Human Biology, 16e **(Mader)**
Chapter 2 Chemistry of Life

1) The smallest unit of an element that still retains the chemical and physical properties of that element is called a(n)
A) isotope.
B) nucleus.
C) atom.
D) molecular bond.
E) neutrino.

Answer: C
Explanation: An atom is the smallest unit of an element that still retains the chemical and physical properties of that element.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Accessibility: Keyboard Navigation

2) In an atom, the number of protons always equals the number of
A) electrons.
B) neutrons.
C) neutrons and protons.
D) quarks.
E) neutrinos.

Answer: A
Explanation: In an atom, the number of protons always equals the number of electrons.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of an atom.
Accessibility: Keyboard Navigation

3) How many elements occur naturally?
A) 112
B) 92
C) 64
D) 32
E) 6

Answer: B
Explanation: There are 92 naturally occurring elements.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Accessibility: Keyboard Navigation

4) The atomic number of an atom is determined by the number of
A) protons.
B) neutrons.
C) electrons.
D) protons and neutrons.
E) protons and electrons.

Answer: A
Explanation: The atomic number of an atom is determined by the number of protons.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of an atom.
Accessibility: Keyboard Navigation

5) An element cannot be broken down by chemical means.

Answer: TRUE
Explanation: An element is one of the basic building blocks of matter and cannot be broken down by chemical means.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Accessibility: Keyboard Navigation

6) Why is He positioned above Ne in the periodic table?
A) They both have the same atomic mass.
B) They both have the same number of electrons in their outermost orbital.
C) They both have a full outermost orbital.
D) They both have the same atomic number.
E) They both have the same number of protons in their nuclei.

Answer: C
Explanation: He has a full outermost orbital with 2 electrons. Ne has a full outermost orbital with 8 electrons.
Section: 02.01
Topic: Atomic Structure
Bloom's: 5. Evaluate
Learning Outcome: 02.01.02 Describe the structure of an atom.
Accessibility: Keyboard Navigation

7) Be has an atomic number of 4 and an atomic mass of 9. How many protons does it have?
A) 4
B) 5
C) 9
D) 13
E) 7

Answer: A
Explanation: The atomic number gives the number of protons, so Be has 4 protons.
Section: 02.01
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.01.02 Describe the structure of an atom.
Accessibility: Keyboard Navigation

8) What is the symbol for sodium?
A) Na
B) S
C) So
D) N
E) Dm

Answer: A
Explanation: Na (short for natrium) is the symbol for sodium.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Accessibility: Keyboard Navigation

9) Which of the following elements will have more than two electrons and have a full outer orbital?
A) He
B) Ne
C) C
D) N
E) O

Answer: B
Explanation: He contains 2 electrons and Ne contains 10 electrons. Both have their outermost orbital filled.
Section: 02.01
Topic: Atomic Structure
Bloom's: 4. Analyze
Learning Outcome: 02.01.02 Describe the structure of an atom.
Accessibility: Keyboard Navigation

10) Isotopes of an element differ due to the number of
A) protons.
B) neutrons.
C) electrons.
D) both protons and electrons.
E) neutrinos.

Answer: B
Explanation: Isotopes of an element differ due to the number of neutrons.
Section: 02.01
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Accessibility: Keyboard Navigation

11) Carbon dating is a common method employed in dating certain kinds of fossils. It is based on the radioactive decay of an isotope of carbon (C^{14}). Referring to the atomic number of carbon attained from the periodic table, how many neutrons does C^{14} have?
A) 2
B) 4
C) 8
D) 12
E) 14

Answer: C
Explanation: Carbon 14 (C^{14}) possesses two more neutrons than carbon 12 (C^{12}), for a total of 8 neutrons.
Section: 02.01
Topic: Atomic Structure
Bloom's: 3. Apply
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Accessibility: Keyboard Navigation

12) What substance is used in medicine to produce various images of organs and tissues?
A) a mixture
B) a tracer
C) an emulsion
D) a colloid
E) a sensor

Answer: B
Explanation: Tracers, such as iodine 131, can be used in medicine to produce various images of organs and tissues.
Section: 02.01
Topic: Atomic Structure
Bloom's: 1. Remember
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Accessibility: Keyboard Navigation

13) Radiation can have both positive and negative impact on humans.

Answer: TRUE
Explanation: Radiation can be used beneficially but can also harm.
Section: 02.01
Topic: Atomic Structure
Bloom's: 2. Understand
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Accessibility: Keyboard Navigation

14) Two or more atoms joined together through the sharing of electrons are called a(n)
A) atomic unit.
B) molecule.
C) compound.
D) isotope.
E) ion.

Answer: B
Explanation: Two or more atoms of the same type that combine are defined as a molecule.
Section: 02.01
Topic: Chemical Bonds
Bloom's: 1. Remember
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Accessibility: Keyboard Navigation

15) $Ca_3(PO_4)_2$ represents a(n)
A) element.
B) mixture.
C) compound.
D) isotope.
E) atom.

Answer: C
Explanation: $Ca_3(PO_4)_2$ represents a compound because it is a combination of different atoms.
Section: 02.01
Topic: Chemical Bonds
Bloom's: 2. Understand
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Accessibility: Keyboard Navigation

16) Atoms that share electrons have what type of bonds?
A) covalent
B) neutral
C) hydrogen
D) colloidal
E) ionic

Answer: A
Explanation: Atoms that share electrons have covalent bonds.
Section: 02.01
Topic: Chemical Bonds
Bloom's: 1. Remember
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Accessibility: Keyboard Navigation

17) $CaCl_2$ is a salt that forms as the result of what type of bond?
A) covalent
B) hydrogen
C) polar
D) nonpolar
E) ionic

Answer: E
Explanation: $CaCl_2$ is a salt that forms as the result of an ionic bond.
Section: 02.01
Topic: Chemical Bonds
Bloom's: 2. Understand
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Accessibility: Keyboard Navigation

18) Water makes up 60–70% of total body weight.

Answer: TRUE
Explanation: Water is the most abundant molecule in living organisms.
Section: 02.02
Topic: Properties of Water
Bloom's: 1. Remember
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

19) Which type of bond is responsible for holding two water molecules together, creating the properties of water?
A) hydrogen
B) covalent
C) ionic
D) polar
E) double covalent

Answer: A
Explanation: Hydrogen bonds are the attraction of the hydrogen of one water molecule to the oxygen of a second water molecule. Due to this type of bond, the properties of water are established.
Section: 02.02
Topic: Chemical Bonds
Bloom's: 2. Understand
Learning Outcome: 02.02.02 Explain the role of hydrogen bonds in the properties of water.
Accessibility: Keyboard Navigation

20) Hydrogen bonds
A) result from the loss of neutrons by an atom.
B) result in the formation of salts.
C) involve the loss and gain of electrons.
D) involve the sharing of electrons.
E) are relatively weak and can be broken rather easily.

Answer: E
Explanation: Hydrogen bonds are relatively weak and can be broken rather easily.
Section: 02.02
Topic: Chemical Bonds
Bloom's: 2. Understand
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

21) The reason water is polar is because
A) in polar molecules atoms share electrons evenly.
B) the electrons spend more time circling the oxygen atom than the hydrogens.
C) hydrophilic molecules interact with water.
D) hydrophobic molecules do not interact with water.
E) there is a transfer of electrons from the hydrogen to the oxygen.

Answer: B
Explanation: Because the oxygen atom is more electronegative than the hydrogen, the electron spends more time circling the oxygen; therefore, water is polar.
Section: 02.02
Topic: Properties of Water
Bloom's: 2. Understand
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

22) Which of the following characteristics of water is most responsible for the sinking of the Titanic?
A) Water is liquid at room temperature.
B) Water has a high heat of vaporization.
C) The temperature of liquid water rises and falls slowly.
D) Frozen water is less dense than liquid water.
E) Water molecules are cohesive.

Answer: D
Explanation: Since frozen water is less dense than liquid water, ice, including icebergs, will float in liquid water.
Section: 02.02
Topic: Properties of Water
Bloom's: 2. Understand
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

23) On a warm day in April, Tina jumped into the swimming pool. To her surprise, the water was really cold. Which property of water did she discover?
A) Water molecules are cohesive.
B) The temperature of liquid water rises and falls slowly.
C) Water possesses hydrogen bonds.
D) Water is a polar molecule.
E) Frozen water is less dense than liquid water.

Answer: B
Explanation: Water is a good temperature buffer because a great deal of energy is required to raise the temperature of water.
Section: 02.02
Topic: Properties of Water
Bloom's: 4. Analyze
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

24) William noticed water mysteriously climbing up a capillary tube. This is an example of which property of water?
A) Frozen water is less dense than liquid water.
B) The temperature of liquid water rises and falls slowly.
C) Water molecules are cohesive.
D) Water has a high heat of vaporization.
E) Water is a solvent.

Answer: C
Explanation: Water climbing up a capillary tube is an example of the cohesive nature of water.
Section: 02.02
Topic: Properties of Water
Bloom's: 3. Apply
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

25) In an acidic solution, the number of H^+ is

A) less than the number of OH^-.

B) greater than the number of OH^-.

C) equal to the number of OH^-.

D) 3 times less than the number of OH^-.

E) 10 times less than the number of OH^-.

Answer: B

Explanation: In an acidic solution, the number of H^+ is greater than the number of OH^-.
Section: 02.02
Topic: Acids and Bases
Bloom's: 2. Understand
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Accessibility: Keyboard Navigation

26) A solution with a pH of 7 has 10 times as many H^+ as a pH of 6.

Answer: FALSE

Explanation: A solution with a pH of 7 actually has 10 times fewer H^+ than a pH of 6.
Section: 02.02
Topic: Acids and Bases
Bloom's: 2. Understand
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Accessibility: Keyboard Navigation

27) A solution containing 0.00001 moles of H^+ has a pH of

A) 3.
B) 5.
C) 7.
D) 9.
E) 11.

Answer: B

Explanation: This (0.00001 moles) is the same as 1×10^{-5} moles, so the pH would be 5.
Section: 02.02
Topic: Acids and Bases
Bloom's: 4. Analyze
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Accessibility: Keyboard Navigation

28) The presence of a buffer in our blood helps maintain homeostasis.

Answer: TRUE
Explanation: A buffer maintains the pH within a normal range, which is required for homeostasis.
Section: 02.02
Topic: Acids and Bases
Bloom's: 3. Apply
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Accessibility: Keyboard Navigation

29) Joining small molecules (monomers) together to form longer chains (polymers) requires a process called
A) a hydrolysis reaction.
B) a dehydration reaction.
C) monomerization.
D) emulsification.
E) disassembly.

Answer: B
Explanation: Polymerization of monomers into polymers requires a process called a dehydration reaction.
Section: 02.03
Topic: Chemical Reactions
Bloom's: 1. Remember
Learning Outcome: 02.03.02 Describe the processes by which the organic molecules are assembled and disassembled.
Accessibility: Keyboard Navigation

30) Which of the following is one of the four classes of organic molecules found in cells?
A) vitamins
B) lipids
C) nutrients
D) minerals
E) nuclei

Answer: B
Explanation: Vitamins are not one of the four categories of organic molecules unique to cells.
Section: 02.03
Topic: Chemical Reactions
Bloom's: 2. Understand
Learning Outcome: 02.03.01 List the four classes of organic molecules found in cells.
Accessibility: Keyboard Navigation

31) In biology, calling something organic means that it was grown without the use of any type of herbicide.

Answer: FALSE
Explanation: In biology, *organic* refers to molecules that have carbon and hydrogen in them. This is usually associated with living organisms.
Section: 02.03
Topic: Chemical Reactions
Bloom's: 1. Remember
Learning Outcome: 02.03.01 List the four classes of organic molecules found in cells.
Accessibility: Keyboard Navigation

32) NaCl is not an organic molecule.

Answer: TRUE
Explanation: Organic molecules contain carbon and hydrogen and NaCl does not.
Section: 02.03
Topic: Chemical Reactions
Bloom's: 2. Understand
Learning Outcome: 02.03.01 List the four classes of organic molecules found in cells.
Accessibility: Keyboard Navigation

33) After lunch, our digestive system will use the process of hydrolysis to break the food down into smaller subunits.

Answer: TRUE
Explanation: Hydrolysis is the process of breaking down food into smaller subunits.
Section: 02.03
Topic: Chemical Reactions
Bloom's: 1. Remember
Learning Outcome: 02.03.02 Describe the processes by which the organic molecules are assembled and disassembled.
Accessibility: Keyboard Navigation

34) A hydrolysis reaction involves the loss of water.

Answer: FALSE
Explanation: A hydrolysis reaction involves the addition of water.
Section: 02.03
Topic: Chemical Reactions
Bloom's: 2. Understand
Learning Outcome: 02.03.02 Describe the processes by which the organic molecules are assembled and disassembled.
Accessibility: Keyboard Navigation

35) Which grouping of elements is found in carbohydrates?
A) C - H - O
B) C - H - P
C) H - O - Cl
D) N - S - O
E) Ca - H - O

Answer: A
Explanation: Carbon (C), hydrogen (H), and oxygen (O) are the primary elements that make up the basic structure of carbohydrates.
Section: 02.04
Topic: Carbohydrates
Bloom's: 1. Remember
Learning Outcome: 02.04.01 Summarize the basic chemical properties of a carbohydrate.
Accessibility: Keyboard Navigation

36) Sugars with three to seven carbon atoms are called
A) monosaccharides.
B) disaccharides.
C) trisaccharides.
D) polysaccharides.
E) steroids.

Answer: A
Explanation: Sugars with only three to seven carbon atoms are called simple sugars or monosaccharides.
Section: 02.04
Topic: Carbohydrates
Bloom's: 1. Remember
Learning Outcome: 02.04.01 Summarize the basic chemical properties of a carbohydrate.
Accessibility: Keyboard Navigation

37) A potato stores a reserve of energy in its underground tuber in the form of
A) glycogen.
B) fat.
C) protein.
D) vitamins.
E) starch.

Answer: E
Explanation: Starch is a common energy storage molecule for potatoes and plants in general.
Section: 02.04
Topic: Carbohydrates
Bloom's: 5. Evaluate
Learning Outcome: 02.04.03 Compare the structures of simple and complex carbohydrates.
Accessibility: Keyboard Navigation

38) Which of the following is a monosaccharide?
A) glucose
B) sucrose
C) lactose
D) maltose
E) None of these is a monosaccharide.

Answer: A
Explanation: All of these are single sugars except maltose, which is a disaccharide composed of two glucose molecules.
Section: 02.04
Topic: Carbohydrates
Bloom's: 1. Remember
Learning Outcome: 02.04.03 Compare the structures of simple and complex carbohydrates.
Accessibility: Keyboard Navigation

39) Which polysaccharide is stored as an energy source in the body of animals?
A) glycogen
B) glucose
C) cellulose
D) starch
E) chitin

Answer: A
Explanation: Glycogen is a polysaccharide that is stored in the muscle tissue and blood of animals. Glucose is a monosaccharide that can be found in both plants and animals. Cellulose and starch are both polysaccharides that are found in members of kingdom Plantae. Chitin is a polysaccharide found in fungi and the exoskeleton of insects and crustaceans. It is not stored as an energy source.
Section: 02.04
Topic: Carbohydrates
Bloom's: 2. Understand
Learning Outcome: 02.04.03 Compare the structures of simple and complex carbohydrates.
Accessibility: Keyboard Navigation

40) What passes through the digestive tract as fiber or roughage?
A) maltose
B) glucose
C) glycogen
D) starch
E) cellulose

Answer: E
Explanation: Cellulose passes through the digestive tract as fiber or roughage because we are unable to break it down.
Section: 02.04
Topic: Carbohydrates
Bloom's: 1. Remember
Learning Outcome: 02.04.04 Explain the importance of fiber in the diet.
Accessibility: Keyboard Navigation

41) Which of the following foods would be a good source of fiber?
A) peaches
B) whole-wheat bread
C) peanuts
D) bran cereal
E) All of the answer choices are good sources of fiber.

Answer: E
Explanation: All of these are good sources of fiber. Fruits are a type of soluble fiber. Bran, nuts, seeds, and whole-wheat foods are forms of insoluble fiber.
Section: 02.04
Topic: Carbohydrates
Bloom's: 2. Understand
Learning Outcome: 02.04.04 Explain the importance of fiber in the diet.
Accessibility: Keyboard Navigation

42) Which polysaccharide is branched the most?
A) cellulose
B) starch
C) glycogen
D) glucose
E) fructose

Answer: C
Explanation: Glycogen has more side chains than the others. Glucose and fructose are monosaccharides and do not have side branches.
Section: 02.04
Topic: Carbohydrates
Bloom's: 4. Analyze
Learning Outcome: 02.04.03 Compare the structures of simple and complex carbohydrates.
Accessibility: Keyboard Navigation

43) Which polysaccharide is consumed as a source of fiber?
A) cellulose
B) glycogen
C) glucose
D) chitin
E) starch

Answer: A
Explanation: Cellulose is the main polysaccharide that functions as a source of fiber in our diets. Glycogen is a polysaccharide, but it acts as a backup source of energy for our body. Glucose is a monosaccharide that acts as a quick source of energy for our body. Chitin is a polysaccharide, but it is not a source of fiber for our body. Starch is a polysaccharide, but it is digested into glucose and used as a source of energy.
Section: 02.04
Topic: Carbohydrates
Bloom's: 3. Apply
Learning Outcome: 02.04.04 Explain the importance of fiber in the diet.
Accessibility: Keyboard Navigation

44) The main function of carbohydrates is for long-term energy storage.

Answer: FALSE
Explanation: The main function of carbohydrates is for quick and short-term energy storage.
Section: 02.04
Topic: Carbohydrates
Bloom's: 2. Understand
Learning Outcome: 02.04.02 State the roles of carbohydrates in human physiology.
Accessibility: Keyboard Navigation

45) Our body is capable of converting starch into glycogen.

Answer: TRUE
Explanation: We eat starchy foods, and the glucose enters the bloodstream. The liver then can store this glucose as glycogen.
Section: 02.04
Topic: Carbohydrates
Bloom's: 3. Apply
Learning Outcome: 02.04.02 State the roles of carbohydrates in human physiology.
Accessibility: Keyboard Navigation

46) Starch, cellulose, and glycogen are alike in that they
A) are all made of glucose.
B) contain the same number of side chains.
C) have the same types of bonds between the monomer units.
D) are all found in animals.
E) can all be digested by our bodies.

Answer: A
Explanation: Starch, glycogen, and cellulose are all made of glucose molecules.
Section: 02.04
Topic: Carbohydrates
Bloom's: 2. Understand
Learning Outcome: 02.04.03 Compare the structures of simple and complex carbohydrates.
Accessibility: Keyboard Navigation

47) A fat contains how many fatty acids?
A) 1
B) 2
C) 3
D) 4
E) 5

Answer: C
Explanation: A fat, or triglyceride, contains three fatty acids.
Section: 02.05
Topic: Lipids
Bloom's: 2. Understand
Learning Outcome: 02.05.01 Compare the structures of fats, phospholipids, and steroids.
Accessibility: Keyboard Navigation

48) How are fats, phospholipids, and steroids alike?
A) They are all solid at room temperature.
B) They each contain a polar phosphate group.
C) They each contain only one fatty acid.
D) They do not dissolve in water.
E) They all contain at least one carbon ring.

Answer: D
Explanation: All lipids are insoluble in water.
Section: 02.05
Topic: Lipids
Bloom's: 4. Analyze
Learning Outcome: 02.05.01 Compare the structures of fats, phospholipids, and steroids.
Accessibility: Keyboard Navigation

49) A fatty acid that contains only single bonds between the carbon atoms is considered
A) saturated.
B) unsaturated.
C) trans unsaturated.
D) a cholesterol.
E) a steroid.

Answer: A
Explanation: If all the carbon atoms are connected by single bonds, the fatty acid is considered saturated.
Section: 02.05
Topic: Lipids
Bloom's: 2. Understand
Learning Outcome: 02.05.01 Compare the structures of fats, phospholipids, and steroids.
Accessibility: Keyboard Navigation

50) Fats are usually of animal origin, while oils are usually of plant origin.

Answer: TRUE
Explanation: Fats, such as lard and butter, are of animal origin, while oils, such as corn oil and soybean oil, are of plant origin.
Section: 02.05
Topic: Lipids
Bloom's: 1. Remember
Learning Outcome: 02.05.01 Compare the structures of fats, phospholipids, and steroids.
Accessibility: Keyboard Navigation

51) The sex hormones belong to which category of lipids?
A) steroids
B) fats
C) oils
D) triglycerides
E) phospholipids

Answer: A
Explanation: The sex hormones are steroids.
Section: 02.05
Topic: Lipids
Bloom's: 2. Understand
Learning Outcome: 02.05.02 State the function of each class of lipids.
Accessibility: Keyboard Navigation

52) The membranes of cells are composed primarily of
A) phospholipids.
B) fats.
C) oils.
D) steroids.
E) triglycerides.

Answer: A
Explanation: Membranes are bilayers of phospholipids.
Section: 02.05
Topic: Lipids
Bloom's: 2. Understand
Learning Outcome: 02.05.02 State the function of each class of lipids.
Accessibility: Keyboard Navigation

53) Fats and oils function better than other biological molecules as energy-storage molecules because of the carbon they contain.

Answer: FALSE
Explanation: Fats and oils function well as energy-storage molecules because they contain more energy per gram than other biological molecules. All organic molecules contain carbon.
Section: 02.05
Topic: Lipids
Bloom's: 3. Apply
Learning Outcome: 02.05.02 State the function of each class of lipids.
Accessibility: Keyboard Navigation

54) The monomer unit of a protein is
A) fatty acids.
B) amino acids.
C) monosaccharides.
D) polysaccharides.
E) nucleic acids.

Answer: B
Explanation: Proteins are composed of amino acids.
Section: 02.06
Topic: Proteins
Bloom's: 1. Remember
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Accessibility: Keyboard Navigation

55) What makes each amino acid unique?
A) the central carbon
B) the R group
C) the amino group
D) the carboxyl group
E) the carbon ring

Answer: B
Explanation: The R group for each amino acid is unique.
Section: 02.06
Topic: Proteins
Bloom's: 2. Understand
Learning Outcome: 02.06.01 Describe the structure of an amino acid.
Accessibility: Keyboard Navigation

56) Which of the following is a function of proteins?
A) quick energy
B) genetic material
C) main component of the cell membrane
D) enzymes
E) digest cell waste

Answer: D
Explanation: Carbohydrates, not proteins, serve as a source of quick energy.
Section: 02.06
Topic: Proteins
Bloom's: 2. Understand
Learning Outcome: 02.06.01 Describe the structure of an amino acid.
Accessibility: Keyboard Navigation

57) Why does a protein not function after it has been denatured?
A) The normal bonding between the *R* groups has been disturbed and the protein loses its normal shape.
B) The normal bonding between the beta sheets has been disturbed and the protein loses its normal shape.
C) The normal bonding between the hydrogens in the alpha helix has been disturbed and the protein loses its normal shape.
D) The *R* groups form additional bonds, causing the structure to become more compact.
E) The normal peptide bonds are ruptured and the individual amino acids are not held together anymore.

Answer: A
Explanation: During denaturation, the normal bonding between the *R* groups has been disturbed and the protein loses its normal shape. This is due to changes in temperature and/or pH.
Section: 02.06
Topic: Proteins
Bloom's: 5. Evaluate
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Accessibility: Keyboard Navigation

58) An alpha helix or a beta sheet are examples of what level of protein structure?
A) secondary
B) primary
C) tertiary
D) quaternary
E) octagon

Answer: A
Explanation: The secondary structure of a protein can be an alpha helix or a beta sheet.
Section: 02.06
Topic: Proteins
Bloom's: 2. Understand
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Accessibility: Keyboard Navigation

59) Which level of protein structure is characterized by alpha and beta sheets in which hydrogen bonding holds the shape in place?
A) secondary structure
B) primary structure
C) tertiary structure
D) quaternary structure
E) pentagonal structure

Answer: A
Explanation: The secondary structure is characterized by alpha and beta sheets in which hydrogen bonding holds the shape in place. The primary structure is characterized by a straight chain sequence of amino acids. The tertiary structure is characterized by the combination secondary structures in a three-dimensional shape. Shape is maintained by the bonding between the R groups. Quaternary structures are composed of multiple polypeptides that are bonded to each other. There is no such protein level as a pentagonal structure.
Section: 02.06
Topic: Proteins
Bloom's: 4. Analyze
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Accessibility: Keyboard Navigation

60) When two amino acids combine via a dehydration reaction
A) a peptide bond is formed.
B) the R groups are lost.
C) water is added to begin the reaction.
D) the carboxyl group of each join together.
E) the amino group of each join together.

Answer: A
Explanation: When two amino acids form a dipeptide, a peptide bond is formed between the carboxyl group of one and the amino group of the other.
Section: 02.06
Topic: Proteins
Bloom's: 3. Apply
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Accessibility: Keyboard Navigation

61) The primary level of protein structure is composed of amino acids in a linear sequence joined by peptide bonds.

Answer: TRUE
Explanation: The primary level of protein structure is composed of amino acids in a linear sequence joined by peptide bonds.
Section: 02.06
Topic: Proteins
Bloom's: 1. Remember
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Accessibility: Keyboard Navigation

62) All amino acids are alike in that their R groups are polar.

Answer: FALSE
Explanation: The R groups of an amino acid can be polar or nonpolar.
Section: 02.06
Topic: Proteins
Bloom's: 2. Understand
Learning Outcome: 02.06.01 Describe the structure of an amino acid.
Accessibility: Keyboard Navigation

63) The sides of the DNA ladder (backbone) are
A) alternating carbons and nitrogens.
B) the *R* groups.
C) the nitrogenous bases.
D) alternating nitrogens and phosphates.
E) sugars and phosphates.

Answer: E
Explanation: Sugars and phosphates make up the sides of the DNA ladder.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 1. Remember
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Accessibility: Keyboard Navigation

64) When an ATP molecule is used to supply energy, which of the following occurs?
A) A phosphate bond is added.
B) A phosphate bond is broken.
C) Oxygen is removed.
D) Oxygen is added.
E) An adenine is added.

Answer: B
Explanation: A phosphate bond is broken when ATP is converted to ADP + phosphate + energy.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 2. Understand
Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.
Accessibility: Keyboard Navigation

65) Which of the following nitrogenous bases is found in DNA?
A) cytosine
B) phosphorous
C) uracil
D) guanasine
E) ribonucleic acid

Answer: A
Explanation: Cytosine is found in DNA.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 1. Remember
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Accessibility: Keyboard Navigation

66) Which of the following is a feature of a nucleotide?
A) potassium
B) nitrogenous base
C) six-ring sugar
D) an R group
E) a fatty acid

Answer: B
Explanation: Nitrogenous bases are features of nucleotides.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 2. Understand
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Accessibility: Keyboard Navigation

67) A species has 29% of its DNA composed of the nucleotide containing guanine (G). What percent does the nitrogen base thymine (T) equal?
A) 58%
B) 42%
C) 21%
D) 67%
E) 29%

Answer: C
Explanation: In DNA, G pairs with C, and A pairs with T. If G is 29%, then C would be 29%. The combination of G (guanine) and C (cytosine) would equal 58%. This would leave 42% for the combination of A (adenine) and T (thymine). Since A and T are equal, then both A and T would comprise 21%.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 4. Analyze
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Accessibility: Keyboard Navigation

68) ATP carries energy in the form of high-energy
A) carbohydrate bonds.
B) peptide bonds.
C) lipid bonds.
D) phosphate bonds.
E) hydrogen bonds.

Answer: D
Explanation: ATP carries energy in the form of high-energy phosphate bonds.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 1. Remember
Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.
Accessibility: Keyboard Navigation

69) The function of RNA in the body is to store the genetic information in the nucleus.

Answer: FALSE
Explanation: The function of DNA is to store genetic information in the nucleus.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 1. Remember
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Accessibility: Keyboard Navigation

70) ATP is called the energy currency of the body because it is a type of electricity.

Answer: FALSE
Explanation: ATP is called the energy currency of the body because it can be spent (like money or currency) to facilitate reactions.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 4. Analyze
Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.
Accessibility: Keyboard Navigation

71) List the functions of proteins.

Answer: Functions of proteins include:
1. support
2. enzymes that bring reactants together in chemical reactions
3. transport of substance through the cell membrane and within the cell
4. defense of the body from foreign substances
5. hormones that serve as intercellular messengers
6. motion of the body
Section: 02.06
Topic: Proteins
Bloom's: 6. Create
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Accessibility: Keyboard Navigation

72) List the properties of water.

Answer: 1. Water has a high heat capacity.
2. Water has a high heat of evaporation.
3. Water is a solvent.
4. Water molecules are cohesive and adhesive.
5. Frozen water is less dense than liquid water.
Section: 02.02
Topic: Properties of Water
Bloom's: 6. Create
Learning Outcome: 02.02.01 Describe the properties of water.
Accessibility: Keyboard Navigation

73) Describe the structure and function of the DNA molecule.

Answer: DNA is composed of a phosphate group, nitrogen-containing base, and a five-carbon (pentose) sugar. The nitrogen-containing base can have one of four bases associated with it (adenine, thymine, cytosine, and guanine). Functions of DNA include: stores information about how to copy or replicate itself and specifies the order in which amino acids are joined to make a protein.
Section: 02.07
Topic: Nucleic Acids
Bloom's: 6. Create
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Accessibility: Keyboard Navigation