

True / False Questions

1. Minerals are organic elements extracted from the soil by plants.
True False
2. Molecules composed of two or more atoms are called compounds.
True False
3. Hydrogen, deuterium, and tritium are three isotopes of hydrogen.
True False
4. Potassium, sodium, and chlorine are trace elements.
True False
5. Ionic bonds break apart in water more easily than covalent bonds do.
True False
6. A solution is a mixture of two or more substances that are physically blended but *not* chemically combined.
True False
7. The pH of blood plasma is approximately 7.4, which is slightly acidic.
True False
8. The high heat capacity of water makes it a very ineffective coolant.
True False
9. In an exchange reaction, covalent bonds are broken and new covalent bonds are formed.
True False
10. Chemical reactions in which larger molecules are broken down into smaller ones are called catabolic reactions.
True False

11. The opposite of a dehydration synthesis reaction is a hydrolysis reaction.

True False

12. Unsaturated fatty acids have as much hydrogen as they can carry.

True False

13. A dipeptide is a molecule with two peptide bonds.

True False

14. All amino acids have both a carboxyl group and an amino group attached to a central carbon.

True False

15. ATP is the body's most important form of long-term energy storage.

True False

Multiple Choice Questions

16. The most abundant element in the human body, by weight, is _____.

- A. nitrogen
- B. hydrogen
- C. carbon
- D. oxygen
- E. calcium

17. Sodium has an atomic number of 11 and an atomic mass of 23. Sodium has _____.

- A. 12 neutrons and 11 protons
- B. 12 protons and 11 neutrons
- C. 12 electrons and 11 neutrons
- D. 12 protons and 11 electrons
- E. 12 electrons and 11 protons

18. The chemical properties of an atom are determined by its _____.

- A. protons
- B. electrons
- C. neutrons
- D. protons and neutrons
- E. particles

19. Na (atomic no. 11) reacts with Cl (atomic no. 17) to become stable. In the reaction, Na will _____, while Cl will _____.
- A. accept one electron; give up one electron
 - B. give up one proton; accept one proton
 - C. share one electron with chlorine; share one electron with sodium
 - D. become an anion; become a cation
 - E. give up one electron; accept one electron
20. Oxygen has an atomic number of 8 and an atomic mass of 16. How many valence electrons does it have?
- A. 2
 - B. 4
 - C. 6
 - D. 8
 - E. 16
21. Oxygen has an atomic number of eight. When two oxygen atoms come together, they form a(n) _____ bond.
- A. hydrogen
 - B. nonpolar covalent
 - C. polar covalent
 - D. ionic
 - E. Van der Waals
22. When table salt, sodium chloride (NaCl), is placed in water _____.
- A. Na^+ and Cl^- form ionic bonds with each other
 - B. Na^+ and Cl^- form polar covalent bonds with each other
 - C. Na^+ and Cl^- form hydrogen bonds with water
 - D. Ionic bonds between Na^+ and Cl^- are broken
 - E. Na^+ and Cl^- become separated by their Van der Waals forces
23. The bonding properties of an atom are determined by its _____.
- A. electrons
 - B. protons
 - C. positrons
 - D. neutrons
 - E. photons

24. What type of bond attracts one water molecule to another?

- A. An ionic bond
- B. A peptide bond
- C. A hydrogen bond
- D. A covalent bond
- E. A hydrolytic bond

Check All That Apply Questions

25. Which of these is a cation? Check all that apply.

- O₂
- K⁺
- Na⁺
- Ca²⁺
- Cl⁻

Multiple Choice Questions

26. _____ account for 98.5% of the body's weight.

- A. Carbon, oxygen, hydrogen, sodium, potassium, and chlorine
- B. Carbon, oxygen, iron, sodium, potassium, and chlorine
- C. Carbon, nitrogen, hydrogen, sodium, potassium, and chlorine
- D. Carbon, oxygen, hydrogen, nitrogen, sodium, and potassium
- E. Carbon, oxygen, hydrogen, nitrogen, calcium, and phosphorus

27. _____ differ from one another in their number of neutrons and atomic mass.

- A. Cations
- B. Anions
- C. Isotopes
- D. Electrolytes
- E. Free radicals

28. When jumping into water you notice resistance. This resistance is caused by water's _____.

- A. adhesiveness
- B. cohesiveness
- C. hydrophobic tension
- D. hydrophilic tension
- E. osmotic equilibrium

29. Which of these is hydrophobic?

- A. Glucose
- B. K^+
- C. Cl^-
- D. Water
- E. Fat

30. Blood contains NaCl, protein, and cells. The NaCl is in a(n) _____, the protein is in a(n) _____, and the cells are in a _____.

- A. emulsion; solution; suspension
- B. solvent; emulsion; colloid
- C. colloid; suspension; solution
- D. suspension; colloid; solution
- E. solution; colloid; suspension

31. Which of these is the most appropriate to express the number of molecules per volume?

- A. Molarity
- B. Volume
- C. Percentage
- D. Weight per volume
- E. Milliequivalents per liter

32. A solution with pH 4 has _____ the H^+ concentration of a solution with pH 8.

- A. $\frac{1}{2}$
- B. 2 times
- C. 4 times
- D. 10,000 times
- E. 1/10,000

33. Which of these has the highest H^+ concentration?
- A. Lemon juice, pH = 2.3
 - B. Red wine, pH = 3.2
 - C. Tomato juice, pH = 4.7
 - D. Saliva, pH = 6.6
 - E. Household ammonia, pH = 10.8
34. In a workout your muscle cells produce lactate, yet you maintain a constant blood pH because _____.
- A. metabolic acids are neutralized in muscle cells before released into the blood
 - B. metabolic bases are produced at the same rate by muscle cells to neutralize the acids
 - C. the respiratory system removes excess H^+ from the blood before the pH is lowered
 - D. the body contains chemicals called buffers that resist changes in pH
 - E. endothelial cells secrete excess H^+ to prevent a decrease in pH
35. A solution that resists a change in pH when an acid or base is added to it is a(n) _____.
- A. buffer
 - B. catalyst
 - C. reducing agent
 - D. oxidizing agent
 - E. colloid
36. A chemical reaction that removes electrons from an atom is called a(n) _____ reaction.
- A. reduction
 - B. condensation
 - C. hydrolysis
 - D. anabolic
 - E. oxidation
37. The most relevant free energy in human physiology is the energy stored in _____.
- A. electrolytes ionized in water
 - B. free radicals with an odd number of electrons
 - C. radioisotopes
 - D. the chemical bonds of organic molecules
 - E. Van der Waals forces

38. The breakdown of glycogen (an energy-storage compound) is an example of a(n) _____ reaction.

- A. exergonic
- B. endergonic
- C. exchange
- D. synthesis
- E. equilibrium

39. Potential energy stored in bonds is released as _____ energy.

- A. electromagnetic
- B. electrical
- C. chemical
- D. heat
- E. kinetic

40. The breakdown of glucose to yield carbon dioxide, oxygen, and ATP can be described as _____.

- A. anabolic and endergonic
- B. catabolic and exergonic
- C. anabolic and exergonic
- D. catabolic and endergonic
- E. anabolic and exothermic

41. Which one of the following would *not* increase the rate of a reaction?

- A. An increase in reactant concentrations
- B. A rise in temperature
- C. The presence of a catalyst
- D. The presence of an enzyme
- E. A decrease in reactant concentrations

42. Which of the following terms encompasses all of the other ones?

- A. Catabolism
- B. Anabolism
- C. Metabolism
- D. Oxidation reactions
- E. Reduction reactions

43. The breakdown of starch by digestive enzymes into glucose molecules is a(n) _____ reaction.

- A. synthesis
- B. decomposition
- C. exchange
- D. anabolic
- E. reduction

44. Which of the following equations depicts an exchange reaction?

- A. $AB \rightarrow A + B$
- B. $A + B \rightarrow AB$
- C. $AB + CD \rightarrow AC + BD$
- D. $AB \rightarrow A^- + B^+$
- E. $A + B \rightarrow AB \rightarrow C + D$

45. A(n) _____ is a group of atoms that determines many of the properties of an organic molecule.

- A. carboxyl group
- B. functional group
- C. hydroxyl group
- D. amino group
- E. phosphate group

46. Which of the following is *not* an organic compound?

- A. $C_{16}H_{18}N_3ClS$
- B. $Na_2HPO_3(H_2O)_5$
- C. CH_4
- D. $C_3H_7O_2N$

47. A _____ reaction breaks a _____ down into its monomers.

- A. hydrolysis; polymer
- B. dehydration synthesis; molecule
- C. dehydration synthesis; polymer
- D. polymer; molecule
- E. condensation; reactant

48. The formula of an amino group is _____; the formula of a carboxyl group is _____.

- A. -COOH; -OH
- B. -CH₃; -NH₂
- C. -OH; -SH
- D. -NH₂; -COOH
- E. -SH; -H₂PO₄

49. Table sugar is a disaccharide called _____ and is made up of the monomer(s) _____.

- A. maltose; glucose and sucrose
- B. sucrose; glucose and fructose
- C. lactose; glucose and galactose
- D. glycogen; glucose and fructose
- E. glucose; galactose and fructose

50. Which of the following is a disaccharide?

- A. Galactose
- B. Lactose
- C. Glucose
- D. Fructose
- E. Amylose

51. _____ is a monosaccharide, whereas _____ is a polysaccharide.

- A. Fructose; sucrose
- B. Galactose; maltose
- C. Lactose; glycogen
- D. Glucose; starch
- E. Cellulose; glucose

52. In general, _____ have a 2:1 ratio of hydrogen to oxygen.

- A. enzymes
- B. proteins
- C. lipids
- D. carbohydrates
- E. nucleic acids

53. Proteoglycans are composed of _____.

- A. carbohydrates and fats
- B. nucleic acids and fats
- C. carbohydrates and proteins
- D. proteins and fats
- E. nucleic acids and proteins

54. Triglycerides consist of a 3-carbon compound called _____ bound to three _____.

- A. pyruvate; fatty acids
- B. lactate; glycerols
- C. eicosanoid; steroids
- D. glycerol; fatty acids
- E. sterol; fatty acids

55. _____ are major components of cell membranes, and are said to be _____.

- A. Triglycerides; hydrophobic
- B. Steroids; hydrophilic
- C. Bile acids; fat-soluble
- D. Eicosanoids; water-soluble
- E. Phospholipids; amphiphilic

56. Which of these molecules is hydrophobic?

- A. Glucose
- B. Cholesterol
- C. Amino acid
- D. Protein
- E. Disaccharide

57. Proteins perform all of the following functions *except* _____.

- A. catalyze metabolic reactions
- B. give structural strength to cells and tissues
- C. produce muscular and other forms of movement
- D. regulate transport of solutes into and out of cells
- E. store hereditary information

58. A drastic conformational change in a protein in response to extreme heat or pH is called _____.

- A. contamination
- B. denaturation
- C. saturation
- D. sedimentation
- E. deconformation

59.

Proteins are _____ built from _____ different amino acids.

- A. monomers; 10
- B. molecules; 10
- C. polymers; 20
- D. macromolecules; 40
- E. peptides; 25

60. The folding and coiling of a protein into a globular shape is the _____ structure of the protein.

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

61. An enzyme is substrate-specific because of the shape of its _____.

- A. active site
- B. receptor
- C. secondary structure
- D. terminal amino acid
- E. alpha chain

62. _____ is the substrate of _____.

- A. Glucose; lactose
- B. Lactase; glucose
- C. Lactose; lactase
- D. Galactose; lactose
- E. Sucrase; sucrose

63. All enzymes are _____.

- A. cofactors
- B. proteins
- C. lipids
- D. carbohydrates
- E. nucleic acids

64. Nucleic acids are _____ of _____.

- A. monomers; monosaccharides
- B. monomers; ATP
- C. polymers; nucleotides
- D. polymers; cAMP
- E. polymers; DNA

65. ATP _____ endergonic and exergonic reactions.

- A. opposes
- B. decomposes
- C. reduces
- D. links
- E. dehydrates

66. Minerals are found in all of the following *except* _____.

- A. bones and teeth
- B. vitamins
- C. thyroid hormone
- D. electrolytes

67.

An atom with 12 electrons, 13 neutrons, and 11 protons is a(n) _____.

A. anion

B. cation

C.

free radical

D. isotope

E.

both an anion and an isotope

F.

both an anion and a free radical

68. The concentration of a solution may be expressed by all of the following *except* _____.

A. weight per volume

B. percentage

C. molarity

D. pH

69. The vibration of an ear drum is an example of _____ energy.

A. kinetic

B. potential

C. elastic

D. radiant

70. In the following reaction, what is(are) the product(s)? $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$

A. H_2CO_3

B. CO_2 and H_2O

C. CO_2 and H_2CO_3

D. H_2O and H_2CO_3

71. Which of the following will increase the rate of a chemical reaction?

A. An increase in reactant concentration

B. An increase in product concentration

C. A decreased temperature

D. Enzyme inhibition

72. Carbon is very versatile in forming bonds with other atoms because it has _____ valence electrons.

- A. four
- B. two
- C. eight
- D. six

73. Amylase is a digestive enzyme that breaks starches down into sugars through _____ reactions.

- A. hydrolysis
- B. dehydration synthesis
- C. anabolic
- D. endergonic

74. Which of the following is *not* a nucleotide?

- A. RNA
- B. GTP
- C. ATP
- D. cAMP

75. Metabolism is the sum of _____ and _____.

- A. inhalation; exhalation
- B. growth; differentiation
- C. anabolism; catabolism
- D. positive; negative feedback
- E. responsiveness; movement

True / False Questions

76. A molecule that is oxidized gains electrons and energy.

True False