Anatomy and Physiology Learning System 4th Edition Applegate Test Bank
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Applegate: The Anatomy and Physiology Learning System, 4th Edition

Chapter 02: Chemistry, Matter, and Life

Test Bank

TRUE/FALSE

1. The chemical symbol for calcium is C.

ANS: F
The symbol for calcium is Ca.

2. An element with 11 protons, 11 electrons, and 12 neutrons has a mass number = 34 amu.

ANS: F
Mass number = protons + neutrons = 23.

3. An iron atom that loses three electrons becomes a positively charged ion.

ANS: T

4. In the covalent molecule of water, the shared electrons are more closely associated with the oxygen than with the hydrogen. This makes water a polar molecule with the hydrogen end positively charged and the oxygen end negatively charged.

ANS: T

5. Crushing a substance into a fine powder tends to increase its reaction rate.

ANS: T

6. A mixture of salt and water that is clear and does not settle is called a suspension.

ANS: F
It is a solution.

7. If a base is added to a solution, the pH of the solution decreases.

ANS: F
A base increases the pH of a solution.

8. Fatty acids are the building blocks of proteins.

ANS: F

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Amino acids are the building blocks of proteins.

9. Glycogen and glucose are examples of carbohydrates.

ANS: T

10. A sugar, a phosphate, and a nitrogenous base make up a nucleotide, which is the building block of a nucleic acid.

ANS: T

MULTIPLE CHOICE

1. Anything that has mass and takes up space is
a. an element
b. matter
c. an atom
d. a compound
e. a molecule

ANS: B

2. The simplest form of matter is a(n)
a. atom
b. molecule
c. ion
d. element
e. compound

ANS: D

3. The chemical symbol for copper is
a. Co
b. Cu
c. C
d. Ca
e. Cp

ANS: B

4. Na is the chemical symbol for
a. sodium
b. potassium
c. calcium
d. iron
e. nitrogen

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ANS: A

5. The three most abundant elements in the body are
a. C, H, and N
b. C, H, and Ca
c. C, H, and O
d. O, H, and N
e. O, Na, and K

ANS: C

6. The positively charged particle in the nucleus of an atom is
a. a proton
b. a neutron
c. an electron
d. an ion
e. made neutral by a neutron

ANS: A

7. If an atom has 7 protons, there will be
a. 7 electrons in the nucleus
b. 7 neutrons in the nucleus
c. 7 neutrons in energy levels outside the nucleus
d. 2 electrons in the lowest energy level outside the nucleus and 5 electrons in the next higher level
e. 5 electrons in the lowest energy level outside the nucleus and 2 electrons in the next higher level

ANS: D

8. How many neutrons are in a neutral atom with 8 protons and a mass number of 16?
a. 8
b. 16
c. 4
d. 32
e. 24

ANS: A

9. A certain neutral atom has an atomic number = 19 and a mass number = 39. Which of the following are correct?
1) It has 19 electrons.
2) It has 20 protons.
3) It has 20 neutrons.
4) It has a total of 39 protons and electrons.

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a. 1 and 4 are correct
b. 1 and 3 are correct
c. 2 and 4 are correct
d. 2 and 3 are correct
e. 1, 3, and 4 are correct

ANS: B

10. Based on the number of electrons in its outer shell or highest energy level, which of these atoms is most stable?
a. hydrogen with atomic number = 1
b. carbon with atomic number = 6
c. oxygen with atomic number = 8
d. neon with atomic number = 10
e. magnesium with atomic number = 12

ANS: D

11. A chemical bond formed by two atoms sharing electrons is known as a(n) _____ bond.
a. intermolecular
b. ionic
c. hydrogen
d. covalent
e. donor

ANS: D

12. A chemical bond that does not hold atoms together to form molecules, but attracts molecules together is a(n) _____ bond.
a. ionic
b. hydrogen
c. intramolecular
d. covalent
e. polar covalent

ANS: B

13. In forming the compound sodium chloride, NaCl, the sodium loses an electron and chlorine gains an electron. The bond that holds this compound together is a(n) _____ bond.
a. covalent
b. hydrogen
c. ionic
d. intermolecular

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ANS: C

14. A water molecule is formed by an unequal sharing of electrons between hydrogen and oxygen. This makes the oxygen end of the molecule slightly negative and the hydrogen portion slightly positive. Which of the following is/are correct?
1) The bonds between the hydrogen and oxygen that hold the molecule together are ionic bonds.
2) The molecule of water is a polar covalent molecule.
3) The intermolecular bonds between water molecules are hydrogen bonds.
a. 1 only
b. 2 only
c. 3 only
d. 1 and 3
e. 2 and 3

ANS: E

15. When an atom loses an electron it becomes
a. negatively charged
b. a cation
c. an anion
d. a neutral ion
e. a molecule

ANS: B

16. The smallest unit of a compound is a(n)
a. element
b. atom
c. cation
d. molecule
e. anion

ANS: D

17. A substance formed by the chemical combination of two or more elements in a fixed or definite ratio is a(n)
a. mixture
b. solution
c. compound
d. element
e. gas

ANS: C

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18. The molecular formula for sodium bicarbonate is $NaHCO_3$. Which one of the following statements is INCORRECT?
a. The elements in this compound are sodium, hydrogen, carbon, and oxygen.
b. The number of sodium atoms equals the number of carbon atoms.
c. The subscript 3 refers to all of the elements preceding it.
d. There are three times as many oxygen atoms as hydrogen atoms.
e. The number of oxygen atoms equals the number of the other atoms combined.

ANS: C

19. A molecule with the formula H_2CO_3 contains
a. 1 hydrogen atom and 2 carbon atoms
b. 2 hydrogen atoms and 3 CO atoms
c. 1 hydrogen atom, 2 calcium atoms, and 3 oxygen atoms
d. 2 hydrogen atoms, 1 carbon atom, and 3 oxygen atoms
e. 1 hydrogen atom, 2 carbon atoms, and 3 oxygen atoms

ANS: D

20. In the chemical reaction $H_2O + CO_2 \rightarrow H_2CO_3$, the
a. reactants are H_2O and CO_2
b. products are H_2O and CO_2
c. reactant is H_2CO_3
d. product is H_2CO_3
e. both a and d

ANS: E

21. A chemical reaction in the body combines hydrogen and nitrogen to make ammonia. This is an example of a _____ reaction.
a. synthesis
b. decomposition
c. single replacement
d. double replacement

ANS: A

22. $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$ is a chemical equation for a _____ reaction.
a. synthesis
b. decomposition
c. single replacement
d. double replacement

ANS: C

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23. A reaction in which more energy is stored in the reactants than in the products with a release of energy during the reaction is a(n) _____ reaction.
a. exergonic
b. single replacement
c. hydrolysis
d. endergonic
e. dehydration synthesis

ANS: A

24. Chemical reactions that need an input of energy and store the energy in the product are called _____ reactions.
a. replacement
b. exergonic
c. synthesis
d. endergonic
e. thermal

ANS: D

25. Coal dust is more explosive than lumps of coal because pulverizing the coal into dust
a. increases the temperature
b. increases the surface area
c. adds a catalyst
d. increases the concentration of oxygen for the reaction
e. changes the chemical composition of the coal

ANS: B

26. The chemical reactions involved in the digestion of food utilize catalysts called enzymes. The enzymes
a. speed up the reactions
b. increase the surface area of the reactants
c. create hydrolysis reactions
d. change the nature of the products
e. change a synthesis reaction into a decomposition reaction

ANS: A

27. $CO_2 + H_2O \Leftrightarrow H^+ + HCO_3^-$ represents a reversible reaction. If CO_2 is added to the system, then
a. more H^+ will be produced
b. more water will be produced
c. the reaction will proceed to the left
d. nothing will happen because the reaction is at equilibrium

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ANS: A

28. A double arrow (⇔) in a chemical equation indicates that the reaction is
a. a synthesis reaction
b. a reversible reaction
c. a decomposition reaction
d. dependent on temperature
e. a reaction that requires a catalyst

ANS: B

29. Which of the following represents a solution?
a. sand and water
b. oil and water
c. sugar and sand
d. sugar and water
e. milk

ANS: D

30. When salt is dissolved in water, the salt is called the
a. solution
b. solute
c. solvent
d. dialysate
e. suspending medium

ANS: B

31. Suspensions
a. are clear
b. have a fixed composition
c. must be separated by chemical means
d. settle when left standing
e. are illustrated by a mixture of sugar and water

ANS: D

32. Which one of the following is NOT true about electrolytes?
a. They dissociate in water to form charged particles.
b. They conduct an electrical current.
c. They form cations and anions.
d. They are the basis of electrocardiograms.
e. They are the result of covalent bonds.

ANS: E

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33. An acid
a. tastes bitter
b. accepts protons donated by bases
c. has a pH <7
d. feels slippery
e. neutralizes salts

ANS: C

34. A substance that accepts hydrogen ions
a. is an acid
b. is a base
c. is a salt
d. has a pH <7
e. reacts with a buffer to form an acid

ANS: B

35. From the list below, the strongest base has a pH equal to
a. 2
b. 5.5
c. 7
d. 8
e. 9

ANS: E

36. The pH range of acids is
a. 0-14
b. 0-6
c. 8-14
d. less than 7
e. greater than 7

ANS: D

37. A substance that reacts with acids or bases to minimize the change in pH is
a. an acid
b. a base
c. a salt
d. water
e. a buffer

ANS: E

38. The acid component of a buffer system

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a. neutralizes water
b. reacts with strong acids to make them weaker
c. reacts with bases to form a salt and water
d. reacts with acids to form a neutral salt

ANS: C

39. Glycogen, or animal starch, is an example of a
a. simple sugar
b. protein
c. saturated fat
d. polysaccharide
e. steroid

ANS: D

40. All of the following are true about proteins EXCEPT they
a. always contain C, H, O, N
b. are formed from fatty acids linked by peptide bonds
c. often contain S
d. form the basic structural material in the body

ANS: B

41. The class of organic compounds that is the primary source of nutrient energy for the body is
a. carbohydrates
b. proteins
c. lipids
d. nucleic acids
e. adenosine triphosphate

ANS: A

42. The form of carbohydrates transported in the blood is
a. glycogen
b. disaccharides
c. fructose
d. ribose
e. glucose

ANS: E

43. Important polysaccharides include
a. ribose and deoxyribose
b. glucose and fructose

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c. starch, glycogen, and cellulose
d. triglycerides and steroids
e. polypeptides and triglycerides

ANS: C

44. Triglycerides and steroids belong to the class of organic compounds called
a. carbohydrates
b. lipids
c. proteins
d. nucleic acids
e. high energy compounds

ANS: B

45. The class of organic compounds with building blocks called amino acids is
a. carbohydrates
b. lipids
c. proteins
d. nucleic acids
e. high energy compounds

ANS: C

46. The most common members of the lipid class of organic compounds are
a. steroids
b. phospholipids
c. triglycerides
d. glycolipids
e. lipoproteins

ANS: C

47. The genetic material of the cell is
a. composed of phospholipid
b. adenosine triphosphate
c. a steroid
d. one of the nucleic acids
e. a polypeptide

ANS: D

48. Energy for immediate use in the body is stored in the high-energy
a. phosphate bonds of nucleic acids
b. phosphate bonds of adenosine triphosphate
c. bonds of triglycerides

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d. bonds of glycogen
e. bonds of glucose

ANS: B

49. A term that means breaking down fat is
a. lipogenesis
b. hydrolysis
c. glycogenesis
d. lipolysis
e. glycolysis

ANS: D

50. A root that means sugar or sweet is
a. carbo-
b. sacchar-
c. hydro-
d. lacto-
e. lipo-

ANS: B

COMPLETION

1. What is the term that describes the simplest form of matter that cannot be broken down by ordinary chemical means?

ANS: element

2. What is the term that describes the element that is designated by the symbol K?

ANS: potassium

3. What is the term that describes the negatively charged particle in an atom?

ANS: electron

4. What is the mass number of an atom with 8 protons, 8 neutrons, and 8 electrons?

ANS: 16

5. What is the term that describes the chemical bond that is formed when electrons are shared?

ANS: covalent

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6. What is the term that describes positively charged ions?

ANS: cations

7. What are the elements and total number of atoms in $NaHCO_2$?

ANS:
sodium, hydrogen, carbon, oxygen, 5
sodium, hydrogen, carbon, and oxygen, 5
elements are sodium, hydrogen, carbon, and oxygen; total number = 5

8. What is the compound that is a product in this reaction: $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$?

ANS:
NaCl

remember Br_2 is not a compound because it has only one type of atom.

9. What is the term that describes the type of reaction represented by this equation: $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$?

ANS:
single replacement
single displacement

10. What is the term that describes the type of reaction in which more energy is stored in the products than in the reactants?

ANS: endergonic

11. What is the substance that increases the rate of a chemical reaction?

ANS: catalyst

12. What is the substance that is dissolved in a solution?

ANS: solute

13. What is the term that describes the type of reaction in which an acid reacts with a base to produce a salt?

ANS: neutralization

14. What is the term that describes the type of organic compounds that contain nitrogen in addition to carbon, hydrogen, and oxygen?

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ANS: proteins

15. What is the term that describes the high energy compound that supplies energy in a form that is usable by body cells?

ANS:
adenosine triphosphate
ATP
adenosine triphosphate (ATP)

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