

## CHAPTER 02—MOLECULES OF LIFE

### Multiple Choice

1. Hydrogenation is a \_\_\_\_\_.  
a. manufacturing process that adds hydrogen atoms to carbohydrates  
b. natural process that adds hydrogen atoms to carbohydrates  
c. manufacturing process that adds hydrogen atoms to oils  
d. natural process that removes hydrogen atoms from fats  
e. manufacturing process that removes hydrogen atoms from fats

ANSWER: c

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.1 Fear of Frying

LEARNING OBJECTIVES: BTAT.STAR.16.02.01 - Discuss the history and harmful health effects of trans fats.

2. The human body requires about \_\_\_\_ of fat each day to stay healthy.  
a. 1 teaspoon  
b. 4 teaspoons  
c. 1 tablespoon  
d. 4 tablespoons  
e. 1 cup

ANSWER: c

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.1 Fear of Frying

LEARNING OBJECTIVES: BTAT.STAR.16.02.01 - Discuss the history and harmful health effects of trans fats.

3. Fats are major components of the cell's \_\_\_\_\_.  
a. membranes  
b. cytoplasm  
c. proteins  
d. ribosomes  
e. DNA

ANSWER: a

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.1 Fear of Frying

LEARNING OBJECTIVES: BTAT.STAR.16.02.01 - Discuss the history and harmful health effects of trans fats.

4. A typical fat molecule has \_\_\_\_ fatty acid tails.  
a. one  
b. two  
c. three  
d. four  
e. five

ANSWER: c

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.1 Fear of Frying

LEARNING OBJECTIVES: BTAT.STAR.16.02.01 - Discuss the history and harmful health effects of trans fats.

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5. Which invention led to *trans* fats being marketed as a solid cooking fat?

- a. the electric light
- b. the telephone
- c. the automobile
- d. the microwave oven
- e. the refrigerator

ANSWER: a

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.1 Fear of Frying

LEARNING OBJECTIVES: BTAT.STAR.16.02.01 - Discuss the history and harmful health effects of trans fats.

6. The atomic number is determined by the number of \_\_\_\_\_.

- a. protons
- b. neutrons
- c. electrons
- d. protons plus neutrons
- e. protons plus electrons

ANSWER: a

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.2 Start with Atoms

LEARNING OBJECTIVES: BTAT.STAR.16.02.02 - Describe the atom and its components.

7. Carbon has an atomic number of 6. Carbon-14 has \_\_\_\_\_.

- a. 6 neutrons and 6 protons
- b. 6 neutrons and 8 protons
- c. 8 neutrons and 6 protons
- d. 14 neutrons and 6 protons
- e. 14 protons and 6 neutrons

ANSWER: c

DIFFICULTY: Bloom's: Apply

REFERENCES: 2.2 Start with Atoms

LEARNING OBJECTIVES: BTAT.STAR.16.02.02 - Describe the atom and its components.

8. Tracers are used in what form of medical test?

- a. PET scans
- b. CT scans
- c. sonograms
- d. x-rays
- e. MRI

ANSWER: a

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.2 Start with Atoms

LEARNING OBJECTIVES: BTAT.STAR.16.02.02 - Describe the atom and its components.

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9. We can accurately determine the age of a rock or fossil by measuring its \_\_\_\_\_.

- a. proton concentration
- b. electron concentration
- c. neutron concentration
- d. isotope concentration
- e. ion concentration

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

10. Helium, neon and argon are \_\_\_\_\_.

- a. extremely stable because they have vacancies in their outer shells
- b. extremely stable because they don't have any vacancies in their outer shells
- c. extremely unstable because they have vacancies in their outer shells
- d. extremely unstable because they don't have any vacancies in their outer shells
- e. extremely unstable because they have vacancies in their inner shells

*ANSWER:* b

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

11. The nucleus of an atom contains \_\_\_\_\_.

- a. protons only
- b. electrons only
- c. neutrons only
- d. protons and neutrons
- e. protons and electrons

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

12. The negative subatomic particle is the \_\_\_\_\_.

- a. neutron
- b. proton
- c. electron
- d. quark
- e. Higg's boson

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

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13. The positive subatomic particle is the \_\_\_\_.

- a. neutron
- b. proton
- c. electron
- d. positron
- e. quark

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

14. Oxygen has an atomic number of 8. This means that oxygen has \_\_\_\_.

- a. 8 electrons in its outer most shell
- b. 8 neutrons in its nucleus
- c. 4 protons and 4 neutrons in its nucleus
- d. 8 protons in its nucleus
- e. 8 protons and 8 neutrons in its nucleus

*ANSWER:* d

*DIFFICULTY:* Bloom's: Apply

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

15. The neutral subatomic particle is the \_\_\_\_.

- a. neutron
- b. proton
- c. electron
- d. quark
- e. Higg's boson

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

16. Carbon 14 radioisotopes decay into stable \_\_\_\_.  
nitrogen 15 isotopes

- a. carbon 13 isotopes
- b. nitrogen atoms
- c. carbon atoms
- d. nitrogen 15 isotopes
- e. sodium atoms

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

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17. An atom that carries a charge is called a(n) \_\_\_\_\_.

- a. ion
- b. molecule
- c. compound
- d. element
- e. microelement

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

18. A(n) \_\_\_\_\_ is a type of chemical bond in which a strong mutual attraction forms between ions of opposite charge.

- a. hydrogen bond
- b. nonpolar bond
- c. polar bond
- d. covalent bond
- e. ionic bond

*ANSWER:* e

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.3 From Atoms to Molecules

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

19. The bond in table salt (NaCl) is \_\_\_\_\_.

- a. polar
- b. ionic
- c. covalent
- d. double
- e. nonpolar

*ANSWER:* b

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.3 From Atoms to Molecules

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

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20. In \_\_\_\_ bonds, atoms share electrons equally.

- a. double
- b. ionic
- c. polar covalent
- d. nonpolar covalent
- e. hydrogen

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.3 From Atoms to Molecules

*LEARNING OBJECTIVE* BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

21. Which type of chemical bonds are found within a water molecule?

- a. hydrogen
- b. ionic
- c. polar covalent
- d. nonpolar covalent
- e. triple

*ANSWER:* c

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.3 From Atoms to Molecules

*LEARNING OBJECTIVE* BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

22. The positively charged ion, potassium, and the negatively charged ion, fluoride, will form what kind of bond?

- a. ionic
- b. polar covalent
- c. nonpolar covalent
- d. hydrogen
- e. isotonic

*ANSWER:* a

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.3 From Atoms to Molecules

*LEARNING OBJECTIVE* BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

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23. What molecule would be considered a covalent compound?

- a. oxygen (O<sub>2</sub>)
- b. sodium chloride (NaCl)
- c. water (H<sub>2</sub>O)
- d. a diamond (C)
- e. ozone (O<sub>3</sub>)

ANSWER: c

DIFFICULTY: Bloom's: Apply

REFERENCES: 2.3 From Atoms to Molecules

LEARNING OBJECTIVE BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

24. The structural formula for molecular oxygen is depicted as O=O. What kind of bond holds molecular oxygen together?

- a. ionic
- b. polar covalent
- c. single covalent
- d. double covalent
- e. triple covalent

ANSWER: d

DIFFICULTY: Bloom's: Apply

REFERENCES: 2.3 From Atoms to Molecules

LEARNING OBJECTIVE BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

25. Which substance is hydrophobic?

- a. canola oil
- b. sodium chloride
- c. sugar
- d. water
- e. the potassium ion

ANSWER: a

DIFFICULTY: Bloom's: Apply

REFERENCES: 2.4 Hydrogen Bonds and Water

LEARNING OBJECTIVES: BTAT.STAR.16.02.04 - Explain the composition and properties of water.

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26. Fats will dissolve in ethanol. Ethanol is an example of a \_\_\_\_\_.

- a. solute
- b. solution
- c. solvent
- d. salt
- e. ion

*ANSWER:* c

*DIFFICULTY:* Bloom's: Apply

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

27. Which bond is weakest?

- a. ionic
- b. double covalent
- c. polar covalent
- d. nonpolar covalent
- e. hydrogen

*ANSWER:* e

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

28. Water molecules are attracted to one another because the \_\_\_\_\_.

- a. slightly positive charge of the hydrogen atom from one molecule of water attracts the slightly negative charge of the oxygen atom from another molecule
- b. slightly negative charge of the hydrogen atom from one molecule of water attracts the slightly negative charge of the oxygen atom from another molecule
- c. slightly positive charge of the hydrogen atom attracts the oxygen within the same molecule of water, which leads to an increase in its polarity
- d. water molecules participate in non-polar covalent bonds, which increase the attraction of the molecules to each other
- e. water molecules bind to each other through their mutual attraction to ionic compounds

*ANSWER:* a

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

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29. A solution is a uniform mixture in which a \_\_\_\_ is dissolved completely in a \_\_\_\_.
- salt; solute
  - solute; salt
  - solute; solvent
  - solvent; salt
  - solvent; solute

**ANSWER:** c

**DIFFICULTY:** Bloom's: Remember

**REFERENCES:** 2.4 Hydrogen Bonds and Water

**LEARNING OBJECTIVES:** BTAT.STAR.16.02.04 - Explain the composition and properties of water.

30. Surface tension is an example of \_\_\_\_.
- hydrophobicity
  - concentration
  - evaporation
  - cohesion
  - polarity

**ANSWER:** d

**DIFFICULTY:** Bloom's: Remember

**REFERENCES:** 2.4 Hydrogen Bonds and Water

**LEARNING OBJECTIVES:** BTAT.STAR.16.02.04 - Explain the composition and properties of water.

31. Sweating to keep cool in the summer is the result of \_\_\_\_.
- hydrogen bonds breaking to release energy
  - hydrogen bonds forming, which requires energy
  - evaporation of water giving off energy
  - cohesion of water molecules giving off energy
  - cohesion of water molecules requiring energy

**ANSWER:** a

**DIFFICULTY:** Bloom's: Understand

**REFERENCES:** 2.4 Hydrogen Bonds and Water

**LEARNING OBJECTIVES:** BTAT.STAR.16.02.04 - Explain the composition and properties of water.

32. Hydrogen bonding \_\_\_\_ the movement of molecules, therefore, substances that form a lot of hydrogen bonds, like water, will require \_\_\_\_ energy to increase their temperature by one degree Celsius.
- decreases; less
  - decreases; more
  - doesn't affect; no additional
  - increases; less
  - increases; more

**ANSWER:** b

**DIFFICULTY:** Bloom's: Analyze

**REFERENCES:** 2.4 Hydrogen Bonds and Water

**LEARNING OBJECTIVES:** BTAT.STAR.16.02.04 - Explain the composition and properties of water.

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33. When water molecules form into ice, \_\_\_\_.
- the water molecules jiggle more
  - their structure becomes less rigid
  - the water molecules pack less densely
  - hydrogen bonds between water molecules readily break
  - evaporation of water molecules happens more readily

*ANSWER:* c

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

34. Hydrophobic molecules are \_\_\_\_ water.
- attracted by
  - absorbed by
  - repelled by
  - mixed with
  - polarized by

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

35. \_\_\_\_ is the tendency of water molecules to stay attached to one another.
- Adhesion
  - Cohesion
  - Fusion
  - Interaction
  - Junction

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

36. Which property of water molecules is responsible for movement of water from roots to leaves in a plant?
- hydrophobicity
  - temperature stability
  - fusion
  - solvent polarity
  - cohesion

*ANSWER:* e

*DIFFICULTY:* Bloom's: Analyze

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

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37. Glucose dissolves in water because it \_\_\_\_.
- a. ionizes
  - b. is a polysaccharide
  - c. is a polar and forms many hydrogen bonds with water molecules
  - d. has a very reactive primary structure
  - e. is an isotope

*ANSWER:* c

*DIFFICULTY:* Bloom's: Analyze

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

38. A solution at a pH of 10 contains how many times more hydrogen ions than a solution at a pH of 7?
- a. 2
  - b. 3
  - c. 10
  - d. 100
  - e. 1,000

*ANSWER:* e

*DIFFICULTY:* Bloom's: Apply

*REFERENCES:* 2.5 Acids and Bases

*LEARNING OBJECTIVE* BTAT.STAR.16.02.05 - Define pH and explain its importance in the maintenance of biological S: functions.

39. A pH value of \_\_\_\_ has the highest concentration of hydrogen ions.
- a. 1
  - b. 3
  - c. 5
  - d. 7
  - e. 9

*ANSWER:* a

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.5 Acids and Bases

*LEARNING OBJECTIVE* BTAT.STAR.16.02.05 - Define pH and explain its importance in the maintenance of biological S: functions.

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40. Nearly all of life's chemistry occurs near a pH of \_\_\_\_.

- a. 1
- b. 3
- c. 5
- d. 7
- e. 9

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.5 Acids and Bases

*LEARNING OBJECTIVE S:* BTAT.STAR.16.02.05 - Define pH and explain its importance in the maintenance of biological functions.

41. A uniform mixture is called a \_\_\_\_.

- a. concentration
- b. salt
- c. solute
- d. solution
- e. solvent

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

42. What category of compounds helps our body fluids to stay within a consistent pH range?

- a. solvents
- b. buffers
- c. solutes
- d. acids
- e. bases

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.5 Acids and Bases

*LEARNING OBJECTIVE S:* BTAT.STAR.16.02.05 - Define pH and explain its importance in the maintenance of biological functions.

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43. \_\_\_\_ is one of the substances that maintains our blood pH between 7.35 and 7.45.

- a. Water
- b. Carbonic acid
- c. Hydrochloric acid
- d. Hydrogen peroxide
- e. Sodium hydroxide

ANSWER: b

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.5 Acids and Bases

LEARNING OBJECTIVE BTAT.STAR.16.02.05 - Define pH and explain its importance in the maintenance of biological S: functions.

44. Which two atoms are found in all organic compounds?

- a. carbon and hydrogen
- b. carbon and oxygen
- c. oxygen and hydrogen
- d. carbon and phosphorous
- e. oxygen and sulfur

ANSWER: a

DIFFICULTY: Bloom's: Remember

REFERENCES: 2.6 Organic Molecules

LEARNING OBJEC BTAT.STAR.16.02.06 - Define organic molecules and demonstrate their importance in the structure TIVES: and function of biological systems.

45. Which is an organic molecule?

- a. carbon dioxide (CO<sub>2</sub>)
- b. water (H<sub>2</sub>O)
- c. methane (CH<sub>4</sub>)
- d. hydrochloric acid (HCl)
- e. oxygen (O<sub>2</sub>)

ANSWER: c

DIFFICULTY: Bloom's: Apply

REFERENCES: 2.6 Organic Molecules

LEARNING OBJEC BTAT.STAR.16.02.06 - Define organic molecules and demonstrate their importance in the structure TIVES: and function of biological systems.

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46. Large polymers are formed from smaller subunits by which type of reaction?

- a. oxidation
- b. reduction
- c. condensation
- d. hydrolysis
- e. decarboxylation

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.6 Organic Molecules

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.06 - Define organic molecules and demonstrate their importance in the structure and function of biological systems.

47. The breakdown of large molecules by enzymes and the addition of water is known as a \_\_\_\_ reaction.

- a. oxidation
- b. reduction
- c. condensation
- d. hydrolysis
- e. decarboxylation

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.6 Organic Molecules

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.06 - Define organic molecules and demonstrate their importance in the structure and function of biological systems.

48. The chemical reactions that cells use to acquire and use energy to live, grow and reproduce are called \_\_\_\_.

- a. hydrolysis
- b. condensation
- c. phosphorylation
- d. metabolism
- e. oxidation

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.6 Organic Molecules

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.06 - Define organic molecules and demonstrate their importance in the structure and function of biological systems.

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How many carbons are present in this figure?

- a. 0
- b. 4
- c. 5
- d. 6
- e. 7

*ANSWER:* d

*DIFFICULTY:* Bloom's: Apply

*REFERENCES:* 2.6 Organic Molecules

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.06 - Define organic molecules and demonstrate their importance in the structure and function of biological systems.

50. Which organic molecule is a carbohydrate monomer?

- a. triglyceride
- b. fatty acids
- c. nucleotide
- d. amino acid
- e. monosaccharide

*ANSWER:* e

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

51. Glucose monomers linked into a highly branched chain make up \_\_\_\_.

- a. glycogen
- b. cellulose
- c. fructose
- d. starch
- e. sucrose

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

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52. Sucrose is composed of \_\_\_\_.
- two molecules of fructose
  - two molecules of glucose
  - a molecule of fructose and a molecule of glucose
  - a molecule of fructose and a molecule of galactose
  - two molecules of galactose

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

53. Plants store their excess carbohydrates in the form of \_\_\_\_.
- cellulose
  - starch
  - glycogen
  - sucrose
  - galactose

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

54. Glycogen is a polysaccharide used for energy storage by \_\_\_\_.
- plants
  - animals
  - protists
  - bacteria
  - archaea

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

55. Which type of bonding allows the long, straight chains of cellulose to lock together tightly?
- hydrogen
  - polar covalent
  - ionic
  - nonpolar covalent
  - metallic

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

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56. Cellulose is \_\_\_\_.
- the most complex of the organic compounds
  - a polymer of glucose and fructose
  - a polymer of glucose and galactose
  - a component of plasma membranes
  - a material found in plant cell walls

*ANSWER:* e

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

57. \_\_\_\_ is a monosaccharide.
- Cellulose
  - Fructose
  - Glycogen
  - Starch
  - Sucrose

*ANSWER:* b

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

58. Humans do not contain the enzymes to break down \_\_\_\_.
- cellulose
  - fructose
  - glycogen
  - starch
  - sucrose

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.7 Carbohydrates

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

59. A triglyceride molecule is made up of \_\_\_\_.
- one glycerol and two fatty acids
  - two fatty acids and two glycerols
  - one fatty acid and three glycerols
  - one glycerol and three fatty acids
  - one glycerol and two fatty acids

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.8 Lipids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

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60. In a cell membrane, the phospholipid heads are \_\_\_\_.
- hydrophobic
  - nonpolar
  - dissolved in the cell's watery interior
  - sandwiched between the phospholipid tails
  - formed by fatty acids

*ANSWER:* c

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.8 Lipids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

61. Unsaturated fats \_\_\_\_.
- are solid at room temperature
  - have at least one double bond in their fatty acid tail
  - are saturated with hydrogen atoms
  - mainly come from animals
  - consist of straight chain fatty acids

*ANSWER:* b

*DIFFICULTY:* Bloom's: Understand

*REFERENCES:* 2.8 Lipids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

62. All steroids have \_\_\_\_.
- the same number of double bonds
  - double bonds in the same positions
  - four carbon rings
  - the same functional groups
  - the same number and positions of double bonds

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.8 Lipids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

63. Which food product would likely contain the largest amount of unsaturated fat?
- butter
  - lard
  - salami
  - olives
  - cheese

*ANSWER:* d

*DIFFICULTY:* Bloom's: Analyze

*REFERENCES:* 2.8 Lipids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

## CHAPTER 02—MOLECULES OF LIFE

64. Fats that contain \_\_\_\_ double bonds are liquids at room temperature, whereas fats that contain \_\_\_\_ double bonds are solids at room temperature.

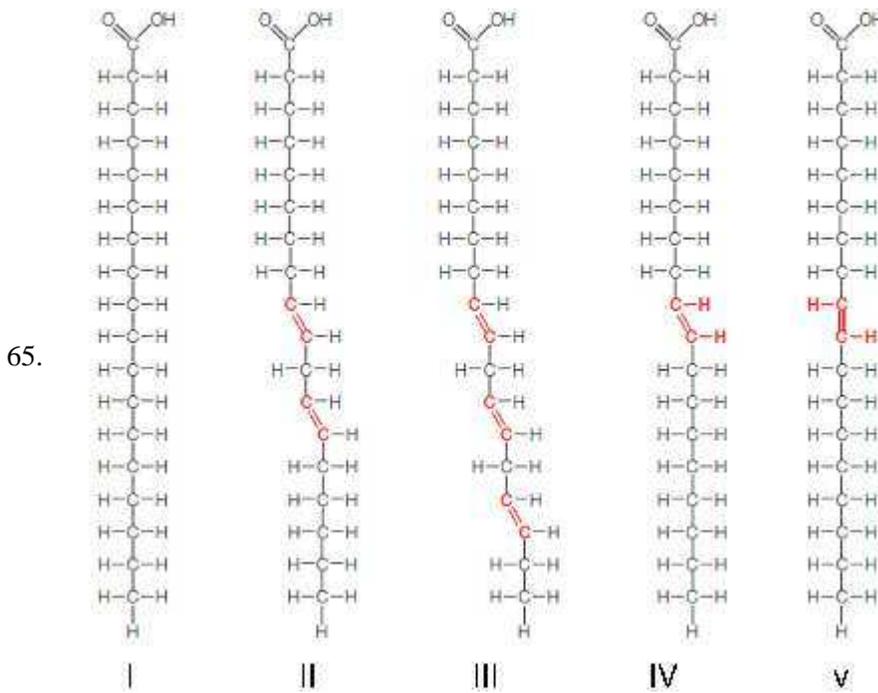
- a. *trans*; *cis*
- b. *cis*; *trans*
- c. hydrogenated; partially hydrogenated
- d. partially hydrogenated; hydrogenated
- e. unsaturated; saturated

ANSWER: b

DIFFICULTY: Bloom's: Understand

REFERENCES: 2.8 Lipids

LEARNING OBJECTIVES: BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.



In the figure above, which fatty acids are most likely to be solid at room temperature?

- a. I
- b. II, III and IV
- c. II, III, IV and V
- d. I and IV
- e. I and V

ANSWER: e

DIFFICULTY: Bloom's: Apply

REFERENCES: 2.8 Lipids

LEARNING OBJECTIVES: BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

## **CHAPTER 02—MOLECULES OF LIFE**

66. A(n) \_\_\_\_ is a protein monomer.
- nucleotide
  - monosaccharide
  - simple sugar
  - amino acid
  - ribose

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein  
*S:* function.

67. Primary protein structure is dependent upon \_\_\_\_.
- hydrophobic interactions
  - hydrogen bonds between two amino acids
  - covalent linkages between carbons and nitrogens of adjacent amino acids
  - covalent linkages between carbons and oxygens of adjacent amino acids
  - covalent linkages between the polypeptide and sugars or lipids

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein  
*S:* function.

68. Which type of bond exists between two amino acids in a protein?
- peptide
  - ionic
  - hydrogen
  - amino
  - sulfhydryl

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein  
*S:* function.

## **CHAPTER 02—MOLECULES OF LIFE**

69. Two amino acids are bonded together to form a dipeptide by which type of reaction?
- condensation
  - oxidation reduction
  - hydrolysis
  - decomposition
  - acid-base

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein  
*S:* function.

70. Protein misfolding causes \_\_\_\_.
- Creutzfeldt-Jakob disease
  - arthritis
  - immunodepression
  - schizophrenia
  - tuberculosis

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein  
*S:* function.

71. When a protein denatures, which type of bonding is affected?
- covalent
  - peptide
  - ionic
  - hydrogen
  - metallic

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein  
*S:* function.

## **CHAPTER 02—MOLECULES OF LIFE**

72. A protein that is linked to a carbohydrate is known as a \_\_\_\_.
- glycoprotein
  - lipoprotein
  - fibrous proteins
  - denatured proteins
  - prions

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.9 Proteins

*LEARNING OBJECTIVE S:* BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein function.

73. Nucleotides are monomers of \_\_\_\_.
- complex lipids
  - proteins
  - polysaccharides
  - nucleic acids
  - cellulose

*ANSWER:* d

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.10 Nucleic Acids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.10 - Describe the features and functions of various types of nucleic acids.

74. A nucleotide consists of \_\_\_\_.
- a five carbon sugar, a nitrogenous acid, and a phosphate group
  - a six carbon sugar, a nitrogenous base, and a phosphate group
  - a five carbon sugar, a nitrogenous base, and a phosphate group
  - a six carbon sugar, a nitrogenous acid, and a phosphate group
  - a four carbon sugar, a nitrogenous acid, and a phosphate group

*ANSWER:* c

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.10 Nucleic Acids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.10 - Describe the features and functions of various types of nucleic acids.

75. In a polymer of nucleotides, how does one nucleotide attach to another?
- The base of one nucleotide is attached to the base of the next.
  - The base of one nucleotide is attached to the sugar of the next.
  - The sugar of one nucleotide is attached to the sugar of the next.
  - The phosphate group of one nucleotide is attached to the base of the next.
  - The phosphate group of one nucleotide is attached to the sugar of the next.

*ANSWER:* e

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.10 Nucleic Acids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.10 - Describe the features and functions of various types of nucleic acids.

## **CHAPTER 02—MOLECULES OF LIFE**

76. Which type of bonds hold the two chains of DNA together in a DNA molecule?

- a. hydrogen
- b. polar covalent
- c. nonpolar covalent
- d. ionic
- e. peptide

*ANSWER:* a

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.10 Nucleic Acids

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.10 - Describe the features and functions of various types of nucleic acids.

### **Matching**

***Match the following terms to the correct description.***

- a. mass number
- b. atomic number
- c. radioisotope
- d. isotopes
- e. ions

*DIFFICULTY:* Bloom's: Remember

*REFERENCES:* 2.2 Start with Atoms

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.02 - Describe the atom and its components.

77. forms of an element that differ in the number of neutrons their atoms carry

*ANSWER:* d

78. number of protons in the atomic nucleus

*ANSWER:* b

79. isotope with an unstable nucleus

*ANSWER:* c

80. total number of protons and neutrons in the nucleus of an atom

*ANSWER:* a

81. atoms with more or less electrons than protons

*ANSWER:* e

## **CHAPTER 02—MOLECULES OF LIFE**

***Match the following terms to the correct description.***

- a. acid
- b. base
- c. neutral
- d. buffer
- e. pH

***DIFFICULTY:*** Bloom's: Apply

***REFERENCES:*** 2.5 Acids and Bases

***LEARNING OBJECTIVE*** BTAT.STAR.16.02.05 - Define pH and explain its importance in the maintenance of biological functions.

82. solution that contains the same concentration of  $H^+$  ions as  $OH^-$  ions

***ANSWER:*** c

83. measure of the relative concentration of hydrogen ions in a solution

***ANSWER:*** e

84. substance that releases hydrogen ions in solution

***ANSWER:*** a

85. substance that accepts hydrogen ions in solution

***ANSWER:*** b

86. substance that can maintain the pH of a solution at a relatively constant level

***ANSWER:*** d

***The following are types of chemical bonds. Match these to the correct description.***

- a. hydrogen
- b. ionic
- c. covalent

***DIFFICULTY:*** Bloom's: Apply

***REFERENCES:*** 2.3 From Atoms to Molecules

***LEARNING OBJECTIVE*** BTAT.STAR.16.02.03 - Define a chemical bond and, using examples, illustrate the different types of chemical bonds.

87. the bond between the atoms in an NaCl molecule

***ANSWER:*** b

88. the bond between the hydrogen atoms of molecular hydrogen

***ANSWER:*** c

89. the bond that breaks when salts dissolve in water

***ANSWER:*** b

90. the bond in which electrons are shared

***ANSWER:*** c

## **CHAPTER 02—MOLECULES OF LIFE**

91. the bond that holds organic molecules together

ANSWER: c

*The following are types of chemical bonds. Match these to the correct description.*

a. hydrogen

b. ionic

c. covalent

*DIFFICULTY:* Bloom's: Apply

*REFERENCES:* 2.4 Hydrogen Bonds and Water

*LEARNING OBJECTIVES:* BTAT.STAR.16.02.04 - Explain the composition and properties of water.

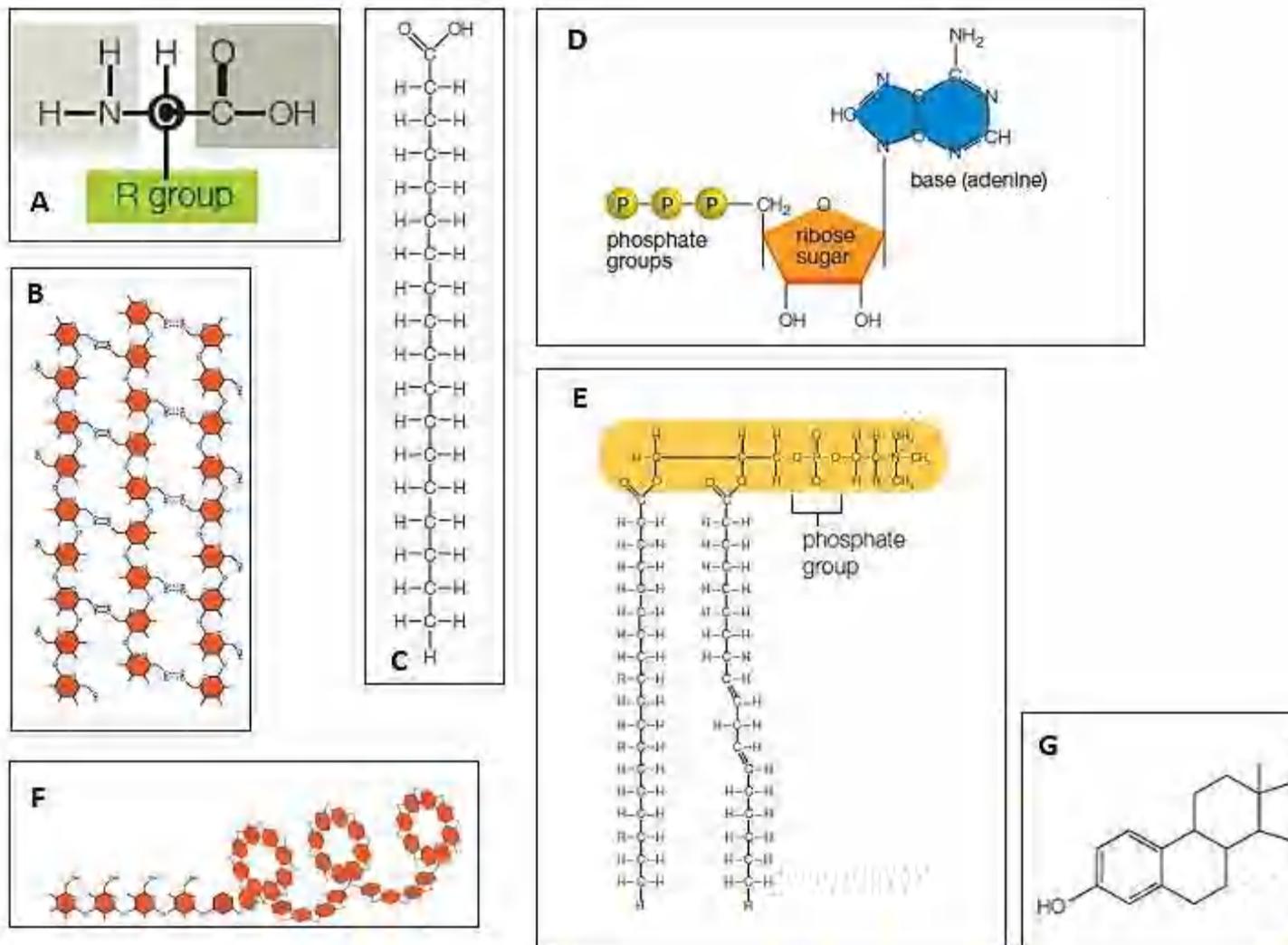
92. the bond between the two strands of DNA in a double helix

ANSWER: a

93. the bond that is easiest to break

ANSWER: a

**CHAPTER 02—MOLECULES OF LIFE**



Match the structures below with the appropriate label in the figure above.

- a. A
- b. B
- c. C
- d. D
- e. E
- f. F
- g. G

**DIFFICULTY:** Bloom's: Apply

**REFERENCES:** 2.8 Lipids

**LEARNING OBJECTIVES:** BTAT.STAR.16.02.08 - Describe the structures and functions of the various types of lipids.

94. fatty acid

**ANSWER:** c

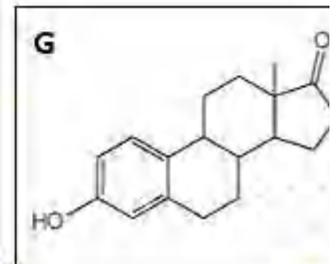
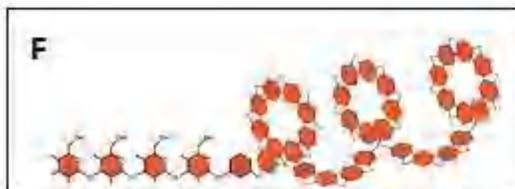
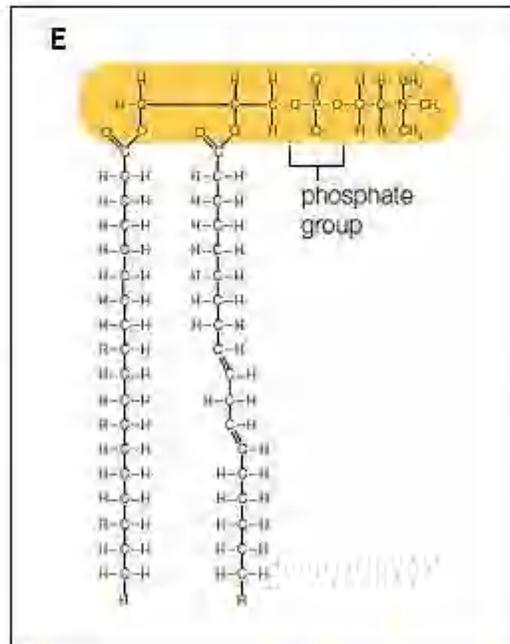
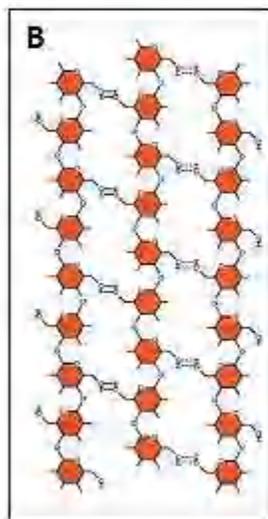
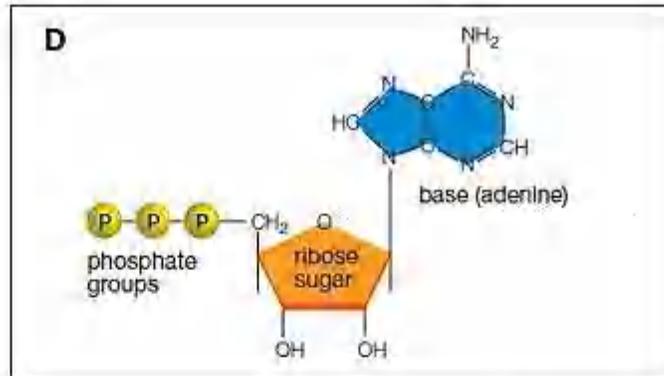
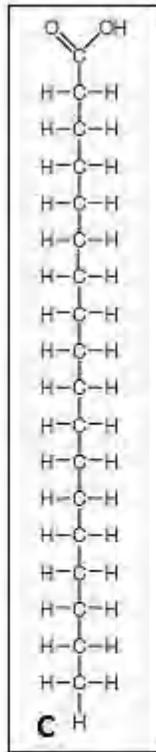
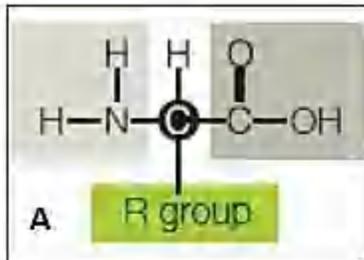
**CHAPTER 02—MOLECULES OF LIFE**

95. phospholipid

ANSWER: e

96. steroid

ANSWER: g



Match the structures below with the appropriate label in the figure above.

- a. A    b. B
- c. C    d. D
- e. E    f. F
- g. G

**DIFFICULTY:** Bloom's: Apply

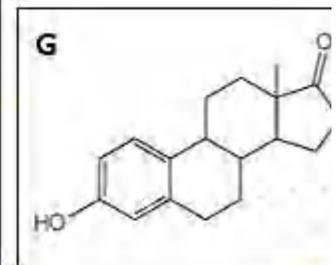
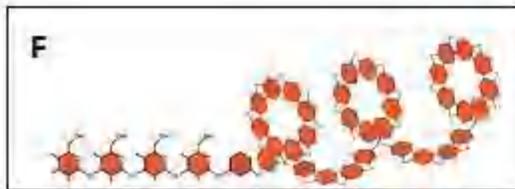
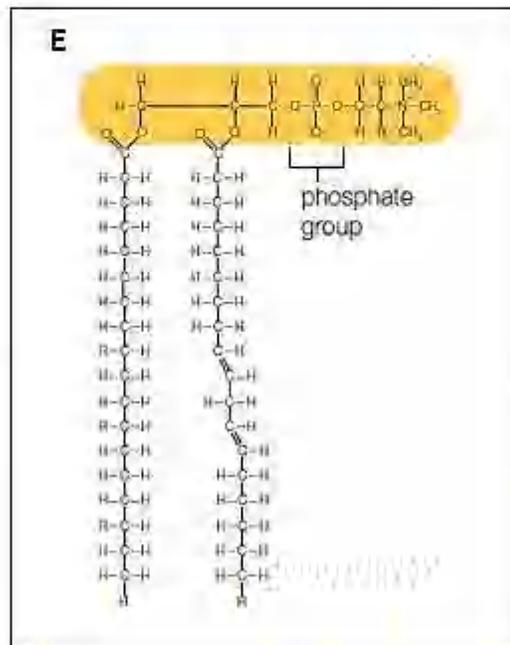
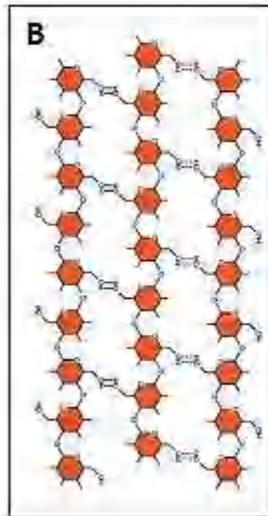
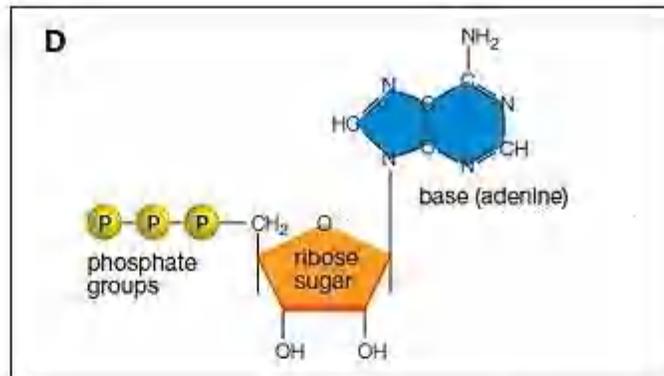
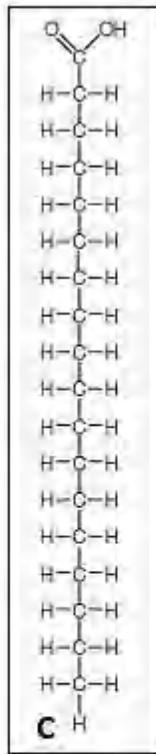
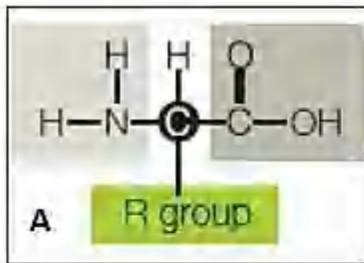
**REFERENCES:** 2.9 Proteins

**LEARNING OBJECTIVE** BTAT.STAR.16.02.09 - Describe the structure of a protein and explain its importance to protein function.

**CHAPTER 02—MOLECULES OF LIFE**

97. amino acid

ANSWER: a



Match the structures below with the appropriate label in the figure above.

- a. A    b. B
- c. C    d. D
- e. E    f. F
- g. G

DIFFICULTY:

Bloom's: Apply

REFERENCES:

2.7 Carbohydrates

LEARNING OBJECTIVES: BTAT.STAR.16.02.07 - Summarize the types of carbohydrates with examples.

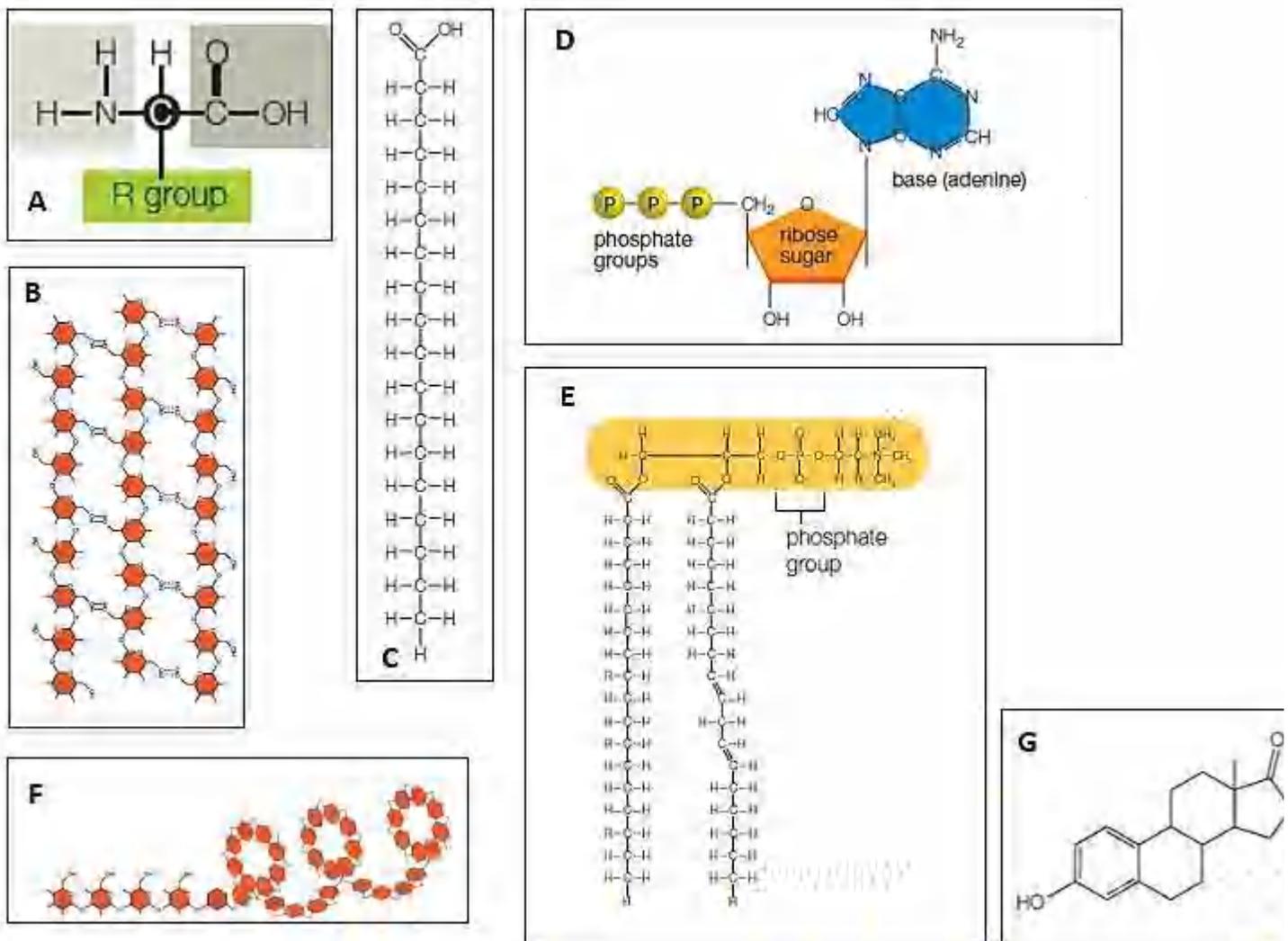
98. cellulose

ANSWER: b

99. starch

ANSWER: f

**CHAPTER 02—MOLECULES OF LIFE**



Match the structures below with the appropriate label in the figure above.

- a. A      b. B
- c. C      d. D
- e. E      f. F
- g. G

**DIFFICULTY:** Bloom's: Apply

**REFERENCES:** 2.10 Nucleic Acids

**LEARNING OBJECTIVES:** BTAT.STAR.16.02.10 - Describe the features and functions of various types of nucleic acids.

100. nucleotide

**ANSWER:** d