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Essentials of Human Anatomy and Physiology, 12e **(Marieb)**
Chapter 2 Basic Chemistry

2.1 Multiple Choice Part I Questions

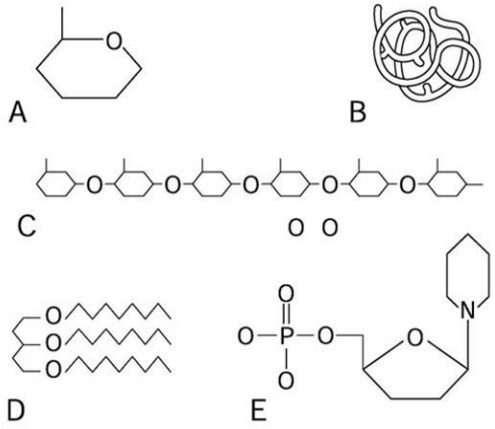


Figure 2.1

Using Figure 2.1, identify the following:

1) Which letter represents a carbohydrate polymer?
A) Label A
B) Label B
C) Label C
D) Label D
E) Label E
Answer: C
Page Ref: 43
Bloom's: 1-2: Remembering/Understanding

2) Letter D represents the structure of a(n) _____.
A) monosaccharide
B) amino acid
C) triglyceride
D) steroid
Answer: C
Page Ref: 45
Bloom's: 1-2: Remembering/Understanding

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3) Letter E represents a nucleic acid building block known as a _____.
A) monosaccharide
B) triglyceride
C) saturated fat
D) nucleotide
Answer: D
Page Ref: 53
Bloom's: 1-2: Remembering/Understanding

4) Which letter represents a globular protein in its quaternary structure?
A) Label A
B) Label B
C) Label C
D) Label D
E) Label E
Answer: B
Page Ref: 49, 50
Bloom's: 1-2: Remembering/Understanding

5) Matter is best described as _____.
A) having no mass
B) the ability to put matter into motion
C) anything that occupies space and has mass
D) the ability to do work
Answer: C
Page Ref: 24, 25
Bloom's: 1-2: Remembering/Understanding

6) Nerve impulses involve the flow of an electrical current, a type of energy known as _____ energy.
A) radiant
B) mechanical
C) electrical
D) chemical
Answer: C
Page Ref: 25
Bloom's: 1-2: Remembering/Understanding

7) Which of the following is NOT a subatomic particle associated with an atom?
A) neutron
B) electron
C) proton
D) ion
Answer: D
Page Ref: 26
Bloom's: 1-2: Remembering/Understanding

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8) The most common element in the human body is _____.
A) carbon
B) oxygen
C) hydrogen
D) nitrogen
Answer: B
Page Ref: 27
Bloom's: 1-2: Remembering/Understanding

9) The atomic number of an atom is equal to the number of _____ an atom contains.
A) protons
B) neutrons
C) protons and neutrons
D) neutrons and electrons
Answer: A
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

10) An atom with 13 electrons will have _____ electrons in the valence shell.
A) 2
B) 3
C) 5
D) 8
Answer: B
Page Ref: 30, 32
Bloom's: 1-2: Remembering/Understanding

11) Polar molecules, like water, result when electrons are shared _____.
A) unequally between atoms
B) between ions
C) equally between atoms
D) or transferred between atoms
Answer: A
Page Ref: 34
Bloom's: 1-2: Remembering/Understanding

12) During a synthesis reaction, amino acids join to form _____.
A) carbohydrates
B) proteins
C) monomers
D) nucleic acids
Answer: B
Page Ref: 37, 48
Bloom's: 1-2: Remembering/Understanding

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13) An acid is a molecule that releases (donates) _____.
A) protons (hydrogen ions)
B) hydroxyl ions
C) neutrons
D) electrons
Answer: A
Page Ref: 40
Bloom's: 1-2: Remembering/Understanding

14) Which property of water explains its ability to prevent sudden changes in body temperature?
A) cushioning
B) chemical reactant
C) polarity
D) high heat capacity
Answer: D
Page Ref: 39
Bloom's: 1-2: Remembering/Understanding

15) Glycogen and starch are examples of a specific category of carbohydrates called _____.
A) monosaccharides
B) triglycerides
C) steroids
D) polysaccharides
Answer: D
Page Ref: 44
Bloom's: 1-2: Remembering/Understanding

16) The pH scale is based on the number of _____ in solution.
A) neutrons
B) electrons
C) protons
D) hydroxyls
Answer: C
Page Ref: 41
Bloom's: 1-2: Remembering/Understanding

17) Unsaturated fatty acid chains contain one or more _____ bonds between carbon atoms.
A) peptide
B) double
C) triple
D) monosaccharide
Answer: B
Page Ref: 44
Bloom's: 1-2: Remembering/Understanding

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18) Enzymes are examples of _____ proteins.
A) structural
B) globular (functional)
C) fibrous
D) alpha
Answer: B
Page Ref: 51
Bloom's: 1-2: Remembering/Understanding

19) The complementary base to adenine in a molecule of DNA is _____.
A) guanine
B) cytosine
C) leucine
D) thymine
Answer: D
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

20) A nucleotide of DNA contain three components: _____, _____, and _____.
A) deoxyribose; a phosphate group; nitrogen-containing base
B) ribose; three phosphate groups; nitrogen-containing base
C) ribose; two phosphate groups; acid group
D) ribose; a phosphate group; nitrogen-containing base
Answer: A
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

2.2 Multiple Choice Part II Questions

1) Which of the following contains sodium?
A) H_2O
B) NaCl
C) N_2
D) CH_4
E) H_2SO_4
Answer: B
Page Ref: 26, 27
Bloom's: 3-4: Applying/Analyzing

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2) Elements are composed of building blocks known as _____.
A) molecules
B) atoms
C) compounds
D) polymers
E) protons
Answer: B
Page Ref: 26
Bloom's: 1-2: Remembering/Understanding

3) The movement of ions across plasma membranes is an example of _____.
A) radiant energy
B) chemical energy
C) electrical energy
D) mechanical energy
E) potential energy
Answer: C
Page Ref: 25
Bloom's: 1-2: Remembering/Understanding

4) Which of the following is classified as an inorganic compound?
A) glucose
B) triglyceride
C) water
D) protein
E) steroid
Answer: C
Page Ref: 38
Bloom's: 1-2: Remembering/Understanding

5) An atom of magnesium has lost two electrons. It is known as a(n) _____.
A) anion
B) molecule
C) isotope
D) cation
E) neutral atom
Answer: D
Page Ref: 33
Bloom's: 3-4: Applying/Analyzing

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6) Which of the following leads to an increase in the rate of a chemical reaction?
A) increased temperature
B) large particle size
C) lack of catalysts
D) decreased temperature
E) few particles
Answer: A
Page Ref: 38
Bloom's: 1-2: Remembering/Understanding

7) The atomic mass number of an atom is equivalent to the number of _____.
A) protons
B) neutrons
C) electrons
D) protons and electrons
E) protons and neutrons
Answer: E
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

8) The atomic number of sodium is 11 while the atomic mass number is 23. Which of the following is NOT true of an atom of sodium?
A) 11 protons
B) 8 electrons in the valence shell of a neutral sodium atom
C) 11 neutrons
D) 11 electrons
E) 1 electron in the valence shell of a neutral sodium atom
Answer: C
Page Ref: 29, 30
Bloom's: 1-2: Remembering/Understanding

9) Which of the following elements is needed to make a functional hemoglobin molecule?
A) magnesium
B) iodine
C) iron
D) potassium
E) chlorine
Answer: C
Page Ref: 27
Bloom's: 1-2: Remembering/Understanding

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10) The number of protons always equals the _____ in a neutral atom.
A) atomic mass number
B) number of electrons
C) number of neutrons
D) atomic weight
E) number of valence shells
Answer: B
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

11) An atom with 6 protons, 7 neutrons, and 6 electrons shares four pairs of electrons with four other atoms. This atom is now considered to be _____.
A) a cation
B) an anion
C) a neutral atom
D) stable
E) an ion
Answer: D
Page Ref: 32-33
Bloom's: 3-4: Applying/Analyzing

12) An atom has 6 protons, 8 neutrons, and 6 electrons. Its atomic mass number is _____.
A) 2
B) 6
C) 8
D) 14
E) 20
Answer: D
Page Ref: 29
Bloom's: 3-4: Applying/Analyzing

13) Which of the following may be used in PET scans as biological tracers that can be followed through the body?
A) nucleic acids
B) proteins
C) electrons
D) ions
E) radioisotopes
Answer: E
Page Ref: 31
Bloom's: 1-2: Remembering/Understanding

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14) Isotopes have different numbers of _____; thus they also have different _____.
A) protons; atomic numbers
B) neutrons; atomic masses
C) electrons; atomic numbers
D) protons; atomic masses
E) neutrons; atomic numbers
Answer: B
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

15) A molecule of methane, CH_4, is known specifically as a(n) _____.
A) compound
B) radioisotope
C) element
D) atom
E) anion
Answer: A
Page Ref: 31
Bloom's: 1-2: Remembering/Understanding

16) The subatomic particles that are responsible for the chemical behavior of atoms are the _____.
A) protons
B) neutrons
C) electrons
D) isotopes
E) ions
Answer: C
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

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17)

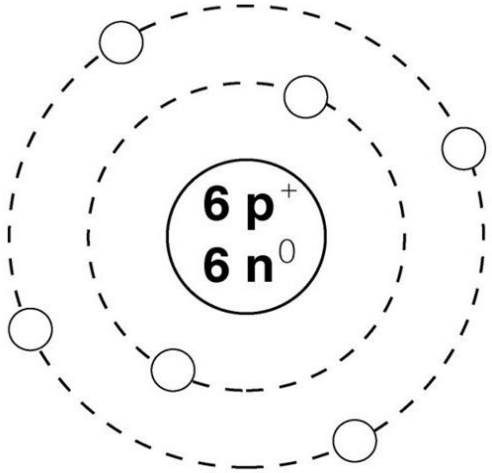


Figure 2.2

What is the atomic number of the atom in Figure 2.2?
A) 2
B) 3
C) 4
D) 6
E) 12
Answer: D
Page Ref: 28
Bloom's: 3-4: Applying/Analyzing

18) What type of bond results when electrons are completely transferred from one atom to another?
A) ionic bond
B) hydrogen bond
C) carbon bond
D) polar covalent bond
E) nonpolar covalent bond
Answer: A
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

19) The growth of cells and repair of worn-out tissues is accomplished by _____.
A) decomposition reactions
B) catabolic reactions
C) hydrolysis reactions
D) synthesis reactions
E) neutralization reactions
Answer: D
Page Ref: 37
Bloom's: 1-2: Remembering/Understanding

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20) In order to break a disaccharide down into simple sugar units, _____.
A) water molecules must be added to each bond
B) water molecules must be removed from each bond
C) carbon atoms must be added to each bond
D) carbon atoms must be removed from each bond
E) water molecules and carbon atoms must be removed from each bond
Answer: A
Page Ref: 43
Bloom's: 1-2: Remembering/Understanding

21) The reaction sucrose + water → glucose + fructose is an example of a(n) _____.
A) double replacement reaction
B) synthesis reaction
C) decomposition reaction
D) neutralization reaction
E) anabolic reaction
Answer: C
Page Ref: 42, 43
Bloom's: 1-2: Remembering/Understanding

22) A chemist experiments on a molecule with the formula of $C_5H_{10}O_5$. This compound is likely a(n) _____.
A) protein
B) triglyceride
C) enzyme
D) carbohydrate
E) nucleotide
Answer: D
Page Ref: 43
Bloom's: 3-4: Applying/Analyzing

23) Hydrogen bonding between water molecules is responsible for _____.
A) polarity
B) denaturation of proteins
C) enzyme structure
D) nonpolar covalent bonding
E) surface tension
Answer: E
Page Ref: 34, 36
Bloom's: 1-2: Remembering/Understanding

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24) Which of the following solutions is the weakest acid?
A) a solution with a pH of 2.4
B) a solution with a pH of 5.2
C) a solution with a pH of 6.4
D) a solution with a pH of 8.6
E) a solution with a pH of 10.1
Answer: C
Page Ref: 41
Bloom's: 3-4: Applying/Analyzing

25) Blood pH falls in a narrow range between _____.
A) 7.0 to 8.0
B) 6.0 to 8.0
C) 7.35 to 7.45
D) 7.15 to 7.25
E) 7.65 to 7.85
Answer: C
Page Ref: 42
Bloom's: 1-2: Remembering/Understanding

26) Exchange reactions in which an acid and a base interact are known as _____.
A) decomposition reactions
B) neutralization reactions
C) anabolic reactions
D) hydrolysis reactions
E) catabolic reactions
Answer: B
Page Ref: 41
Bloom's: 1-2: Remembering/Understanding

27) Which of these vitamins is produced in skin upon exposure to ultraviolet (UV) radiation?
A) vitamin A
B) vitamin C
C) vitamin D
D) vitamin E
E) vitamin K
Answer: C
Page Ref: 46
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28) Which carbohydrate is also known as *blood sugar*?
A) sucrose
B) glucose
C) ribose
D) deoxyribose
E) cellulose
Answer: B
Page Ref: 43
Bloom's: 1-2: Remembering/Understanding

29) Which polysaccharide is formed of linked glucose molecules and stored in animal tissues?
A) ribose
B) cellulose
C) starch
D) glucose
E) glycogen
Answer: E
Page Ref: 44
Bloom's: 1-2: Remembering/Understanding

30) The organic compounds that function in building tissues and acting as enzymes are the _____.
A) nucleic acids
B) carbohydrates
C) salts
D) lipids
E) proteins
Answer: E
Page Ref: 48-52
Bloom's: 1-2: Remembering/Understanding

31) The building blocks of a triglyceride are _____.
A) three fatty acid chains and one glycerol molecule
B) one fatty acid chain and one glycerol molecule
C) four interlocking rings of carbon and hydrogen atoms
D) amino acids
E) nucleotides
Answer: A
Page Ref: 44
Bloom's: 1-2: Remembering/Understanding

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32) Which statement best describes why ATP is an important nucleic acid in the body?
A) ATP is the storage form of glucose in the body.
B) ATP is a modified RNA molecule used to store genetic information.
C) ATP carries out the orders for protein synthesis issued by DNA.
D) ATP functions as a catalyst to increase reaction rates.
E) ATP provides a form of chemical energy all body cells can use.
Answer: E
Page Ref: 55
Bloom's: 1-2: Remembering/Understanding

33) Which of the following DNA base pairs is complementary?
A) adenine and guanine
B) guanine and uracil
C) thymine and guanine
D) cytosine and adenine
E) adenine and thymine
Answer: E
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

34) Which statement best describes fibrous proteins?
A) Fibrous proteins are the major source of stored energy in the body.
B) Fibrous proteins most often appear in body structures.
C) Fibrous proteins are the basis for all body steroids.
D) Fibrous proteins are spherical molecules.
E) Fibrous proteins are considered water-soluble proteins.
Answer: B
Page Ref: 50
Bloom's: 1-2: Remembering/Understanding

35) Enzymes are _____.
A) carbohydrates
B) stable at high temperatures
C) biological catalysts
D) not reusable
E) required in large amounts in order to be effective
Answer: C
Page Ref: 51
Bloom's: 1-2: Remembering/Understanding

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36) Saturated fats _____.
A) have two fatty acid chains
B) exist as solids at room temperature
C) are formed from four interlocking carbon rings
D) contain many double bonds
E) exist as liquids and are derived from plants
Answer: B
Page Ref: 44
Bloom's: 1-2: Remembering/Understanding

37) Identify the nucleic acid.
A) oxidase
B) cholesterol
C) glucose
D) DNA
E) triglyceride
Answer: D
Page Ref: 52, 54
Bloom's: 1-2: Remembering/Understanding

38) Two or more polypeptides chains combine to form a complex structure called a _____.
A) primary structure
B) beta-pleated sheet
C) secondary structure
D) tertiary structure
E) quaternary structure
Answer: E
Page Ref: 50
Bloom's: 1-2: Remembering/Understanding

39) Which of the following statements about RNA is true?
A) RNA is a single nucleotide strand.
B) RNA is composed of the bases cytosine, guanine, adenine, and thymine.
C) RNA is found only in the nucleus of the cell.
D) RNA contains a sugar called deoxyribose.
E) RNA is the genetic material found within the cell nucleus.
Answer: A
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

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40) Which of the following lipids is formed of four interlocking carbon rings?
A) phospholipid
B) cholesterol
C) triglyceride
D) trans fat
E) unsaturated fat
Answer: B
Page Ref: 48
Bloom's: 1-2: Remembering/Understanding

41) The nucleotide chains of DNA are held together by _____.
A) carbon bonds
B) hydrogen bonds
C) ionic bonds
D) nonpolar covalent bonds
E) polar covalent bonds
Answer: B
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

42) Which of the following statements about ATP is false?
A) ATP drives the transport of certain solutes (e.g., amino acids) across cell membranes.
B) ATP activates contractile proteins in muscle cells so that cells can shorten and perform mechanical work.
C) ATP provides the energy needed to drive energy-absorbing chemical reactions.
D) ATP is a modified nucleotide.
E) The phosphate groups of ATP are attached by high-energy hydrogen bonds.
Answer: E
Page Ref: 55
Bloom's: 1-2: Remembering/Understanding

43) Which of the following is classified as a protein?
A) cholesterol
B) enzyme
C) glucose
D) triglyceride
E) RNA
Answer: B
Page Ref: 51
Bloom's: 1-2: Remembering/Understanding

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44) The building blocks of proteins are _____.
A) monosaccharides
B) nucleotides
C) amino acids
D) nucleic acids
E) fatty acids
Answer: C
Page Ref: 48
Bloom's: 1-2: Remembering/Understanding

45) Shell 1 of an atom can hold a maximum of _____ electron(s).
A) 1
B) 2
C) 4
D) 8
E) 18
Answer: B
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

46) Trans fats are oils that have been solidified by the addition of _____.
A) oxygen atoms
B) carbon atoms
C) hydrogen atoms
D) nitrogen atoms
E) phosphorus-containing groups
Answer: C
Page Ref: 46
Bloom's: 1-2: Remembering/Understanding

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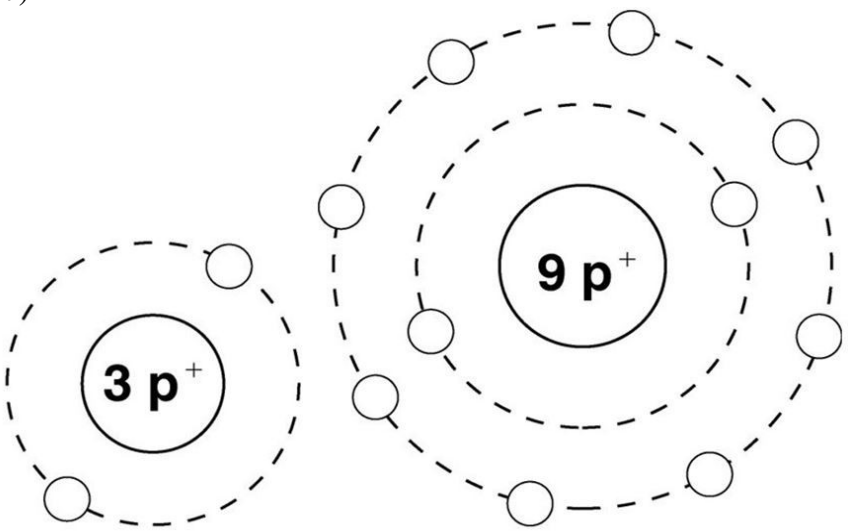


Figure 2.3

What type of chemical bond is pictured in Figure 2.3?
A) nonpolar covalent bond
B) polar covalent bond
C) ionic bond
D) single covalent bond
E) double covalent bond
Answer: C
Page Ref: 32, 34
Bloom's: 1-2: Remembering/Understanding

48) What is the function of DNA?
A) DNA provides instructions for building every protein in the body.
B) DNA serves as a form of chemical energy that all body cells can use.
C) DNA serves as the most important fuel for body cells.
D) DNA carries out the orders for protein synthesis issued by RNA.
E) DNA increases the rate of a chemical reaction without becoming part of the product.
Answer: A
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

49) Which of the following would be classified as an enzyme?
A) hydrolase
B) cholesterol
C) triglyceride
D) cellulose
E) ATP
Answer: A
Page Ref: 52
Bloom's: 1-2: Remembering/Understanding

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50) A molecule with the sequence of AUCGUCA should be categorized as _____.
A) ATP
B) an enzyme
C) RNA
D) DNA
E) a triglyceride
Answer: C
Page Ref: 54
Bloom's: 1-2: Remembering/Understanding

2.3 True/False Questions

1) Inactive or stored energy is called kinetic energy.
Answer: FALSE
Page Ref: 25
Bloom's: 1-2: Remembering/Understanding

2) The number of protons in an atom equals the atomic number for that element.
Answer: TRUE
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

3) Atoms that have lost or gained electrons during chemical bonding are known as isotopes.
Answer: FALSE
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

4) Inorganic compounds lack carbon and tend to be small, simple molecules.
Answer: TRUE
Page Ref: 38
Bloom's: 1-2: Remembering/Understanding

5) The four most common elements in the human body are oxygen, carbon, nitrogen, and hydrogen.
Answer: TRUE
Page Ref: 27
Bloom's: 1-2: Remembering/Understanding

6) Hydrogen bonds are very strong bonds that hold together water molecules.
Answer: FALSE
Page Ref: 34, 36
Bloom's: 1-2: Remembering/Understanding

7) Water is the single most abundant inorganic compound in the human body.
Answer: TRUE
Page Ref: 39
Bloom's: 1-2: Remembering/Understanding

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8) The lower the pH, the greater the number of hydrogen ions released by a chemical into solution.
Answer: TRUE
Page Ref: 41
Bloom's: 1-2: Remembering/Understanding

9) Electrolytes conduct electrical currents in solution.
Answer: TRUE
Page Ref: 40
Bloom's: 1-2: Remembering/Understanding

10) Neutralization reactions that occur between an acid and a base are a type of exchange reaction.
Answer: TRUE
Page Ref: 41
Bloom's: 1-2: Remembering/Understanding

11) A solution with a pH of 3 has 20 times more hydrogen ions than a solution with a pH of 5.
Answer: FALSE
Page Ref: 41
Bloom's: 3-4: Applying/Analyzing

12) Amino acids are the building blocks for proteins.
Answer: TRUE
Page Ref: 48
Bloom's: 1-2: Remembering/Understanding

13) Glucose and fructose are classified as disaccharides.
Answer: FALSE
Page Ref: 44
Bloom's: 1-2: Remembering/Understanding

14) Phospholipids have a hydrophobic region (the "head") and a hydrophilic region (fatty acid chains, or nonpolar "tails").
Answer: FALSE
Page Ref: 46
Bloom's: 1-2: Remembering/Understanding

15) Disruption of the hydrogen bonds of functional proteins leads to their denaturation.
Answer: TRUE
Page Ref: 51
Bloom's: 1-2: Remembering/Understanding

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2.4 Matching Questions

Match the following:

A) Proton
B) Neutron
C) Electron

1) Atomic number is based on the number of these subatomic particles in an atom of a particular element.
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

2) Atoms share these subatomic particles when they combine to form molecules.
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

3) The atomic mass number does *not* include these subatomic particles in the calculation.
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

4) Ionic bonds are formed when these subatomic particles are completely transferred from one atom to another atom.
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

5) Isotopes have the same numbers of protons and _____.
Page Ref: 29
Bloom's: 1-2: Remembering/Understanding

6) These subatomic particles carry a negative charge and are found in orbitals that surround the nucleus.
Page Ref: 28
Bloom's: 1-2: Remembering/Understanding

7) Ions have lost or gained these subatomic particles.
Page Ref: 32
Bloom's: 1-2: Remembering/Understanding

8) Along with protons, these subatomic particles are situated in the nucleus of an atom.
Page Ref: 28
Bloom's: 1-2: Remembering/Understanding

Answers: 1) A 2) C 3) C 4) C 5) C 6) C 7) C 8) B

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Match the following:

A) Synthesis reaction
B) Decomposition reaction
C) Exchange reaction

9) Glycogen is broken down to release glucose subunits.
Page Ref: 37
Bloom's: 1-2: Remembering/Understanding

10) Amino acids join together to form proteins.
Page Ref: 37
Bloom's: 1-2: Remembering/Understanding

11) Bonds are both made and broken in these reactions.
Page Ref: 37
Bloom's: 1-2: Remembering/Understanding

12) Digestion of food
Page Ref: 37
Bloom's: 1-2: Remembering/Understanding

Answers: 9) B 10) A 11) C 12) B

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Match the following:

A) fibrous proteins
B) globular proteins
C) amino acids
D) lipids
E) carbohydrates
F) nucleic acids

13) Building block is the monosaccharide
Page Ref: 43
Bloom's: 1-2: Remembering/Understanding

14) DNA, RNA, and ATP are types
Page Ref: 54, 55
Bloom's: 1-2: Remembering/Understanding

15) Triglycerides, steroids, and fat-soluble vitamins are examples
Page Ref: 44, 46
Bloom's: 1-2: Remembering/Understanding

16) Antibodies, some hormones, and enzymes are examples
Page Ref: 48
Bloom's: 1-2: Remembering/Understanding

17) Collagen and keratin are types
Page Ref: 50
Bloom's: 1-2: Remembering/Understanding

18) Nucleotides are the building blocks for this organic compound group
Page Ref: 52
Bloom's: 1-2: Remembering/Understanding

19) The hydrolysis of proteins produces these building blocks
Page Ref: 48
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20) Also known as functional proteins
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Answers: 13) E 14) F 15) D 16) B 17) A 18) F 19) C 20) C

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2.5 Essay Questions

1) Describe the role of the electron in chemical bond formation.
Answer: When the valence shell of an atom contains fewer than 8 electrons, an atom will tend to gain, lose, or share electrons with other atoms to reach a stable state. As a result, chemical bonds such as covalent bonds or ionic bonds are formed.
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Bloom's: 1-2: Remembering/Understanding

2) Differentiate between the method of determination of the atomic number and the atomic mass number.
Answer: The atomic number is determined by the number of protons in that atom. The atomic mass number is the sum of the protons and neutrons in the atom's nucleus.
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Bloom's: 3-4: Applying/Analyzing

3) Discuss radioisotopes and explain why they are studied in anatomy and physiology.
Answer: Radioisotopes are unstable isotopes of heavier elements that tend to decompose to become more stable. Recall that isotopes are structural variations of an element that vary by their neutron number. Radioisotopes are used to tag biological molecules so they can be followed or traced through the human body. Radioisotopes are valuable tools in medical diagnosis and treatment.
Page Ref: 30, 31
Bloom's: 1-2: Remembering/Understanding

4) Explain how saturated fats are different from unsaturated fats.
Answer:
Saturated fats:
1. tend to be animal fats
2. have all single bonds between carbon atoms
3. may be solid

Unsaturated fats:
1. tend to be plant oils
2. have some double or triple bonds between carbon atoms
3. may be liquid

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5) Distinguish between a dehydration synthesis and a hydrolysis reaction.
Answer: In a dehydration synthesis reaction, a more complex molecule is formed from two simpler ones, and a water molecule is lost as each bond forms. An example of dehydration synthesis is seen when a disaccharide is formed from two monosaccharides. Hydrolysis is the breakdown of a more complex molecule into its building blocks. A water molecule is added to each bond, the bond is broken, and simpler molecules are formed. In the process, water is split into a hydrogen ion and a hydroxyl ion. An example of hydrolysis is seen when a disaccharide is broken down into two monosaccharides.
Page Ref: 36, 37
Bloom's: 3-4: Applying/Analyzing

6) Differentiate between the functions of RNA and DNA.
Answer: DNA is the genetic material found in the nucleus of a cell. It replicates prior to cell division to ensure every body cell is identical. DNA provides instructions for building every protein in the body. By contrast, RNA is mostly found outside the nucleus and carries out the instructions for generating proteins as dictated by DNA.
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Bloom's: 3-4: Applying/Analyzing

7) Describe the difference between the roles of functional, or globular, proteins and structural, or fibrous, proteins.
Answer: Structural proteins most often appear in the body structures, binding structures together or providing strength in tissues. Functional proteins perform jobs for the body. They serve in a variety of roles in the body from antibodies, enzymes, hormones to transport proteins.
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Bloom's: 1-2: Remembering/Understanding

8) Explain why a denatured protein no longer functions.
Answer: Denaturation results when the three-dimensional shape of a protein is destroyed. The function of a protein depends on its structure. The presence of an active site on the surface of a protein that interacts with other molecules must be intact for the protein to work properly.
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Bloom's: 1-2: Remembering/Understanding

9) Discuss the organization of the pH scale, including the location of acids, bases, and neutral substances.
Answer: The pH scale is based on the number of hydrogen ions in solution. The pH scale is constructed from zero to 14. Each sequential change of one pH unit represents a ten-fold change in hydrogen ion concentration. Solutions with a pH lower than seven are considered acidic while solutions with a pH greater than seven are considered basic (alkaline). At a pH of seven, the solution is neutral since hydrogen ion concentration equals hydroxyl ion concentration.
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10) Describe the four structural levels of proteins.
Answer:
1. The primary structure of a protein resembles a string of beads in which the amino acids form the basis for the protein molecule.
2. A protein in its secondary structure may exist in a coiled alpha-helix or an accordion-like beta-pleated sheet.
3. Most proteins reach the more complex tertiary level of structure. The tertiary structure is achieved when the alpha-helical or beta-pleated region of the polypeptide chain folds in on itself to form a globular (ball-like) molecule.
4. The quaternary structure results when two polypeptide chains combine to form a complex protein.
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11) Joey works in a lab on an organic compound with the formula of $C_6H_{12}O_6$. Determine the type of organic compound, being as specific as possible, on which he works. Explain how you know.
Answer: Joey is working with a carbohydrate. Carbohydrates contain carbon, hydrogen, and oxygen atoms in the same ratio as water (2 hydrogens to every carbon and oxygen atom). To be specific, he is working with a monosaccharide. Monosaccharides contain between three and seven carbon atoms.
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Bloom's: 3-4: Applying/Analyzing

12) Explain how potential energy differs from kinetic energy.
Answer: When energy is doing work, it is referred to as kinetic energy. However, when energy is active or stored, we call it potential energy.
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Bloom's: 1-2: Remembering/Understanding

13) Explain the relationship between atoms and elements.
Answer: Elements are unique substances that cannot be broken down into simpler substances by ordinary chemical means. Each element is composed of very similar particles, or building blocks, called atoms. Because all elements are unique, the atoms of each element differ from those of all other elements.
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