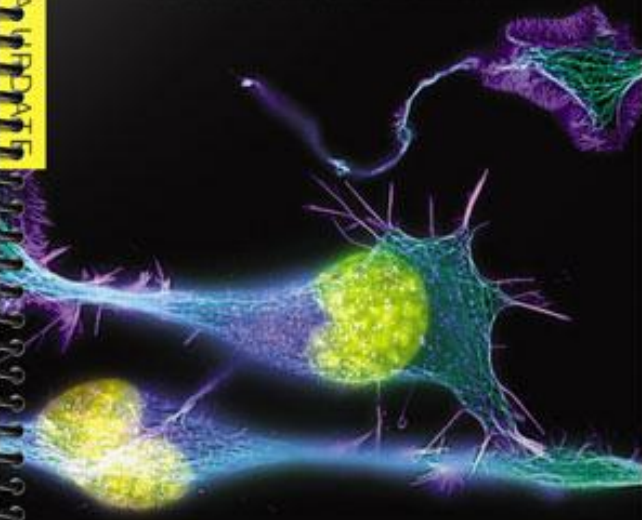


TEST BANK

MEDIA UPDATE

HUMAN PHYSIOLOGY

AN INTEGRATED APPROACH FOURTH EDITION



DEE UNGLAUB SILVERTHORN

MEDIA UPDATE includes

- Interactive Physiology 10-System Suite featuring a new module on The Immune System.
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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) The smallest unit of an element is a(n) 1) _____
A) atom.
B) oxygen.
C) electron.
D) proton.
E) neutron.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 2) List the following in order of increasing size: atom, molecule, 2) _____
proton, neutron, electron.

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

- 3) When atoms of two or more different elements are chemically linked 3) _____
together, the result is a(n)
A) peptide bond.
B) matter.
C) compound.
D) atom.
E) None of these choices are correct.

- 4) The atomic mass of an atom indicates the average total number of 4) _____
A) protons.
B) protons and neutrons.
C) electrons.
D) neutrons.
E) protons and electrons.

- 5) A proton has an electrical charge of -1 whereas an electron has an 5) _____
electrical charge of +1.
A) True B) False

- 6) One proton has a mass approximately equal to 6) _____
A) one neutron.
B) one angstrom.
C) 1836 electrons.
D) one electron.
E) More than one of these is correct.

- 7) One atom of an element usually has 7) _____
A) more protons than electrons.
B) equal numbers of protons and electrons.
C) the same number of protons, electrons, and neutrons.
D) more neutrons than electrons.

- 8) Which group of elements makes up more than 90% of the body's mass? 8) _____
A) O, H, Na
B) O, C, H

- C) C, Na, K
- D) Ca, C, O
- E) O, Ca, H

- 9) The element ${}^4\text{He}$ contains _____
- A) 2 protons and 2 electrons.
 - B) 4 neutrons.
 - C) 3 protons and 1 neutron.
 - D) 4 protons.
 - E) 2 protons and 2 neutrons.
- 10) The two subatomic particles that contribute almost all of the mass of any particular element are: 1. electrons; 2. protons; 3. neutrons _____
- A) 2 and 3
 - B) 1 and 3
 - C) 1 and 2
 - D) electrons only
 - E) protons only
- 11) The atomic number of an element is equivalent to _____
- A) the number of electrons in the outer shell.
 - B) the number of protons in the nucleus.
 - C) the electrical charge of an atom.
 - D) the number of neutrons in the nucleus.
 - E) the number of protons plus neutrons in the nucleus.
- 12) Approximately how many different elements are known? _____
- A) many millions
 - B) one hundred
 - C) one million
 - D) eleven
 - E) one thousand
- 13) Which of the following is NOT considered an **essential** element for a living organism? _____
- A) carbon
 - B) nitrogen
 - C) mercury
 - D) oxygen
 - E) hydrogen
- 14) The difference between a major essential element and a trace element is that _____
- A) trace elements are not required for cell function.
 - B) major essential elements are found in the body in large amounts, and are the most common constituents of biological molecules.
 - C) trace elements are necessary for cell function but in minute amounts.
 - D) major essential elements are the only elements found in biomolecules.
 - E) Both B and C are correct.

Identify each of the following as an element or a compound.

- 15) CO₂ 15) _____
A) element B) compound
- 16) C 16) _____
A) element B) compound
- 17) O₂ 17) _____
A) element B) compound
- 18) H₂ 18) _____
A) element B) compound
- 19) C₆H₁₂O₆ 19) _____
A) element B) compound
- 20) Radioisotopes 20) _____
A) are unstable and emit energy called radiation.
B) exist only artificially, using particle accelerators to produce them.
C) can be used medically for both diagnosis and treatment of diseases.
D) are only harmful and are known to cause different diseases.
E) A and C are correct.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 21) How many neutrons are in the nucleus of the radioisotope Iodine-131? 21) _____

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

- 22) An **antioxidant** is 22) _____
A) a compound that absorbs oxygen.
B) a molecule that alters free radicals.
C) a free radical.
D) the active ingredient in bleach.
E) a vitamin.
- 23) A **free radical** is a 23) _____
A) molecule with an unpaired electron.
B) molecule with an extra neutron.
C) molecule with an extra electron.
D) molecule with an extra proton.
E) charged particle.
- 24) Radioisotopes emit 24) _____
A) alpha particles.
B) ions.
C) beta particles.
D) protons.
E) both A and C

- 25) Which statement is NOT true for electrons? 25) _____
- A) Electrons have no significant mass.
 - B) Electrons are found in the nucleus of an atom.
 - C) Electrons have a charge of -1.
 - D) The number of electrons in an atom is usually the same as the number of protons.
 - E) Electrons influence the formation of chemical bonds between atoms to produce molecules.
- 26) Electrons travel around an atom's nucleus along "pathways" referred to as 26) _____
- A) tails.
 - B) trails.
 - C) ions.
 - D) isotopes.
 - E) shells.
- 27) The chemical bonding behavior of an atom is determined by 27) _____
- A) the size of the atom.
 - B) the mass of the atom.
 - C) the number of protons.
 - D) the number and arrangement of electrons.
 - E) the number of neutrons.
- 28) Which of the following elements tend(s) to form covalent bonds that are typically nonpolar? 28) _____
- A) hydrogen
 - B) nitrogen
 - C) carbon
 - D) A and C
 - E) B and C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 29) Draw the electron-dot shorthand for an atom of sodium. How many covalent bonds can sodium participate in? 29) _____

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

- 30) Which of the following substances would be the most alkaline? 30) _____
- A) lemon juice, pH = 2
 - B) stomach secretions, pH = 1
 - C) white wine, pH = 3
 - D) urine, pH = 6
 - E) tomato juice, pH = 4
- 31) If a substance has a pH that is less than 7, it is considered 31) _____
- A) neutral.
 - B) acidic.
 - C) a buffer.
 - D) a salt.

E) alkaline.

- 32) Which is a true statement regarding the pH of body fluids? 32) _____
- A) As the concentration of hydrogen ions increases, pH decreases.
 - B) As the concentration of hydrogen ions increases, acidity increases.
 - C) As the concentration of hydrogen ions increases, pH increases.
 - D) Two of these statements are true.
 - E) Two of these statements are false.

- 33) A component of an important buffer in the human body is 33) _____
- A) NaCl.
 - B) H₂O.
 - C) HCO₃⁻.
 - D) H⁺.
 - E) HCl.

- 34) Which of the following is NOT one of the four classes of biomolecule? 34) _____
- A) nucleotides
 - B) lipids
 - C) proteins
 - D) carbohydrates
 - E) starches

- 35) All of these statements about carbohydrates are true except one. 35) _____
Identify the exception.
- A) Polysaccharides are important both for energy storage and to provide structure to cells.
 - B) Simple sugars include lactose, glucose, and ribose.
 - C) Glycogen is important both for energy storage and to provide structure for cells.
 - D) Cellulose is the most abundant carbohydrate on earth.
 - E) Glycogen is a storage polysaccharide made by animal cells.

- 36) In regard to lipids, the term **unsaturated** refers to 36) _____
- A) the ring structure of steroids.
 - B) the lack of double bonds between adjacent carbon atoms in a fatty acid.
 - C) fats, such as butter and lard, which come from animal sources.
 - D) the presence of double bonds between adjacent carbon atoms in a fatty acid.
 - E) glycerol, which acts as an anchor for joined fatty acids.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 37) What are functional groups? List the most common functional groups found in biological molecules. 37) _____

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

- 38) Each amino acid differs from others in the 38) _____
- A) chemical structure of the R group.
 - B) number of central carbon atoms.

- C) number of peptide bonds in the molecule.
- D) size of the amino group.
- E) number of carboxyl groups.

- 39) The alpha-helix and pleated sheet are examples of the _____ structure of a protein. 39) _____
- A) quaternary
 - B) secondary
 - C) pentanary
 - D) primary
 - E) tertiary
- 40) Interactions between different globular or fibrous polypeptide chains result in which type of structure? 40) _____
- A) tertiary
 - B) pentagonal
 - C) secondary
 - D) primary
 - E) quaternary

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 41) _____ is any molecule that binds to another molecule. 41) _____

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

- 42) Which of the following projects aims to catalog the structure and function of all proteins in the body? 42) _____
- A) human genome project
 - B) human physiology initiative
 - C) human proteomics initiative
 - D) human physiome initiative
 - E) human proteome project
- 43) Nucleic acids are polymers of units called 43) _____
- A) amino acids.
 - B) fatty acids.
 - C) ribose.
 - D) nucleotides.
 - E) bases.
- 44) A **nucleotide** consists of 44) _____
- A) a phosphate group and a nitrogenous base.
 - B) a five-carbon sugar and an amino acid.
 - C) a five-carbon sugar and a nitrogenous base.
 - D) a five-carbon sugar, a nitrogenous base, and a phosphate group.
 - E) a five-carbon sugar and phosphate group.
- 45) According to the rules of complementary base pairing, a nucleotide containing the base **cytosine** would only pair with a nucleotide containing the base 45) _____
- A) adenine.

- B) thymine.
- C) uracil.
- D) cytosine.
- E) guanine.

46) The most important energy-transferring compound in cells is 46) _____

- A) fructose.
- B) glucose.
- C) deoxyribonucleic acid.
- D) adenosine triphosphate.
- E) protein.

47) Which bases below are **purines**? 47) _____

- 1) adenine
- 2) cytosine
- 3) guanine
- 4) thymine
- 5) uracil

- A) 1 and 2
- B) 1, 3, and 5
- C) 2 and 3
- D) 2, 4, and 5
- E) 1 and 3

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

48) What makes trans fats just as harmful as saturated animal fats? 48) _____

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

49) Protein specificity is 49) _____

- A) the activation of a specific protein that is needed to perform a particular function.
- B) the degree to which a protein-ligand complex initiates a response.
- C) the degree to which a protein is attracted to a ligand.
- D) the ability of a protein to bind a certain ligand or a group of related ligands.
- E) B and C

50) Which of the following is a common feature of soluble proteins? 50) _____

- A) receptor binding
- B) chemical modulation
- C) structural support
- D) noncovalent interaction
- E) all of the above

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

51) Two methods of protein activation include _____ and _____.

Match the correct subatomic particle with the statement about it. Answers may be used once, more than

once, or not at all.

- A. protons
- B. neutrons
- C. electrons

52) An ion has gained or lost _____. 52) _____

53) Isotopes of the same element differ by having different numbers of _____. 53) _____

54) The identity of an element can be determined by the number of _____. 54) _____

55) This particle has a charge of +1 and a mass of 1. 55) _____

56) This particle has a charge of -1 and a negligible mass. 56) _____

57) This particle has a neutral charge and a mass of 1. 57) _____

Match the given examples with the proper category. Answers may be used once, more than once, or not at all.

- A. ions
- B. isotopes
- C. major essential elements
- D. trace elements

58) deuterium and tritium 58) _____

59) carbon and nitrogen 59) _____

60) chloride and sodium 60) _____

61) chromium and iron 61) _____

62) hydrogen and oxygen 62) _____

Match the symbol with the correct element:

- A. P
- B. Na
- C. Ca
- D. C
- E. K
- F. Pb

63) calcium 63) _____

64) carbon 64) _____

65) potassium 65) _____

66) phosphorus 66) _____

67) lead 67) _____

68) sodium 68) _____

Match each level of protein structure with its description.

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

69) Applies to proteins containing more than one peptide chain. 69) _____

70) The sequence and number of amino acids in the chain. 70) _____

71) The 3-D shape of an amino acid chain; can be fibrous or globular. 71) _____

72) The spatial arrangement of amino acids; can be a helix or a pleated sheet. 72) _____

Match each class of biomolecules to the correct statement about it.

- A. carbohydrates
- B. lipids
- C. proteins
- D. nucleotides

73) Glucose and ribose are examples; these molecules provide energy or structure. 73) _____

74) ATP and DNA are examples; they transfer energy and encode genetic information. 74) _____

75) Comprised of units called amino acids, these can be linked into chains over 100 peptides long. 75) _____

76) Triglycerides and steroids are members of this group. As a class they are hydrophobic. 76) _____

Match each bond type with its description.

- A. van der Waals
- B. ionic
- C. hydrogen
- D. covalent

77) This results when an atom has such a strong attraction for electrons that it pulls one or more electrons completely away from another atom. 77) _____

- 78) These are weak attractive forces between hydrogen and certain other atoms. 78) _____
- 79) These result when two atoms share a pair of electrons. 79) _____
- 80) These are weak attractive forces between the nucleus of one atom and the electrons of another atom close by. 80) _____

Match the descriptions to the correct protein category.

- A. fibrous
- B. globular

- 81) soluble in water 81) _____
- 82) keratin 82) _____
- 83) disulfide bond 83) _____
- 84) lipid carriers 84) _____
- 85) structural components 85) _____

For the following questions, match the type of modulator with the best description below.

- A. involved in phosphorylation
- B. cannot be displaced by competition
- C. bind to proteins away from the active site
- D. reversible antagonist

- 86) irreversible antagonist 86) _____
- 87) covalent modulator 87) _____
- 88) competitive inhibitor 88) _____
- 89) allosteric modulator 89) _____
- 90) The smallest unit of an element is a(n) _____. 90) _____
- 91) When two or more atoms are chemically linked, the smallest unit of the resulting material is referred to as a(n) _____. 91) _____
- 92) A(n) _____ is a substance that consists entirely of atoms with the same atomic number. 92) _____
- 93) The center of an atom is called the _____. 93) _____
- 94) Electrons travel around the center of the atom at high speed forming a(n) _____. 94) _____
- 95) A combination of two or more atoms that has physical and chemical properties that differ from the atoms that compose it is ed a(n) call _____. 95) _____

95) _____

96) Ions with a positive charge are called _____. 96) _____

97) Ions with a negative charge are called _____. 97) _____

98) In a chemical reaction, _____ between atoms are broken as atoms are rearranged in new combinations to form different chemical substances. 98) _____

99) The reaction rates of many chemical reactions that occur in the body are controlled by special protein molecules called _____. 99) _____

100) A(n) _____ is a homogeneous mixture containing a solvent and a solute. 100) _____

101) Molecules that readily dissolve in water are called _____. 101) _____

102) Molecules that do not dissolve in water are called _____. 102) _____

103) The molecule DNA contains the five-carbon sugar _____. 103) _____

104) The molecule RNA contains the five-carbon sugar _____. 104) _____

105) The purines found in DNA are _____ and _____. 105) _____

106) The pyrimidine bases found in DNA are _____ and _____. 106) _____

107) List and briefly describe the seven categories of soluble proteins. 107) _____

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

108) Of the chemical bonding types listed, which is the strongest and usually requires the input of energy to be broken apart? 108) _____

- A) ionic
- B) hydrogen bonds
- C) covalent
- D) van der Waals forces
- E) impossible to determine

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

109) What are protein isoforms? Provide an example. 109) _____

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

110) When a molecule is referred to as polar, it means that 110) _____

- A) the positive and negative charges of the molecule are unevenly distributed.

- B) the molecule has ionized and now carries a charge.
- C) the molecule is likely to dissolve in water.
- D) A and C are true.
- E) All of these are true statements.

111) Lipids are hydrophobic, and do not usually dissolve in water. To overcome this problem, in the blood, the lipid cholesterol is combined with 111) _____

- A) nothing; lipids and water just do not mix.
- B) a hydrophilic molecule, such as a lipoprotein.
- C) an anion, such as chloride.
- D) another hydrophobic molecule, an oil.

112) A mole of water (H₂O) 112) _____

- A) has 6.02×10^{23} molecules.
- B) has a mass of 18 grams.
- C) is equivalent to 1 liter of water.
- D) A and B
- E) All of these are true statements.

113) If an element is composed of atoms with an atomic number of 6 and a mass number of 14, then a neutral atom of this element contains 113) _____

- A) 14 electrons.
- B) 6 neutrons.
- C) 8 electrons.
- D) 14 protons.
- E) 6 protons.

114) One mole of NaCl is _____ one mole of C^O2. 114) _____
A) equal to B) greater than C) less than

115) Calcium atoms have two electrons in the outermost shell. As a result, you would expect calcium to form ions with a charge of 115) _____

- A) -2.
- B) -1.
- C) +1.
- D) +2.
- E) none of the above

116) Magnesium atoms have two electrons in the outermost shell and chlorine atoms have seven. The compound **magnesium chloride** would contain 116) _____

- A) 2 magnesium and 1 chlorine.
- B) 1 magnesium and 2 chlorine.
- C) 1 magnesium and 1 chlorine.
- D) 2 magnesium and 7 chlorine.
- E) impossible to tell without more information

117) Each of the following statements concerning hydrogen bonds is true except one. Identify the exception. 117) _____

- A) Hydrogen bonds are important forces for holding large molecules together.

- B) Hydrogen bonds are strong attractive forces between two hydrogen atoms.
- C) Hydrogen bonds can occur within a single molecule.
- D) Hydrogen bonds can form between neighboring molecules.
- E) Hydrogen bonds are responsible for many of the unique properties of water.

118) The hydrogen bonding that occurs in water is responsible for 118) _____
 A) the ability of water to dissolve inorganic salts.
 B) the low freezing point of water.
 C) the high boiling point of water.
 D) the surface tension of water.
 E) all of the above

119) When a small amount of hydrochloric acid is added to a solution of 119) _____
 Na_2HPO_4 , the pH of the solution does not change. The pH does not change when a small amount of NaOH is added, either. Based on these observations, the compound Na_2HPO_4 is
 A) able to donate hydrogen ions to the OH^- from NaOH.
 B) acting as a buffer.
 C) able to accept extra hydrogen ions from the HCl.
 D) all of the above

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

120) Compare/contrast the chemical bonds between adjacent 120) _____
 monomers in DNA, and between two strands of DNA.

121) Explain the general chemical structure for monosaccharides 121) _____
 and amino acids.

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

122) A shortage of cholesterol in the body could interfere with the formation 122) _____
 of
 A) nucleic acids.
 B) proteins.
 C) glycogen.
 D) steroid hormones.
 E) all of the above

123) The nucleic acid RNA 123) _____
 A) contains the pentose deoxyribose.
 B) stores the cell's genetic information.
 C) is double stranded.
 D) contains the pyrimidine uracil in place of thymine.

124) Ionic bonds are formed when 124) _____
 A) two or more atoms lose electrons at the same time.
 B) hydrogen forms bonds with negatively charged atoms in the same or different molecule.
 C) electrons are completely transferred from one atom to another.

D) a pair of electrons is shared unequally by two atoms.

E) atoms share electrons.

- 125) Chemical reactions that occur in the human body proceed at a faster rate due to special catalytic molecules called 125) _____
A) activators.
B) enzymes.
C) cytozymes.
D) cofactors.
E) none of the above
- 126) A solution containing equal numbers of hydrogen ions (H^+) and hydroxide ions (OH^-) is 126) _____
A) alkaline.
B) neutral.
C) basic.
D) acidic.
E) none of the above
- 127) The fuel molecule all cells in the body can use is 127) _____
A) vitamins.
B) sucrose.
C) glucose.
D) starch.
E) protein.
- 128) The group of biomolecules containing hydrogen and oxygen in the same ratio as the ratio in water is defined as a 128) _____
A) lipid.
B) protein.
C) nucleic acid.
D) carbohydrate.
E) none of the above
- 129) A fatty acid that contains three double bonds in its carbon chain is said to be 129) _____
A) saturated.
B) monounsaturated.
C) carboxylated.
D) polyunsaturated.
E) hydrogenated.
- 130) Most of the fat found in the human body is in the form of 130) _____
A) triglycerides.
B) steroids.
C) monoglycerides.
D) prostaglandins.
E) phospholipids.
- 131) Cholesterol, phospholipids, and glycolipids are examples of 131) _____
A) prostaglandins. B) steroids.
C) eicosanoids. D) structural lipids.

- 132) Each of the following is a function of proteins except one. Identify the exception. 132) _____
- A) support and structure
 - B) enzymes
 - C) storage of genetic information
 - D) carrying of messages
 - E) transport
- 133) A peptide bond links 133) _____
- A) two nucleotides.
 - B) two amino acids.
 - C) a fatty acid and a glycerol molecule.
 - D) two simple sugars.
 - E) a cholesterol molecule and a fatty acid molecule.
- 134) A reaction between glycerol and a single fatty acid would yield a(n) 134) _____
- A) diglyceride.
 - B) omega-3 fatty acid.
 - C) triglyceride.
 - D) monoglyceride.
 - E) micelle.
- 135) If a polypeptide contains 10 peptide bonds, how many amino acids does it contain? 135) _____
- A) 0 B) 5 C) 10 D) 11 E) 12
- 136) Glycoprotein molecules 136) _____
- A) act as receptors on the surface of cell membranes.
 - B) function as cell markers.
 - C) are present in the secretions coating the respiratory tract.
 - D) function as hormones from the pancreas.
 - E) both A and B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 137) The _____ of a solution is the negative logarithm of the hydrogen ion concentration, expressed in moles per liter of solution. 137) _____
- 138) _____ are compounds in solution that maintain pH within given limits. 138) _____
- 139) When a nitrogenous base is bonded to a pentose sugar and a phosphate, a _____ is formed. 139) _____
- 140) Radiation emitted by radioisotopes creates an image on a special photographic plate, in the oldest method of imaging used in medicine, _____. 140) _____
- 141) The technique known as _____ uses computers to visualize sections through the body that can be used to reconstruct the three-dimensional structure of a molecule. 141) _____

nal 141)
structure
of
specific
organs.

142) Radiation involving the emission of neutrons + protons is called _____. 142) _____

143) Radiation involving the emission of an electron is called _____. 143) _____

144) High energy waves that are emitted by radioactive nuclei and which penetrate deeply into structures are called _____. 144) _____

145) Diagram and explain the progression of protein structure from primary to quaternary. 145) _____

146) True or False? Lipids contain substantially more oxygen than carbohydrate molecules. Based on your answer, what does that suggest about lipid solubility in water? 146) _____

147) Explain the polar character of an ammonia molecule (N^{H_3}). What is the cause of the partial charges? What is the overall charge for N^{H_3} ? 147) _____

148) What is the induced-fit model? Classify the types of bonds involved as strong or weak. 148) _____

149) If the dissociation constant of a protein is less than one ($K_d < 1$), what can you conclude about the affinity of the protein for the ligand? 149) _____

150) Water striders are insects that literally walk on water. These insects are frequently found living on ponds. If hydrogen bonds did not exist, how would this affect the life of water striders? 150) _____

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

151) Do you know what kinds of cell markers your red blood cells have? Do you know your own blood type? How are these two pieces of information related?

152) Describe and distinguish between the techniques of X-ray, CT scan, PET scan, MRI scan, and ultrasound.

153) Describe what happens to NaCl when placed in water.

154) Using the periodic table, list the number of neutrons, electrons, and protons in sodium and chlorine. What is the atomic mass of each of these elements? What is the molecular weight of sodium chloride (table salt), NaCl? What is a mole? What does a mole of NaCl weigh (calculate it, don't look it up)? How much NaCl and water would you mix to make a 2 molar solution?

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

155) How many grams of glucose, m.w. 180 daltons, is necessary to make 1 liter of a 1.0 molar solution? 155) _____
A) 90
B) 180
C) 360
D) 1.0
E) 6.02×10^{23}

156) A 5 M solution of 100 ml of glucose contains how many grams of glucose, m.w. 180 daltons? 156) _____
A) 90
B) 360
C) 1.0
D) 6.02×10^{23}
E) 180

157) How many grams of NaCl, m.w. 58.5 daltons, is necessary to make 1 liter of a 2.0 molar solution? 157) _____
A) 6.02×10^{23}
B) 58.5
C) 29.25
D) 2.0
E) 117

158) If 100 ml of water contains 5 grams of NaCl, m.w. 58.5 daltons, what is the molarity of the solution in moles/L? 158) _____
A) 0.085 B) 2.92 C) 0.85 D) 0.05 E) 0.25

159) How many grams of NaCl, m.w. 58.5 daltons, are the molar equivalent to 90 g of glucose (m.w. 180 daltons)? 159) _____
A) 0.5 B) 14.6 C) 117 D) 0.25 E) 29.25

160) How many grams of NaCl, m.w. 58.5 daltons, are necessary to make 1 liter of 5% saline? 160) _____
A) 2.9
B) 58.5
C) 1
D) 6.02×10^{23}
E) 50

161) 100 mg/dL is a typical blood concentration of glucose. The molecular weight of glucose is approximately 180 daltons. What is the molarity of this solution in millimoles? 161) _____
A) 18 B) 10 C) 5.6 D) 100 E) 0.56

162) If in an acid-base reaction $\text{H}_2\text{S} \text{O}_4^{2-}$ donates two H^+ , one mole of $\text{H}_2\text{S} \text{O}_4^{2-}$ would equal how many

equivalents? 162)

A) 1

B) 2

C) 4

D) 0.5

E) 0.75

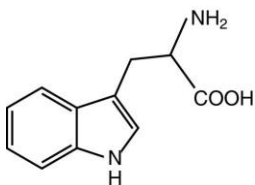
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SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

163) Which HCl solution is more acidic, a 500 mM or a 5 M? 163) _____

164) What is the pH of a 0.005 M HCl solution? Assume complete dissociation. 164) _____

165) Write the chemical formula for the molecule drawn below. 165) _____
Which class of organic molecule does it belong to? Is it most likely polar or non-polar?



- 1) A
- 2) electron < proton = neutron < atom < molecule
- 3) C
- 4) B
- 5) B
- 6) E
- 7) B
- 8) B
- 9) E
- 10) A
- 11) B
- 12) B
- 13) C
- 14) E
- 15) B
- 16) A
- 17) A
- 18) A
- 19) B
- 20) E
- 21) The atomic number gives the number of protons. Therefore, subtract the atomic number of iodine from the radioisotope number and the result is the number of neutrons present in the nucleus. $131 - 53 = 78$
- 22) B
- 23) A
- 24) E
- 25) B
- 26) E
- 27) D
- 28) D
- 29) Na⁺; One
- 30) D
- 31) B
- 32) D
- 33) C
- 34) E
- 35) C
- 36) D
- 37) Several combinations of atoms that occur repeatedly in biological molecules. See Table 2-2 in the main text.
- 38) A
- 39) B
- 40) E
- 41) Ligand
- 42) C
- 43) D
- 44) D
- 45) E
- 46) D
- 47) E
- 48) Manufacturers attach hydrogens to the initially unsaturated vegetable oils in order to

make them more solid at room temperature.

49) D

50) D

51) proteolytic (removal of portions of the molecule) and cofactor binding

52) C

53) B

54) A

55) A

56) C

57) B

58) B

59) C

60) A

61) D

62) C

63) C

64) D

65) E

66) A

67) F

68) B

69) D

70) A

71) C

72) B

73) A

74) D

75) C

76) B

77) B

78) C

79) D

80) A

81) B

82) A

83) B

84) B

85) A

86) B

87) A

88) D

89) C

90) atom

91) molecule

92) element

93) nucleus

94) shell (or orbital)

95) compound

96) cations

97) anions

98) bonds

99) enzymes

- 100) solution
- 101) hydrophilic (Most are also polar).
- 102) hydrophobic (Most are also non-polar.)
- 103) deoxyribose
- 104) ribose
- 105) adenine & guanine
- 106) thymine & cytosine
- 107) The seven categories: enzymes, membrane transporters, signal molecules, receptors, binding proteins, regulatory proteins, and immunoglobulins. See page 38 for descriptions.
- 108) C
- 109) Closely related proteins whose function is similar but whose affinity for ligands differs. Adult and fetal hemoglobin.
- 110) D
- 111) B
- 112) D
- 113) E
- 114) A
- 115) D
- 116) B
- 117) B
- 118) E
- 119) D
- 120) The bonds holding monomers together are covalent bonds, between sugar and phosphate molecules. The bonds holding neighboring strands together at the complementary bases are hydrogen bonds.
- 121) Monosaccharides consist of carbon, hydrogen, and oxygen, in the ratio C:H:O of 1:2:1. Amino acids consist of a central carbon (CH) a carboxylic acid (COOH), an amine (NH₂), and an organic side chain of variable structure (mainly a hydrocarbon chain, designated as R).
- 122) D
- 123) D
- 124) C
- 125) B
- 126) B
- 127) C
- 128) D
- 129) D
- 130) A
- 131) D
- 132) C
- 133) B
- 134) D
- 135) D
- 136) E
- 137) pH
- 138) Buffers
- 139) nucleotide
- 140) X-rays
- 141) computerized tomography
- 142) alpha radiation
- 143) beta radiation

- 144) gamma rays
- 145) See Figure 2-9, page 30.
- 146) False. Lipids contain much less oxygen than carbohydrates. With less oxygen, lipids are not able to participate in hydrogen bonding with water molecules and therefore are relatively insoluble in aqueous environments.
- 147) The nitrogen atom is partially negative whereas the hydrogen atoms are partially positive. The nitrogen atom in a molecule of ammonia has a stronger attraction for the electrons participating in the covalent bonds than the hydrogen atoms. However, the net charge on the molecule is still zero.
- 148) The interaction between a protein binding site and a ligand that are in close proximity results in a conformational change of the protein to fit more closely to the ligand. The bonds involved are hydrogen (weak), ionic (strong), and van der Waals (weak).
- 149) Since $K_d < 1$, you know that $[P][L] < [PL]$. Therefore at equilibrium, there is a higher concentration of protein-ligand complex suggesting that the protein has a relatively high binding affinity for the ligand.
- 150) Hydrogen bonds are responsible for the surface tension of water, the attractive force between water molecules that makes it difficult to separate them. The surface tension supports the weight of water striders thus allowing them to walk on water. If water molecules could not form hydrogen bonds, the water striders would not be able to walk on water because there would be no surface tension to support their weight. Therefore, these insects would have to adapt to terrestrial conditions near ponds or lakes rather than living on them.
- 151) Glycoproteins and glycolipids can act as cell surface markers. On blood cells, some of these markers are designated as the blood type. The most common blood typing system is the A-B-O system, usually paired with the rh system, so your blood type may be, for example, B+ or O-. Some of this information is in Ch. 16.
- 152) All of these techniques exploit differences in density or activity of tissues, which alter the way in which electromagnetic or sound waves are transmitted, absorbed, or reflected. The data are converted to an image, resulting in a picture of the internal organs, in which areas differ in appearance based on differences in density or activity. These techniques can be used to visualize tumors, blood flow, metabolic activity, damaged organs, gall or kidney stones, fetuses, etc. X-rays are electromagnetic radiations, which penetrate tissues to varying degrees based on their density. A photographic film is placed behind the body, producing an image. CT (cat) scans are a series of X-rays that are analyzed by a computer instead of exposing film; CT scans provide images in thin planes or slices, for more precise localization of dense areas. PET scans utilize positrons emitted from radioisotopes, which computers can analyze to provide information about metabolic activity and blood flow. In an MRI (NMR or nuclear magnetic resonance) scan, a magnetic field is used to alter the energy level of the nuclei of hydrogen atoms, which emit radiation when they return to their normal state; a computer analyzes the data, which are of relatively high contrast. Ultrasound utilizes ultrasonic (high frequency sound) waves, which produce echoes that vary with tissue density, and are analyzed by computer; this technique is especially useful for observing fetal development because it does not risk harming the fetus with radiation. None of these techniques is as informative as actually visualizing the area of interest by performing surgery, but they are non-invasive.
- 153) Water molecules break the ionic bonds holding Na^+ and Cl^- together. Each sodium ion becomes surrounded by polar water molecules, with the electronegative ends of water molecules interacting with the ion. Each chloride ion also becomes surrounded by polar water molecules, but in this case it is the electropositive ends of the water molecules that bind to the ion. A consequence is that sodium and chloride ions can function relatively independently of each other when in solution.
- 154) Electrons have an approximate mass of 0 atomic units, and each proton and neutron has

an is just the sum of the protons and neutrons. The number of protons (which in an atom appr equals the number of electrons) and the atomic mass are listed in the periodic table, and oxim the number of neutrons can be calculated from that (atomic mass - number of protons = ate number of neutrons). Sodium has 11 protons, 11 electrons, and 12 neutrons, and its atomic mass mass is 23. Chlorine has 17 protons, 17 electrons, and 19 neutrons, and its atomic mass is of 1 36 (mass is rounded up from 35.5, which is its measured weight, and is not a whole atom number because the number of neutrons varies slightly and therefore this is an average ic mass). The molecular weight of table salt is the sum of the atomic masses of each element unit, multiplied by the number of atoms present. One molecule of sodium chloride, NaCl, there weighs (23 + 36) 59 atomic mass units. A mole is a standard quantity of 6.02×10^{23} of fore anything, just as a dozen is 12 of anything; the weight of a mole of any substance is its the molecular weight in grams. A mole of NaCl, therefore, weighs 59 grams. To make a 2 atom molar solution (2 moles per liter), you would place $59 \times 2 = 118$ grams of NaCl into a ic volumetric flask and add water until you have a final solution volume of 1 liter.

mass

155) B

156) A

157) E

158) C

159) E

160) E

161) C

162) B

163) A 5 M solution of HCl is more concentrated than a 500 mM (i.e., 0.5 M) solution and therefore is more acidic.

164) pH = 2.3. If $\text{pH} = -\log [\text{H}^+]$ and HCl is a strong acid, we can assume complete dissociation will occur in solution.

165) $\text{C}_{11}\text{H}_{12}\text{N}_2\text{O}_2$. The presence of the carboxylic acid (COOH) and amine (NH₂) indicate this is an amino acid. Because of the R group structure, it is relatively non-polar (this amino acid is tryptophan).