Visual Anatomy & Physiology **(Martini)**
Chapter 2 Chemical Level of Organization

1) The smallest stable units of matter are
A) atoms.
B) molecules.
C) protons.
D) neutrons.
E) electrons.
Answer: A
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

2) The "atomic number" of an atom is determined by the number of _____ it has.
A) electrons
B) protons
C) neutrons
D) protons + neutrons
E) protons + electrons
Answer: B
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

3) Isotopes of an element differ in the number of
A) protons in the nucleus.
B) electrons in the nucleus.
C) neutrons in the nucleus.
D) electron clouds.
E) electrons in energy shells.
Answer: C
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

4) The mass number represents the number of
A) protons in an atom.
B) electrons in an ion.
C) neutrons in an atom.
D) protons + neutrons.
E) neutrons + electrons.
Answer: D
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

5) The "atomic weight" of an atom reflects the average number of
A) protons.
B) neutrons.
C) electrons.
D) protons + neutrons.
E) protons + neutrons + electrons.
Answer: E
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

6) If an isotope of oxygen has 8 protons, 10 neutrons, and 8 electrons, its mass number is _____.
A) 26
B) 16
C) 18
D) 8
E) 12
Answer: C
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

7) Which element commonly has only a proton as its nucleus?
A) helium
B) neon
C) argon
D) hydrogen
E) none of the above
Answer: D
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

8) The mass of an atom is largely determined by the number of _____ it has.
A) electrons
B) protons
C) neutrons
D) protons + neutrons
E) protons + electrons
Answer: D
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

9) By weight, which element is the most plentiful in the human body?
A) sulfur
B) sodium
C) oxygen
D) potassium
E) carbon
Answer: C
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

10) By weight, which element is the second most abundant in the human body?
A) oxygen
B) carbon
C) hydrogen
D) nitrogen
E) calcium
Answer: B
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

11) Which of the following lists contain only trace elements?
A) sulfur, chlorine, oxygen
B) selenium, hydrogen, calcium
C) boron, oxygen, carbon
D) silicon, fluorine, tin
E) cobalt, calcium, sodium
Answer: D
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

12) The nucleus of an atom consists of
A) electrons.
B) protons.
C) neutrons.
D) protons + neutrons.
E) protons + electrons.
Answer: D
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

13) Oxygen is required in biological systems for
A) cellular respiration.
B) storage of energy.
C) serving as structural components of bone.
D) serving as catalysts.
E) chemical messengers.
Answer: A
Learning Outcome: 2.1
Bloom's Taxonomy: Comprehension

14) If an element is composed of atoms with an atomic number of 6 and a mass number of 14, then the nucleus of a neutral atom of this element contains
A) 6 protons.
B) 8 electrons.
C) 8 neutrons.
D) 6 protons and 8 electrons.
E) 6 protons and 8 neutrons.
Answer: E
Learning Outcome: 2.1
Bloom's Taxonomy: Comprehension

15) The innermost electron shell in an atom holds up to _____ electrons.
A) 1
B) 2
C) 4
D) 6
E) 8
Answer: B
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

16) The chemical behavior of an atom is determined by
A) the number of protons.
B) the number of neutrons.
C) the outermost electron shell.
D) the size of the atom.
E) the mass of the nucleus.
Answer: C
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

17) Ions with a + charge are called
A) cations.
B) anions.
C) radicals.
D) positrons.
E) isotopes.
Answer: A
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

18) Elements that have atoms with full outer shells of electrons
A) will form many compounds.
B) will normally form anions.
C) will normally form cations.
D) frequently form hydrogen bonds.
E) are inert gases.
Answer: E
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

19) Which of the following is **not** a cation?
A) Na^+
B) Cl^-
C) K^+
D) Ca^{2+}
E) Mg^{2+}
Answer: B
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

20) In an aqueous solution, cations are attracted toward
A) water.
B) salt.
C) buffers.
D) anions.
E) hydrogen ions.
Answer: D
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

21) In an aqueous solution, sodium ions would move toward
A) a negative terminal.
B) a positive terminal.
C) a pH terminal.
D) an organic terminal.
E) the bottom.
Answer: A
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

22) Magnesium atoms have two electrons in the outermost shell. As a result, you would expect magnesium to form ions with a charge of
A) +1.
B) +2.
C) -1.
D) -2.
E) either +2 or -2
Answer: B
Learning Outcome: 2.2
Bloom's Taxonomy: Comprehension

23) Ionic bonds are formed when
A) atoms share electrons.
B) electrons are completely transferred from one atom to another.
C) a pair of electrons is shared unequally by two atoms.
D) hydrogen forms bonds with negatively charged atoms.
E) two or more atoms lose electrons at the same time.
Answer: B
Learning Outcome: 2.3
Bloom's Taxonomy: Knowledge

24) In a molecule of oxygen gas, two pairs of electrons are shared equally by two oxygen atoms. The type of bond that is formed is an example of a(n)
A) single trivalent bond.
B) double nonpolar covalent bond.
C) triple nonpolar covalent bond.
D) double polar covalent bond.
E) hydrogen bond.
Answer: B
Learning Outcome: 2.3
Bloom's Taxonomy: Knowledge

25) If one pair of electrons is unequally shared between two atoms, a(n) _____ occurs.
A) single nonpolar covalent bond
B) double nonpolar covalent bond
C) double polar covalent bond
D) single polar covalent bond
E) hydrogen bond
Answer: D
Learning Outcome: 2.3
Bloom's Taxonomy: Knowledge

26) When atoms complete their outer electron shell by sharing electrons, they form
A) ionic bonds.
B) covalent bonds.
C) hydrogen bonds.
D) anions.
E) cations.
Answer: B
Learning Outcome: 2.3
Bloom's Taxonomy: Knowledge

27) Which of the following is both an anion and a compound?
A) Na^+
B) Cl^-
C) K^+
D) HCO_3^-
E) NaCl
Answer: D
Learning Outcome: 2.3
Bloom's Taxonomy: Knowledge

28) When electrons are transferred from one atom to another, and the two atoms unite as a result of the opposite charges,
A) an ion is formed.
B) a free electron is formed.
C) a hydrogen bond is formed.
D) an ionic bond is formed.
E) a covalent bond is formed.
Answer: D
Learning Outcome: 2.3
Bloom's Taxonomy: Knowledge

29) Magnesium atoms have two electrons in their outermost shells and chlorine atoms have seven. The compound magnesium chloride would contain
A) 1 magnesium and 1 chlorine.
B) 1 magnesium and 2 chlorine.
C) 2 magnesium and 1 chlorine.
D) 2 magnesium and 7 chlorine.
E) impossible to tell without more information
Answer: B
Learning Outcome: 2.3
Bloom's Taxonomy: Comprehension

30) The weakest bond between two atoms is the _____ bond.
A) ionic
B) covalent
C) polar
D) nonpolar
E) hydrogen
Answer: E
Learning Outcome: 2.4
Bloom's Taxonomy: Knowledge

31) Which of the following statements about hydrogen bonds is **false**?
A) Hydrogen bonds are strong attractive forces between hydrogen atoms and negatively charged atoms.
B) Hydrogen bonds can occur within a single molecule.
C) Hydrogen bonds can form between neighboring molecules.
D) Hydrogen bonds are important for holding large molecules together.
E) Hydrogen bonds are responsible for many of the properties of water.
Answer: A
Learning Outcome: 2.4
Bloom's Taxonomy: Knowledge

32) Which one of the following statements is **not** correct about the reaction $H_2 + Cl_2 \rightarrow 2\ HCl$?
A) H_2 and Cl_2 are the reactants.
B) HCl is the product.
C) One molecule of hydrogen contains two atoms.
D) Two molecules of HCl are formed in the reaction.
E) This reaction is easily reversible.
Answer: E
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

33) In chemical notation, the symbol Ca^{2+} means _____.
A) two calcium atoms
B) a calcium ion that has lost two electrons
C) a calcium ion that has gained two protons
D) a calcium ion that has gained two electrons
E) a calcium ion that has lost two protons
Answer: B
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

34) The molecule CO_2 is known as
A) carbonized oxygen.
B) carbonated oxygen.
C) carbon monoxide.
D) carbon oxide.
E) carbon dioxide.
Answer: E
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

35) The molecule H_2 is known as
A) hydrohydrogen.
B) hydrogen.
C) hydroxide.
D) helium.
E) semi-water.
Answer: B
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

36) The molecule O_2 is known as
A) oxide.
B) oxygen.
C) organic.
D) oxygen and organic.
E) oxyous.
Answer: B
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

37) H_2O is an example of a(n)
A) ionic formula.
B) glucose molecule.
C) molecular formula.
D) water molecule.
E) covalent formula.
Answer: C
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

38) In the reaction listed below, what coefficient needs to be added to balance the equation?
$6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + \_\_\_\_\_\ O_2$
A) 2
B) 4
C) 6
D) 8
E) 10
Answer: C
Learning Outcome: 2.5
Bloom's Taxonomy: Comprehension

39) $AB \rightarrow A + B$ is to decomposition as $A + B \rightarrow AB$ is to
A) exchange.
B) synthesis.
C) combustion.
D) replacement.
E) metabolism.
Answer: B
Learning Outcome: 2.6
Bloom's Taxonomy: Knowledge

40) The reaction $N_2 + 3\ H_2 \rightarrow 2\ NH_3$ is an example of a(n)
A) exchange reaction.
B) decomposition reaction.
C) synthesis reaction.
D) enzyme reaction.
E) metabolic reaction.
Answer: C
Learning Outcome: 2.6
Bloom's Taxonomy: Knowledge

41) In hydrolysis reactions, compounds react with
A) hydrogen, causing decomposition.
B) glucose, causing decomposition.
C) water, causing decomposition.
D) carbon, causing decomposition.
E) water, causing synthesis.
Answer: C
Learning Outcome: 2.6
Bloom's Taxonomy: Knowledge

42) In dehydration reactions, compounds
A) lose water molecules.
B) gain water molecules.
C) convert water molecules to hydrogen and oxygen.
D) convert hydrogen and oxygen to water.
E) gain electrons.
Answer: A
Learning Outcome: 2.6
Bloom's Taxonomy: Knowledge

43) The reaction A + B + energy → AB is an example of a(n)
A) exergonic reaction.
B) endergonic reaction.
C) equilibrium reaction.
D) decomposition reaction.
E) exchange reaction.
Answer: B
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

44) Chemical reactions that yield energy, such as heat, are said to be
A) endergonic.
B) activated.
C) exergonic.
D) neutral.
E) thermonuclear.
Answer: C
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

45) All of the following are true concerning enzymes, **except** that they
A) are proteins.
B) function as biological catalysts.
C) lower the activation energy required for a reaction.
D) affect only the rate of a chemical reaction.
E) are consumed during the reaction.
Answer: E
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

46) Substrate molecules bind to enzymes at the _____ sites.
A) amino
B) active
C) carboxyl
D) reactant
E) neutral
Answer: B
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

47) Compounds that can be synthesized or broken down by chemical reactions inside the body are called
A) inorganic compounds.
B) organic compounds.
C) nutrients.
D) metabolites.
E) enzymes.
Answer: D
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

48) Each of the following is an example of an inorganic compound, **except**
A) water.
B) acids.
C) bases.
D) salts.
E) proteins
Answer: E
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

49) An example of an inorganic substance is (are)
A) fructose.
B) water.
C) glycerol.
D) carbon dioxide.
E) both water and carbon dioxide.
Answer: E
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

50) Which of the following statements about water is **not** correct?
A) is composed of polar molecules
B) is responsible for much of the mass of the human body
C) has a relatively low heat capacity
D) can dissolve many substances
E) contains hydrogen bonds
Answer: C
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

51) During ionization, water molecules disrupt the ionic bonds of a salt to produce a mixture of ions. These ions can carry a current and so are called
A) cations.
B) anions.
C) acids.
D) electrolytes.
E) counter ions.
Answer: D
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

52) Oppositely charged ions in solution are prevented from combining by
A) heat capacity of water.
B) hydration spheres.
C) water's nonpolar nature.
D) free radicals.
E) hydrogen bonding.
Answer: B
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

53) Hydrophilic molecules readily associate with
A) lipid molecules.
B) hydrophobic molecules.
C) water molecules.
D) both lipid molecules and hydrophobic molecules.
E) cholesterol.
Answer: C
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

54) A dust particle floating on a water surface illustrates
A) surface tension.
B) chemical tension.
C) static electricity.
D) heat capacity.
E) hydrophilic attraction.
Answer: A
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

55) Which property of water helps keep body temperature stabilized?
A) kinetic energy
B) lubrication
C) surface tension
D) reactivity
E) thermal inertia
Answer: E
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

56) Nonpolar organic molecules are good examples of
A) electrolytes.
B) molecules that will dissociate when placed into water.
C) hydrophobic compounds.
D) hydrophilic compounds.
E) solutes.
Answer: C
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

57) A solution containing equal numbers of hydrogen ions and hydroxide ions is
A) acidic.
B) basic.
C) neutral.
D) alkaline.
E) in equilibrium.
Answer: C
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

58) Which of the following substances would be most acidic?
A) lemon juice, pH = 2
B) urine, pH = 6
C) tomato juice, pH = 4
D) white wine, pH = 3
E) stomach secretions, pH = 1
Answer: E
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

59) If a substance has a pH that is greater than 7, it is
A) neutral.
B) acidic.
C) alkaline.
D) a buffer.
E) a salt.
Answer: C
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

60) An important buffer in body fluids is
A) NaCl.
B) NaOH.
C) HCl.
D) $NaHCO_3$.
E) H_2O.
Answer: D
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

61) In the body, inorganic compounds
A) can serve as buffers.
B) can make up proteins.
C) can make up lipids.
D) are structural components of cells.
E) are all very large.
Answer: A
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

62) Of the following choices, the pH of the least acidic solution is
A) 6.0.
B) 4.5.
C) 2.3.
D) 1.0.
E) 12.0.
Answer: E
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

63) Which has the greater concentration of hydrogen ions, a substance with a pH of 5 or a substance with a pH of 4?
A) A pH of 4 is greater.
B) A pH of 5 is greater.
C) They are both equal; 4 and 5 are relative values.
D) pH 9, if you mixed the solutions.
E) Neither, pH has nothing to do with hydrogen ion concentration.
Answer: A
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

64) Of the list below, which has the highest concentration of hydroxide ions?
A) pH 1
B) pH 14
C) pH 7
D) pH 10
E) pH 2
Answer: B
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

65) Which pH is closest to normal blood pH?
A) pH 7
B) pH 8
C) pH 4
D) pH 3
E) pH 2
Answer: A
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

66) A(n) _____ removes hydrogen ions and a(n) _____ releases hydrogen ions.
A) acid; base
B) base; acid
C) compound; element
D) element; compound
E) molecule; acid
Answer: B
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

67) An excess of hydrogen ions in the body fluids can have fatal results because this can
A) block ion movements.
B) change the shape of large complex molecules, rendering them nonfunctional.
C) disrupt tissue functions.
D) all of the above
E) none of the above
Answer: D
Learning Outcome: 2.9
Bloom's Taxonomy: Comprehension

68) When placed in water, an inorganic compound dissociates 99 percent, forming hydrogen ions and anions. This compound would be
A) a strong base.
B) a weak base.
C) a strong acid.
D) a weak acid.
E) a salt.
Answer: C
Learning Outcome: 2.9
Bloom's Taxonomy: Comprehension

69) When a small amount of HCl or NaOH is added to a solution of Na_2HPO_4, the pH of the solution barely changes. Based on these observations, all of the following are true concerning the compound Na_2HPO_4, **except**

A) Na_2HPO_4 is able to accept extra hydrogen ions from the HCl.

B) Na_2HPO_4 is able to donate hydrogen ions to the OH^- from NaOH.

C) Na_2HPO_4 adsorbs excess H^+ and OH^- directly onto the surface of its crystalline structure.

D) Na_2HPO_4 is a salt formed from reacting a strong base with a weak acid.

E) Na_2HPO_4 acts as a buffer.

Answer: C
Learning Outcome: 2.9
Bloom's Taxonomy: Application

70) Carbohydrate molecules
A) are the building blocks of cellular membranes.
B) form the regulatory molecules known as enzymes.
C) are the body's most readily available source of energy.
D) are composed of C, H, O, and N atoms.
E) contain the genetic information found in cells.
Answer: C
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

71) The most important metabolic fuel molecule in the body is
A) sucrose.
B) caffeine.
C) protein.
D) vitamins.
E) glucose.
Answer: E
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

72) Molecules that have the same molecular formula but different structural formulas are called
A) isotopes.
B) isomers.
C) isozymes.
D) isotypes.
E) isomoles.
Answer: B
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

73) A polysaccharide that is formed in liver and muscle cells to store glucose is
A) lactose.
B) cellulose.
C) glycogen.
D) sucrose.
E) fructose.
Answer: C
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

74) The group of organic compounds containing carbon, hydrogen, and oxygen in a near 1:2:1 ratio is defined as a
A) carbohydrate.
B) lipid.
C) protein.
D) nucleic acid.
E) cholesterol.
Answer: A
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

75) Carbohydrates, lipids, and proteins are classified as
A) organic molecules.
B) inorganic molecules.
C) acids.
D) salts.
E) bases.
Answer: A
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

76) Which of the following is the symbol for an amino group?
A) -COOH
B) $-PO_3$
C) $-NH_2$
D) -AMO
E) -OH
Answer: C
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

77) An example of an organic substance is
A) sucrose.
B) carbonic acid.
C) sodium chloride.
D) oxygen.
E) carbon dioxide.
Answer: A
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

78) A functional group is best described as reoccurring clusters of
A) elements that occur in a salt.
B) atoms that greatly influence the chemical properties of molecules they are part of.
C) atoms that function in the body.
D) elements that form at high pH.
E) amino acids in a globular protein.
Answer: B
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

79) Fructose
A) is a hexose.
B) is an isomer of glucose.
C) is found in fruits.
D) all of the above
E) none of the above
Answer: D
Learning Outcome: 2.10
Bloom's Taxonomy: Knowledge

80) When two monosaccharides undergo a dehydration synthesis,
A) two new monosaccharides are formed.
B) a disaccharide is formed.
C) a polysaccharide is formed.
D) a starch is formed.
E) all of the above
Answer: B
Learning Outcome: 2.10
Bloom's Taxonomy: Comprehension

81) Lipids
A) form essential structural components of cells.
B) provide roughly twice the energy as carbohydrates.
C) help to maintain body temperature.
D) cushion organs against shocks.
E) all of the above
Answer: E
Learning Outcome: 2.11
Bloom's Taxonomy: Knowledge

82) A fatty acid that contains multiple double covalent bonds is said to be
A) saturated.
B) monounsaturated.
C) polyunsaturated.
D) hydrogenated.
E) carboxylated.
Answer: C
Learning Outcome: 2.11
Bloom's Taxonomy: Knowledge

83) A lipid made of a glycerol molecule with two fatty acids attached to one side and a phosphate group connecting a nonlipid group attached to the other
A) cholesterol.
B) phospholipids.
C) triglycerides.
D) prostaglandins.
E) monoglycerides.
Answer: C
Learning Outcome: 2.11
Bloom's Taxonomy: Knowledge

84) Which of the following is/are needed to form a triglyceride molecule?
A) 3 glycerol molecules
B) 1 glycerol molecule
C) 3 fatty acid molecules
D) 3 glycerol + 3 fatty acid molecules
E) 1 glycerol + 3 fatty acid molecules
Answer: E
Learning Outcome: 2.11
Bloom's Taxonomy: Knowledge

85) Lipids that are produced by nearly every tissue in the body and that act as local regulators of cell activities are the
A) prostaglandins.
B) steroids.
C) monoglycerides.
D) phospholipids.
E) glycolipids.
Answer: A
Learning Outcome: 2.12
Bloom's Taxonomy: Knowledge

86) Cholesterol, phospholipids, and glycolipids are examples of
A) dietary fats.
B) prostaglandins.
C) structural lipids.
D) lipid drugs.
E) steroids.
Answer: C
Learning Outcome: 2.12
Bloom's Taxonomy: Knowledge

87) A shortage of cholesterol in the body could interfere with the formation of
A) sex hormones.
B) proteins.
C) cytoplasm.
D) glycogen.
E) nucleic acids.
Answer: A
Learning Outcome: 2.12
Bloom's Taxonomy: Comprehension

88) A side chain on an amino acid is sometimes called _____.
A) fibrous or globular
B) a polypeptide chain
C) an R group
D) an isozyme
E) nucleic acid
Answer: C
Learning Outcome: 2.13
Bloom's Taxonomy: Knowledge

89) You would expect a peptide bond to link
A) two simple sugars.
B) two amino acids.
C) two nucleotides.
D) a sugar and a peptide.
E) a peptide and a fatty acid.
Answer: B
Learning Outcome: 2.13
Bloom's Taxonomy: Knowledge

90) Each amino acid differs from another in the
A) number of central carbon atoms.
B) size of the amino group.
C) number of carboxyl groups.
D) nature of the side chain.
E) number of peptide bonds in the molecule.
Answer: D
Learning Outcome: 2.13
Bloom's Taxonomy: Knowledge

91) The alpha-helix and pleated sheet are examples of _____ protein structure.
A) primary
B) secondary
C) tertiary
D) quaternary
E) pentanary
Answer: B
Learning Outcome: 2.13
Bloom's Taxonomy: Knowledge

92) Interaction between individual polypeptide chains to form a protein complex is _____ structure.
A) primary
B) secondary
C) tertiary
D) quaternary
E) pentagonal
Answer: D
Learning Outcome: 2.13
Bloom's Taxonomy: Knowledge

93) The term _____ means each enzyme catalyzes only one type of reaction.
A) saturation
B) specificity
C) inertia
D) activation
E) monoreactive
Answer: B
Learning Outcome: 2.14
Bloom's Taxonomy: Knowledge

94) The maximum rate of an enzyme reaction occurs at
A) dehydration.
B) hydrolysis.
C) synthesis.
D) reversible.
E) saturation limit.
Answer: E
Learning Outcome: 2.14
Bloom's Taxonomy: Knowledge

95) The most abundant high-energy compound in cells is
A) DNA.
B) adenosine diphosphate.
C) adenosine monophosphate.
D) adenosine triphosphate.
E) RNA.
Answer: D
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

96) A high-energy bond in ATP is present
A) between adenine and ribose.
B) between adenine and a phosphate group.
C) between the first and second phosphate group.
D) between the second and third phosphate group.
E) between the first and second, and the second and third phosphate groups.
Answer: E
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

97) Identify the product formed from the addition of a phosphate group to ADP.
A) adenosine diphosphate
B) adenine
C) adenosine triphosphate
D) deoxyribonucleic acid
E) ribose
Answer: C
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

98) AMP + P →
A) ADP
B) 2ADP
C) DNA
D) ATP
E) adenine
Answer: A
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

99) Adding a phosphate group to adenosine forms
A) ADP.
B) ATP.
C) AMP.
D) 2ATP.
E) ribose.
Answer: C
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

100) Adenosine is formed by combining
A) adenine and ribose.
B) adenine and phosphate group.
C) ribose and a phosphate group.
D) adenine, ribose, and a phosphate group.
E) adenine, ribose, and 3 phosphate groups.
Answer: A
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

101) Molecules that store and process genetic information are the
A) proteins.
B) nucleic acids.
C) carbohydrates.
D) lipids.
E) steroids.
Answer: B
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

102) An amino acid is to a protein as _____ is to a nucleic acid.
A) a purine
B) a nucleotide
C) a protein
D) a proton
E) a neutron
Answer: B
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

103) A nucleotide consists of
A) a five-carbon sugar and phosphate group.
B) a five-carbon sugar and a nitrogenous base.
C) a phosphate group and a nitrogenous base.
D) a five-carbon sugar, a nitrogenous base, and a phosphate group.
E) a five-carbon sugar and an amino acid.
Answer: D
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

104) According to the rules of complementary base pairing in nucleic acids, cytosine would pair with the base
A) thymine.
B) adenine.
C) uracil.
D) cytosine.
E) guanine.
Answer: E
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

105) Adenine and guanine are
A) purines represented by T and C.
B) pyrimidines represented by A and G.
C) purines represented by A and G.
D) pyrimidines represented by T and C.
E) nucleotides represented by A and G.
Answer: C
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

106) The structure of RNA differs from DNA in that
A) the backbone of RNA contains ribose.
B) RNA contains pyrimidines but not purines.
C) RNA contains purines but not pyrimidines.
D) DNA contains pyrimidines but not purines.
E) DNA contains purines but not pyrimidines.
Answer: A
Learning Outcome: 2.16
Bloom's Taxonomy: Comprehension

107) A(n) _____ is a pure substance composed of atoms.
Answer: element
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

108) The center of an atom is called the _____.
Answer: nucleus
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

109) The actual mass of an atom is known as its _____.
Answer: atomic weight
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

110) Atoms of the same element whose nuclei contain the same number of protons, but different numbers of neutrons, are called _____.
Answer: isotopes
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

111) Electrons whirl around the center of the atom at high speed, forming a(n) _____.
Answer: electron cloud
Learning Outcome: 2.1
Bloom's Taxonomy: Knowledge

112) Electrons in an atom occupy an orderly series of electron shells or _____.
Answer: energy levels
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

113) Ions with a positive charge are called _____.
Answer: cations
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

114) Ions with a negative charge are called _____.
Answer: anions
Learning Outcome: 2.2
Bloom's Taxonomy: Knowledge

115) The three familiar states of matter are solids, liquids, and _____.
Answer: gases
Learning Outcome: 2.4
Bloom's Taxonomy: Knowledge

116) Kinetic energy is stored as _____ energy when a spring is stretched.
Answer: potential
Learning Outcome: 2.5
Bloom's Taxonomy: Knowledge

117) Chemical reactions that release energy are called _____.
Answer: exergonic
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

118) Chemical reactions that absorb energy are called _____.
Answer: endergonic
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

119) _____ accelerate chemical reactions that occur in the human body.
Answer: Enzymes
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

120) In living cells, complex metabolic reactions proceed in a series of steps called a(n) _____.
Answer: metabolic pathway
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

121) _____ molecules are compounds that contain carbon as the primary structural atom.
Answer: Organic
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

122) _____ compounds do not usually contain carbon as a primary structural atom.
Answer: Inorganic
Learning Outcome: 2.7
Bloom's Taxonomy: Knowledge

123) A(n) _____ is a homogeneous mixture containing a solvent and a solute.
Answer: solution
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

124) _____ are soluble inorganic compounds whose solutions will conduct an electric current.
Answer: Electrolytes
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

125) Molecules that do not readily dissolve in water are called _____.
Answer: hydrophobic
Learning Outcome: 2.8
Bloom's Taxonomy: Knowledge

126) The _____ of a solution is the negative logarithm of the hydrogen ion concentration expressed in moles per liter.
Answer: pH
Learning Outcome: 2.9
Bloom's Taxonomy: Knowledge

127) All fatty acids contain a functional group at one end called the _____.
Answer: carboxylic acid group
Learning Outcome: 2.11
Bloom's Taxonomy: Knowledge

128) In water, fatty acids tend to form tiny droplets with hydrophobic tails buried inside called _____.
Answer: micelles
Learning Outcome: 2.12
Bloom's Taxonomy: Knowledge

129) _____ are molecules with two fatty acid chains and a phosphate group that form biological membranes.
Answer: Phospholipids
Learning Outcome: 2.12
Bloom's Taxonomy: Knowledge

130) Individual steroids differ in the _____ attached to the carbon rings.
Answer: side chains
Learning Outcome: 2.12
Bloom's Taxonomy: Knowledge

131) A(n) _____ is a covalent bond that stores an unusually large amount of energy.
Answer: high-energy bond
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

132) The hydrolysis of ATP yields ADP, phosphate ion, and _____.
Answer: energy
Learning Outcome: 2.15
Bloom's Taxonomy: Knowledge

133) The molecule DNA contains a five-carbon sugar called _____.
Answer: deoxyribose
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

134) The purines found in DNA are _____ and _____.
Answer: adenine; guanine
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

135) The pyrimidine bases found in DNA are _____ and _____.
Answer: thymine; cytosine
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

136) Identify the three structural components of a nucleotide.
Answer: sugar (pentose); phosphate group; nitrogenous base
Learning Outcome: 2.16
Bloom's Taxonomy: Knowledge

137) Compare and contrast ionic and covalent bonds.
Answer: An ionic bond is when one molecule loses an electron and gives it to another molecule. One molecule becomes positive and the other one becomes negative. This forms a weak magnetic attraction between the two molecules. A covalent bond is when two or more molecules share an electron with each other. The bond is much stronger than an ionic bond.
Learning Outcome: 2.3
Bloom's Taxonomy: Analysis

138) Predict what will happen in the human body when a person ingests a large amount of Rolaids®, i.e., a base.
Answer: Because the Rolaids® are a base, they would neutralize some of the acid in the stomach. If enough of the acid is neutralized the body's buffer systems would need to correct the pH shift.
Learning Outcome: 2.9
Bloom's Taxonomy: Synthesis

139) Justify why blood has a very narrow normal pH range. What happens if the blood pH gets too high or too low?
Answer: Homeostasis requires that the pH of body fluids be maintained almost constant to avoid disruptions of normal cell and tissue function. If the pH of the blood and body fluids gets too high, alkalosis occurs causing uncontrollable muscle contractions. If the pH of the blood and body fluids gets too low, acidosis occurs and will result in coma and death.
Learning Outcome: 2.9
Bloom's Taxonomy: Evaluation

140) Explain the role of water molecules in polysaccharide formation.
Answer: Water molecules are removed in the dehydration synthesis of polysaccharides.
Learning Outcome: 2.10
Bloom's Taxonomy: Comprehension

141) How does the DNA molecule control the appearance and function of a cell?
Answer: The DNA molecule controls the synthesis of enzymes and structural proteins. By controlling the synthesis of structural proteins, the DNA is able to influence the physical appearance of a cell. By controlling the production of enzymes, the DNA is able to control all aspects of cellular metabolism and thus control the activity and biological functions of the cell.
Learning Outcome: 2.16
Bloom's Taxonomy: Comprehension