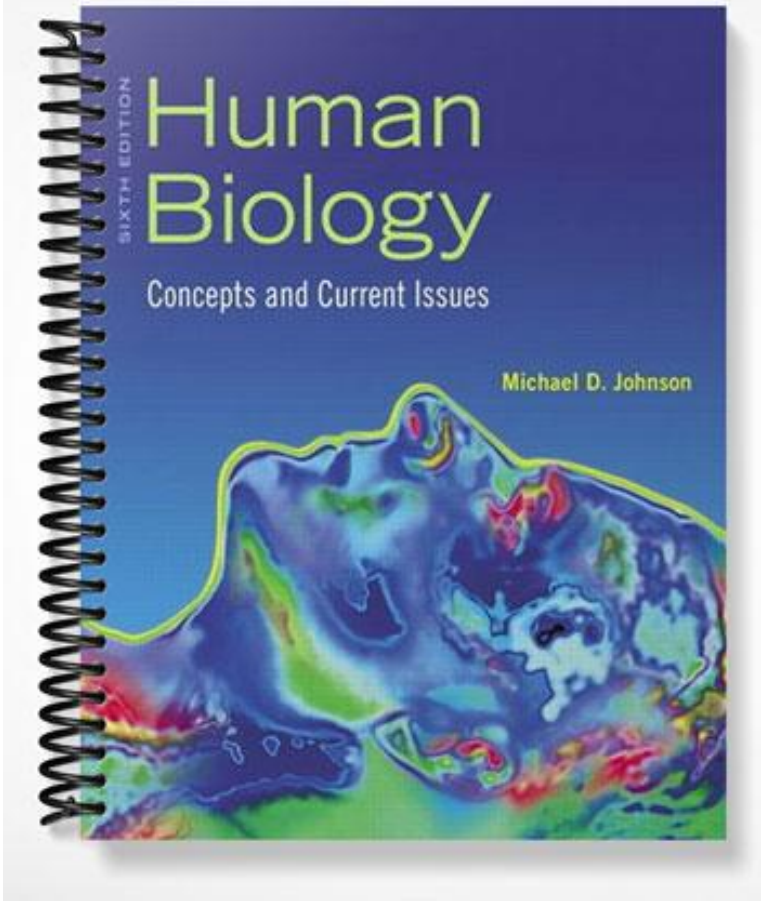
TEST BANK


SIXTH EDITION
Human Biology
Concepts and Current Issues
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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which of the following characteristics applies to both living organisms and nonliving things? 1) _____
A) have the ability to store energy for later use
B) are capable of growth
C) are made up of cells
D) are capable of reproduction
E) are made up of matter

2) _____ is the study of matter and the energy that causes matter to combine, break apart and recombine in everything living and non-living. 2) _____
A) Geology B) Biology C) Chemistry D) Physics

3) _____ is the capacity to do work□the capacity to cause some change in matter. 3) _____
A) Atom B) Energy C) Molecule D) Matter

4) A mad scientist has ripped apart an atom and collected all the subatomic particles located in the nucleus of the atom. Which of the following has he collected? 4) _____
A) neutrons and electrons
B) protons and neutrons
C) electrons
D) protons
E) electrons and protons

5) Which of the following is true regarding the structure of the atom? 5) _____
A) The nucleus is composed of equal numbers of positively charged particles and negatively charged particles.
B) Most of the mass of an atom is due to its protons and neutrons.
C) All electrons are located at the same distance from the nucleus.
D) Neutrons carry a negative charge.
E) In small elements, such as carbon, electrons have a positive charge; in larger elements, such as barium, electrons have a negative charge.

6) Isotopes of an element have the same atomic number as the more common atoms, but different atomic mass because 6) _____
A) isotopes contain more neutrons than the more common atoms.
B) isotopes absorb water from the surrounding environment.
C) isotopes contain more electrons than the more common atoms.
D) isotopes contain more protons than the more common atoms.

7) The total number of protons and neutrons in an atom can best be determined by 7) _____
A) the subscript number following the chemical symbol
B) the chemical symbol
C) atomic mass
D) atomic number
E) the charge of the atom

8) Isotopes of an element have the same _____, but different _____. 8) _____
A) number of neutrons, numbers of protons
B) name, chemical symbols
C) atomic mass, atomic numbers
D) atomic number, atomic masses

E) number of electron shells, numbers of protons

9) Radioisotopes have a number of uses in science and medicine. These uses include 9) _____
A) providing the power supply in heart pacemakers.
B) repairing damaged heart tissue.
C) dating fossils and treating cancer.
D) treating asthma and regulating nerve transmission.
E) curing diabetes.

10) Carbon has an atomic number of 6 and an atomic mass of 12. Therefore, carbon has _____ electrons and _____ neutrons. 10) _____
A) 6, 6 B) 6, 12 C) 2, 10 D) 12, 12 E) 12, 6

11) Which of the following is true regarding electrons, shells, and energy? 11) _____
A) As an electron moves to a shell further from the nucleus, it loses energy.
B) Electrons are located in shells around the nucleus.
C) The innermost electron shell has the most potential energy.
D) In order for an electron to move closer to the nucleus, it must absorb energy.
E) Electrons are attracted to each other because they have the same charge.

12) Which of the following is a molecule? 12) _____
A) C B) O C) NaCl D) N E) Lead

13) A molecule of water forms when one oxygen binds with two hydrogen atoms, completely filling the outershell of the hydrogens and oxygen. The type of bond linking the atoms together is 13) _____
A) ionic. B) polar. C) covalent. D) hydrogen. E) disulfide.

14) Ions in body fluids of a human are referred to as 14) _____
A) atoms. B) electrolytes. C) isotopes. D) osmolytes.

15) Which of the following is true regarding water? 15) _____
A) Each molecule of water consists of two atoms of hydrogen and one atom of oxygen covalently bonded to each other.
B) Water is a type of ion.
C) The oxygen side of the water molecule is partially positive.
D) Water molecules are attracted to each other by ionic bonds.
E) Electrons are shared equally between the atoms of water.

16) Which of the following is true concerning hydrogen bonds? 16) _____
A) The bonds break when water enters a vapor state and remain broken as long as water molecules remain in the gas phase.
B) Hydrogen bonds hold strands of DNA together.
C) They are weak bonds that form between water molecules in liquid form.
D) All of the above are correct.

17) Molecules such as water that are electrically neutral overall but still have partially charged regions are referred to as 17) _____
A) ions.
B) isotopes.
C) polar molecules.
D) covalently charged.
E) electrolytes.

18) Investigators at the National Institutes of Health examined the sales trends of five dietary supplements before and after the publication of negative research results. There were no significant declines in sales of four of five of the dietary supplements after published reports that the supplements were ineffective. However, sales of a fifth supplement, vitamin E, dropped by more than 33%. Researchers speculated that the drop in sales of only one of the five supplements could be due to 18) _____

A) the report simply not being heard or read by the public as a whole.
B) vitamin E has more negative side effects than the other supplements.
C) supplements like vitamin E are recommend more frequently by physicians to their patients.
D) vitamin E serves less useful purposes than the other supplements.
E) the higher cost of vitamin E in relation to the other dietary supplements examined.

19) Water is an excellent solvent for biological systems because 19) _____

A) it can maintain a relatively unstable temperature for chemical reactions to occur.
B) water is a semi-solid at body temperature preventing it from flowing freely through the human body.
C) the polar nature of water prevents reassociation of ions once dissolved.
D) it can form covalent bonds with molecules once dissolved.

20) A solution with a pH of 6 has _____ times as many hydrogen ions as a solution with a pH of 7. 20) _____

A) 100,000 B) 10 C) 1,000 D) 10,000 E) 100

21) A student measuring the pH of the water in a fish tank found it to have a pH of 8. Which of the following statements is true regarding that solution? 21) _____

A) The water does not contain hydrogen ions.
B) The water is more alkaline than a solution with a pH of 10.
C) The water contains equal numbers of hydrogen ions and hydroxyl ions.
D) The water is highly acidic.
E) The water is alkaline.

22) Body fluids in humans have a high buffering capacity because 22) _____

A) even modest shifts in pH can severely alter the physiology of cells.
B) it is the natural result of water as a solvent.
C) shifts in blood pH are required to maintain homeostasis.
D) it promotes hydrogen bonding between water molecules in biological fluids.

23) Which of the following is true regarding carbon? 23) _____

A) It is most stable when its outermost shell is filled with eight electrons
B) It is capable of forming strong hydrogen bonds with other elements
C) It can form molecules that branch in many directions
D) It is found in inorganic molecules
E) It is an ideal solvent in living systems

24) Which of the following is true regarding macromolecules? 24) _____

A) Cells produce macromolecules by the process of hydrolysis.
B) Cells cannot use macromolecules to signal other cells.
C) Cells use certain macromolecules to store energy.
D) Macromolecules are produced by hydration synthesis.
E) An example of a macromolecule is H2O.

25) Hydrolysis reactions are important in biological systems 25) _____
A) due to their role in the breakdown of food molecules during digestion.
B) since these reactions are associated with recycling of materials and elimination of substances from the body.
C) because they promote the release of energy when covalent bonds are broken.
D) All of the above are correct.

26) Carbohydrates are characterized by 26) _____
A) being indigestible by most organisms.
B) being composed of carbon, hydrogen, and nitrogen.
C) releasing energy when their peptide bonds are broken.
D) possessing a carbon backbone that is hydrated.

27) Which of the following is a very important source of energy for cells? 27) _____
A) starch
B) cellulose
C) glucose
D) deoxyribose
E) ribose

28) Which of the following is an oligosaccharide? 28) _____
A) starch B) DNA C) ribose D) maltose E) glucose

29) Sucrose is an oligosaccharide made up of which of the following sugars? 29) _____
A) glucose and glucose
B) starch and glycogen
C) deoxyribose and ribose
D) glucose and fructose
E) maltose and glucose

30) Lipids are important to biological systems because 30) _____
A) most help to buffer aqueous solutions in the body.
B) some lipid types are potentially large sources of energy to perform cellular work.
C) all lipids are very soluble in water.
D) they are solid at body temperature so they stabilize membranes.

31) Which of the following molecules is stored in adipose tissue and serves as an important source of energy for the human body? 31) _____
A) triglycerides
B) glucose
C) glycogen
D) phospholipids
E) steroids

32) Which of the following is a lipid? 32) _____
A) Maltose. B) Alanine. C) Cholesterol. D) Glycogen.

33) The most important physical characteristic of lipids with regard to living organisms is that they 33) _____
A) dissolve easily in water.
B) are very large and therefore difficult to store.
C) are hydrophobic.
D) are typically a form of waste product that is difficult to eliminate.

E) are more dense than water.

34) Pancreatic cells make insulin, which is a type of protein. These cells use _____ in order to synthesize insulin by the process of _____. 34) _____
A) nucleotides, condensation.
B) monosaccharides, dehydration synthesis.
C) fatty acids and glycerol, hydrolysis.
D) oligosaccharides, hydrolysis.
E) amino acids, dehydration synthesis.

35) Each amino acid is composed of a central carbon that forms covalent bonds with four other atoms/molecules. These atoms/molecules include all but a(n) 35) _____
A) carboxyl group.
B) R group.
C) A group.
D) hydrogen atom.
E) amino group.

36) Disulfide bonds are most characteristic of which of the following levels of protein structure? 36) _____
A) quaternary
B) secondary
C) enzymatic
D) primary
E) tertiary

37) Which of the following is a function of a protein? 37) _____
A) acts as a catalyst
B) provides energy for a muscle contraction
C) is a major subunit of cellulose
D) primary structural component of a cell membrane
E) stores genetic material

38) Students seeking a "boost" of energy to pull an all-nighter should consider a caffeine tablet instead of "energy shot" because 38) _____
A) energy shots are generally bad tasting by comparison to a caffeine tablet.
B) caffeine tablets usually contain more caffeine.
C) the tablets are much cheaper to purchase.
D) all of the ingredients in an energy shot are not provided by the manufacturer, so you really are not entirely sure what you are drinking.
E) All of the above are correct.

39) Which of the following is true regarding enzymes? 39) _____
A) Enzymes slow the rate of chemical reactions in living systems.
B) Enzymes convert products into reactants.
C) Enzymes are consumed in a chemical reaction, so an organism must constantly replace these enzymes.
D) Enzyme function is not affected by changes in temperature or pH.
E) Each enzyme catalyzes one specific reaction or group of reactions.

40) Which of the following is needed to synthesis a new strand of DNA? 40) _____
A) lipids
B) GTP

C) RNA
D) nucleotides
E) amino acids

41) DNA differs from RNA in that DNA 41) _____
A) is made up of nucleotides.
B) contains cytosine.
C) contains deoxyribose.
D) contains phosphates.
E) is single stranded.

42) A research student is analyzing the nucleic acid of a virus. He finds that the nucleic acid contains thymine. From this it can be concluded that the nucleic acid 42) _____
A) is a strand of DNA.
B) contains ribose.
C) is double stranded.
D) is actually a protein.
E) contains glucose.

43) Which of the following is true regarding nucleotides? 43) _____
A) DNA nucleotides are assembled into RNA by the process of dehydration synthesis.
B) There are three different DNA nucleotides.
C) DNA nucleotides contain deoxyribose; RNA nucleotides contain sucrose.
D) A DNA nucleotide could be made up of ribose, a phosphate, and cytosine.
E) Nucleotides are bonded together by covalent bonds between the sugars and the phosphates.

44) Which of the following occurs when a phosphate is removed from an ATP molecule? 44) _____
A) Oxygen produced in the reaction causes the molecule to explode.
B) Energy is added to the ATP molecule to form ATP4.
C) Energy is released for cell work.
D) Fat is converted to protein.
E) Chemical reactions stop in a cell due to lack of an energy source.

45) Proteins that function as a catalyst 45) _____
A) maintain primary structure.
B) slow down the speed at which chemical reactions occur, but do not alter the final products formed.
C) are referred to as enzymes.
D) facilitate chemical reactions by altering the final products formed.
E) can only participate in reactions that synthesize new products.

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

46) Electrons are smaller than protons, negatively charged, and orbit the nucleus. 46) _____

47) All matter is made up of atoms. 47) _____

48) If the number of protons in an atom equals the number of electrons in the atom, the atom is electrically neutral. 48) _____

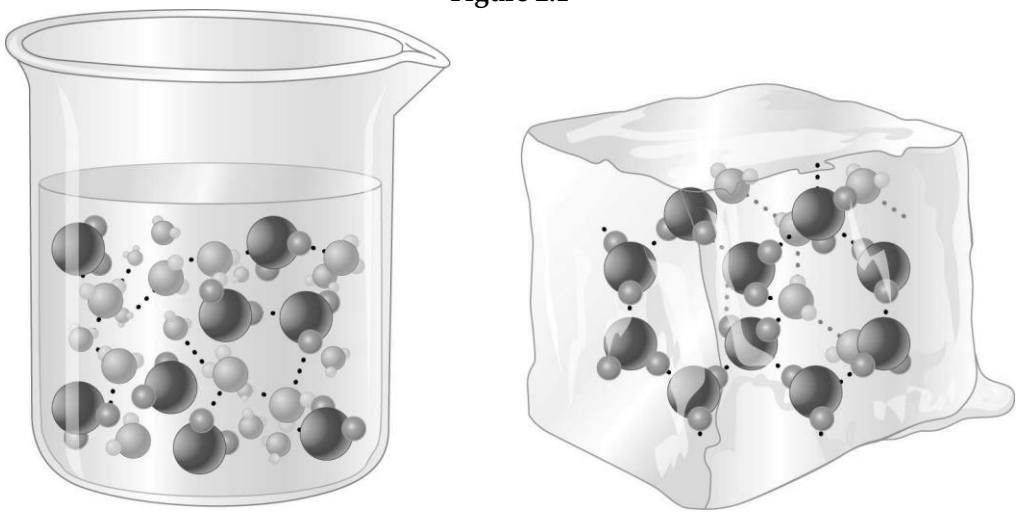
49) Atoms with either more or fewer neutrons than the usual number for an element are referred to as isotopes. 49) _____

50) Potential energy is energy that has not been used yet, but has the potential to do work. 50) _____

51) When water is released from a dam, potential energy is converted to kinetic energy. 51) _____

Figure 2.1 shows water molecules in close proximity to one another. Use this figure to answer the following questions.

Figure 2.1



52) The type of bond indicated by the dotted lines is a hydrogen bond. 52) _____

53) The difference between water molecules in liquid water versus water molecules in ice is in the number of covalent bonds that form. 53) _____

54) During intense exercise, you produce a lot of heat energy yet your body temperature rises only in small increments. This temperature stability is because water in body fluids releases the heat very quickly. 54) _____

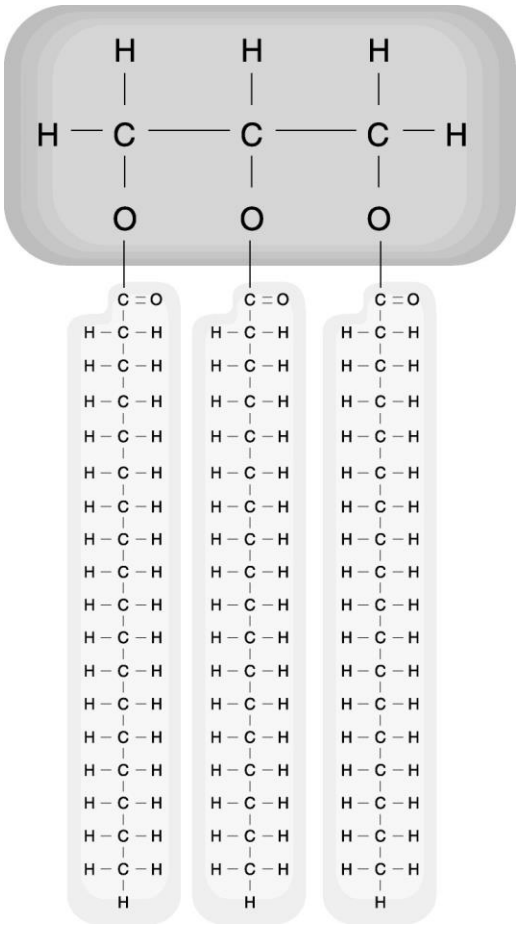
55) One of the most important buffer pairs in blood is carbonic acid and bicarbonate because they regulate the pH of blood by absorbing and releasing hydrogen ions as needed. 55) _____

56) The more buffers present in a body fluid, the more likely that your blood pH will change after absorbing nutrients during digestion. 56) _____

57) Because carbon requires four additional electrons to fill its outermost shell, it has a natural tendency to form four covalent bonds with other atoms, making it an ideal element for forming structures in living cells. 57) _____

Use Figure 2.2 to answer the following questions.

Figure 2.2



58) The figure above shows a triglyceride that contains unsaturated fatty acids. 58) _____

59) The diagram shows a triglyceride with fatty acid tails representing a fat that is liquid at room temperature. 59) _____

60) If the pH of your blood is lowered significantly, many proteins will not be able to fold correctly. The result will be decreased enzyme function throughout the body. 60) _____

MATCHING. Choose the item in column 2 that best matches each item in column 1.
Match each of the following descriptions to the appropriate term.

61) a component of an atom that carries a negative charge 61) _____

62) the smallest unit of matter that can take part in a chemical reaction 62) _____

63) anything that has mass and occupies space 63) _____

64) formed by chemical reactions between atoms 64) _____

A) lipids

B) isotope

C) elements

D) amino acids

E) matter

F) molecule

65) different forms of the same element that differ in their atomic mass

G) electron

65) _____

66) steroids, triglycerides

H) nucleic acids

66) _____

67) matter that cannot be broken down

I) molecules

67) _____

68) DNA, RNA

J) atom

68) _____

69) water, sodium chloride, carbon dioxide

K) carbohydrates

69) _____

70) alanine, glycine, cysteine

70) _____

71) glucose, cellulose, glycogen

71) _____

Match the following:

72) a double strand of nucleotides; stores genetic information

A) cellulose

72) _____

B) DNA

73) lipid that stabilizes membranes and is a precursor to many hormones

73) _____

C) cholesterol

74) dominant energy source used by cells

D) glucose

74) _____

75) major structural polysaccharide produced by plants

75) _____

76) a molecule consisting of glycerol plus fatty acid chains with two hydrogen atoms per carbon atom; solid at room temperature

A) polypeptide

76) _____

B) starch

77) a polysaccharide composed of a long chain of glucose molecules

C) saturated fat

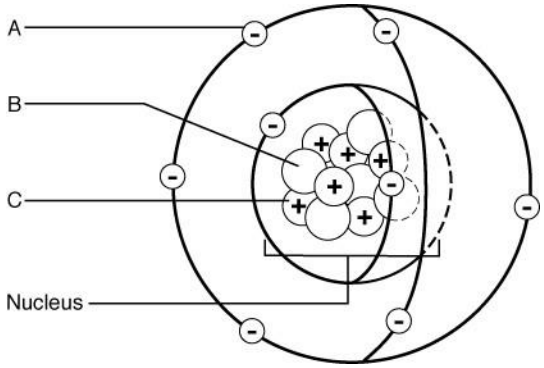
77) _____

78) a strand of 3 to 100 amino acids

78) _____

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

Figure 2.3



Use the letters from Figure 2.3 to answer the following questions.

79) The subatomic particles, _____ and _____, have approximately the same mass. 79) _____

80) Isotopes of this element would differ in the number of _____. 80) _____

81) In order for this atom to be electrically neutral, the number of subatomic particles labeled "A" in the diagram would have to equal the number of _____. 81) _____

82) The label _____ points to a neutron. 82) _____

83) In order for this atom to develop a positive charge, it would have to lose _____. 83) _____

84) The number of subatomic particles _____ is the atomic number of that atom. 84) _____

85) All things on earth are made up of _____, which is defined as anything that has mass and occupies space. 85) _____

86) The pure form of matter that cannot be broken down into a simpler form is a(n) _____. 86) _____

87) Protons and neutrons are located in the _____ of an atom. 87) _____

88) In the atom, electrons are located in "clouds" with negative charges around the nucleus; these are called _____. 88) _____

89) Isotopes that give off energy and emit particles are known as _____. 89) _____

90) Foods and drinks that provide benefits beyond typically expected for nutrients are called _____. 90) _____

91) Water held behind a dam has a large amount of _____ energy. 91) _____

92) Dietary supplements are not regulated by the U.S. Food and Drug Agency until the supplement is proven _____. 92) _____

93) An electrically charged molecule or atom is a(n) _____. 93) _____

94) Molecules that are polar and attracted to water are _____; molecules that are nonpolar and therefore not attracted to water are _____. 94) _____

95) Evaporation of water from the skin results in a(n) _____ in body temperature. 95) _____

96) Molecules that give up or donate hydrogen ions are _____. 96) _____

97) The acidity or alkalinity of a solution can be measured in terms of _____. 97) _____

98) Which solution has more free hydrogen ions: pH = 9 or pH = 3? 98) _____

99) The normal pH of human blood falls within a range that is near a _____ pH. 99) _____

100) A substance that helps to maintain a stable pH is a(n) _____. 100) _____

101) Large organic molecules that are composed of thousands of smaller molecules bonded to one another are known as _____. 101) _____

102) The process by which cells break down organic macromolecules into their subunits is _____. 102) _____

103) In order for a cell to produce a fat, it must have one molecule of _____ and three _____. 103) _____

104) A diet rich in _____ fat is believed to contribute to the development of cardiovascular disease. 104) _____

105) The structure of a cell membrane includes a modified form of lipid called a _____. 105) _____

106) The molecule that stores the set of instructions of a cell and directs everything a cell does is _____. 106) _____

107) The molecule with which an enzyme reacts is a(n) _____. 107) _____

108) There are _____ different deoxynucleotides found in the human genome. 108) _____

109) Plants produce a polysaccharide of made glucose known as _____ which is virtually undigestable by most animals. 109) _____

110) The universal energy source for cells is _____. 110) _____

111) Certain nutrients and enzymes known as _____ are the body's natural defense against oxygen free radicals. 111) _____

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

112) Describe how denaturing a protein alters the function of that protein.

113) Explain how water in your body helps to regulate body temperature following a long-distance bike ride.

114) In the human body, bicarbonate and carbonate ions work together to stabilize or buffer the pH of body fluids. What would happen to your blood if these buffering agents were removed?

1) E
2) C
3) B
4) B
5) B
6) A
7) C
8) D
9) C
10) A
11) B
12) C
13) C
14) B
15) A
16) D
17) C
18) C
19) C
20) B
21) E
22) A
23) C
24) C
25) D
26) D
27) C
28) D
29) D
30) B
31) A
32) A
33) C
34) E
35) C
36) E
37) A
38) E
39) E
40) D
41) C
42) C
43) E
44) C
45) C
46) TRUE
47) FALSE
48) TRUE
49) TRUE
50) TRUE
51) TRUE

52) TRUE
53) FALSE
54) FALSE
55) TRUE
56) FALSE
57) TRUE
58) FALSE
59) FALSE
60) TRUE
61) G
62) J
63) E
64) F
65) B
66) A
67) C
68) H
69) I
70) D
71) K
72) E
73) F
74) G
75) B
76) D
77) C
78) A
79) B, C
80) B
81) C
82) B
83) A
84) C
85) matter
86) element
87) nucleus
88) shells
89) radioisotopes
90) nutraceuticals
91) potential
92) unsafe
93) ion
94) hydrophilic, hydrophobic
95) decrease
96) acids
97) pH
98) pH = 3
99) neutral
100) buffer
101) macromolecules
102) hydrolysis
103) glycerol, fatty acids

104) saturated
105) phospholipid
106) DNA
107) substrate (reactant)
108) four
109) cellulose
110) ATP
111) antioxidants
112) Denaturing a protein permanently disrupts protein structure. Ordinarily, if the protein shape is altered so is the function of that protein. This can be seen with denatured enzymes that loose the ability to bind the substrate and thus no chemical reaction can occur.
113) Water in body fluids is able to absorb heat without experiencing large temperature shifts. Water is also able to "hold" the heat, so that when the warm fluid moves to the periphery of the body, the heat can be exchanged or released into the environment. Perspiration is one means for the heat to be released from the body, which in turn allows you to maintain a relatively constant body temperature.
114) Blood pH could not be regulated in the absence of this buffering pair. Anything absorbed or released from those fluids that altered the hydrogen or hydroxyl ion content of blood would cause a pH change. For humans that tightly regulate homeostasis, even relatively modest changes in blood pH can have devastating consequences.