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Chapter 2: Chemistry of Life

Matching

Match each term to its definition or characteristic.

a. galactose
b. electron
c. radioactivity
d. proton
e. amino group
f. glucose
g. compounds
h. carboxyl group
i. cation
j. glycogen
k. catalyst
l. polar
m. buffer
n. anion
o. enzymes
p. matter
q. neutron
r. atomic weight
s. fructose

____ 1. Positively charged atomic particle

____ 2. Stored form of sugar in the human body

____ 3. Having oppositely charged ends

____ 4. COOH molecule

____ 5. Atom with a positive charge

____ 6. Substances that donate or remove H^+ ions

____ 7. Atom with a negative charge

____ 8. Primary source of energy used by most of the body's cells

____ 9. Substance that enhances the rate of a chemical reaction

____ 10. NH_3 molecule

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 11. What differentiates one element from another?
a. The number of shells encircling the nucleus
b. The number of electrons
c. The number of neutrons
d. The number of protons

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____ 12. What distinguishes elements from compounds?
a. Elements can be broken down into two or more compounds.
b. Elements have only one kind of atom.
c. Elements do not combine with compounds.
d. Elements do not react with other elements.

____ 13. Which four elements make up more than 96% of the human body?
a. Oxygen, carbon, hydrogen, and iron
b. Carbon, hydrogen, calcium, and oxygen
c. Nitrogen, oxygen, carbon, and sodium
d. Oxygen, carbon, hydrogen, and nitrogen

____ 14. Electrons are found
a. orbiting around the nucleus in circular paths.
b. moving around the nucleus in concentric clouds.
c. in individual clouds (one electron per cloud) that orbit the nucleus.
d. in fixed positions on the rings that surround the nucleus.

____ 15. Where are protons and neutrons located?
a. Protons and neutrons orbit the nucleus in one or more concentric clouds.
b. Protons orbit the nucleus in a cloud, and neutrons reside in the nucleus.
c. Protons and neutrons both reside in the nucleus.
d. Neutrons orbit the nucleus in a cloud, whereas protons reside in the nucleus.

____ 16. What are the electrons in the outer energy level (shell) called?
a. Covalent electrons
b. Bonding electrons
c. Valence electrons
d. Ionic electrons

____ 17. An atom is stable when the outer shell contains how many electrons?
a. Four
b. Six
c. Eight
d. Twelve

____ 18. Why do atoms lose, gain, or share electrons?
a. To release energy
b. To obtain stability
c. To increase bonding
d. To form compounds

____ 19. Which element makes up the greatest percentage of the body's weight?
a. Carbon
b. Hydrogen
c. Nitrogen
d. Oxygen

____ 20. Which statement about isotopes is true?
a. Each isotope of an element has chemical properties that differ from those of other isotopes of the same element.
b. Isotopes of an element have different numbers of protons.

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c. Some isotopes are unstable and decay.
d. All isotopes emit radiation.

____ 21. Adding or removing electrons from an atom results in the formation of a(n)
a. isotope.
b. different element.
c. ion.
d. change in the atom's atomic weight.

____ 22. Which factor differentiates one element from another?
a. The number of neutrons
b. The number of protons
c. The type of bonds formed by the atoms of the element
d. The number of energy levels in the electron cloud

____ 23. What makes atoms electrically neutral?
a. An equal number of protons and electrons
b. The formation of ionic bonds
c. An equal number of electrons and neutrons
d. Neutrons, which neutralize the electrically charged protons and electrons

____ 24. What causes an atom to emit radiation?
a. The electron cloud emits small amounts of radiation as the electrons accelerate.
b. Unstable isotopes emit radiation as they decay.
c. Atoms emit radiation when covalent bonds break down.
d. Atoms emit radiation when ionic bonds break down.

____ 25. Transfer of electrons from an atom of one element to an atom of another element results in
a. a covalent bond.
b. an ionic bond
c. a hydrogen bond.
d. one unstable atom and one stable atom.

____ 26. Covalent bonds form when
a. positively charged hydrogen atoms attract negatively charged atoms.
b. electrostatic forces bring atoms together to form a new molecule.
c. two atoms share electrons to fill their outer shells.
d. a nitrogen atom combines with a carbon atom.

____ 27. How do water molecules form, and what factors create water's hydrogen bond?
a. Each of two hydrogen atoms donates its electron to an oxygen atom to fill its outer shell. This forms two hydrogen anions and one oxygen cation. The larger oxygen cation attracts the two hydrogen anions, forming two attachments called *hydrogen bonds* and creating the neutral water molecule.
b. Two hydrogen atoms covalently bond to an oxygen atom. This forms a water molecule that is weakly positive on the hydrogen side and weakly negative on the oxygen side. These opposing charges form a mild attachment to other water molecules called a hydrogen bond.
c. The single electron on the shell of a hydrogen atom bonds covalently to another hydrogen atom to complete both outer shells. This H_2 molecule now has two weakly positive ends, which attract a weakly negative oxygen atom. This attachment is the hydrogen bond and forms the water molecule.
d. The electrons of two hydrogen atoms form ionic bonds with an oxygen atom, forming a

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water molecule with four free electrons on the oxygen side. The hydrogen side has a strong positive charge because the single protons are no longer countered by their electrons. The oxygen side is negatively charged because it now has more electrons than protons. The positively charged hydrogen side of one water molecule attracts the negatively charged oxygen side of another water molecule. Each hydrogen atom forms a weak attachment with two of an oxygen atom's remaining electrons. These are the hydrogen bonds.

____ 28. Electrons moving around a nucleus is an example of
a. potential energy.
b. kinetic energy.
c. electrical energy.
d. radiant energy.

____ 29. Metabolism is
a. the breakdown of food in the digestive tract.
b. the creation of complex molecules from smaller units.
c. all the chemical reactions that occur in the body.
d. the chemical processes performed by the liver.

____ 30. In general, what type of process is wound healing and what are the implications from the standpoint of energy?
a. It is an anabolic process that releases energy.
b. It is an anabolic process that requires energy.
c. It is a catabolic process that releases energy.
d. It is a catabolic process that requires energy.

____ 31. Based on your understanding of catabolism, what does it means when a person is in a catabolic state?
a. The person has an excess of adenosine triphosphate (ATP).
b. The person is suffering from malnutrition and breaking down body tissues for fuel.
c. The person has a high degree of energy because of the breakdown of chemical bonds.
d. The person is still growing and requires energy to do so.

____ 32. Which type of chemical reaction allows the body to create new proteins?
a. Exchange
b. Decomposition
c. Synthesis
d. Fusion

____ 33. Which factors would increase the speed of chemical reactions that occur in the body?
a. Increased levels of glucose in the blood
b. Fever
c. The presence of electrolytes
d. The presence of catalysts
e. B and D only
f. C and D only
g. A, B, and D only

____ 34. Particles will separate out of a
a. solution.
b. colloid.
c. suspension.
d. mixture.

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____ 35. How do mixtures differ from compounds?
a. Mixtures are new substances with properties unlike the properties of the elements in the mix.
b. Mixtures are either liquid or solid, whereas compounds are solid, liquid, or gas.
c. Mixtures are not combined chemically.
d. Mixtures cannot be separated by physical means, such as filtering.

____ 36. Which of the following describes a solute?
a. Particles of matter dissolved in a substance, often water
b. Large particles of matter in a substance like water but not dissolved
c. Particles that do not separate out of a clear liquid when allowed to stand
d. Small particles that do not separate out of a cloudy liquid when allowed to stand
e. A and D only
f. B and D only
g. A and C only

____ 37. Which statement relates best to why water is so important to the human body?
a. The average adult human body is about 60% water.
b. Water is needed for most chemical reactions to take place.
c. All the cells in the body are surrounded by water.
d. Water lubricates many body tissues.

____ 38. Which statement about acids is correct?
a. The greater the percentage of nitrogen, the stronger the acid
b. The greater the concentration of OH^- ions, the stronger the acid
c. The greater the concentration of H^+ ions, the stronger the acid
d. The greater the percentage of water, the weaker the acid

____ 39. Acidity or alkalinity is determined using the
a. Kelvin scale.
b. acid test.
c. pH scale.
d. anion test.

____ 40. What is the normal pH of human blood? Is it acidic, alkaline, or neutral?
a. 7.35 to 7.45, slightly alkaline
b. 7.5 to 7.9, alkaline
c. 6.5 to 6.75, slightly acidic
d. 7.0, neutral

____ 41. The four main organic compounds in the human body are
a. carbohydrates, bile acids, lipids, and proteins.
b. carbohydrates, nucleic acids, proteins, and lipids.
c. calcium carbonate, protein, carbohydrates, and hemoglobin.
d. hemoglobin, nucleic acids, carbohydrates, and protein.

____ 42. Which element differentiates organic compounds from inorganic compounds?
a. Oxygen
b. Hydrogen
c. Carbon
d. Nitrogen

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____ 43. Which compound is the body's main energy source?
a. Protein
b. Carbohydrates
c. Fats
d. Enzymes

____ 44. Carbohydrates are categorized by
a. their electrical charge.
b. what type of bonds they contain.
c. what food type they come from; for example, fruit or dairy.
d. the length of their carbon chain.

____ 45. Which type of carbohydrate provides the body with the most steady supply of energy and why?
a. Monosaccharides, because they break down quickly
b. Disaccharides, because they contain two sugar units bonded together
c. Polysaccharides, because their multiple bonds take longer to break down
d. Fatty saccharides, because fat slows digestion

____ 46. Which lipid is a concentrated source of energy for the body?
a. Phospholipids
b. Triglycerides
c. Steroids
d. Cholesterol

____ 47. What molecular configuration is necessary for a fat to be unsaturated?
a. Every other carbon forms a single bond with hydrogen.
b. The hydrocarbon chain contains all single covalent bonds.
c. A carboxyl group bonds to the hydrocarbon chain.
d. The hydrocarbon chain contains at least one double bond.

____ 48. The basic building block of a protein molecule is a(n)
a. carboxyl group.
b. nitrogen atom.
c. amino acid.
d. R group.

____ 49. Why are some amino acids called essential?
a. They are essential for making bones and teeth.
b. They make enzymes essential for the breakdown of food.
c. They must be obtained from outside sources.
d. The body must manufacture them.

____ 50. Amino acids link together through
a. protein bonds.
b. peptide bonds.
c. ionic bonds.
d. hydrogen bonds.

____ 51. A peptide bond forms when
a. an R group links to an amino group.
b. amino groups link together to form folds or spirals.
c. a water group links to an amino group.
d. an amino group links to a carboxyl group.

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____ 52. A sequence of amino acids in a chain is called the
a. carboxyl group.
b. primary structure.
c. polypeptide bond.
d. amino group.

____ 53. How do cells obtain energy?
a. Energy is made in the liver and released into the blood for the cells to use.
b. Cells break down protein molecules.
c. Energy stored as fat is released into the blood.
d. Cells break bonds in ATP molecules.

____ 54. Nucleic acids and nucleotides form
a. proteins.
b. fatty acids.
c. DNA and RNA.
d. amino acids.

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Chapter 2: Chemistry of Life
Answer Section

MATCHING

1. ANS: D PTS: 1 DIF: E REF: 19
   KEY: REMEMBERING
2. ANS: J PTS: 1 DIF: E REF: 29
   KEY: REMEMBERING
3. ANS: L PTS: 1 DIF: E REF: 22
   KEY: REMEMBERING
4. ANS: H PTS: 1 DIF: E REF: 31
   KEY: REMEMBERING
5. ANS: I PTS: 1 DIF: E REF: 21
   KEY: REMEMBERING
6. ANS: M PTS: 1 DIF: E REF: 28
   KEY: REMEMBERING
7. ANS: N PTS: 1 DIF: E REF: 21
   KEY: REMEMBERING
8. ANS: F PTS: 1 DIF: E REF: 29
   KEY: REMEMBERING
9. ANS: K PTS: 1 DIF: E REF: 24
   KEY: REMEMBERING
10. ANS: E PTS: 1 DIF: E REF: 31
    KEY: REMEMBERING

MULTIPLE CHOICE

11. ANS: D
    The number of protons in the nucleus differentiates one element from another. The number of shells around the nucleus depends on the number of electrons, which is equal to the number of protons. The number of neutrons can vary but does not change the element.

    PTS: 1 DIF: E REF: 19 KEY: UNDERSTANDING
12. ANS: B
    Elements have only one kind of atom. They cannot be broken down into other constituents. Compounds can be broken down into two or more elements, not the other way around. Elements combine or react with other compounds as well as with other elements.

    PTS: 1 DIF: E REF: 17 KEY: UNDERSTANDING
13. ANS: D
    Oxygen, carbon, hydrogen, and nitrogen are the most abundant elements in the human body and account for 96% of its mass. Calcium, iron, and sodium are critically important to the body's structure and function but combined they make up less than 2% of its mass.

    PTS: 1 DIF: E REF: 17 KEY: REMEMBERING
14. ANS: B

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Electrons move around the nucleus in concentric clouds that represent different energy levels. Electrons do not orbit in circular paths like the planets orbit the Sun. The electron cloud can contain many electrons and does not orbit the nucleus but surrounds it. Electrons do not maintain fixed positions.

PTS: 1 DIF: M REF: 19 KEY: UNDERSTANDING

15. ANS: C
Protons and neutrons are located in the nucleus of the atom. Neither particle ever orbits the nucleus.

PTS: 1 DIF: E REF: 19 KEY: REMEMBERING

16. ANS: C
The outer energy level is called the *valence shell* and the electrons are called *valence electrons*. Covalent refers to a type of chemical bond between atoms. Although valence electrons are involved in chemical bonding, the term "bonding electrons" is not used. Ionic refers to a type of chemical bond that results in charged particles.

PTS: 1 DIF: M REF: 20 KEY: UNDERSTANDING

17. ANS: C
Atoms are stable when the outer shell has eight electrons. The shell closest to the nucleus can hold two electrons; each shell after the inner shell can hold eight.

PTS: 1 DIF: E REF: 19 KEY: UNDERSTANDING

18. ANS: B
Atoms lose, gain, or share electrons to achieve a full outer shell and stability. Energy is not released by bonding but is released by breaking bonds. The bonding of two atoms does not necessarily result in a compound; atoms of the same element bond to each other.

PTS: 1 DIF: M REF: 20 KEY: REMEMBERING

19. ANS: D
Oxygen makes up 65% of body mass. Carbon is next at 18%. Hydrogen and nitrogen comprise 10% and 3%, respectively.

PTS: 1 DIF: M REF: 18 KEY: UNDERSTANDING

20. ANS: B
All isotopes of an element have identical chemical properties. Isotopes of an element have different numbers of neutrons, not protons. Only unstable isotopes emit radiation as they decay.

PTS: 1 DIF: M REF: 20 KEY: REMEMBERING

21. ANS: C
Ions are atoms that have either lost or gained electrons, which changes the atom from electrically neutral to charged. Isotopes result from a change in the number of neutrons. Adding or removing electrons does not create a different element. The number of protons added to the number of neutrons equals the atomic weight.

PTS: 1 DIF: M REF: 21 KEY: UNDERSTANDING

22. ANS: B
The number of protons is unique to each element. The number of neutrons distinguishes an element from its isotopes. The types of bonds formed by an element do not distinguish it from another element. Although the number of energy levels around the nucleus of different elements varies, it does not distinguish one element from another.

PTS: 1 DIF: D REF: 19 KEY: ANALYZING

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23. ANS: A
Atoms are neutral because the number of negatively charged electrons equals the number of positively charged protons. Ionic bonding produces a charged molecule. Neutrons are not charged, so they cannot cancel out electrons or "neutralize" a charge.

PTS: 1 DIF: E REF: 19 KEY: UNDERSTANDING

24. ANS: B
An unstable isotope will seek a more stable state by emitting radiation from its nucleus. Electron clouds do not emit radiation. Breaking chemical bonds releases energy, not radiation.

PTS: 1 DIF: D REF: 20 KEY: UNDERSTANDING

25. ANS: B
Transfer of electrons from one atom to another is the definition of ionic bonding. Covalent and hydrogen bonds do not involve transfer of electrons. Ionic bonding creates a stable molecule because both atoms have full outer shells.

PTS: 1 DIF: D REF: 21 KEY: ANALYZING

26. ANS: C
Covalent bonding occurs when electrons are shared by two atoms so that each has a complete outer shell of eight electrons. The attraction of hydrogen atoms to oxygen atoms is an example of hydrogen bonding. Electrostatic forces pull ions together; no electrons are shared. Nitrogen and carbon are involved in peptide bonds.

PTS: 1 DIF: M REF: 22 KEY: UNDERSTANDING

27. ANS: B
Water molecules form when two hydrogen atoms covalently bond (i.e., share electrons) to an oxygen atom. The two hydrogen atoms have weak, positive charges, whereas the oxygen side has a weak, negative charge. The partially positive oxygen side of one water molecule is attracted to the partially negative hydrogen side of another molecule. This results in a weak attachment called a *hydrogen bond*. Hydrogen does not donate its electron, it shares it with the oxygen atom. Therefore, it does not form ions and the water molecule is not neutral. Hydrogen atoms do not first bond to each other and then to an oxygen atom. Each hydrogen bonds with the oxygen separately. Two covalently bonded hydrogen atoms will have no free electrons to share with an oxygen atom. The hydrogen atoms form covalent bonds, not ionic bonds.

PTS: 1 DIF: D REF: 22 KEY: UNDERSTANDING

28. ANS: B
Kinetic energy is energy in motion; thus, the movement of electrons is an example of kinetic energy. Potential energy is stored energy. Electrical energy is the movement of charged particles. Radiant energy is energy that travels in waves, like heat generated by a light bulb.

PTS: 1 DIF: E REF: 23 KEY: UNDERSTANDING

29. ANS: C
Metabolism refers to all chemical processes that occur in the body. Digestion of food is just one example of a metabolic process, as is the creation of complex molecules. The liver and its many processes are critical to metabolism, but it is not the only organ involved.

PTS: 1 DIF: E REF: 23 KEY: REMEMBERING

30. ANS: B

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Wound healing involves the creation of many new cells, which is an anabolic process and requires energy. A catabolic process is the breakdown of complex substances into their constituent units. Catabolic processes release energy.

PTS: 1 DIF: M REF: 23 KEY: APPLYING

31. ANS: B
In states of health, the body performs both catabolic and anabolic processes at the cellular level all the time. However, if a person is said to be in a catabolic state, it means that the person is malnourished and is breaking down important body tissues for energy. The body manufactures ATP as it needs it but does not create it in excess. A person in a catabolic state has less energy. Stages of normal growth and development are considered anabolic stages.

PTS: 1 DIF: D REF: 23 KEY: APPLYING

32. ANS: C
Synthesis is the creation of a complex substance from simpler substances. The body synthesizes protein from amino acids that it makes and from amino acids in food. An exchange reaction occurs when two molecules exchange atoms or groups of atoms; this type of reaction is not used to create new proteins. Decomposition is a process of breaking down, not building. Fusion has various meanings in science but none involves the creation of new proteins.

PTS: 1 DIF: E REF: 24 KEY: REMEMBERING

33. ANS: E
Both catalysts and heat (fever) speed up molecular reactions. An increased level of glucose in the blood will not speed up chemical reactions. Electrolytes are a normal component of blood and do not speed up reactions.

PTS: 1 DIF: M REF: 24 KEY: UNDERSTANDING

34. ANS: C
Particles settle out of suspensions because they are too large to dissolve. Solutions contain dissolved particles. Colloids contain particles small enough to stay dispersed throughout the liquid but large enough to cause cloudiness. “Mixture” is a broad term for two or more substances that are physically combined. Solutions, colloids, and suspensions are three basic mixtures.

PTS: 1 DIF: E REF: 26 KEY: UNDERSTANDING

35. ANS: C
Mixtures are not combined chemically, they are blended together. Compounds, not mixtures, have unique properties unlike the properties of the combined elements. Mixtures can be liquid, solid, or gas. Mixtures can be separated by physical means, whereas compounds can be separated only by chemical means.

PTS: 1 DIF: M REF: 25 KEY: UNDERSTANDING

36. ANS: G
A solute consists of particles of matter dissolved in a substance so thoroughly that the liquid (called a *solution*) is clear. The particles must not separate out of the solvent when allowed to stand. A suspension contains large particles of undissolved matter. Particles are given the name *solute* only when they are small enough to be completely dissolved and the liquid becomes clear. A colloid contains small particles that don’t separate out of a cloudy liquid.

PTS: 1 DIF: M REF: 26 KEY: UNDERSTANDING

37. ANS: B
All the answers are true and important, but the fact that most of the chemical reactions required for life take place in water is the most important.

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PTS: 1 DIF: M REF: 25 KEY: APPLYING

38. ANS: C
The greater the concentration of hydrogen ions (H^+) is, the stronger the acid is. The greater the concentration of OH^- ions is, the stronger the base is. Nitrogen and water do not influence the degree of acidity.

PTS: 1 DIF: M REF: 27 KEY: ANALYZING

39. ANS: C
Acidity or alkalinity is measured on the pH scale, which determines the degree of H^+ or OH^- ions in the solution. The Kelvin scale is a measurement of temperature. The term "acid test" has many uses, but it is not used to determine acidity or alkalinity of solutions. Chemists can analyze solution for the presence of anions, but that type of testing is not used for determining the concentration of H^+ or OH^- in a solution.

PTS: 1 DIF: E REF: 28 KEY: REMEMBERING

40. ANS: A
The normal blood pH is 7.35 to 7.45, which is slightly alkaline.

PTS: 1 DIF: E REF: 28 KEY: REMEMBERING

41. ANS: B
Carbohydrates, nucleic acids, proteins, and lipids are the four major organic compounds. Hemoglobin is a protein; calcium carbonate is a buffering dietary supplement; bile acids are not a major organic compound.

PTS: 1 DIF: M REF: 29 KEY: UNDERSTANDING

42. ANS: C
Carbon differentiates organic compounds from inorganic compounds. Oxygen, hydrogen, and nitrogen are a part of many organic compounds, but it is only by combining with carbon that the formation of all living things is possible.

PTS: 1 DIF: E REF: 25 KEY: REMEMBERING

43. ANS: B
Carbohydrates are the main energy source. Protein and fats can be converted into energy for the body, but only if carbohydrate intake is insufficient. Enzymes are catalysts for chemical reactions.

PTS: 1 DIF: E REF: 29 KEY: REMEMBERING

44. ANS: D
The length of the carbon chain is the basis for categorizing carbohydrates. Carbohydrates are not ions and do not have an electrical charge. The type of bond is not directly relevant to classification. Food source is not a scientific criterion for classifying carbohydrates.

PTS: 1 DIF: M REF: 29 KEY: UNDERSTANDING

45. ANS: C
Because polysaccharides contain many chemical bonds, they take longer to break down thus providing a steady supply of energy over several hours. Simpler carbohydrates such as monosaccharides and disaccharides are broken down quickly thereby releasing energy quickly. Although fat slows digestion, there is no such thing as a fatty saccharide.

PTS: 1 DIF: D REF: 29 KEY: CREATING

46. ANS: B

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Triglycerides are a source of energy for the body. Phospholipids are important in the structure of the cell membrane. Steroids have many functions throughout the body but are not an energy source. Cholesterol is a steroid with multiple functions.

PTS: 1 DIF: M REF: 30 KEY: UNDERSTANDING

47. ANS: D
If the hydrocarbon chain contains at least one double bond, hydrogen cannot saturate the chain. Double bonds are required for the chain to be unsaturated. A hydrocarbon chain with all single covalent bonds is a saturated fat. A carboxyl group is part of a protein molecule.

PTS: 1 DIF: D REF: 30 KEY: UNDERSTANDING

48. ANS: C
The basic unit of a protein molecule is an amino acid. The carboxyl group is part of a protein's structure, but amino acids are the differentiating molecule. Nitrogen is essential to an amino acid but only when bonded to hydrogen. "R group" is the term used for the part of the amino acid that distinguishes it from other amino acids. It can be a single atom or a complex molecule.

PTS: 1 DIF: M REF: 31 KEY: UNDERSTANDING

49. ANS: C
Essential amino acids are those that the body cannot make and must be obtained from outside sources. The body needs amino acids to make many structures and substances, but essential amino acids must be ingested.

PTS: 1 DIF: E REF: 31 KEY: UNDERSTANDING

50. ANS: B
Amino acids link together with peptide bonds. "Protein bond" is not a term in current use. Ionic bonds are bonds between ions. Hydrogen bonds are weak bonds between a slightly positive hydrogen atom and a slightly negative oxygen or nitrogen atom in another. Hydrogen bonds may be present in large protein molecules, but hydrogen bonds do not form new molecules; they are simply weak attractions between polar atoms.

PTS: 1 DIF: M REF: 32 KEY: UNDERSTANDING

51. ANS: D
Peptide bonds are formed when the amino group of one amino acid links to the carboxyl group of another amino acid. The term "R group" is a "placeholder" for whatever other atom or molecule bonds to the carbon atom of an amino acid. Amino acid chains spiral or fold depending on their function. A water molecule bonding to an amino group is not a peptide bond.

PTS: 1 DIF: M REF: 32 KEY: UNDERSTANDING

52. ANS: B
A protein's primary structure is a simple chain of amino acids. All amino acids have a central carbon atom with an amino group and a carboxyl group bonded to it. A polypeptide is a sequence of amino acids, but it is not a type of bond. The amino group consists of one atom of nitrogen covalently bonded to two hydrogen atoms. It is a functional part of one amino acid, not a sequence of them in a chain.

PTS: 1 DIF: M REF: 32 KEY: UNDERSTANDING

53. ANS: D
Cells obtain energy by breaking phosphate bonds in the ATP molecule. The liver does not release energy into the bloodstream; cells release energy when they need it. Proteins, fats, and carbohydrates can all be used for energy production; however, those substances must first be converted to ATP.

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PTS: 1 DIF: M REF: 33 KEY: UNDERSTANDING

54. ANS: C
Nucleic acids and nucleotides form DNA and RNA. Proteins are formed from amino acids. Fatty acids are components of lipids. Carbon, hydrogen, nitrogen, and oxygen are the elements that make amino acids.

PTS: 1 DIF: M REF: 33 KEY: UNDERSTANDING

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