

***Human Anatomy & Physiology, Global Edition (Amerman)***  
**Chapter 2 The Chemistry of Life**

1) Which subatomic particle carries a negative charge?

- A) proton
- B) neutron
- C) electron
- D) nucleus

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.1.1

2) How many electrons are in the outermost shell of an atom with 15 electrons?

- A) 2
- B) 8
- C) 10
- D) 5

Answer: D

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.1

3) The innermost shell of an atom holds:

- A) 2 electrons.
- B) 6 electrons.
- C) 2 protons.
- D) 8 electrons.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.1.1

4) An electrically neutral atom with an atomic number of 8 and a mass number of 17 has:

- A) 8 protons.
- B) 9 electrons.
- C) 8 neutrons.
- D) 17 protons.

Answer: A

Bloom's Taxonomy: 3) Application

Learning Outcome: 2.1.1

5) What predicts the element to which an atom belongs?

- A) total number of electrons
- B) total number of protons
- C) total number of neutrons
- D) number of electrons in the first shell

Answer: B

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.2

6) The four most common elements, comprising 96% of the body's mass, are:

- A) carbon, sodium, phosphorus, sulfur.
- B) oxygen, nitrogen, hydrogen, carbon.
- C) chlorine, sodium, magnesium, potassium.
- D) oxygen, potassium, iron, copper.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.1.3

7) An atom of iron has an atomic number of 26. Which of the following is TRUE?

- A) Iron has 13 protons and 13 electrons.
- B) Iron has 26 protons.
- C) Iron has 13 protons and 13 neutrons.
- D) Iron has 13 electrons.

Answer: B

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.1, 2.1.4

8) The atomic number represents the number of:

- A) electrons in an atom.
- B) protons in an atom.
- C) protons and neutrons in the nucleus of an atom.
- D) neutrons in an atom.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.1.4

9) What contributes to the calculation of the mass number?

- A) sum of protons and electrons
- B) sum of electrons and neutrons
- C) sum of protons and neutrons
- D) sum of protons, neutrons, and electrons

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.1.4

10) Determine the number of protons in an isotope of nitrogen with an atomic number of 7 and a mass number of 14.

- A) 7
- B) 10
- C) 14
- D) 17

Answer: A

Bloom's Taxonomy: 3) Application

Learning Outcome: 2.1.4

11) Which of the following is the same among isotopes of the same element?

- A) atomic number
- B) number of neutrons
- C) mass number
- D) both the number of neutrons and the mass number

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.5

12) Interpret what is meant by carbon-13.

- A) Carbon-13 represents an isotope of carbon with a mass number of 13.
- B) Carbon-13 represents the mass number of every atom of carbon.
- C) Carbon-13 represents an isotope of carbon with an atomic number of 13.
- D) Carbon-13 represents an isotope of carbon with 13 protons.

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.6

13) Glucose dissolves in the water of blood plasma. This mixture is best known as a(n):

- A) solution.
- B) suspension.
- C) colloid.
- D) aerosol.

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.1

14) Atoms that satisfy the octet rule are said to be:

- A) inert.
- B) reactive.
- C) isotopes.
- D) ions.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.2

15) Which of the following atoms is inert?

- A) atomic number of 6
- B) atomic number of 8
- C) atomic number of 10
- D) atomic number of 14

Answer: C

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.2

16) An atom has 3 electrons in its valence shell. What is the atomic number of this atom?

- A) 3
- B) 7
- C) 8
- D) 13

Answer: D

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.2

17) Two or more atoms of the same element that are chemically combined are known as:

- A) molecules.
- B) compounds.
- C) ions.
- D) suspensions.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.3

18) Two or more atoms of different elements that are chemically bonded together are known as:

- A) molecules.
- B) macromolecules.
- C) compounds.
- D) ions.

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.3

19) What is meant by N<sub>2</sub>?

- A) Two nitrogen atoms formed a molecule.
- B) The atomic number of nitrogen is two.
- C) Two nitrogen atoms form a compound.
- D) The atomic mass of nitrogen is two.

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.3

20) The formation of a cation and an anion is indicative of a(n):

- A) ionic bond.
- B) nonpolar bond.
- C) polar bond.
- D) covalent bond.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.4

21) Ionic bonds result from:

- A) equal sharing of electrons between nonmetals.
- B) the transfer of electrons from a metal to a nonmetal.
- C) unequal sharing of electrons between nonmetals.
- D) weak attractions between polar molecules.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.4

22) Which of the following is the strongest bond?

- A) ionic
- B) single covalent
- C) hydrogen
- D) double covalent

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.4

23) What does this structural formula,  $\text{N}\equiv\text{N}$ , indicate?

- A) Two atoms of nitrogen are held together by hydrogen bonds.
- B) Two atoms of nitrogen share three pairs of electrons.
- C) An ionic bond holds the two atoms of nitrogen together.
- D) Three atoms of nitrogen are double bonded.

Answer: B

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.4

24) In a molecule of oxygen gas, the atoms of oxygen share electrons equally with one another.

This statement best describes a(n):

- A) ionic bond.
- B) nonpolar covalent bond.
- C) polar covalent bond.
- D) compound.

Answer: B

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.5

25) What is a dipole?

- A) polar molecule
- B) a salt
- C) a type of reaction
- D) nonpolar molecule

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.5

26) Hydrogen bonds may occur between:

- A) polar molecules.
- B) nonpolar covalent molecules.
- C) ions.
- D) metals.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.6

27) What type of bond is responsible for the surface tension of water?

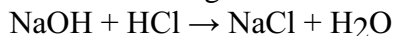
- A) nonpolar covalent bond
- B) polar covalent bond
- C) hydrogen bond
- D) ionic bond

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.6

28) In the following chemical reaction, what is NaCl?



- A) acid
- B) water
- C) reactant
- D) product

Answer: D

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.3.1

29) The transfer of an electron from sodium to chlorine is an example of:

- A) sound energy.
- B) chemical energy.
- C) electrical energy.
- D) mechanical energy.

Answer: B

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.3.2

30) What type of reaction is  $A + B + \text{energy} \rightarrow AB$ ?

- A) equilibrium reaction
- B) catabolic reaction
- C) endergonic reaction
- D) exergonic reaction

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.3

31) The process of digesting food breaks large food particles into smaller particles. This example is best described as a(n):

- A) exchange reaction.
- B) catabolic reaction.
- C) anabolic reaction.
- D) neutralization reaction.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.4

32) What happens in oxidation-reduction (redox) reactions?

- A) Electron exchange occurs.
- B) Larger molecules are built from smaller subunits.
- C) Energy is used since these are endergonic reactions.
- D) Atoms are exchanged.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.4

33) Which of the following represents an exchange reaction?

- A)  $AB + CD \rightarrow BA + DC$
- B)  $AB \rightarrow A + B$
- C)  $AB + CD \rightarrow AD + BC$
- D)  $A + B \rightarrow AB$

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.4

34) Which of the following increases the rate of a reaction?

- A) cold temperatures
- B) absence of a catalyst
- C) increased reactant concentration
- D) solid reactants

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.5

35) Which biological catalyst lowers the activation energy of a reaction?

- A) carbohydrate
- B) enzyme
- C) lipid
- D) salt

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.6

36) Which statement best describes enzyme function?

- A) One enzyme can work on thousands of different substrates.
- B) Enzymes can perform catabolic reactions only.
- C) Enzymes speed chemical reactions by lowering the activation energy.
- D) Enzymes chemically alter both the reactants and products.

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.6

37) What property of water helps keep body temperature stabilized?

- A) polarity
- B) universal solvent
- C) surface tension
- D) heat capacity

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.1

38) What type of compound is NOT likely to dissolve in water?

- A) ionic compound
- B) polar covalent compound
- C) nonpolar covalent compound
- D) both polar and nonpolar covalent compounds

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.2

39) Water is most likely to dissolve a solute that is:

- A) hydrophilic.
- B) a lipid.
- C) hydrophobic.
- D) nonpolar.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.2

40) Which of the following does NOT correctly describe water?

- A) Water is constructed of polar covalent bonds.
- B) Water has a low heat capacity.
- C) Water cushions the body's structures.
- D) Water can dissolve ionic compounds.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.2



41) What chemical binds free hydrogen ions in solution?

- A) acid
- B) salt
- C) base
- D) water

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.3

42) Hydrochloric acid is a:

- A) hydrogen ion donor.
- B) hydrogen ion acceptor.
- C) hydroxide ion donor.
- D) proton acceptor.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.3

43) On the pH scale, which number has the highest concentration of hydrogen ions?

- A) pH 1
- B) pH 5
- C) pH 7
- D) pH 10

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

44) What does the *H* in the pH scale represent?

- A) heat
- B) concentration of  $H^+$  ions in solution
- C) the negative logarithm
- D) negative charge

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

45) A solution containing equal number of hydrogen ions and hydroxide ions is:

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

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

46) Which pH represents a solution that has the highest concentration of hydroxide ions?

- A) pH 1
- B) pH 7
- C) pH 10
- D) pH 14

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

47) Which of the following represents the strongest acidic solution?

- A) pH 1
- B) pH 4
- C) pH 6
- D) pH 9

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

48) On average, blood pH is approximately:

- A) 7.1.
- B) 7.4.
- C) 7.6.
- D) 7.8.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

49) What pH value represents a solution that releases 10 times more hydrogen ions than a pH of 7?

- A) pH 4
- B) pH 5
- C) pH 6
- D) pH 8

Answer: C

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.4.4

50) Which pH represents a solution that releases 100 times less hydrogen ions than a pH of 9?

- A) pH 7
- B) pH 8
- C) pH 11
- D) pH 12

Answer: C

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.4.4

51) Which two organ systems work to maintain pH balance in the body?

- A) respiratory and urinary
- B) urinary and endocrine
- C) digestive and respiratory
- D) endocrine and nervous

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.5

52) What is the function of a buffer?

- A) Buffers lower the activation energy of a chemical reaction.
- B) Buffers act as a lubricant between two adjacent surfaces.
- C) Buffers absorb heat without changing temperature themselves.
- D) Buffers prevent large swings in pH when an acid or base is added to a solution.

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.5

53) An important buffer system in the body is:

- A) HCl.
- B) NaOH.
- C) H<sub>2</sub>O.
- D) HCO<sub>3</sub><sup>-</sup>.

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.5

54) Salts are held together by:

- A) single covalent bonds.
- B) nonpolar covalent bonds.
- C) polar covalent bonds.
- D) ionic bonds.

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.6

55) Ionic compounds dissociate in water into:

- A) polar and nonpolar substances.
- B) hydrophilic and hydrophobic substances.
- C) electrolytes.
- D) acids and bases.

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.6

56) What does ABC represent in the following reaction:  $A + B + C \rightarrow ABC$

- A) enzyme
- B) reactant
- C) product
- D) monomer

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.1

57) Building blocks of organic molecules are known as:

- A) electrolytes.
- B) polymers.
- C) monomers.
- D) enzymes.

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.1

58) When you soak dirty dishes in your kitchen sink, you allow the water to break apart the bonds of the food stuck to your plates. This type of reaction is known as:

- A) anabolism.
- B) hydrolysis.
- C) neutralization.
- D) dehydration synthesis.

Answer: B

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.2

59) The monomer of the carbohydrates is:

- A) fatty acid.
- B) amino acid.
- C) nucleotide.
- D) monosaccharide.

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

60) Select the simplest sugar:

- A) sucrose
- B) lactose
- C) glucose
- D) starch

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.3

61) Glucose and fructose are joined through dehydration synthesis to produce:

- A) lactose.
- B) sucrose.
- C) maltose.
- D) galactose.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

62) Glucose, galactose, and fructose have the molecular formula  $C_6H_{12}O_6$  but have different arrangements of atoms. These sugars are:

- A) isomers.
- B) disaccharides.
- C) isotopes.
- D) polysaccharides.

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.4

63) What is the building block of a lipid?

- A) glucose
- B) fatty acid
- C) glycogen
- D) nucleic acid

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

64) Which of the following lipids stores the most energy in the fatty acid chains?

- A) polyunsaturated fatty acid
- B) saturated fatty acid
- C) monounsaturated fatty acid
- D) glycerol

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

65) A fatty acid that contains two or more double covalent bonds is:

- A) hydrogenated.
- B) polyunsaturated.
- C) monounsaturated.
- D) saturated.

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.3

66) What forms the basis for the body's steroids?

- A) testosterone
- B) glucose
- C) triglyceride
- D) cholesterol

Answer: D

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

67) Most fat in our adipose tissue is in the form of:

- A) phospholipids.
- B) cholesterol.
- C) triglycerides.
- D) steroids.

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

68) Amino acids are the monomers for:

- A) proteins.
- B) carbohydrates.
- C) lipids.
- D) nucleic acids.

Answer: A

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

69) What group makes each amino acid unique?

- A) ammonia group
- B) "R" group
- C) amino group
- D) carboxylic acid group

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

70) What type of polar covalent bond links amino acids?

- A) hydrophobic bond
- B) amphiphilic bond
- C) peptide bond
- D) ketone bond

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.4

71) The alpha-helix and beta-pleated sheet are examples of:

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

Answer: B

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.5

72) A long-lasting high fever is a concern for denaturation of:

- A) enzymes.
- B) glycogen.
- C) phospholipids.
- D) saturated fats.

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.4

73) Yuri is working with a chemical in lab. This chemical is composed of repetitive units that include a phosphate group, a nitrogenous base, and a sugar known as ribose. He is working with:

- A) a nucleic acid.
- B) a carbohydrate.
- C) a lipid.
- D) a protein.

Answer: A

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.4

74) What makes RNA a unique nucleic acid?

- A) RNA is built from building blocks known as a nucleotide.
- B) RNA contains a sugar known as deoxyribose.
- C) RNA contains a nitrogenous base known as uracil.
- D) RNA is composed of two strands held together by hydrogen bonds.

Answer: C

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.4

75) Through a dehydration synthesis reaction, a phosphate is added to ADP. What product is formed?

- A) AMP
- B) DNA
- C) ATP
- D) 2ADP

Answer: C

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.6

76) Explain how to determine the atomic number and mass number for an atom.

Answer: An atom's atomic number is determined by its number of protons. The mass number is

equal to the number of protons plus the number of neutrons in the atom.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.4

77) Describe how a radioisotope achieves a more stable form.

Answer: Radioisotopes are isotopes that release energy in the form of radiation, known as radioactive decay, to become more stable.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.5

78) To make a gallon of lemonade, Emily mixed sugar with water until it dissolved. Did she create a solution, a suspension, or a colloid? Explain.

Answer: Emily made a solution. Solutions are described by saying that one substance, the sugar, dissolves in another substance, the water. The sugar is the solute since it is dissolved by the water. Water is the solvent since it dissolves the solute.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.1

79) Determine the atomic number of a neutral atom with 3 shells and 6 electrons in its valence shell.

Answer: The innermost shell of the atom holds 2 electrons. The next shell holds a maximum of 8 electrons. The valence shell holds 6 electrons. This atom has 3 shells and 16 total electrons.

Add the electrons ( $2 + 8 + 6 = 16$ ). In a neutral atom, the number of protons equals the number of electrons. Thus, this atom has an atomic number of 16.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.1, 2.2.2

80) What is the octet rule?

Answer: The octet rule states that an atom is most stable when it has eight electrons in its valence shell.

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.2

81) Is  $N_2$  a molecule or a compound? Explain.

Answer: Two or more atoms of the same element that are chemically bonded, such as these two nitrogen atoms, are known as a molecule.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.3

82) Predict the type of chemical bond that may form between two nonmetals.

Answer: Covalent bonding occurs between two or more nonmetals sharing electrons.

Bloom's Taxonomy: 3) Application

Learning Outcome: 2.2.4



83) How do nonpolar covalent bonds differ from polar covalent bonds?

Answer: In a nonpolar covalent molecule, the nonmetals sharing electrons have nearly equal electronegativities. The electrons are shared equally. In a polar covalent molecule, the more electronegative nonmetal does not share electrons equally with other nonmetal atoms participating in the bond.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.5

84) Explain the difference between potential and kinetic energy.

Answer: Potential energy is energy that is stored, ready to be released and used to do work. Potential energy becomes kinetic energy when it is used to do work. Kinetic energy is energy of motion.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.3.2

85) Predict the effect of a 101°F fever on reaction rate.

Answer: Increased temperature increases the kinetic energy of atoms involved in a chemical reaction. More forceful and effective collisions between atoms result in an increase in reaction rate.

Bloom's Taxonomy: 3) Application

Learning Outcome: 2.3.5

86) Define activation energy ( $E_a$ ).

Answer: Activation energy is the energy input required to overcome the repulsion of the atom's electrons and to allow an adequately strong collision to occur. All reactions must overcome activation energy to proceed.

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.5

87) Explain how water interacts with hydrophobic and hydrophilic substances. Which type of substance is more likely to be dissolved by water?

Answer: Water is only able to dissolve substances that are hydrophilic. Hydrophilic substances have fully or partially charged ends that make it possible for water molecules to grab.

Hydrophobic substances do not dissolve in water since they lack the charged ends necessary for water to grab. Water is more likely to dissolve hydrophilic substances.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.4.2

88) Describe the organization of the pH scale, including the locations of acids, bases, and neutral chemicals.

Answer: The pH scale ranges from 0 to 14. Acids are situated below 7 while bases or alkaline substances are found above 7. The more hydrogen ions present in solution, the lower the pH of the chemical. At a pH of 7, a chemical is said to be neutral as equal amounts of hydrogen and hydroxide ions are released.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.4.4

89) Dwain is drinking a cup of coffee which has a pH of 5. Compare Dwain's coffee to his friend's coffee which has a pH of 6.

Answer: Each single digit change on the pH scale corresponds to a 10-fold change in hydrogen ion concentration. Dwain's coffee, with a pH of 5, is 10 times more acidic than his friend's coffee, with a pH of 6. The hydrogen ion concentration increases 10-fold from a pH of 6 to a pH of 5.

Bloom's Taxonomy: 3) Analysis

Learning Outcome: 2.4.4

90) Is hydrolysis an anabolic or a catabolic reaction? Explain.

Answer: Hydrolysis is a catabolic reaction. For example, in a hydrolysis reaction of a polymer, it is broken down and separated into monomers through the addition of a water molecule.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.1

91) Describe how animals store excess glucose in the body.

Answer: Animals store their excess glucose as glycogen. Glycogen is primarily stored in the liver and skeletal muscles.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.4

92) Explain three differences between saturated and unsaturated fatty acids.

Answer: Saturated fatty acids:

1) have no double bonds between carbon atoms in their hydrocarbon chains.

2) are found predominantly in animal fats.

3) are solid at room temperature.

Unsaturated fatty acids:

1) have one or more double bonds between carbon atoms in their hydrocarbon chains.

2) are commonly found in plant oils.

3) are generally liquid at room temperature.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.3, 2.5.4

93) Determine the type of reaction that occurs between fructose and glucose to form water and sucrose.

Answer: This chemical reaction is a dehydration synthesis reaction. Fructose and glucose are monosaccharides that are joined together through this chemical reaction. Water is formed as a product. Sucrose is a disaccharide formed from the union of these two monomers, glucose and fructose.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.2, 2.5.4

94) What is the role of ATP in the cell?

Answer: ATP stores chemical energy in its bonds and is the main source of chemical energy in the body.

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.6

95) In a solution, the solute dissolves the solvent.

Answer: FALSE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.1

96) An atom with an atomic number of 13 has satisfied the octet rule and is inert.

Answer: FALSE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.2

97) Hydrogen bonds are strong attractions between nonpolar covalent molecules.

Answer: FALSE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.6

98) The strongest type of chemical bond is a covalent bond because electrons are shared between two or more nonmetals.

Answer: TRUE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.2.4

99) The reactants of an endergonic reaction contain more energy than the products.

Answer: FALSE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.3

100) The digestion of food is exergonic since chemical bonds are broken and energy is released.

Answer: TRUE

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.3.3

101) Enzymes bind with substrates at their active sites and are permanently altered by the binding process.

Answer: FALSE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.3.6

102) Due to the low heat capacity of water, the human body is resistant to overheating and cooling down quickly.

Answer: FALSE

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.4.1

103) A base is a hydrogen ion acceptor while an acid is a hydrogen ion donor.

Answer: TRUE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.3

104) Solutions with a pH less than 7 are considered basic or alkaline.

Answer: FALSE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.4.4

105) Growing new muscle proteins through the assembly of amino acids is a type of dehydration synthesis reaction.

Answer: TRUE

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.2

106) Like the carbohydrates, lipids have twice the hydrogen atoms as carbon and oxygen atoms in their molecular structures.

Answer: FALSE

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.3

107) Polypeptide chains that contribute to a protein's quaternary structure each have their own primary, secondary, and tertiary structures.

Answer: TRUE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.5

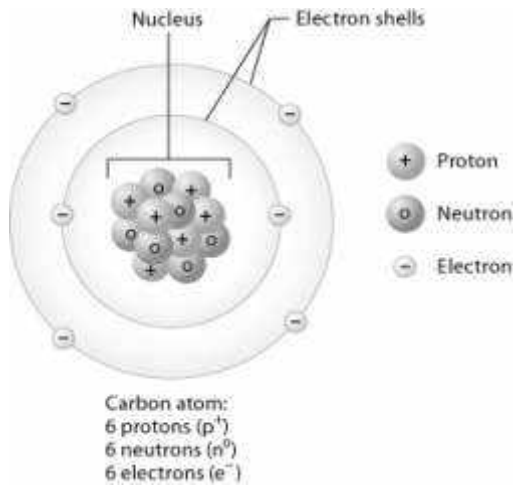
108) Energy is released when ATP is broken down into ADP.

Answer: TRUE

Bloom's Taxonomy: 1) Knowledge

Learning Outcome: 2.5.6

Match the following information about the carbon atom using the figure.



109) Determine the atomic number for this atom.

Answer: 6

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.4

110) Determine the number of electrons in carbon's valence shell.

Answer: 4

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.2.2

111) Determine the mass number for this atom.

Answer: 12

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.4

112) Determine the number of protons in an isotope of carbon.

Answer: 6

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.1.5

*Match the following organic compounds with their descriptions.*

- A) lipid
- B) nucleic acid
- C) carbohydrate
- D) protein

113) Monomers are composed of carbon, hydrogen, and oxygen in a 1C:2H:1O ratio  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.3

114) Examples include phospholipids, triglycerides, and steroids  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.4

115) Sucrose, glucose, galactose, and cellulose are examples  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.4

116) Amino acids are the monomers  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.4

117) Nucleotides are the monomers that form deoxyribonucleic acid and ribonucleic acid  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.4

118) Three-dimensional shape is known as the tertiary structure  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.5

119) Monomers vary by an "R" group  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.3

120) Monomer is the fatty acid  
Bloom's Taxonomy: 1) Knowledge  
Learning Outcome: 2.5.4

Answers: 113) C 114) A 115) C 116) D 117) B 118) D 119) D 120) A

121) An atom of carbon has an atomic number of 6 and a mass number of 12. Predict how many hydrogen atoms must covalently bond with carbon to satisfy carbon's octet rule. Hydrogen has an atomic number of 1.

Answer: Carbon has an atomic number of 6. A neutral atom of carbon has 6 protons and 6 electrons. Four of those six electrons are situated in carbon's valence, or outermost, shell. Four more electrons would be needed to satisfy the octet rule. Hydrogen has an atomic number of 1. A neutral atom of hydrogen has 1 proton and 1 electron. The sole electron is situated in hydrogen's only shell. Each hydrogen atom can share one electron with the carbon atom. Four hydrogen atoms are needed to form four covalent bonds and share electrons with the carbon atom.

Bloom's Taxonomy: 3) Application

Learning Outcome: 2.2.2, 2.2.4

122) Blood pH exists within a narrow range of values. Describe the role of buffer systems in achieving blood pH homeostasis.

Answer: Buffers are chemical systems that resist changes in pH and prevent large swings in pH when an acid or a base is added to a solution. A buffer typically consists of a weak acid and its corresponding anion. When blood becomes too basic or alkaline, the weak acid releases hydrogen ions into the blood to lower the pH. When the blood becomes too acidic, the anion binds hydrogen ions in the blood. The removal of hydrogen ions from the blood offsets the decrease in pH.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.4.5

123) The process of building protein from amino acids produces water. Describe the type of reaction used to build muscles.

Answer: Muscle contains protein built from amino acids. Dehydration synthesis is an anabolic reaction that links monomers, amino acids, through the removal of a water molecule to form a polymer, thus making new muscle proteins. Thus, muscle building generates water through the joining of amino acids.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.2

124) Sophie is working in the lab with a chemical with the formula  $C_{12}H_{24}O_{12}$ . With what type of organic molecule does she work? Discuss how you came to your conclusion.

Answer: Sophie is working with a carbohydrate. Most carbohydrate monomers are composed of carbon, hydrogen, and oxygen atoms in the ratio 1C:2H:1O. This molecule satisfies the general pattern of atoms in a typical carbohydrate.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.3

125) Sucrose and lactose are two common dietary disaccharides. Explain which one of these disaccharides a patient with fructosemia should avoid. Fructosemia is a disorder in which fructose cannot be metabolized.

Answer: Sucrose is formed through dehydration synthesis of a glucose and a fructose molecule. Lactose is formed through dehydration synthesis of a glucose and a galactose molecule. Patients who cannot breakdown fructose should avoid eating sucrose in their diets.

Bloom's Taxonomy: 2) Comprehension

Learning Outcome: 2.5.4

126) Catherine is confused by the information on food labels. Instruct her about the differences among the following three she sees on the label: polyunsaturated fat, saturated fat, and monounsaturated fat.

Answer: The polyunsaturated fat is the healthiest choice of the three that Catherine should choose to eat. The hydrocarbon chain of a polyunsaturated fatty acid has two or more double bonds between its carbon atoms. Although monounsaturated fats are often oils, the hydrocarbon chain has only one double bond between two carbons. The hydrocarbon chain of a saturated fat is full, or saturated with, hydrogen atoms.

Bloom's Taxonomy: 3) Application

Learning Outcome: 2.5.3, 2.5.4