

Student name: \_\_\_\_\_

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

1) The number of protons in an atom of an element always equals its mass number.

- true
- false

2) Radioactive isotopes have stable nuclei.

- true
- false

3) Sodium and chloride atoms interact with each other because they both lose electrons.

- true
- false

4) The symbol  $\text{Na}^+$  represents a sodium atom that has lost an electron.

- true
- false

5) Water is an example of a compound.

- true
- false

6) If  $\text{Ca}^{+2}$  were to gain 2 electrons, it would become  $\text{Ca}^0$  and become neutral.

- true
- false

7) Two negatively charged bromide ( $\text{Br}^-$ ) ions exist in solution. They will be attracted to each other and form an ionic bond.

- true
- false

8) Chemistry is the study of the composition of matter and how matter changes.

- true
- false

9)  $\text{CaCl}_2$  is dissolved in water. The chlorine that is released will be in the form of anions.

- true
- false

10) The compound  $\text{H}_2\text{SO}_4$  will dissociate in water to create  $\text{HSO}_4^-$  and  $\text{H}^+$ . The product  $\text{HSO}_4^-$  is a base.

- true
- false

11) In the reaction between  $\text{HCl}$  and  $\text{Ca}(\text{OH})_2$ , the product  $\text{CaCl}_2$  will be a salt.

- true
- false

12) Chemically inert atoms always have their outermost electron shell full.

- true
- false

13) An acid is an electrolyte that releases hydroxide ions ( $\text{OH}^-$ ) in water.

- true
- false

14) A base is an electrolyte that releases ions that will then combine with hydrogen ions.

- true
- false

**15)** An electrolyte ionizes in water.

- true
- false

**16)** A person with alkalosis has a blood pH less than 7.3.

- true
- false

**17)** A complex carbohydrate consists of a phosphate group attached to a sugar molecule.

- true
- false

**18)** Cholesterol, a type of lipid, is composed of three fatty acid chains attached to glycerol.

- true
- false

**19)** Glycogen is a complex carbohydrate that is obtained by eating plants.

- true
- false

**20)** A phospholipid differs structurally from a triglyceride in that the phospholipid has three phosphate groups attached to the glycerol molecule rather than three fatty acid chains.

- true
- false

**21)** Nucleic acids are composed of building blocks called amino acids.

- true
- false

22) A protein is formed by a sequence of amino acids.

- true
- false

23) Proteins contain the code for the production of nucleic acids.

- true
- false

24) DNA and RNA are nucleic acids.

- true
- false

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

25) Matter is composed of elements which, in turn, are composed of \_\_\_\_\_.

- A) atoms
- B) inorganic molecules
- C) organic molecules
- D) chemicals

26) The atomic number of an atom equals the number of \_\_\_\_\_, and the mass number equals the \_\_\_\_\_.

- A) weight of all electrons; number of protons plus neutrons
- B) number of protons; weight of all the electrons
- C) number of neutrons plus protons; number of electrons
- D) number of protons; number of protons plus neutrons

- 27) What occurs to form a covalent bond?
- A) One atom loses electrons and another atom gains electrons.
  - B) Atoms share one or more pairs of electrons.
  - C) Oppositely charged atoms are attracted to one another.
  - D) Like-charged atoms repel each other.
- 28) What occurs to form an ionic bond?
- A) Each atom gains electrons.
  - B) Atoms share a pair or more of electrons.
  - C) Oppositely charged atoms are attracted to each other.
  - D) Like-charged atoms repel each other.
- 29) Sodium ions and calcium ions are examples of what type of particle?
- A) Cations
  - B) Uncharged particles
  - C) Anions
  - D) Salts
- 30) The bond that forms between  $K^+$  and  $Cl^-$  is a(n) \_\_\_\_\_.
- A) nonpolar covalent bond
  - B) ionic bond
  - C) hydrogen bond
  - D) polar covalent bond
- 31) What happens to the ionic compound NaCl when placed in water?

- A) A new covalent bond will form between Na and Cl.
  - B) NaCl will dissociate into Na<sup>+</sup> and Cl<sup>-</sup> ions.
  - C) Na and Cl will each form a covalent bond with a water molecule.
  - D) The bond between Na and Cl will become a hydrogen bond.
- 32) What is the maximum number of hydrogen atoms a free carbon atom may bond with?
- A) 1
  - B) 2
  - C) 4
  - D) 8
- 33) How does one isotope of a particular element differ from another of the same element?
- A) The isotopes have different numbers of protons.
  - B) The isotopes have different atomic numbers.
  - C) The isotopes have different numbers of electrons.
  - D) The isotopes have different mass numbers.
- 34) Which of the following pairs of atoms are isotopes of each other?
- A) Atom A with 6 protons and 6 neutrons; atom B with 6 protons and 7 neutrons.
  - B) Atom A with 6 protons and 6 neutrons; atom B with 7 protons and 6 neutrons.
  - C) Atom A with 6 protons and 6 neutrons; atom B with 7 protons and 7 neutrons.
- 35) Which statement correctly describes radioactive isotopes?

- A) They are stable and can participate in chemical bonding.
- B) They are unstable and will decompose, releasing energy.
- C) They are stable and will decompose, releasing energy.
- D) They are unstable, but can become stable by bonding with other isotopes.

**36)** What type of atomic radiation will most deeply penetrate matter?

- A) Alpha radiation
- B) Beta radiation
- C) Gamma radiation

**37)** Because the ways that atoms interact is due to their number of \_\_\_\_\_, isotopes of an atom chemically react in the same manner.

- A) electrons
- B) neutrons
- C) protons

**38)** The type of radiation that removes electrons from atoms is called \_\_\_\_\_ radiation.

- A) ionizing
- B) radicalizing
- C) energizing
- D) fusion

**39)** How does a computerized tomography (CT) scan differ from a conventional X-ray image?

- A) The CT scan is two-dimensional.
- B) The CT scan is three-dimensional.
- C) The CT scan is four-dimensional.
- D) The CT scan is safer.

**40)** Positronemission tomography (PET) imaging relies upon the emission of \_\_\_\_\_ from radioactive isotopes such as carbon-11.

- A) positively charged electrons
- B) negatively charged electrons
- C) positively charged neutrons
- D) protons

**41)** Chemistry is the branch of science that studies \_\_\_\_\_.

- A) the composition, properties, and interactions of matter
- B) the function of organs within the body
- C) the structure of the organs of the body
- D) the location of organs in body cavities

**42)** In order to understand how digestion of nutrients occurs, or how nutrients are used to provide cellular energy, it is necessary to understand \_\_\_\_\_.

- A) chemistry
- B) anatomy
- C) radioactivity
- D) cytology

**43)** Which of the following is an element?



- A) Iron
  - B) Water
  - C) Sodium chloride
  - D) Glucose
- 44) What group of elements accounts 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.
- 45) How do the atoms of different elements differ from one another?
- A) They have the same atomic numbers and the same mass numbers.
  - B) They have the same atomic numbers but different mass numbers.
  - C) They have different atomic numbers and different mass numbers.
  - D) They have different atomic numbers but the same number of electrons.
- 46) How do isotopes of a particular element compare to each other?
- A) They have the same atomic number and same mass number.
  - B) They have the same atomic number but different mass numbers.
  - C) They have different atomic numbers but the same mass number.
  - D) They have different atomic numbers and different mass numbers.
- 47) What particles are located in the nucleus of an atom?

- A) Protons and neutrons
- B) Protons and electrons
- C) Electrons and neutrons
- D) Neutrons, electrons, and protons

**48)** What is the mass number of an element whose atoms contain eight protons, eight electrons, and eight neutrons?

- A) 8
- B) 16
- C) 24
- D) 32

**49)** How do the atoms of isotopes of a particular element vary?

- A) They have differing numbers of electrons.
- B) They have differing numbers of protons.
- C) They have differing numbers of neutrons.
- D) They have differing number of nuclei.

**50)** The first electron shell of an atom can hold a maximum of \_\_\_\_\_ electrons.

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

**51)** An atom has a full innermost shell and three electrons in its second shell. What would happen when this atom forms a chemical bond?

- A) It will lose three electrons from its second shell.
- B) It will lose all of the electrons from its innermost shell.
- C) It will lose all of the electrons from both its innermost and second shells.
- D) It will gain five electrons in its second shell.

52) What is the chemical formula  $H_2O$  referring to?

- A) An atom with two hydrogen molecules and one oxygen molecule.
- B) An atom with 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.

53) Which of the following best describes the reaction  $H_2CO_3 \rightarrow H_2O + CO_2$ ?

- A) Decomposition reaction
- B) Exchange reaction
- C) Reversible reaction
- D) Synthesis reaction

54) A solution that contains equal numbers of hydrogen ions and hydroxide ions is described as being \_\_\_\_\_.

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

55) When placed in a solution, the compound  $HNO_3$  dissociates into  $H^+$  and  $NO_3^-$ . The compound  $HNO_3$  must be a(n) \_\_\_\_\_.

- A) salt
- B) nucleotide
- C) acid
- D) monosaccharide

56) The difference in hydrogen ion concentration between solutions with pH 4 and pH 5 is \_\_\_\_\_.

- A) two-fold
- B) five-fold
- C) ten-fold
- D) hundred-fold

57) Which of the following best describes the reaction  $\text{NaNO}_3 + \text{HCl} \rightarrow \text{HNO}_3 + \text{NaCl}$ ?

- A) Decomposition reaction
- B) Exchange reaction
- C) Reversible reaction
- D) Synthesis reaction

58) Consider the following list of commonly found items and their pH values:

Baking Soda (8.3), Battery Acid (1.0), Beer (4.2), Bleach (12.8), Butter (6.1–6.4), Coffee (5.0), Egg Whites (7.6–8.0), Grapes (3.5–4.5), Milk of Magnesia (10.6), Tomato (4.0–4.5), Vinegar (2.2), White Bread (5.0–6.0)

Which list includes only 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.

59) What are electrolytes?

- A) Compounds that form covalent bonds with water.
- B) Compounds that ionize in water.
- C) Compounds that alter pH of the solution they are in electrolytes.
- D) Compounds that release radioactive radiation.

**60)** What is measured by the pH scale?

- A) Concentration of hydrogen ions in a solution.
- B) Concentration of salts dissolved in a solution.
- C) Concentration of hydroxide ions in a solution.
- D) Strength of an electrical current that a solution can carry.

**61)** What is the most abundant inorganic substance in the body?

- A) Glucose
- B) Water
- C) Lipid
- D) DNA

**62)** A blood pH of \_\_\_\_\_ is called alkalemia.

- A) 6.5 - 7.0
- B) 7.0- 7.2
- C) 7.2 - 7.5
- D) 7.5 - 7.8

**63)** Why is a complete atom considered to be electrically neutral?

- A) Because the number of protons equals the number of neutrons.
- B) Because the number of electrons equals the number of neutrons.
- C) Because the number of electrons equals the number of protons.
- D) Because the number of electrons is greater than the number of protons.

64) When are synthesis reactions particularly important in the body?

- A) During the release of energy from nutrients.
- B) For the digestion of food products.
- C) For the growth of body parts.
- D) During the neutralization of acids by buffers.

65) Which of the following is true regarding the pH scale?

- A) Each whole number on the scale represents a two-fold difference in hydrogen ion concentration.
- B) The lower the whole number on the scale, the greater the  $H^+$  concentration.
- C) Values above 7 are acidic.
- D) A substance of pH 2 is more basic than a substance of pH 4.

66) When an acid and a base interact during a chemical reaction to produce water and a salt, a type of reaction called a(n) \_\_\_\_\_ reaction has occurred.

- A) synthesis
- B) decomposition
- C) exchange

67) Consider this reaction:  $HBr + NaOH \rightarrow NaBr + H_2O$ . The product NaBr is a(n) \_\_\_\_\_.

- A) buffer
- B) salt
- C) solvent
- D) acid

**68)** A substance that has been added to a protein sample does not alter the composition or amino acid sequence of the protein itself, but changes its three-dimensional structure. What term describes this effect?

- A) Decomposition
- B) Denaturation
- C) Exchange reaction
- D) Neutralization

**69)** What is the role of oxygen in the body?

- A) Reacts with water to form carbonic acid.
- B) Used to release energy from nutrient molecules.
- C) Functions as a major electrolyte.
- D) Produced as a waste product of cellular metabolism.

**70)** What statement describes carbohydrates?

- A) They contain C, H, O, with twice as many hydrogen as oxygen atoms.
- B) They are not water soluble, but are lipid soluble.
- C) They include enzymes, antibodies, and membrane receptor molecules.
- D) Some will contain nitrogen and phosphate.

**71)** What type of molecule has a molecular formula of  $C_6H_{12}O_6$ ?

- A) Monosaccharide
- B) Amino acid
- C) Polysaccharide
- D) Phospholipid

72) What statement describes lipids?

- A) They are insoluble in water.
- B) They contain abundant amounts of nitrogen and sulfur.
- C) They have equal numbers of hydrogen and oxygen atoms.
- D) They include starch, cellulose, and sucrose.

73) Collagen is a protein with a coiled (helical) conformation. When it is exposed to high temperature, it becomes straight and flat. Its primary structure is not altered by the temperature change. What happened to cause the molecule to flatten?

- A) Bonds between carbon and oxygen were broken.
- B) Hydrogen bonds were broken.
- C) Peptide bonds were broken.
- D) Peptide bonds were formed.

74) Which of the following is not an organic compound?

- A) Sodium chloride
- B) Cholesterol
- C) DNA
- D) The enzyme phosphodiesterase

75) Lard, a fat that is solid at room temperature, will have \_\_\_\_\_ than peanut oil.



- A) more oxygen atoms
- B) more glycerol groups
- C) more single carbon-carbon bonds
- D) fewer hydrogen atoms bonded to carbon atoms

76) What statement describes proteins?

- A) Proteins provide most of the energy used by cells.
- B) The shape of proteins molecules are critical to their function.
- C) Proteins are built of long carbon chains with specialized chemical groups at either end of the chains.
- D) Proteins are not water soluble.

77) Amylase is an enzyme that promotes the breakdown of starches during digestion. Which of the following describes the method by which amylase functions?

- A) It catalyzes starch breakdown without being changed or depleted.
- B) It functions as a hormone that signals for starch breakdown to begin.
- C) It inhibits chemical reactions by being changed or depleted by the starch.
- D) It changes its composition in order to break starch down itself.

78) How is a protein molecule changed when it is denatured?

- A) Its primary and secondary structures are altered.
- B) Its secondary and tertiary structures are altered.
- C) Its amino acid sequence and the secondary structure is altered.
- D) Its tertiary and quaternary structures are altered.

79) What statement describes DNA?

- A) It is assembled out of subunits containing a sugar group and a phosphate group.
- B) It is assembled out of subunits called amino acids.
- C) It is a major source of cellular energy.
- D) It is important in forming the structure of cells.

**80)** What are nucleic acids?

- A) Inorganic salts
- B) Molecules that act as enzymes.
- C) Molecules comprised of nucleotides.
- D) Primary sources of cellular energy.

**81)** Nitrogenous bases are components of what type of molecule?

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

**82)** An individual with the condition called phenylketonuria cannot break down the amino acid phenylalanine. Molecules that include phenylalanine will build up in the blood, potentially causing 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

**83)** The breakdown of table sugar (sucrose) into glucose and fructose is an example of a(n) \_\_\_\_\_ reaction.

- A) synthesis
- B) decomposition
- C) neutralization
- D) exchange

**84)** Nucleic acids include \_\_\_\_\_.

- A) proteins and DNA
- B) RNA and DNA
- C) enzymes and RNA
- D) steroids and triglycerides

**85)** How do DNA and RNA differ?

- A) DNA contains ribose and RNA contains deoxyribose.
- B) DNA is single-stranded and RNA is double-stranded.
- C) DNA codes for genetic information and RNA uses that information to synthesize protein.
- D) DNA is comprised of nucleotides and RNA is comprised of amino acids.

**86)** What type of organic molecule can undergo replication?

- A) Protein
- B) Lipid
- C) Carbohydrate
- D) Nucleic acid

**87)** What does the term conformation refer to?

- A) The three-dimensional shape of a molecule.
- B) The energy held in the bonds of an organic molecule.
- C) The ability of DNA to copy itself.
- D) The amino acid sequence of a protein.

**88)** How are organic compounds different from inorganic compounds?

- A) Organic compounds always contain both carbon and hydrogen.
- B) Organic compounds always contain both oxygen and nitrogen.
- C) Organic compounds always contain both carbon and oxygen.
- D) Organic compounds always contain both nitrogen and hydrogen.

**89)** Which of these is a monosaccharide?

- A) Glucose
- B) Starch
- C) Cellulose
- D) Sucrose

**90)** Name the polysachharide synthesized by human cells and stored in the liver and skeletal muscles.

- A) Glucose
- B) Glycogen
- C) Sucrose
- D) Lactose

**91)** What building blocks form triglycerides?

- A) Three glycerol groups and one fatty acid.
- B) Three glucose molecules.
- C) Three fatty acids and three phosphate groups.
- D) Three fatty acids and one glycerol.

92) Which compound is not soluble in water?

- A) Albumin
- B) Cholesterol
- C) Sucrose
- D) DNA

93) Which molecule does not have a polar region?

- A) Water
- B) Triglyceride
- C) Water-soluble amino acid
- D) Glucose

94) How does an atom of helium differ from an atom of lithium?

- A) One has two protons, and one has three.
- B) One is organic and one is inorganic.
- C) One is polar and one is not.
- D) One is a molecule and one is a compound.

95) Chemical bonding occurs because of interactions between the \_\_\_\_\_ of atoms.

- A) electrons
- B) nuclei
- C) protons
- D) neutrons

**96)** The chemical bond called a(n) \_\_\_\_\_ bond involves the unequal sharing of electrons between two atoms.

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

**97)** If helium (He) were to gain a proton, what would it become?

- A) He<sup>+</sup>
- B) He<sup>-</sup>
- C) Helium-3
- D) Lithium

**98)** A patient's blood test shows that their blood pH is 7.26. What is the term for this condition?

- A) Alkalosis
- B) Acidosis

**99)** Complete ribosomes, found within cells of the body, are formed by the association between different protein subunits. Each complete ribosome represents the \_\_\_\_\_ of this organelle.

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

**100)** Consider the following list of commonly found items and their pH values:

Stomach acid (2.0), tomato juice (4.2), cabbage (5.3), cow's milk (6.6), egg white (8.0), baking soda (8.4), milk of magnesia (10.5), bleach (12.8)

Which of the following is closest to the pH of distilled water?

- A) Tomato juice
- B) Baking soda
- C) Egg white
- D) Cow's milk

**101)** 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)

Based on your knowledge of acid and base reactions, which of the following would be most likely to react with a base to form a salt?

- A) Bleach
- B) Battery acid
- C) Coffee
- D) Egg whites

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

**102)** When atoms form chemical bonds, the particles that interact to form the bonds are the \_\_\_\_\_.

- 103) The opposite of a decomposition reaction is a(n) \_\_\_\_\_ reaction.
- 104) The value along that pH scale that indicates an equal number of hydrogen ions and hydroxyl ions in solution is \_\_\_\_\_.
- 105) Based on their pH of 3.8, apricots are classified as being \_\_\_\_\_.
- 106) Amino acids are the building blocks for \_\_\_\_\_.
- 107) The amino acid sequence of a protein makes up its \_\_\_\_\_ structure.
- 108) Chemical groups called \_\_\_\_\_ are the building blocks of nucleic acids.
- 109) The organic molecule called \_\_\_\_\_ has the unique ability to replicate itself.
- 110) For the element iron (Fe), a change from  $\text{Fe}^{2+}$  to  $\text{Fe}^{3+}$  would require a change in the number of \_\_\_\_\_.
- 111) The difference between carbon-13 and carbon-14 is their number of \_\_\_\_\_.
- 112) The type of chemical bond formed when ions with opposite electrical charges attract is a(n) \_\_\_\_\_ bond.



**113)** The particle formed when two or more atoms chemically bond together is a(n)  
\_\_\_\_\_.

## Answer Key

Test name: Prentice2

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

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

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

- 87) A
- 88) A
- 89) A
- 90) B
- 91) D
- 92) B
- 93) B
- 94) A
- 95) A
- 96) D
- 97) D
- 98) B
- 99) D
- 100) D
- 101) B
- 102) electrons
- 103) synthesis
- 104) 7
- 105) acidic
- 106) protein
- 107) primary
- 108) nucleotides
- 109) DNA
- 110) electrons
- 111) neutrons
- 112) ionic
- 113) molecule