

**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.

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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.

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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?

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- 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

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: 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

## **Chapter 02 - Chemistry of Life**

*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

## **Chapter 02 - Chemistry of Life**

*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

## **Chapter 02 - Chemistry of Life**

*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



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*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

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*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

## **Chapter 02 - Chemistry of Life**

*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. trans fatty acids
- d. phospholipids
- e. cholesterol

*ANSWER:* b

## **Chapter 02 - Chemistry of Life**

*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

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*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

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*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

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*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

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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.



## **Chapter 02 - Chemistry of Life**

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**

## **Chapter 02 - Chemistry of Life**

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

## **Chapter 02 - Chemistry of Life**

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<sub>3</sub>
- c. —NH<sub>2</sub>
- d. —OH
- e. —CO—
- f. —PO<sub>4</sub>

*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