ch02

Student: _____

1. Chemistry deals with
   A. the composition and changes of substances that make up living as well as non-living matter.
   B. the composition and changes of substances found in organisms only.
   C. the composition of and changes of substances that make up non-living matter only.
   D. the location of organs in body cavities.

2. Chemistry is important to the study of physiology because
   A. the foods that we eat are chemicals.
   B. body functions depend on cellular functions that reflect chemical changes.
   C. chemical reactions enable our bodies to extract energy from nutrients.
   D. all of the above.

3. Which of the following substances is an element?
   A. Iron
   B. Water
   C. Sodium chloride
   D. Glucose

4. Which of the following groups of elements account for more than 95% of the human body by weight?

   A. Carbon, hydrogen, oxygen, nitrogen
   B. Calcium, hydrogen, oxygen, nitrogen
   C. Carbon, phosphorus, oxygen, hydrogen
   D. Calcium, phosphorus, hydrogen, nitrogen

5. The atoms of different elements have
   A. the same atomic number and same atomic weight.
   B. the same atomic number but different atomic weights.
   C. different atomic numbers.
   D. different atomic numbers but the same number of electrons.

6. Isotopes of an element have
   A. the same atomic number and same atomic weight.
   B. the same atomic number but different atomic weights.
   C. different atomic numbers but the same atomic weight.
   D. different atomic numbers and different atomic weights.

7. Which of the following is(are) ionizing radiation?
   A. Cosmic radiation only
   B. Gamma radiation only
   C. Both cosmic radiation and gamma radiation
   D. Neither cosmic nor gamma radiation

8. The atomic weight of an element whose atoms contain 8 protons, 8 electrons, and 8 neutrons is
   A. 8.
   B. 16.
   C. 24.
   D. 32.

9. The atoms of the isotopes of a particular element vary in the number of
   A. electrons.
   B. protons.
   C. neutrons.
   D. nuclei.

10. The first electron shell of an atom can hold a maximum of
   A. 1 electron.
   B. 2 electrons.
   C. 4 electrons.
   D. 8 electrons.

11. When forming a bond, an atom that has 3 electrons in its second shell and a filled first shell will
   A. lose 3 electrons from its second shell.
   B. lose all of the electrons from its first shell.
   C. lose all of the electrons from both its first and second shells.
   D. gain 5 electrons in its second shell.

12. The formula H_2O refers to
   A. Two hydrogen molecules and one oxygen molecule.
   B. One hydrogen molecule and two oxygen molecules.
   C. A molecule that contains two hydrogen atoms and one oxygen atom.
   D. A molecule that contains one hydrogen atom and two oxygen atoms.

13. A decomposition reaction can be symbolized by
   A. $A + B \rightarrow C + D$.
   B. $A + B \rightarrow AB$.
   C. $AB \rightarrow A + B$.
   D. $C + D \rightarrow AB$.

14. A water solution that contains equal numbers of hydrogen ions and hydroxide ions is
   A. acidic.
   B. basic.
   C. alkaline.
   D. neutral.

15. Electrolytes that release hydrogen ions in water are
   A. bases.
   B. nucleotides.
   C. acids.
   D. electrons.

16. The difference in hydrogen ion concentration between solutions with pH 4 and pH 5 is
   A. twofold.
   B. fivefold.
   C. tenfold.
   D. twentyfold.

17. A chemical reaction in which parts of different molecules trade positions is a(n)
   A. decomposition reaction.
   B. exchange reaction.
   C. reversible reaction.
   D. synthesis reaction.

18. Consider the following list of commonly found items and their pH values:

Battery acid	1.0
Vinegar	2.2
Grapes	3.5-4.5
Tomato	4.0-4.5
Beer	4.2
Coffee	5.0
White bread	5.0-6.0
Butter	6.1-6.4
Egg whites	7.6-8.0
Baking soda	8.3
Milk of magnesia	10.6
Bleach	12.8

Which of the choices includes all acids?
A. Egg whites, baking soda, milk of magnesia, and bleach
B. Tomatoes, egg whites, and baking soda
C. Vinegar, grapes, tomatoes, and coffee
D. Beer, butter, and baking soda

19. Electrolytes are substances that
A. form covalent bonds with water.
B. ionize in water.
C. cannot conduct electricity in solution.
D. form bonds that are stable in water.

20. The pH scale measures the
A. concentration of hydrogen ions in solution.
B. number of molecules of salts dissolved in water.
C. number of hydroxide ions in water.
D. strength of an electrical current that a solution carries.

21. Which of the following is the most abundant inorganic substance in the body?
A. Carbohydrate
B. Water
C. Lipid
D. Protein

22. A person has alkalosis if the blood pH
A. is above 7.0.
B. is below 7.0.
C. rises above 7.5.
D. drops below 7.3.

23. Matter is composed of elements, which are composed of _____.
A. atoms
B. inorganic molecules
C. organic molecules
D. chemicals

24. A complete atom is electrically neutral because the number of
A. protons and neutrons are equal.
B. electrons and neutrons are equal.
C. electrons and protons are equal.
D. electrons is greater than the number of protons.

25. The atomic number of an atom equals the number of _____ and the atomic weight equals the ____.
A. neutrons; number of protons
B. protons; weight of all the electrons
C. neutrons; number of protons plus electrons
D. protons; number of protons plus neutrons

26. Synthesis reactions are particularly important in the body for
    A. release of energy.
    B. digestion of food products.
    C. growth of body parts.
    D. neutralization of acids by buffers.

27. In a covalent bond
    A. one atom loses and another atom gains electrons.
    B. atoms share a pair or more of electrons.
    C. oppositely charged atoms attract.
    D. like-charged atoms repel.

28. In an ionic bond
    A. each atom gains electrons.
    B. atoms share a pair or more of electrons.
    C. oppositely charged atoms attract.
    D. like-charged atoms repel.

29. On the pH scale
    A. a tenfold difference in hydrogen ion concentration separates each whole number.
    B. the lower the whole number on the scale, the greater the H^+ concentration.
    C. pH values above 7 are basic (alkaline).
    D. all of the above.

30. Sodium ions and calcium ions are examples of
    A. cations.
    B. uncharged particles.
    C. anions.
    D. salts.

31. When cations and anions meet they
    A. repel.
    B. form ionic bonds.
    C. form covalent bonds.
    D. form individual molecules.

32. An acid reacting with a base is
    A. a synthesis reaction.
    B. hydrolysis.
    C. a decomposition reaction.
    D. an exchange reaction.

33. Water causes ionically-bonded atoms to
    A. bond more strongly.
    B. dissociate.
    C. bond covalently.
    D. decompose.

34. Bases reacting with acids form _____ and water.
    A. buffers
    B. salts
    C. new elements
    D. proteins

35. The secondary structure of a protein molecule is the result of
    A. oxygen double bonds.
    B. covalent bonds.
    C. ionic bonds.
    D. hydrogen bonds.

36. In the body, oxygen
    A. reacts with water to form carbonic acid.
    B. is used during cellular respiration.
    C. is a major electrolyte.
    D. is produced by cells.

37. Which of the following is characteristic of carbohydrates?
    A. They contain C, H, O, with twice as many hydrogen as oxygen atoms.
    B. They provide much of the energy that the cell requires.
    C. They include sugars and starches.
    D. all of the above.

38. A simple carbohydrate
    A. has a molecular formula of $C_6H_{12}O_6$.
    B. is a building block of protein.
    C. consists of several joined chains.
    D. has only one nucleotide.

39. Lipids
    A. are insoluble in water.
    B. include phospholipids, cholesterol, and fats.
    C. contain C, H, and O, but with proportionately less oxygen than in carbohydrates.
    D. all of the above.

40. Proteins denature when
    A. bonds between carbon and oxygen break.
    B. hydrogen bonds break.
    C. peptide bonds break.
    D. peptide bonds form.

41. Which of the following is not organic?
    A. Sodium chloride
    B. Lipids
    C. Nucleic acids
    D. Enzymes

42. Saturated fats _____ than unsaturated fats.
    A. contain more water
    B. have more glycerol
    C. have more single carbon-carbon bonds
    D. have fewer hydrogen atoms bonded to carbon atoms

43. Proteins
    A. are structural materials.
    B. can function as enzymes.
    C. contain C, H, O, and N, and sometimes S.
    D. all of the above.

44. An enzyme is a ____.
    A. protein that speeds up chemical reactions without being changed or depleted
    B. protein that functions as a hormone
    C. protein that inhibits chemical reactions by being changed or depleted
    D. fibrous protein that is part of certain tissues in the body

45. The parts of a protein that change when it denatures are
    A. the primary and secondary structures.
    B. the secondary and tertiary structures.
    C. the amino acid sequence and the secondary structure.
    D. the tertiary and quaternary structures.

46. DNA
    A. is a protein.
    B. plays no role in the synthesis of fats.
    C. stores genetic information, including instructions for enzymes that synthesize fats and carbohydrates.
    D. is routinely broken down to provide cellular energy.

47. Nucleic acids are
    A. very small, simple molecules.
    B. structural molecules that have no function other than support.
    C. composed of building blocks called nucleotides.
    D. primary sources of cellular energy.

48. The informational content of DNA and RNA is in the nitrogenous bases because
    A. the bases are of several types and therefore can form a code sequence.
    B. they all contain nitrogen.
    C. the sugars and phosphates vary.
    D. the bases are also parts of amino acids.

49. In phenylketonuria, an individual cannot break down the amino acid phenylalanine. Molecules that include phenylalanine build up in the blood, which causes intellectual disability and other symptoms. This inherited disease can be controlled by following a diet that is very low in
    A. carbohydrates.
    B. cholesterol.
    C. protein.
    D. nucleic acids.

50. Table sugar breaking down into glucose and fructose is a(n) _____ reaction.
    A. synthesis
    B. hydrolysis
    C. acid-base
    D. exchange reaction

51. Nucleic acids include
    A. proteins and DNA.
    B. RNA and DNA.
    C. enzymes and RNA.
    D. steroids and triglycerides.

52. DNA and RNA differ in that
    A. RNA has deoxyribose and DNA has ribose.
    B. RNA is double-stranded and DNA is single-stranded.
    C. DNA holds genetic information and RNA uses that information to synthesize protein.
    D. RNA is found only in the nucleus and DNA is found only in the cytoplasm.

53. The type of organic molecule that can replicate is a
    A. protein.
    B. lipid.
    C. carbohydrate.
    D. nucleic acid.

54. Conformation is
    A. the three dimensional shape of a molecule, such as a protein.
    B. the energy held in the bonds of an organic molecule, such as a protein.
    C. the ability of DNA to copy itself.
    D. the amino acid sequence (primary structure) of a protein.

55. An organic compound always contains
    A. carbon and hydrogen.
    B. oxygen and nitrogen.
    C. carbon and oxygen.
    D. nitrogen and hydrogen.

56. Carbon can form ___ covalent bonds.
    A. 1
    B. 2
    C. 4
    D. 8

57. Which of these is not a monosaccharide?
    A. Glucose
    B. Ribose
    C. 6-carbon sugar
    D. Sucrose

58. Glycogen is stored in the liver and _____.
    A. spleen
    B. skeletal muscles
    C. pancreas
    D. heart

59. A triglyceride consists of
    A. 3 glycerols and 1 fatty acid.
    B. 3 glucose molecules.
    C. 3 fatty acids and 3 phosphate groups.
    D. 3 fatty acids and 1 glycerol.

60. Which of the following groups of compounds is hydrophobic?
    A. Carbohydrates
    B. Lipids
    C. Proteins
    D. Nucleic Acids

61. Which of the following molecules does not have a polar region?
    A. Water
    B. Triglyceride
    C. Water soluble amino acid
    D. Glucose

62. A biomarker is
    A. a gene that encodes a particular protein.
    B. always a protein.
    C. a body chemical associated with a particular disease or exposure to a toxin.
    D. any chemical in the body.

63. An example of a biomarker is
    A. cholesterol.
    B. any DNA sequence.
    C. sodium chloride.
    D. hydrogen.

64. A biomarker test for cancer should ideally be
    A. inexpensive.
    B. easy to perform.
    C. specific.
    D. all of the above.

65. Which of the following isotopes has the longest half-life?
    A. Iodine-131
    B. Iron-59
    C. Phosphorus-32
    D. Cobalt-60

66. The _____ uses iodine in a synthesis reaction.
    A. spleen
    B. liver
    C. thymus
    D. thyroid gland

67. The isotope most likely to be used to study the thyroid gland is
    A. Iodine-131
    B. Iron-59
    C. Thallium-201
    D. Cobalt-60

68. Atomic radiation is useful for treating cancer because
    A. radiation affects cancer cells but not normal cells.
    B. radiation protects normal cells against the effects of cancer.
    C. radiation harms cancer cells more readily than it does most non-cancer cells.
    D. normal cells are not affected by radiation.

69. Exposure to ionizing radiation may
    A. cloud the lens of the eye.
    B. cause cancer.
    C. interfere with normal growth.
    D. all of the above.

70. Which of the following is not a source of ionizing radiation?
    A. Cosmic rays from outer space
    B. Cholesterol and triglycerides
    C. Atomic and nuclear weapons
    D. Smoke detectors

71. A CT scan differs from a conventional X-ray image because it is
    A. two dimensional.
    B. three dimensional.
    C. four dimensional.
    D. safer.

72. PET imaging follows the emission of
    A. positrons.
    B. electrons.
    C. neutrons.
    D. protons.

73. Chemistry is the study of the composition of matter and how matter changes.
    True False

74. The number of protons in an atom of an element always equals its atomic weight.
    True False

75. Radioactive isotopes have stable nuclei.
    True False

76. Sodium and chloride atoms combine readily because they both lose electrons.
    True False

77. The symbol Na^+ represents a sodium atom that has lost an electron.
True False

78. At atom that has gained or lost electrons is called an ion.
True False

79. Water is an example of a compound.
True False

80. A substance that releases hydrogen ions in water is a base.
True False

81. A strong acid reacting with a strong base produces a salt.
True False

82. An atom with 10 protons and which has lost 2 electrons is electrically neutral.
True False

83. Chemically inert atoms always have their outermost electron shell full.
True False

84. An acid is an electrolyte that releases hydroxide ions (OH^-) in water.
True False

85. A base is an electrolyte that releases ions that combine with hydrogen ions.
True False

86. An electrolyte ionizes in water.
True False

87. A person with alkalosis has a blood pH less than 7.3.
True False

88. A complex carbohydrate consists of a phosphate group attached to a sugar molecule.
True False

89. Cholesterol, a type of lipid, is composed of 3 fatty acid chains attached to glycerol.
True False

90. Glycogen is a complex carbohydrate that we get directly by eating plants.
True False

91. A phospholipid differs structurally from a triglyceride in that it has three phosphate groups attached to the glycerol molecule rather than three fatty acid chains.
True False

92. Nucleic acids are composed of building blocks called amino acids.
True False

93. A protein is formed from a sequence of amino acids.
True False

94. Proteins encode nucleic acids.
True False

95. DNA and RNA are nucleic acids.
True False

96. The parts of an atom that carry single negative electrical charges are called _____.
_____

97. When atoms form chemical bonds, the subatomic particles that directly interact are the _____.
_____

98. The type of subatomic particle that does not have an electrical charge is a(n) _____.
_____

99. The type of chemical bond formed when ions with opposite electrical charges attract is a(n) _____ bond.
_____

100. Two or more atoms bonding form a _____.
_____

101. The opposite of a decomposition reaction is a _____ reaction.
_____

102. The midpoint of the pH scale is pH __.
_____

103. Apricots have a pH of 3.8. Therefore, they are _____.
_____

104. Organic substances always contain the elements _____ and _____.
_____

105. Amino acids are building blocks of _____.
_____

106. The amino acid sequence of a protein is its _____ structure.
_____

107. _____ are building blocks of nucleic acids.
_____

108. ____ has the unique ability among types of organic molecules to replicate.
_____

ch02 Key

1. A
2. D
3. A
4. A
5. C
6. B
7. C
8. B
9. C
10. B
11. A
12. C
13. C
14. D
15. C
16. C
17. B
18. C
19. B
20. A
21. B
22. C
23. A
24. C
25. D
26. C
27. B
28. C
29. D
30. A
31. B
32. D
33. B
34. B
35. D
36. B

37. D

38. A

39. D

40. B

41. A

42. C

43. D

44. A

45. B

46. C

47. C

48. A

49. C

50. B

51. B

52. C

53. D

54. A

55. A

56. C

57. D

58. B

59. D

60. B

61. B

62. C

63. A

64. D

65. D

66. D

67. A

68. C

69. D

70. B

71. B

72. A

73. TRUE

74. FALSE

75. FALSE

76. FALSE

77. TRUE

78. TRUE

79. TRUE

80. FALSE

81. TRUE

82. FALSE

83. TRUE

84. FALSE

85. TRUE

86. TRUE

87. FALSE

88. FALSE

89. FALSE

90. FALSE

91. FALSE

92. FALSE

93. TRUE

94. FALSE

95. TRUE

96. electrons

97. electrons

98. neutron

99. ionic

100. molecule

101. synthesis

102. 7

103. acidic *or* acid

104. carbon, hydrogen

105. protein

106. primary

107. nucleotides

108. DNA *or* Deoxyribonucleic acid

ch02 Summary

Category	*# of Questions*
Blooms Level: 1. Remember	36
Blooms Level: 2. Understand	65
Blooms Level: 3. Apply	7
Boxed Reading: From Science to Technology 2.1	3
Boxed Reading: From Science to Technology 2.2	3
Boxed Reading: From Science to Technology 2.3	2
Boxed Reading: Vignette	3
Learning Outcome: 02.01	3
Learning Outcome: 02.02	55
Learning Outcome: 02.03	39
Shier - Ch02 Chemical...	108
Topic: Chemistry	108