Chapter 02
Chemical Composition of the Body

Multiple Choice Questions

1. Water makes up _____ of the total body weight of an average adult.
A. 50-60%
B. 55-65%
C. 60-70%
D. 65-75%

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

2. Most of the water found in the body is in the
A. blood.
B. intracellular fluid compartment.
C. extracellular fluid compartment.
D. blood and extracellular fluid compartment.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

3. Neutrons are uncharged particles found in the nucleus of an atom.
TRUE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

4. An element with 5 protons, 5 neutrons, and 5 electrons would have an atomic number of 15.
FALSE

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

Multiple Choice Questions

5. The atomic nucleus does not contain _____, which are negatively charged subatomic particles.
A. protons
B. electrons
C. neutrons

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

6. An element with 11 neutrons, 11 protons, and 11 electrons would have an atomic mass of _.
A. 11
B. 33
C. 22
D. cannot be determined

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

7. The _____ is the physical space which an electron occupies in an atom.
A. nucleus
B. orbital
C. energy level
D. Both orbital and energy level are correct.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

8. The _____ electrons are the outermost electrons of an atom.
A. kernel
B. valence
C. atomic
D. anion

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

9. Isotopes have the same _____ number, but a different _____ number.
A. mass, atomic
B. neutron, mass
C. atomic, mass
D. atomic, proton

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

10. Which of the following is NOT true of isotopes of a given atom?
A. have the same number of neutrons
B. have the same number of protons
C. have different atomic masses
D. All of these choices are true.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

11. The term "chemical element" refers to the most common isotope of that element.
FALSE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

Multiple Choice Questions

12. Which of the following subatomic particles have negligible mass?
A. electrons
B. neutrons
C. protons
D. Both neutrons and protons.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

13. Molecules with polar covalent bonds are hydrophobic.
FALSE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

14. Negatively charged ions will migrate toward the anode in an electrical field.
TRUE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

15. Hydrogen bonds form between the partially charged atoms of two polar molecules, such as the slightly negatively charged hydrogen atom of one water molecule and the slightly positively charged oxygen atom of another.
FALSE

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

16. Atoms sharing a pair of electrons form covalent bonds.
TRUE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

Multiple Choice Questions

17. When an atom loses one or more electrons, it
A. becomes positively charged.
B. becomes negatively charged.
C. is called an anion.
D. has no change in its charge.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

18. When an atom gains one or more electrons, it
A. becomes positively charged.
B. has no change in its charge.
C. is called an anion.
D. is called a cation.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

19. An atom with 5 protons, 5 neutrons, and 6 electrons would have a net charge of
A. -1.
B. -2.
C. +1.
D. +2.

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

20. _____ bonds are formed when atoms share electrons unequally.
A. Nonpolar covalent
B. Ionic
C. Polar covalent
D. van der Waals

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

21. Hydration spheres can be formed by compounds which contain _____ bonds.
A. nonpolar covalent
B. polar covalent
C. ionic
D. either polar covalent or ionic

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

22. Hydrophobic molecules would contain _____ bonds.
A. nonpolar covalent
B. polar covalent
C. hydrogen
D. ionic

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

23. Surface tension between water molecules occurs because adjacent water molecules form _____ bonds with each other.
A. nonpolar covalent
B. polar covalent
C. hydrogen
D. ionic

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

24. Bonds that are formed between oxygen and hydrogen atoms within water molecules are called
A. hydrogen bonds.
B. ionic bonds.
C. nonpolar covalent bonds.
D. polar covalent bonds.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

25. The type of bond found in sodium chloride is
A. an ionic bond.
B. a polar covalent bond.
C. a hydrogen bond.
D. a nonpolar covalent bond.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

26. What type of bond is formed between potassium and iodine?
A. polar covalent bond
B. ionic bond
C. nonpolar covalent bond
D. hydrogen bond

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

27. Which of the following would be most easily broken?
A. a hydrogen bond
B. a nonpolar covalent bond
C. an ionic bond
D. a polar covalent bond

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

28. The ability of water to be pulled as a column through narrow channels is called
A. osmalality.
B. surface tension.
C. neutrality.
D. capillary action.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

29. The pH of a solution is directly proportional to the hydrogen ion concentration of the solution.
FALSE

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

30. Acids release hydrogen ions into solutions.
TRUE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

31. As the pH of the blood decreases, the amount of hydrogen ions in the blood would decrease.
FALSE

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

Multiple Choice Questions

32. Water molecules form _____ ions when they associate with a hydrogen ion.
A. hydroxide
B. bicarbonate
C. hydronium
D. water

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

33. A solution of a pH above 7 is called _____.
A. acidic
B. neutral
C. basic

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

34. Bases will _____ protons in a solution.
A. accept
B. donate
C. ignore
D. repel

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

35. The primary buffer in the blood is the _____ buffer.
A. hydronium
B. ammonia
C. phosphate
D. bicarbonate

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

36. The pH of a solution increases as the _____ ion concentration decreases.
A. hydrogen
B. hydroxide
C. bicarbonate
D. sodium

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

37. In an acidic solution,
A. the OH^- ion concentration is greater than the H^+ ion concentration.
B. the OH^- ion concentration is less than the H^+ ion concentration.
C. the H^+ ion concentration is equal to the OH^- ion concentration.
D. the H^+ ion concentration is less than the OH^- ion concentration only if the solution is buffered.

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

38. A blood pH of 7.6 is
A. indicative of acidosis.
B. indicative of alkalosis.
C. in the normal physiological range.
D. indicates effective buffering by the bicarbonate/carbonic acid system.

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

39. Regarding acids and bases,
A. acids will increase the pH of a solution.
B. bases will decrease the pH of a solution.
C. acids will accept hydrogen ions in a solution.
D. bases will accept hydrogen ions in a solution.

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

40. Ammonia usually
A. acts as a base.
B. acts as an acid.
C. acts as a buffer.
D. ionizes to form a hydroxyl ion.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

41. Organic acids contain carbonyl groups.
FALSE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

Multiple Choice Questions

42. Molecules that contain carbon and hydrogen atoms are
A. ionic.
B. inorganic.
C. organic.
D. carbonic.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

43. Only L-stereoisomers are absorbed by the digestive tract and used to synthesize organic molecules.
FALSE

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

44. An ionized organic acid is designated with the suffix - ate.
TRUE

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

45. The ionized form of the organic lactic acid is lactate.
TRUE

Bloom's Level: 2. Understand
Section: 2.01
Topic: Chemistry

Multiple Choice Questions

46. How many single bonds can a carbon atom form if it is double-bonded to an oxygen atom?
A. 1
B. 2
C. 3
D. 4

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

47. A six-sided organic molecule with alternating double bonds is termed a(n)
A. aromatic compound.
B. ketone.
C. alcohol.
D. organic acid.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

48. Ketones contain a(n) _____ group within the carbon chain.
A. hydroxyl
B. carbonyl
C. carboxyl
D. aromatic

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

49. Organic acids will contain
A. a carboxyl group.
B. a carbonyl group.
C. an amino group.
D. a hydroxyl group.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

50. An example of an aromatic substance is
A. hexane.
B. cyclohexane.
C. fructose.
D. benzene.

Bloom's Level: 1. Remember
Section: 2.01
Topic: Chemistry

True / False Questions

51. Fats and carbohydrates are the primary energy stores in the body.
TRUE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

52. Glucose, galactose, and fructose can be considered structural isomers of each other.
TRUE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

53. Fructose is a ketone.
FALSE

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

Multiple Choice Questions

54. _____ are molecules with the same ratio of atoms but different arrangements of atoms.
A. Isotopes
B. Structural isomers
C. Stereoisomers
D. Radioactive isotopes

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

True / False Questions

55. Covalent bonds are formed between monosaccharides through dehydration synthesis.
TRUE

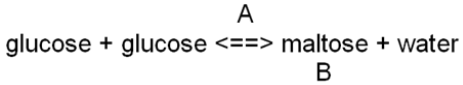
Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

Multiple Choice Questions

56. The addition of water with the proper enzymes to a molecule is called
A. dehydration synthesis.
B. condensation.
C. hydrolysis.
D. combustion.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

57. Which reaction represents a dehydration synthesis reaction?



A. Reaction A
B. Reaction B

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

True / False Questions

58. Carbohydrate molecules have a ratio of twice as many oxygen atoms to carbon atoms.
FALSE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

Multiple Choice Questions

59. Sucrose is a disaccharide that is composed of _____ and _____.
A. glucose, glucose
B. glucose, galactose
C. glucose, fructose
D. fructose, galactose

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

60. Glycogen
A. is more highly branched than plant starch.
B. is a glycoprotein found in the liver.
C. is a glycolipid found in skeletal muscles.
D. is composed of alternating glucose and galactose molecules.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

61. An example of a monosaccharide is
A. maltose.
B. sucrose.
C. glucose.
D. glycogen.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

True / False Questions

62. Glucose is stored as a polysaccharide to prevent osmosis of water into the cells.
TRUE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

Multiple Choice Questions

63. Which of the following is NOT a disaccharide?
A. fructose
B. sucrose
C. maltose
D. lactose

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

64. Which of the following polysaccharides cannot be digested by animals themselves?
A. glycogen
B. cellulose
C. starch
D. All of these can be digested by animals themselves.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

True / False Questions

65. Unsaturated fatty acids contain more hydrogen atoms than saturated fatty acids of the same length.
FALSE

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

66. Rapid, uncontrolled hydrolysis of body fats can result in ketoacidosis.
TRUE

Bloom's Level: 2. Understand
Section: 2.02
Topic: Chemistry

67. Corticosteroids are a type of lipid commonly found in cell membranes.
FALSE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

68. Steroids are derived from cholesterol.
TRUE

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

Multiple Choice Questions

69. In order to maintain proper health, total dietary fat intake should not exceed _____ of total dietary energy intake.
A. 10%
B. 20%
C. 30%
D. 40%

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

70. Which of the following is NOT a type of lipid?
A. prostaglandins
B. triglycerides
C. cholesterol
D. glycogen

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

71. Lipids containing glycerol would include _____ and _____.
A. triglycerides, steroids
B. prostaglandins, phospholipids
C. triglycerides, phospholipids
D. steroids, prostaglandins

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

72. _____ are liver synthesized derivatives of free fatty acids that can be used as an immediate source of energy by many organs.
A. Glycerols
B. Ketone bodies
C. Steroids
D. Cholesterols

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

73. _____ are fatty acids with a cyclic hydrocarbon group.
A. Triglycerides
B. Prostaglandins
C. Proteins
D. Carbohydrates

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

74. This group of organic compounds acts as surfactants:
A. carbohydrates
B. phospholipids
C. nucleic acids
D. prostaglandins

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

75. In the formation of triglycerides,
A. hydroxyl and carbonyl groups interact.
B. amino and carbonyl groups interact.
C. carboxyl and amino groups interact.
D. carboxyl and hydroxyl groups interact.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

76. Unsaturated fatty acids
A. contain one or more double bonds.
B. are usually liquid at room temperature.
C. contain a maximal number of hydrogen atoms.
D. Both contain one or more double bonds and are usually liquid at room temperature are correct.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

77. Phospholipids
A. are glycolipids originally isolated from the prostate gland.
B. are major components of the cell membrane.
C. have a polar head and a nonpolar tail.
D. Both are major components of the cell membrane and have a polar head and a nonpolar tail are correct.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

78. Ketosis
A. occurs when stored fats are rapidly degraded by the body.
B. stimulates an increased blood pH.
C. may lead to alkalosis.
D. occurs as the concentration of ketones in the urine decreases.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

79. Which of the following describes a trans-fat?
A. Has carbon-carbon single bonds.
B. Has carbon-carbon double bonds with hydrogens on opposite sides of the bonds.
C. Has carbon-carbon double bonds with hydrogens on the same side of the bonds.
D. The fatty acids form a bent chain.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

80. Which of the following is NOT true of steroids?
A. They have three 6-carbon rings joined to one 5-carbon ring.
B. They contain a variety of functional groups.
C. They are derived from palmitate.
D. They differ in the position of the double covalent bonds between the carbon atoms in the rings.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

81. Which of the following is NOT a derivative of cholesterol?
A. corticosteroids
B. vitamin D_3
C. aldosterone
D. lecithin

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

82. Phospholipid molecules will form aggregates called _____ when placed in water.
A. surfactants
B. ketone bodies
C. prostaglandins
D. micelles

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

83. What characteristic of phospholipids allows them to form the double layer seen in cell membranes?
A. They are amphipathic.
B. They are totally nonpolar.
C. They are soluble in water.
D. They are totally hydrophobic.

Bloom's Level: 1. Remember
Section: 2.02
Topic: Chemistry

True / False Questions

84. All amino acids contain carboxyl and amino groups.
TRUE

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

85. The specific sequence of amino acids in a polypeptide is known as the primary protein structure.
TRUE

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

86. The white part of a cooked egg is due to denatured albumin proteins.
TRUE

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

Multiple Choice Questions

87. _____ is a structural protein found in tendons and ligaments.
A. Collagen
B. Keratin
C. Myosin
D. Fibrin

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

88. Peptide bonds are formed by the process of
A. ketosis.
B. hydrolysis.
C. dehydration synthesis.
D. aromatization.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

89. The secondary structure of proteins is/are
A. the linear arrangement of amino acids in the molecule.
B. alpha helix coils and beta-pleated sheet folds of a protein strand.
C. due to the interaction between protein subunits.
D. stabilized when a protein is denatured.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

90. The primary structure of proteins is/are
A. the linear arrangement of amino acids in the molecule.
B. alpha helix coils and beta-pleated sheet folds of a protein strand.
C. due to the interaction between protein subunits.
D. stabilized when a protein is denatured.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

91. The subunit of protein is the
A. fatty acid.
B. nucleic acid.
C. amino acid.
D. carboxylic acid.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

92. How many different amino acids are known?
A. 10
B. 25
C. 30
D. 20

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

93. What holds a protein in its tertiary structure?
A. hydrogen bonds between nearby amino acids
B. weak chemical bonds between widely spaced amino acids
C. disulfide bonds between sulfur groups on cysteines
D. Both weak chemical bonds between widely spaced amino acids and disulfide bonds between sulfur groups on cysteines are correct.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

94. How many amino acids are present for a polypeptide chain to be called a protein?
A. 3
B. 30
C. 50
D. 100

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

True / False Questions

95. Proteins that combine with other molecules are said to be condensed.
FALSE

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

96. The specific shape of a protein determines its function.
TRUE

Bloom's Level: 2. Understand
Section: 2.03
Topic: Chemistry

Multiple Choice Questions

97. A protein that is combined with another type of molecule like a carbohydrate is
A. conjugated.
B. denatured.
C. hydrolyzed.
D. complemented.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

98. Which of the following is NOT a function of proteins in the body?
A. carriers for membrane transport
B. enzymes
C. compose genes
D. receptors for regulator molecules

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

99. Keratin and collagen are considered _____ proteins.
A. functional
B. structural
C. fibrous
D. Both structural and fibrous are correct.

Bloom's Level: 1. Remember
Section: 2.03
Topic: Chemistry

True / False Questions

100. In DNA, cytosine forms a complementary base pair with adenine.
FALSE

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

Multiple Choice Questions

101. The nitrogenous base adenine is a
A. purine.
B. pyrimidine.
C. steroid.
D. prostaglandin.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

102. Which of the following is NOT a component of DNA?
A. phosphate
B. deoxyribose sugar
C. guanine
D. uracil

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

103. The human genome refers to
A. all living human beings.
B. the total variations in human cells.
C. all of the genes in the cell.
D. human mutations caused by gene defects.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

104. The "spiral staircase" structure of DNA is referred to as the
A. tertiary structure.
B. spiral structure.
C. the double helix.
D. the twist of life.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

105. Which of the following is NOT one of the three types of RNA?
A. dRNA
B. tRNA
C. rRNA
D. mRNA

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

106. The base that is NOT found in RNA is
A. thymine.
B. guanine.
C. cytosine.
D. uracil.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

107. Which of the following is NOT a difference between DNA and RNA?
A. They have different sugars.
B. RNA is a single strand, while DNA is a double strand.
C. DNA has thymine, while RNA has uracil.
D. They both can leave the nucleus to perform their functions.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

108. The backbone of a DNA molecule is a chain of
A. alternating deoxyribose sugar and phosphate.
B. alternating phosphate and nitrogen.
C. alternating nitrogenous bases.
D. alternating deoxyribose and ribose sugars.

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry

109. Which of the following is NOT a function of a purine-containing nucleotide?
A. neurotransmitter
B. hormone
C. energy carrier
D. coenzymes

Bloom's Level: 1. Remember
Section: 2.04
Topic: Chemistry