

Student name: _____

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

- 1) Chemistry is the branch of science that deals with the composition of matter.
 true
 false

- 2) Matter is anything that has weight and takes up space.
 true
 false

- 3) The atomic weight of an atom of an element equals the number of neutrons in its nucleus.
 true
 false

- 4) Sodium and chloride ions readily combine because they have opposite charges.
 true
 false

- 5) A covalent bond is formed when two atoms share electrons.
 true
 false

- 6) The molecular formula for compounds like sodium chloride (NaCl) indicate the relative amounts of each element present.
 true
 false

- 7) When two pairs of electrons are shared, the resulting bond is called a double covalent bond.

- true
- false

8) Water is an example of a compound.

- true
- false

9) A molecular formula represents the numbers and types of atoms in a molecule.

- true
- false

10) During an exchange reaction, the bonds of a reactant molecule break so that simpler molecules, atoms, or ions are formed.

- true
- false

11) A synthesis reaction occurs when two or more atoms (reactants) bond to form a more complex structure (product).

- true
- false

12) A pH value indicates the hydrogen ion concentration in solutions such as body fluids.

- true
- false

13) A substance that dissociates and releases hydrogen ions into water is classified as a base.

- true
- false

14) An acid is defined as an electrolyte that releases hydroxide ions (OH^-) in water.

- true
- false

15) Within a solution, buffers combine with hydrogen ions when H^+ ions are in excess or they donate hydroxide ions when H^+ ions are depleted.

- true
- false

16) A salt is a compound composed of oppositely charged ions.

- true
- false

17) Cells use oxygen to release energy from glucose.

- true
- false

18) The building blocks of triglyceride molecules are amino acids.

- true
- false

19) Cholesterol is a type of protein.

- true
- false

20) Steroid molecules consist of four connected rings of carbon atoms.

- true
- false

- 21) The building blocks of proteins are molecules called amino acids.
- true
 - false
- 22) Examples of proteins include DNA and RNA.
- true
 - false
- 23) Carbon, oxygen, sodium, and hydrogen compose over 95% (by weight) of the human body.
- true
 - false
- 24) Atoms of different elements vary in size, weight, and ways they interact with other atoms.
- true
 - false
- 25) Protons are the particles within an atom that determine the atom's bonding behavior.
- true
 - false
- 26) Protons and electrons are similar in size.
- true
 - false
- 27) All isotopes of an element have the same number of electrons.
- true
 - false

28) As the concentration of hydrogen ions increases in a solution, the pH decreases.

- true
- false

29) Water, salts, oxygen, and proteins are all examples of inorganic substances.

- true
- false

MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

30) All of the food that we eat, liquids that we drink, and medications that we take are examples of _____.

- A) chemicals
- B) vitamins
- C) proteins
- D) nucleic acids
- E) carbohydrates

31) Indicate the substance that is NOT an element.

- A) Iron
- B) Oxygen
- C) Water
- D) Carbon
- E) Hydrogen

32) Ninety-five percent (95%) of the human body (by weight) is made up of what four elements?

- A) Carbon, hydrogen, oxygen, nitrogen
- B) Carbon, hydrogen, oxygen, calcium
- C) Carbon, hydrogen, calcium, nitrogen
- D) Carbon, hydrogen, selenium, sodium
- E) Sodium, calcium, nitrogen, selenium

33) The term _____ is defined as the amount of matter, while the term _____ refers to the gravitational pull on the matter.

- A) mass; weight
- B) weight; mass

34) The electrons of an atom occupy one or more areas of space, called _____, around the nucleus.

- A) pockets
- B) shells
- C) regions
- D) zones
- E) tracts

35) The _____ of an atom is determined by the electrons in its outermost shell.

- A) shape
- B) weight
- C) chemical behavior
- D) mass
- E) atomic number

36) What differs between the isotopes of a particular element?

- A) The shape of the protons
- B) The number of protons
- C) The number of neutrons
- D) The size of the electrons
- E) The number of electron shells

37) By what mechanism does a chemical bond form between an ion of potassium (K^+) and chloride (Cl^-)?

- A) Electrons are shared between ions, forming a bond.
- B) The opposite charges of the ions cause them to be attracted to each other, forming a bond.
- C) The protons of each nucleus are attracted to each other, forming a bond.
- D) Neutrons from one ion are transferred to the other ion, forming a bond.

38) The first (innermost) electron shell of an atom can hold a maximum of _____ electrons.

- A) 1
- B) 2
- C) 4
- D) 8
- E) 16

39) What is indicated by the formula H_2O ?

- A) An atom that contains 2 hydrogen molecules and 1 oxygen molecule
- B) An atom that contains 1 hydrogen atom and 2 oxygen molecules
- C) A molecule that contains 2 hydrogen atoms and 1 oxygen atom
- D) A molecule that contains 1 hydrogen atom and 2 oxygen atoms
- E) A molecule that contains 2 hydrogen atoms and no oxygen atoms

40) What type of chemical bond is formed by the attraction of the positive hydrogen end of one polar molecule to the negative nitrogen or oxygen end of another polar molecule?

- A) Ionic bond
- B) Double bond
- C) Triple bond
- D) Hydrogen bond
- E) Covalent bond

41) Based on their subatomic makeup, which atom is actually an ion? Atom 1: 3 protons, 2 neutrons, 3 electrons Atom 2: 3 protons, 3 neutrons, 2 electrons Atom 3: 3 protons, 1 neutron, 3 electrons

- A) Atom 1
- B) Atom 2
- C) Atom 3

42) A chemical reaction in which parts of two different molecules trade positions is called a(an) _____ reaction.

- A) decomposition
- B) exchange
- C) reversible
- D) synthesis
- E) irreversible

43) How would a decomposition reaction be illustrated?

- A) $A + B \rightarrow C + D$
- B) $A + B \rightarrow AB$
- C) $AB \rightarrow A + B$
- D) $C + D \rightarrow AB$
- E) $AB + CD \rightarrow AC + BD$

44) A solution with a pH of 4 is _____ and a solution with a pH of 9 is _____.

- A) acidic; basic (alkaline)
- B) acidic; neutral
- C) basic (alkaline); acidic
- D) basic (alkaline); neutral
- E) neutral; acidic

45) A(n) _____ solution contains more hydroxide ions than hydrogen ions.

- A) basic
- B) neutral
- C) acidic

46) Each whole number on the pH scale represents a _____-fold difference in hydrogen ion concentration.

- A) 2
- B) 10
- C) 15
- D) 20
- E) 100

47) As hydrogen ion concentration of a solution increases, what change occurs in the pH value?

- A) The pH value increases.
- B) The pH value decreases.
- C) The pH value stays the same.
- D) The pH becomes negative.
- E) The pH value approaches 14.

48) A solution with a pH of 6 has ten times the hydrogen ion concentration of a solution of what pH?

- A) pH of 0.6
- B) pH of 2
- C) pH of 5
- D) pH of 7
- E) pH of 8

49) What blood pH is associated with the condition called alkalosis?

- A) Blood pH between 7.35 and 7.45
- B) Blood pH below 7.0
- C) Blood pH above 7.45
- D) Blood pH below 7.35

50) Consider the chemical reaction: $\text{H}_2\text{SO}_4 \rightarrow \text{HSO}_4^- + \text{H}^+$. In this reaction, is H_2SO_4 an acid or a base?

- A) Acid
- B) Base

51) What type of chemicals function to resist changes in pH of a solution?

- A) Buffers
- B) Electrolytes
- C) Acids
- D) Bases
- E) Ions

52) At the cellular level, physiology becomes the study of _____.

- A) organs
- B) chemistry
- C) tissues
- D) organ systems
- E) human populations

53) Indicate the compound that is an organic substance.

- A) Water
- B) Protein
- C) Sodium chloride
- D) Carbon dioxide
- E) Oxygen

54) Inorganic substances called _____ dissociate in water, releasing ions.

- A) organic compounds
- B) non-electrolytes
- C) electrolytes
- D) lipids
- E) carbohydrates

55) Water is the major _____ in the body.

- A) solvent
- B) solute

56) Describe carbon dioxide.

- A) It is inhaled in large quantities from the environment.
- B) It is a waste product of metabolic processes.
- C) It is an element.
- D) It is a salt.
- E) It is an electrolyte.

57) Indicate the inorganic substance.

- A) Glucose
- B) An enzyme
- C) Cholesterol
- D) Carbon dioxide
- E) DNA

58) Indicate the non-carbohydrate molecule.

- A) Monosaccharide
- B) Disaccharide
- C) Protein
- D) Polysaccharide
- E) Glucose

59) Neutrons are located in the _____ of an atom, and they have an electrical charge that is _____.

- A) nucleus; negative
- B) nucleus; neutral
- C) shells; negative
- D) nucleus; positive
- E) shells; neutral

60) Electrons are located in the _____ of an atom and they have an electrical charge that is _____.

- A) nucleus; negative
- B) nucleus; neutral
- C) shells; negative
- D) nucleus; positive
- E) shells; neutral

61) Protons are located in the _____ of an atom and they have an electrical charge that is _____.

- A) nucleus; negative
- B) nucleus; neutral
- C) shells; negative
- D) nucleus; positive
- E) shells; neutral

62) The branch of science called _____ deals with the composition of matter.

- A) histology
- B) chemistry
- C) physiology
- D) biology
- E) cytology

63) Atoms that lose or gain electrons become electrically charged particles called _____.

- A) ions
- B) molecules
- C) protons
- D) isotopes

64) When atoms form bonds by sharing electrons, the bond formed is a(an) _____ bond.

- A) ionic
- B) covalent
- C) electronic
- D) hydrogen

65) Within a water molecule, the shared electrons forming the bonds between the hydrogen atoms and the oxygen atom spend more time at the oxygen end of the molecule than at the hydrogen end. These are examples of _____ bonds.

- A) polar covalent
- B) nonpolar covalent
- C) ionic
- D) hydrogen

66) What type of chemical bonds are, individually, relatively weak but, collectively, are strong enough to be responsible for the surface tension of water?

- A) Ionic bonds
- B) Polar covalent bonds
- C) Hydrogen bonds
- D) Nonpolar covalent bonds

67) Solution A has a pH of 6 and Solution B has a pH of 3. Which statement is correct?

- A) Solution B has 3 times more H^+ than Solution A.
- B) Solution B has 3 times less H^+ than Solution A.
- C) Solution B has 30 times more H^+ than Solution A.
- D) Solution B has 1000 times more H^+ than Solution A.
- E) Solution B has 1000 times less H^+ than Solution A.

68) Addition of lactic acid to a solution will result in a(n) _____ in the pH of the solution.

- A) increase
- B) decrease

69) What is the normal range for blood pH?

- A) 6.35 — 7.45
- B) 6.85 — 7.15
- C) 7.0 — 7.35
- D) 7.35 — 7.45

70) Three atoms have the following subatomic particles: Atom 1: 3 protons, 2 neutrons, 3 electrons
Atom 2: 3 protons, 3 neutrons, 2 electrons
Atom 3: 3 protons, 1 neutron, 3 electrons
Which statement best describes these three atoms?

- A) They are all the same element; they are isotopes of each other.
- B) They are three different elements; they are isotopes of each other.
- C) They are all the same element; two of the atoms are ions.
- D) They all have the same atomic number and atomic weight.

- 71) Overall, the electrical charge of a nucleus of an atom is always _____.
- A) neutral
 - B) positive
 - C) negative
- 72) What is the atomic number for an atom with 12 protons and 11 neutrons?
- A) 11
 - B) 12
 - C) 23
 - D) 24
- 73) What is the atomic weight for an atom with 12 protons and 11 neutrons?
- A) 11
 - B) 12
 - C) 23
 - D) 24
- 74) An atom of oxygen has an atomic weight of 8. Its isotope with an atomic weight of 15 would have _____ neutrons in its nucleus.
- A) 5
 - B) 7
 - C) 8
 - D) 15
- 75) Atom X gains one electron, and Atom Y loses one. As a result, Atom X becomes _____ charged, Atom Y becomes _____ charged, and a(n) _____ bond can form.

- A) negatively; positively; ionic
- B) negatively; positively; polar covalent
- C) positively; negatively; ionic
- D) positively; negatively; polar covalent

76) Which atom will become a positively charged ion?

- A) An atom that loses an electron
- B) An atom that gains an electron
- C) An atom that gains a neutron
- D) An atom that loses a neutron

77) A _____ is a substance that dissolves in another substance, called the _____.

- A) solute; solvent
- B) solvent; solute

78) $C_6H_{12}O_6$ is an example of an _____ compound.

- A) organic
- B) inorganic

79) Sucrose, lactose, and maltose are examples of what type of carbohydrate?

- A) Monosaccharides
- B) Polysaccharides
- C) Disaccharides

80) Galactose, glucose, and fructose are examples of what type of carbohydrate?

- A) Monosaccharides
- B) Polysaccharides
- C) Disaccharides

81) Starch and glycogen are examples of what type of carbohydrate?

- A) Monosaccharides
- B) Polysaccharides
- C) Disaccharides

82) Ribose and deoxyribose are examples of what type of organic molecule?

- A) Carbohydrates
- B) Proteins
- C) Lipids
- D) Nucleic acids

83) Compare the compounds $C_6H_{12}O_6$ and $C_{57}H_{110}O_6$. Which is the carbohydrate?

- A) $C_6H_{12}O_6$
- B) $C_{57}H_{110}O_6$

84) The building blocks of _____ molecules are fatty acids and glycerol.

- A) triglyceride
- B) steroid
- C) polysaccharide
- D) protein

85) Within a phospholipid molecule, the phosphate "head" is _____ and the fatty acid "tails" are _____.

- A) hydrophilic; hydrophobic
- B) hydrophobic; hydrophilic

86) What type of lipid is used in the production of hormones such as estrogen and testosterone?

- A) Steroids
- B) Triglycerides
- C) Phospholipids
- D) Fatty acids

87) Stearic acid and linolenic acid are both fatty acids built on chains of 18 carbon atoms. Based on their chemical composition, which of these is the saturated fatty acid? Stearic acid: 18 carbon atoms, 36 hydrogen atoms, 2 oxygen atoms
Linolenic acid: 18 carbon atoms, 30 hydrogen atoms, 2 oxygen atoms

- A) Stearic acid
- B) Linolenic acid

88) What type of fatty acid will have double bonds between carbon atoms within its carbon chain?

- A) Unsaturated fatty acids
- B) Saturated fatty acids

89) What type of organic compound will have amino groups, carboxyl groups, and R groups?

- A) Proteins
- B) Carbohydrates
- C) Lipids
- D) Nucleic acids

90) Enzymes, receptors, and antibodies are examples of what type of organic compound?

- A) Proteins
- B) Carbohydrates
- C) Lipids
- D) Nucleic acids

91) A chemical reaction in which bonds are broken is associated with the _____ of energy.

- A) consumption
- B) release

92) Lipids _____ dissolve in water. Thus, they are described as being _____.

- A) do; hydrophilic
- B) do not; hydrophilic
- C) do; hydrophobic
- D) do not; hydrophobic

93) A primary, secondary, and tertiary structure describe the structure of what type of organic compound?

- A) Proteins
- B) Lipids
- C) Nucleic acids
- D) Carbohydrates

94) The order of amino acids within a polypeptide chain makes up the _____ structure of the molecule.

- A) primary
- B) secondary
- C) tertiary
- D) quaternary

95) What is meant by the denaturation of a protein?

- A) Amino acids are removed from the original polypeptide chain, leading to denaturation.
- B) Additional carboxyl groups bind to the ends of the polypeptide chain, leading to denaturation.
- C) Hydrogen bonds between regions of the polypeptide chain are broken, leading to denaturation.
- D) Larger amino acids such as phenylalanine are replaced with smaller amino acids such as cysteine, leading to denaturation.

96) Nitrogenous bases are important components of what type of organic compound?

- A) Proteins
- B) Carbohydrates
- C) Nucleic acids
- D) Lipids

97) The type of nucleic acid called _____ consists of a single strand of nucleotides containing the sugar ribose.

- A) RNA
- B) DNA

98) Name the type of chemical bonding that occurs between the two nucleotide chains of a DNA molecule.

- A) Hydrogen bonds
- B) Ionic bonds
- C) Nonpolar covalent bonds
- D) Polar covalent bonds

FILL IN THE BLANK. Write the word or phrase that best completes each statement or answers the question.

99) Understanding _____ is essential for understanding anatomy and physiology because body structures and functions result from chemical changes.

100) The term _____ is defined as anything that has weight and takes up space.

101) The simplest examples of matter are the _____, each of which has specific chemical properties that differentiate them from all others.

102) When unstable isotopes decompose, they release _____ in the form of energy or atomic fragments.

103) The atomic _____ of an atom of an element is equal to the number of protons plus the number of neutrons in its nucleus.

- 104)** The atomic _____ for an element is equal to the number of protons in the nucleus of one atom of that particular element.
- 105)** Particles called _____ are the smallest complete units of any element; those of one element will be different in structure from those of any other element.
- 106)** Particles within an atom called _____ lack an electrical charge.
- 107)** Chemical bonds between atoms involve the component of atoms called _____.
- 108)** Atoms that gain or lose electrons become electrically charged and are called _____.
- 109)** The type of chemical bond formed when atoms share electrons is called a/an _____ bond.
- 110)** When ions with opposite charges are attracted to one another, a type of chemical bond called a/an _____ bond is formed.
- 111)** Molecules called _____ are formed when atoms of different elements bond together.
- 112)** In order to show how atoms within a molecule are joined and arranged, a representation called a _____ formula is used.

- 113) A/an _____ reaction is illustrated as $A + B \rightarrow AB$.
- 114) A/an _____ reaction is illustrated as $AB \rightarrow A + B$.
- 115) A(n) _____ reaction is the opposite of a decomposition reaction.
- 116) The pH of a solution is the measure of its _____ ion concentration.
- 117) For a solution, a pH value of _____ signifies equal numbers of hydrogen and hydroxide ions in the solution.
- 118) Adding a(an) _____ to a solution will cause the pH of the solution to decrease.
- 119) Chemicals called _____ are those that resist changes in pH of a solution.
- 120) Organic substances always contain atoms of hydrogen and _____.
- 121) The substance _____ is the most abundant compound in living material.
- 122) The primary function of the type of lipid called _____ is to store energy for cellular activities.

- 123) Molecules called _____ are the building blocks of nucleic acids.
- 124) Within an atom, the number of protons plus the number of _____ is approximately equal to the atomic weight of the atom.
- 125) In an atom, the first (innermost) shell contains a maximum of _____ electrons.
- 126) In an atom, the second electron shell contains a maximum of _____ electrons.
- 127) The chemical behavior of atoms results from interactions between the _____ of each atom.
- 128) The smallest subatomic particles are the _____.
- 129) $FX \rightarrow F + X$ This reaction is an example of a(n) _____ reaction.
- 130) $X + Y \rightarrow XY$ This reaction is an example of a(n) _____ reaction.
- 131) In _____ reactions, parts of two different molecules trade positions.

Answer Key

Test name: Unnamed Test2

- 1) TRUE
- 2) TRUE
- 3) FALSE
- 4) TRUE
- 5) TRUE
- 6) TRUE
- 7) TRUE
- 8) TRUE
- 9) TRUE
- 10) FALSE
- 11) TRUE
- 12) TRUE
- 13) FALSE
- 14) FALSE
- 15) FALSE
- 16) TRUE
- 17) TRUE
- 18) FALSE
- 19) FALSE
- 20) TRUE
- 21) TRUE
- 22) FALSE
- 23) FALSE
- 24) TRUE
- 25) FALSE
- 26) FALSE

- 27) TRUE
- 28) TRUE
- 29) FALSE
- 30) A
- 31) C
- 32) A
- 33) A
- 34) B
- 35) C
- 36) C
- 37) B
- 38) B
- 39) C
- 40) D
- 41) A
- 42) B
- 43) C
- 44) A
- 45) A
- 46) B
- 47) B
- 48) D
- 49) C
- 50) A
- 51) A
- 52) B
- 53) B
- 54) C
- 55) A
- 56) B

- 57) D
- 58) C
- 59) B
- 60) C
- 61) D
- 62) B
- 63) A
- 64) B
- 65) A
- 66) C
- 67) D
- 68) B
- 69) D
- 70) A
- 71) B
- 72) B
- 73) C
- 74) B
- 75) A
- 76) A
- 77) A
- 78) A
- 79) C
- 80) A
- 81) B
- 82) A
- 83) A
- 84) A
- 85) A
- 86) A

- 87) A
- 88) A
- 89) A
- 90) A
- 91) A
- 92) D
- 93) A
- 94) A
- 95) C
- 96) C
- 97) A
- 98) A
- 99) chemistry
- 100) matter
- 101) elements
- 102) radiation
- 103) weight
- 104) number
- 105) atoms
- 106) neutrons
- 107) electrons
- 108) ions
- 109) covalent
- 110) ionic
- 111) compounds
- 112) structural
- 113) synthesis
- 114) decomposition
- 115) synthesis
- 116) hydrogen

- 117) 7
- 118) acid
- 119) buffers
- 120) carbon
- 121) water
- 122) fats
- 123) nucleotides
- 124) neutrons
- 125) 2
- 126) 8
- 127) electrons
- 128) electron
- 129) decomposition
- 130) synthesis
- 131) exchange