glucose
   d. ion
   e. antibodies

ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.2 PET Scanning-Using Radioisotopes in Medicine
LEARNING OBJECTIVES: HBIO.STMC.16.2.2 - Explain the use of radioisotopes in medicine.

7. Positron emission tomography (PET) utilizes ____ to yield results of a scan.
   a. x-rays
   b. tracers
   c. glucose
   d. ion
   e. photons

ANSWER: b
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.2 PET Scanning-Using Radioisotopes in Medicine
LEARNING OBJECTIVES: HBIO.STMC.16.2.2 - Explain the use of radioisotopes in medicine.

8. Which statement is true of electron shells?
   a. The innermost shell can hold up to two electrons.
   b. The innermost shell is at the highest energy level.
   c. A shell can hold up 20 electrons.
   d. Larger atoms have less electron shells.
   e. A second shell with six electrons is completely filled.

ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.3 Chemical Bonds: How Atoms Interact
LEARNING OBJECTIVES: HBIO.STMC.16.2.3 - Explain how chemical bonds are formed.

9. What is the maximum number of electrons in a shell?
   a. 0
   b. 2
   c. 6
   d. 8
   e. 12

ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.3 Chemical Bonds: How Atoms Interact
LEARNING OBJECTIVES: HBIO.STMC.16.2.3 - Explain how chemical bonds are formed.

10. When an atom's outer electron shell is filled, the atom is ____.
   a. unstable
   b. positively charged
   c. polarized
   d. most stable
   e. isotope

ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.3 Chemical Bonds: How Atoms Interact
LEARNING OBJECTIVES: HBIO.STMC.16.2.3 - Explain how chemical bonds are formed.

11. The bonding of two or more atoms creates a(n) ____.
   a. molecule
   b. ion
   c. isotope
   d. mixture
   e. solution

ANSWER: a
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.3 Chemical Bonds: How Atoms Interact
LEARNING OBJECTIVES: HBIO.STMC.16.2.3 - Explain how chemical bonds are formed.

12. The blending of two or more kinds of molecules is a(n)____.
   a. compound
   b. isotope
   c. reactant
   d. mixture
   e. chemical bond

ANSWER: d
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.3 Chemical Bonds: How Atoms Interact
LEARNING OBJECTIVES: HBIO.STMC.16.2.3 - Explain how chemical bonds are formed.

13. If a chlorine atom has 7 electrons in its outer energy level, which of the following is true about chlorine?

a. It is stable as it is and will not react with other atoms.
b. It will lose an electron during a chemical reaction.
c. It has an electron structure similar to sodium atoms.
d. It will form a covalent bond with sodium.
e. When it fills its outer electron shell, it becomes a negatively charged ion.

ANSWER: e
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological molecules.

14. Covalent bonds ____.
a. occur when ions of opposite charge are attracted to each other
b. occur during oxidation reactions
c. are the weak link between two water molecules
d. are extremely strong and stable
e. form bonds that hold Na and Cl together in NaCl (table salt)

ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological molecules.

15. An ion is formed ____.
a. during covalent bonds
b. when water molecules are bound together
c. when atoms exchange electrons
d. when atoms share electrons equally
e. when atoms share electrons unequally

ANSWER: c
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological molecules.

16. Which type of bond is responsible for the linking together of two water molecules?
a. hydrogen
b. ionic
c. polar covalent
d. nonpolar covalent
e. isotropic

ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological

molecules.

17. Which type of bond is responsible for the linking together of atoms within a water molecule?
    a. hydrogen
    b. ionic
    c. polar covalent
    d. nonpolar covalent
    e. isotropic

ANSWER: c
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological molecules.

18. An atom carries no charge because it has as many electrons as ____.
    a. protons
    b. neutrons
    c. orbitals
    d. neutrinos
    e. shells

ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological molecules.

19. How do hydrophilic molecules interact with water?
    a. They are attracted to water.
    b. They are absorbed by water.
    c. They are repelled by water.
    d. They absorb heat from water.
    e. They transfer heat to water.

ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.5 Water: Necessary for Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.5 - Describe the chemical properties of water that help support life.

20. What makes water a good solvent?
    a. It dissolves ions and polar molecules.
    b. It dissolves fats.
    c. It mixes well with alcohol.
    d. It heats up very quickly.
    e. It is very acidic.

ANSWER: a
DIFFICULTY: Bloom's: Understand

REFERENCES: 2.5 Water: Necessary for Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.5 - Describe the chemical properties of water that help support life.

21. Water has a high heat capacity because it has ____.
    a. covalent bonds
    b. ionic bonds
    c. low freezing point
    d. high boiling point
    e. hydrogen bonds

ANSWER: e
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.5 Water: Necessary for Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.5 - Describe the chemical properties of water that help support life.

22. A dissolved substance in water is a(n)____.
    a. solvent
    b. solute
    c. antioxidant
    d. free radical
    e. acid

ANSWER: b
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.5 Water: Necessary for Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.5 - Describe the chemical properties of water that help support life.

23. Which statement is true of water?
    a. Water molecules attract hydrophobic substances.
    b. Water evaporates after absorbing small amounts of heat energy.
    c. Water's hydrogen atom is slightly negative.
    d. Water molecules are polar.
    e. Water's oxygen atom is slightly positive.

ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.5 Water: Necessary for Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.5 - Describe the chemical properties of water that help support life.

24. A free radical takes what particle from a stable molecule?
    a. a proton
    b. an electron
    c. a neutron
    d. an atom
    e. a hydrogen ion

ANSWER: b
DIFFICULTY: Bloom's: Understand

REFERENCES: 2.6 Antioxidants Help Protect Cells
LEARNING OBJECTIVES: HBIO.STMC.16.2.6 - Explain how antioxidants help protect cells.

25. A substance that gives up an electron to a free radical is a(n) ____.
    a. oxidizer
    b. antioxidant
    c. antibiotic
    d. antibody
    e. antiviral

ANSWER: b
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.6 Antioxidants Help Protect Cells
LEARNING OBJECTIVES: HBIO.STMC.16.2.6 - Explain how antioxidants help protect cells.

26. An acid is a substance that donates a(n) ____.
    a. neutron
    b. antioxidant
    c. hydroxide ion
    d. electron
    e. proton

ANSWER: e
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.7 Acids, Bases and Buffers
LEARNING OBJECTIVES: HBIO.STMC.16.2.7 - Explain the role of acids, bases, salts, and buffers in the body.

27. A solution with a pH of 7.4 ____.
    a. is considered an acid
    b. has more H^+ than OH^-
    c. has equal numbers of H^+ and OH^-
    d. has a pH similar to ammonia
    e. is similar in acidity to normal body fluids

ANSWER: e
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.7 Acids, Bases and Buffers
LEARNING OBJECTIVES: HBIO.STMC.16.2.7 - Explain the role of acids, bases, salts, and buffers in the body.

28. A buildup of H^+ in the blood will lead to ____.
    a. alkalosis
    b. acidosis
    c. excess calcium
    d. excess carbon dioxide
    e. a higher than normal pH

ANSWER: b
DIFFICULTY: Bloom's: Understand`

REFERENCES: 2.7 Acids, Bases and Buffers
LEARNING OBJECTIVES: HBIO.STMC.16.2.7 - Explain the role of acids, bases, salts, and buffers in the body.

29. A system that compensates for pH fluctuations by donating or accepting H^+ is known as a(n) ____.
    a. acid
    b. base
    c. salt
    d. buffer
    e. antioxidant
ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.7 Acids, Bases and Buffers
LEARNING OBJECTIVES: HBIO.STMC.16.2.7 - Explain the role of acids, bases, salts, and buffers in the body.

30. A compound that contains both carbon and hydrogen is ____.
    a. a salt
    b. always an acid
    c. non-biological
    d. organic
    e. inorganic
ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

31. Each carbon atom can share pairs of electrons with as many as ____ other atoms.
    a. two
    b. three
    c. four
    d. five
    e. six
ANSWER: c
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

32. Atoms or clusters of atoms that are covalently bonded to carbon and influence the behavior of organic compounds are known as ____.
    a. ions
    b. anhydrides
    c. antioxidants
    d. acids
    e. functional groups
ANSWER: e

DIFFICULTY: Bloom's: Remember
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

33. A protein inside cells that speeds up the rate of a chemical reaction is a(n) ____.
    a. hydrocarbon
    b. inorganic compound
    c. enzyme
    d. buffer
    e. functional group

ANSWER: c
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

34. During an hydrolysis reaction, ____.
    a. covalent bonds are formed
    b. a water molecule is formed
    c. bonds are broken
    d. polymers are formed
    e. condensation occurs

ANSWER: c
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

35. The process by which the movement of internal bonds converts one type of organic compound into another is ____.
    a. condensation
    b. cleavage
    c. functional group transfer
    d. electron transfer
    e. rearrangement

ANSWER: e
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

36. The building block of large carbohydrates is ____.
    a. amino acids
    b. glycerol
    c. polysaccharide
    d. glucose
    e. glycogen

ANSWER: d

DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

37. During a synthesis reaction, glucose and fructose combine to form ____.
    a. glycogen
    b. sucrose
    c. starch
    d. a monosaccharide
    e. a polysaccharide

ANSWER: b
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

38. Which of the following is composed of a 1:2:1 ratio of carbon to hydrogen to oxygen?
    a. carbohydrate
    b. protein
    c. lipid
    d. nucleic acid
    e. steroid

ANSWER: a
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

39. Animals store carbohydrates in the form of ____.
    a. glycogen
    b. starch
    c. glucose
    d. sucrose
    e. lipids

ANSWER: a
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

40. Plants store large amounts of carbohydrates in the form of ____.
    a. glycogen
    b. starch
    c. glucose
    d. sucrose
    e. lipids

ANSWER: b

DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

41. Which carbohydrate, found only in plants, is indigestible by humans?
    a. glycogen
    b. starch
    c. glucose
    d. sucrose
    e. cellulose

ANSWER: e
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

42. A lipid is a(n) ____.
    a. polar hydrocarbon
    b. polar peptide
    c. nonpolar peptide
    d. ionic polar hydrocarbon
    e. nonpolar hydrocarbon

ANSWER: e
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

43. The most abundant lipids in the body are ____.
    a. triglycerides
    b. oils
    c. waxes
    d. fatty acids
    e. phospholipids

ANSWER: a
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

44. Fats that stay liquid at room temperature are ____.
    a. animal fats
    b. unsaturated
    c. transfatty acids
    d. phospholipids
    e. cholesterol

ANSWER: b

DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

45. What fat is the building block for cell membranes?
    a. trans fatty acids
    b. sterols
    c. phospholipids
    d. triglycerides
    e. cholesterol
ANSWER: c
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

46. A phospholipid molecule contains a "head" portion that ____.
    a. is hydrophilic
    b. is derived from cholesterol
    c. contains two fatty acid chains
    d. is similar in structure to a triglyceride
    e. forms a hydrophobic barrier
ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

47. Which class of fats is used to synthesize various vitamins and hormones?
    a. fatty acids
    b. triglycerides
    c. phospholipids
    d. sterols
    e. waxes
ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

48. Proteins perform four of the following functions. They do NOT, however ____.
    a. act as enzymes
    b. store large amounts of energy
    c. act as transport molecules
    d. bind molecules to or inside cells
    e. adjust cell activities
ANSWER: b

DIFFICULTY: Bloom's: Understand
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

49. The structural building blocks for proteins are ____.
    a. enzymes
    b. amino acids
    c. cholesterol
    d. polysaccharides
    e. vitamins
ANSWER: b
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

50. The type of bond that exists between amino acids in a protein is a(n) ____ bond.
    a. peptide
    b. hydrogen
    c. ionic
    d. glycosidic
    e. primary
ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

51. The sequence of amino acids in a protein represents its ____.
    a. primary structure
    b. secondary structure
    c. three dimensional shape
    d. tertiary folding pattern
    e. biological function
ANSWER: a
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

52. Which part of the amino acid helps to determine its chemical properties?
    a. amino group
    b. carboxyl group
    c. covalent bond
    d. peptide bond
    e. R-group
ANSWER: e

DIFFICULTY: Bloom's: Remember
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

53. There are how many different types of amino acids?
    a. 5
    b. 10
    c. 15
    d. 20
    e. 50
ANSWER: d
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

54. What level of protein structure is associated with the folding of coils and sheets to form a hollow region through which substances can move into and out of cells?
    a. primary
    b. secondary
    c. tertiary
    d. quaternary
    e. binary
ANSWER: c
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.12 A Protein's Shape and Function
LEARNING OBJECTIVES: HBIO.STMC.16.2.12 - Explain the relationship between a protein's shape and its function.

55. Which protein binds and releases oxygen molecules?
    a. collagen
    b. insulin
    c. keratin
    d. hemoglobin
    e. enzymes
ANSWER: d
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.12 A Protein's Shape and Function
LEARNING OBJECTIVES: HBIO.STMC.16.2.12 - Explain the relationship between a protein's shape and its function.

56. A protein combined with cholesterol in the blood is an example of a(n) ____.
    a. irregular protein
    b. lipoprotein
    c. glycoprotein
    d. denatured protein
    e. collagen
ANSWER: b

DIFFICULTY: Bloom's: Remember
REFERENCES: 2.12 A Protein's Shape and Function
LEARNING OBJECTIVES: HBIO.STMC.16.2.12 - Explain the relationship between a protein's shape and its function.

57. A nucleotide is composed of at least one sugar, one phosphate group, and ____.
    a. one nitrogen-containing base
    b. one amino acid
    c. multiple cholesterol molecules
    d. fatty acid chains
    e. ATP

ANSWER: a
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.13 Nucleotides and Nucleic Acids
LEARNING OBJECTIVES: HBIO.STMC.16.2.13 - Describe the composition and functions of nucleotides and nucleic acids.

58. Which nucleotide contains the sugar ribose?
    a. DNA
    b. ATP
    c. RNA
    d. cAMP
    e. UBP

ANSWER: c
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.13 Nucleotides and Nucleic Acids
LEARNING OBJECTIVES: HBIO.STMC.16.2.13 - Describe the composition and functions of nucleotides and nucleic acids.

59. Which nucleotide is associated with energy transfer?
    a. DNA
    b. ATP
    c. RNA
    d. cAMP
    e. UBP

ANSWER: b
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.13 Nucleotides and Nucleic Acids
LEARNING OBJECTIVES: HBIO.STMC.16.2.13 - Describe the composition and functions of nucleotides and nucleic acids.

60. Which pesticide can trigger rashes, hives, headaches and asthma?
    a. atrazine
    b. growth hormone
    c. anthocyanin
    d. DDT

e. sterols

ANSWER: d
DIFFICULTY: Bloom's: Understand
REFERENCES: 2.14 Food Production and a Chemical Arms Race
LEARNING OBJECTIVES: HBIO.STMC.16.2.14 - Describe the effects of the use of chemicals in food production.

Completion

61. Glycogen, starch and cellulose are examples of _____ or complex carbohydrates.
ANSWER: polysaccharides
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

62. Carbohydrates consist of carbon, hydrogen and oxygen in a ratio of _____.
ANSWER: 1:2:1
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.9 Carbohydrates: Plentiful and Varied
LEARNING OBJECTIVES: HBIO.STMC.16.2.9 - Describe the properties of the three types of carbohydrates.

63. In saturated fats, the fatty acid backbones have only _____ covalent bonds.
ANSWER: single
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

64. Phospholipids contain _____ tails that are repelled by water.
ANSWER: hydrophobic
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

65. The sterol _____ is a vital component of all cell membranes and is used to synthesize steroid hormones.
ANSWER: cholesterol
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.10 Lipids: Fats and Their Chemical Relatives
LEARNING OBJECTIVES: HBIO.STMC.16.2.10 - Describe the composition and functions of three types of lipids.

66. _____ determines the order in which amino acids form the primary structure of a protein.
ANSWER: DNA
deoxyribonucleic acid
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

67. A peptide bond is found between the amino group of one amino acid and the _____ group of a second amino acid.

ANSWER: carboxyl
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

68. The interaction of many separate polypeptide chains determines the _____ structure of a protein molecule.

ANSWER: quaternary
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.11 Proteins: Biological Molecules with Many Roles
LEARNING OBJECTIVES: HBIO.STMC.16.2.11 - Describe the seven biological roles of proteins.

69. Nucleotide-containing molecules that move hydrogen atoms and electrons from one reaction site to another are known as _____.

ANSWER: coenzymes
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.13 Nucleotides and Nucleic Acids
LEARNING OBJECTIVES: HBIO.STMC.16.2.13 - Describe the composition and functions of nucleotides and nucleic acids.

70. DNA carries the genetic material while _____ processes the genetic information to build proteins in cells.

ANSWER: RNA
ribonucleic acid
DIFFICULTY: Bloom's: Remember
REFERENCES: 2.13 Nucleotides and Nucleic Acids
LEARNING OBJECTIVES: HBIO.STMC.16.2.13 - Describe the composition and functions of nucleotides and nucleic acids.

Essay

71. The protein enzymes in the stomach work best in a very acidic environment. As the material from the stomach moves into the small intestines, the pancreas must secrete alkaline buffers into the small intestines. Based on what you know about pH and protein structure explain why this function of the pancreas is important to digestive function.

ANSWER: Answer will vary, but should be similar to this. Protein molecules have a specific three dimensional shape that determines its function. Factors such as temperature and pH can affect this shape and thus influence protein function. The enzymes that function in the stomach work best in an acidic environment but those in the small intestines work best at a more basic pH. So the pancreas must secrete alkaline buffers into the small intestines to neutralize the acidity to allow the small intestine enzymes to function properly.
DIFFICULTY: Bloom's: Apply
REFERENCES: 2.12 A Protein's Shape and Function
LEARNING OBJECTIVES: HBIO.STMC.16.2.12 - Explain the relationship between a protein's shape and its function.

Matching

Answer the questions by matching the statement with the most appropriate building block.
a. amino acids
b. glucose
c. glycerol
d. fatty acids
e. nucleotides
f. cholesterol

DIFFICULTY: Bloom's: Understand
REFERENCES: Chapter 2: Chemistry of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

72. Basic units of glycogen
ANSWER: b

73. Basic unit of genetic material
ANSWER: e

74. Basic units of proteins
ANSWER: a

75. Three of these basic units found in triglycerides
ANSWER: d

76. Used to synthesize hormones and vitamins
ANSWER: f

77. Forms the backbone of phospholipids
ANSWER: c

Answer the questions by matching the statement with the most appropriate bond type.
a. hydrogen
b. ionic
c. nonpolar covalent
d. peptide
e. disulfide

DIFFICULTY: Bloom's: Understand
REFERENCES: 2.4 Important Bonds in Biological Molecules
LEARNING OBJECTIVES: HBIO.STMC.16.2.4 - Describe the three types of chemical bonds that occur in biological molecules.

78. weak bonds between water molecules
ANSWER: a

79. unequal sharing of electrons
ANSWER: c

80. forms quaternary protein structure by linking two sulfur atoms

ANSWER: e

81. associated with the transfer of electrons between atoms
ANSWER: b

82. binds amino acids within a protein
ANSWER: d

Answer the questions by matching the statement with the most appropriate term.
a. ion
b. acid
c. base
d. buffer
e. salt
f. inorganic compound
g. organic compound
h. functional group
i. hydrophobic
DIFFICULTY: Bloom's: Understand
REFERENCES: Chapter 2: Chemistry of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.1 - Describe the relationship between atoms and elements.

83. donates H+
ANSWER: b

84. releases ions other than H+ and OH-
ANSWER: e

85. glucose is an example
ANSWER: g

86. binds H+
ANSWER: c

87. formed when electrons are transferred between atoms
ANSWER: a

88. determines special properties of molecules
ANSWER: h

89. does not contain both C and H
ANSWER: f

90. resists pH changes by binding and releasing H+
ANSWER: d

91. property of phospholipid tails
ANSWER: i

Chapter 02 - Chemistry of Life

The following are chemical functional groups that may be part of a biologically active molecule. Answer the questions by matching the statement with the most appropriate group.

a. —COOH
b. —CH_3
c. —NH_2
d. —OH
e. —CO—
f. —PO_4

DIFFICULTY: Bloom's: Understand
REFERENCES: 2.8 Molecules of Life
LEARNING OBJECTIVES: HBIO.STMC.16.2.8 - Describe the properties of biological molecules.

92. amine group
ANSWER: c

93. carboxyl group
ANSWER: a

94. group that is very acidic
ANSWER: a

95. group that occurs repeatedly in alcohol and sugars
ANSWER: d

96. methyl group
ANSWER: b

97. hydroxyl group
ANSWER: d

98. ketone group
ANSWER: e

99. group on the amino-terminal end of proteins
ANSWER: c

100. group on the carboxyl-terminal end of proteins
ANSWER: a

101. three of these groups found in ATP
ANSWER: f