

## Chapter 02 The Chemistry of Life

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 composed of two or more substances that are physically blended but not chemically combined.

True False

7. Blood pH 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. All the chemical reactions in which larger molecules are broken down to smaller ones are called catabolic reactions.

True False

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

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

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. Sodium, which has an atomic number of 11, will react with chlorine, which has an atomic number of 17.

When these two atoms react, both become stable. To become stable, sodium will \_\_\_\_\_, while chlorine 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. Consider oxygen, which 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.  $\text{Na}^+$  and  $\text{Cl}^-$  form ionic bonds with each other.
- B.  $\text{Na}^+$  and  $\text{Cl}^-$  form polar covalent bonds with each other.
- C.  $\text{Na}^+$  and  $\text{Cl}^-$  form hydrogen bonds with water.
- D. Ionic bonds between  $\text{Na}^+$  and  $\text{Cl}^-$  are broken.
- E.  $\text{Na}^+$  and  $\text{Cl}^-$  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

25. Which of these is a cation?

- A.  $\text{O}_2$
- B. K
- C. Na
- D.  $\text{Ca}^{2+}$
- E.  $\text{Cl}^-$

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. Varieties of elements called \_\_\_\_\_ differ from one another only in number of neutrons and therefore in atomic mass.
- A. cations
  - B. anions
  - C. isotopes
  - D. electrolytes
  - E. free radicals
28. When you jump off a high diving board into water, you notice great resistance of water. This resistance is called \_\_\_\_\_ and is caused by water's great \_\_\_\_\_.
- A. surface tension; adhesiveness.
  - B. surface tension; cohesiveness.
  - C. hydrophobic tension; adhesiveness.
  - D. hydrophilic tension; cohesiveness.
  - E. hydrophilic tension; adhesiveness.
29. Which of these is hydrophobic?
- A. sugar
  - B.  $K^+$
  - C.  $Cl^-$
  - D. water
  - E. fat

30. Consider a mixture of blood, which contains sodium chloride, protein, and cells or formed elements. The sodium chloride 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 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. twice
- 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. Blood has a pH ranging from 7.35 to 7.45. Slight deviations from this can cause major problems, even death. You are doing an intense workout, and your skeletal muscle cells are producing metabolic acids such as lactic acid. Your blood pH does not drop significantly in spite of the metabolic acids released into the blood. 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 acid or base is added to it is

- A. a buffer.
- B. a catalyst.
- C. a reducing agent.
- D. an oxidizing agent.
- E. a colloid.

36. Any chemical reaction that removes electrons from an atom is called

- A. reduction.
- B. condensation.
- C. hydrolysis.
- D. anabolism.
- 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. When ATP breaks down to ADP, potential energy stored in bonds is released. This energy stored in bonds is \_\_\_\_\_ energy.

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

40. Glucose is broken down in most of your cells to form carbon dioxide, oxygen, and the energy currency of the cell called ATP. What type of chemical reaction is this?

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

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

- A. reactants being more concentrated
- B. rise in temperature
- C. presence of a catalyst
- D. presence of an enzyme
- E. decrease in reactant concentrations

42. Which of the following words includes all of the other terms?

- A. catabolism
- B. anabolism
- C. metabolism
- D. oxidative reactions
- E. reductive reactions



43. Digestive enzymes breakdown the starch in a potato into thousands of glucose molecules. This exemplifies a(n) \_\_\_\_\_ reaction.

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

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. \_\_\_\_\_ 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 \_\_\_\_\_ converts a \_\_\_\_\_ to its monomers.

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

48. The formula for an amino group is \_\_\_\_\_ whereas the formula of a carboxyl group is \_\_\_\_\_
- A.  $\text{-COOH}$ ;  $\text{-OH}$ .
  - B.  $\text{-CH}_3$ ;  $\text{-NH}_2$ .
  - C.  $\text{-OH}$ ;  $\text{-SH}$ .
  - D.  $\text{-NH}_2$ ;  $\text{-COOH}$ .
  - E.  $\text{-SH}$ ;  $\text{-H}_2\text{PO}_4$ .
49. Table sugar is a disaccharide called \_\_\_\_\_ and is made up of the monomer(s) \_\_\_\_\_.
- A. maltose; glucose
  - B. sucrose; glucose and fructose
  - C. lactose; glucose and galactose
  - D. glycogen; glucose
  - 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 macromolecules that form gels, which help hold cells and tissues together, lubricate joints, and account for the tough rubbery texture of cartilage. 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 are molecules consisting of one 3-carbon compound called \_\_\_\_\_ bound to three \_\_\_\_\_.

- A. eicosanoid; fatty acids
- B. steroid; glycerols
- C. eicosanoid; steroid
- D. glycerol; fatty acids
- E. steroid; 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 is (are) always hydrophobic?

- A. glucose
- B. cholesterol
- C. amino acids
- D. proteins
- E. disaccharides

57. Proteins can serve 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 proteins in response to conditions such as extreme heat or pH will lead to loss of a protein's function. This drastic change in three-dimensional shape 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. polypeptides; 80

60. The folding and coiling of proteins into globular and fibrous shapes determines the \_\_\_\_\_ structure of the protein

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

61. Enzymes are specific to substrates because of the shape of their

- A. active sites.
- B. receptors.
- C. secondary structure.
- D. terminal amino acids.
- 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 \_\_\_\_\_ but not all of those are enzymes.

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

64. Nucleic acids are \_\_\_\_\_ of \_\_\_\_\_.

- A. molecules; 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

## Chapter 02 The Chemistry of Life **Key**

1. Minerals are organic elements extracted from the soil by plants.

**FALSE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #1*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

2. Molecules composed of two or more atoms are called compounds.

**FALSE**

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #2*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

3. Hydrogen, deuterium, and tritium are three isotopes of hydrogen.

**TRUE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #3*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

4. Potassium, sodium, and chlorine are trace elements.

**FALSE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #4*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

5. Ionic bonds break apart in water more easily than covalent bonds do

**TRUE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #5*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

6. A solution is a mixture composed of two or more substances that are physically blended but not chemically combined.

**TRUE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #6*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

7. Blood pH is approximately 7.4, which is slightly acidic.

**FALSE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #7*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

8. The high heat capacity of water makes it a very ineffective coolant.

**FALSE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #8*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

9. In an exchange reaction, covalent bonds are broken and new covalent bonds are formed.

**TRUE**

*Difficulty Level: Evaluate/Create*

*Saladin - Chapter 02 #9*

*Section: 2.3 Energy and Chemical Reactions*

*Topic: Chemistry*

10. All the chemical reactions in which larger molecules are broken down to smaller ones are called catabolic reactions.

**TRUE**

*Difficulty Level: Remember/Understand  
Saladin - Chapter 02 #10  
Section: 2.3 Energy and Chemical Reactions  
Topic: Chemistry*

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

**TRUE**

*Difficulty Level: Remember/Understand  
Saladin - Chapter 02 #11  
Section: 2.4 Organic Compounds  
Topic: Chemistry*

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

**FALSE**

*Difficulty Level: Remember/Understand  
Saladin - Chapter 02 #12  
Section: 2.4 Organic Compounds  
Topic: Chemistry*

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

**FALSE**

*Difficulty Level: Apply/Analyze  
Saladin - Chapter 02 #13  
Section: 2.4 Organic Compounds  
Topic: Chemistry*

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

**TRUE**

*Difficulty Level: Remember/Understand  
Saladin - Chapter 02 #14  
Section: 2.4 Organic Compounds  
Topic: Chemistry*



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

**FALSE**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #15*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

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

A. nitrogen.

B. hydrogen.

C. carbon.

**D.** oxygen.

E. calcium

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #16*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

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.

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #17*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

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

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

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #18*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

19. Sodium, which has an atomic number of 11, will react with chlorine, which has an atomic number of 17. When these two atoms react, both become stable. To become stable, sodium will \_\_\_\_\_, while chlorine 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**

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #19*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

20. Consider oxygen, which 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

*Difficulty Level: Evaluate/Create*

*Saladin - Chapter 02 #20*

*Section: 2.1 Atoms, Ions, and Molecules*

*Topic: Chemistry*

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

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #21*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

22. When table salt, sodium chloride (NaCl), is placed in water

- A.  $\text{Na}^+$  and  $\text{Cl}^-$  form ionic bonds with each other.
- B.  $\text{Na}^+$  and  $\text{Cl}^-$  form polar covalent bonds with each other.
- C.  $\text{Na}^+$  and  $\text{Cl}^-$  form hydrogen bonds with water.
- D. Ionic bonds between  $\text{Na}^+$  and  $\text{Cl}^-$  are broken.**
- E.  $\text{Na}^+$  and  $\text{Cl}^-$  become separated by their Van der Waals forces.

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #22*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

23. The bonding properties of an atom are determined by its

- A. electrons.**
- B. protons.
- C. positrons.
- D. neutrons.
- E. photons.

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #23*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

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

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #24*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

25. Which of these is a cation?

- A.  $O_2$
- B. K
- C. Na
- D.  $Ca^{2+}$**
- E.  $Cl^-$

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #25*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

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**

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #26*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

27. Varieties of elements called \_\_\_\_\_ differ from one another only in number of neutrons and therefore in atomic mass.

- A. cations
- B. anions
- C. isotopes**
- D. electrolytes
- E. free radicals

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #27*  
*Section: 2.1 Atoms, Ions, and Molecules*  
*Topic: Chemistry*

28. When you jump off a high diving board into water, you notice great resistance of water. This resistance is called \_\_\_\_\_ and is caused by water's great \_\_\_\_\_.

- A. surface tension; adhesiveness.
- B. surface tension; cohesiveness.**
- C. hydrophobic tension; adhesiveness.
- D. hydrophilic tension; cohesiveness.
- E. hydrophilic tension; adhesiveness.

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #28*  
*Section: 2.2 Water and Mixtures*  
*Topic: Chemistry*

29. Which of these is hydrophobic?

- A. sugar
- B.  $K^+$
- C.  $Cl^-$
- D. water
- E. fat**

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #29*  
*Section: 2.2 Water and Mixtures*  
*Topic: Chemistry*

30. Consider a mixture of blood, which contains sodium chloride, protein, and cells or formed elements. The sodium chloride 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**

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #30*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

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

- A. molarity**
- B. volume
- C. percentage
- D. weight per volume
- E. milliequivalents per liter

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #31*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

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

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

*Difficulty Level: Evaluate/Create*

*Saladin - Chapter 02 #32*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

33. Which of these has the highest  $\text{H}^+$  concentration?

- A. lemon juice,  $\text{pH} = 2.3$
- B. red wine,  $\text{pH} = 3.2$
- C. tomato juice,  $\text{pH} = 4.7$
- D. saliva,  $\text{pH} = 6.6$
- E. household ammonia,  $\text{pH} = 10.8$

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #33*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

34. Blood has a pH ranging from 7.35 to 7.45. Slight deviations from this can cause major problems, even death. You are doing an intense workout, and your skeletal muscle cells are producing metabolic acids such as lactic acid. Your blood pH does not drop significantly in spite of the metabolic acids released into the blood. 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  $\text{H}^+$  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  $\text{H}^+$  to prevent a decrease in pH.

*Difficulty Level: Evaluate/Create*

*Saladin - Chapter 02 #34*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

35. A solution that resists a change in pH when acid or base is added to it is

- A. a buffer.
- B. a catalyst.
- C. a reducing agent.
- D. an oxidizing agent.
- E. a colloid.

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #35*

*Section: 2.2 Water and Mixtures*

*Topic: Chemistry*

36. Any chemical reaction that removes electrons from an atom is called

- A. reduction.
- B. condensation.
- C. hydrolysis.
- D. anabolism.
- E. oxidation.**

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #36*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

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.

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #37*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

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

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #38*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*



39. When ATP breaks down to ADP, potential energy stored in bonds is released. This energy stored in bonds is \_\_\_\_\_ energy.

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

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #39*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

40. Glucose is broken down in most of your cells to form carbon dioxide, oxygen, and the energy currency of the cell called ATP. What type of chemical reaction is this?

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

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #40*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

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

- A. reactants being more concentrated
- B. rise in temperature
- C. presence of a catalyst
- D. presence of an enzyme
- E. decrease in reactant concentrations**

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #41*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

42. Which of the following words includes all of the other terms?

- A. catabolism
- B. anabolism
- C. metabolism**
- D. oxidative reactions
- E. reductive reactions

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #42*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

43. Digestive enzymes breakdown the starch in a potato into thousands of glucose molecules. This exemplifies a(n) \_\_\_\_\_ reaction.

- A. synthesis
- B. decomposition**
- C. exchange
- D. anabolic
- E. reductive

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #43*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

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.  $A + B \rightarrow AB \rightarrow C + D$

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #44*  
*Section: 2.3 Energy and Chemical Reactions*  
*Topic: Chemistry*

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.

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #45*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

46. \_\_\_\_\_ is *not* an organic compound.

- A.  $\text{C}_{16}\text{H}_{18}\text{N}_3\text{ClS}$
- B.  $\text{Na}_2\text{HPO}_3(\text{H}_2\text{O})_5$**
- C.  $\text{CH}_4$
- D.  $\text{C}_3\text{H}_7\text{O}_2\text{N}$

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #46*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

47. A \_\_\_\_\_ converts a \_\_\_\_\_ to its monomers.

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

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #47*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

48. The formula for an amino group is \_\_\_\_\_ whereas the formula of a carboxyl group is \_\_\_\_\_
- A.  $\text{-COOH}$ ;  $\text{-OH}$ .
  - B.  $\text{-CH}_3$ ;  $\text{-NH}_2$ .
  - C.  $\text{-OH}$ ;  $\text{-SH}$ .
  - D.**  $\text{-NH}_2$ ;  $\text{-COOH}$ .
  - E.  $\text{-SH}$ ;  $\text{-H}_2\text{PO}_4$ .

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #48*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

49. Table sugar is a disaccharide called \_\_\_\_\_ and is made up of the monomer(s) \_\_\_\_\_.
- A. maltose; glucose
  - B.** sucrose; glucose and fructose
  - C. lactose; glucose and galactose
  - D. glycogen; glucose
  - E. glucose; galactose and fructose

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #49*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

50. Which of the following is a disaccharide?
- A. galactose
  - B.** lactose
  - C. glucose
  - D. fructose
  - E. amylose

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #50*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

51. \_\_\_\_\_ is a monosaccharide, whereas \_\_\_\_\_ is a polysaccharide.

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

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #51*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

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

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

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #52*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

53. Proteoglycans are macromolecules that form gels, which help hold cells and tissues together, lubricate joints, and account for the tough rubbery texture of cartilage. 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.

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #53*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

54. Triglycerides are molecules consisting of one 3-carbon compound called \_\_\_\_\_ bound to three \_\_\_\_\_.

- A. eicosanoid; fatty acids
- B. steroid; glycerols
- C. eicosanoid; steroid
- D. glycerol; fatty acids**
- E. steroid; fatty acids

*Difficulty Level: Remember/Understand*  
*Saladin - Chapter 02 #54*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

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**

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #55*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

56. Which of these is (are) always hydrophobic?

- A. glucose
- B. cholesterol**
- C. amino acids
- D. proteins
- E. disaccharides

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #56*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

57. Proteins can serve 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.**

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #57*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

58. A drastic conformational change in proteins in response to conditions such as extreme heat or pH will lead to loss of a protein's function. This drastic change in three-dimensional shape is called

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

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #58*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

59. Proteins are \_\_\_\_\_ built from \_\_\_\_\_ different amino acids.

- A. monomers; 10
- B. molecules; 10
- C. polymers; 20**
- D. macromolecules; 40
- E. polypeptides; 80

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #59*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

60. The folding and coiling of proteins into globular and fibrous shapes determines the \_\_\_\_\_ structure of the protein

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

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #60*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

61. Enzymes are specific to substrates because of the shape of their

- A. active sites.**
- B. receptors.
- C. secondary structure.
- D. terminal amino acids.
- E. alpha chain.

*Difficulty Level: Remember/Understand*

*Saladin - Chapter 02 #61*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*

62. \_\_\_\_\_ is the substrate of \_\_\_\_\_.

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

*Difficulty Level: Apply/Analyze*

*Saladin - Chapter 02 #62*

*Section: 2.4 Organic Compounds*

*Topic: Chemistry*



63. All enzymes are \_\_\_\_\_ but not all of those are enzymes.

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

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #63*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

64. Nucleic acids are \_\_\_\_\_ of \_\_\_\_\_.

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

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #64*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

65. ATP \_\_\_\_\_ endergonic and exergonic reactions.

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

*Difficulty Level: Apply/Analyze*  
*Saladin - Chapter 02 #65*  
*Section: 2.4 Organic Compounds*  
*Topic: Chemistry*

## Chapter 02 The Chemistry of Life Summary

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