Q1W5- Bio12-Qs Bank

True/False
Indicate whether the statement is true or false.

____ 1. In a water molecule, electrons are shared equally between the hydrogen atoms and oxygen atom.

____ 2. The attraction of opposite charges between hydrogen and oxygen forms a weak oxygen bond.

____ 3. Because of its polarity, water can move from the roots of a plant up to its leaves.

____ 4. Water changes temperature easily.

____ 5. Unlike most substances, water expands when it freezes.

____ 6. Carbon atoms can bond together in straight chains, branched chains, or rings.

____ 7. Large molecules containing carbon atoms are called micromolecules.

____ 8. Polymers are formed by hydrolysis.

____ 9. Cells use carbohydrates for energy.

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

____ 10. All objects in motion have
a. potential energy.
b. heat energy.
c. kinetic energy.
d. random energy.

____ 11. The first scientist to observe evidence of the random motion of molecules was
a. Brown.
b. Darwin.
c. Mendel.
d. Hooke.

____ 12. The net movement of particles from an area of higher concentration to an area of lower concentration is called
a. dynamic equilibrium.
b. nonrandom movement.
c. concentration gradient.
d. diffusion.

____ 13. Diffusion occurs because of
a. nonrandom movement of particles.
b. random movement of particles.
c. a chemical reaction between particles.
d. chemical energy.

____ 14. When a few drops of colored corn syrup are added to a beaker of pure corn syrup, the color will
a. move from low concentration to high concentration.
b. form a polar bond.
c. start to diffuse.
d. remain on the bottom of the beaker.

____ 15. Diffusion can be accelerated by
a. decreasing the pressure.
b. increasing the temperature.
c. decreasing the movement of particles.
d. increasing the dynamic equilibrium.

____ 16. When materials pass into and out of a cell at equal rates, there is no net change in concentration inside the cell. The cell is in a state of
a. dynamic equilibrium.
b. metabolism.
c. imbalance.
d. inertia.

____ 17. The difference in concentration of a substance across space is called
a. dynamic equilibrium.
c. diffusion.

b. concentration gradient.
d. Brownian movement.

____ 18. Which of the following compounds may be polymers?
a. carbohydrates
c. proteins
b. nucleic acids
d. all of these

____ 19. Which of the following does NOT describe a polymer?
a. Polymers are made of monomers.
b. Polymers are large molecules.
c. Polymers usually form by covalent bonding.
d. Polymers are broken down by the process of hydrogenation.

____ 20. Carbon compounds that come from living organisms are called _____ compounds.
a. water
c. homogeneous
b. organic
d. biological

____ 21. How many electrons can a carbon atom share?
a. one
c. three
b. two
d. four

____ 22. Which of the following is a chemical reaction?
a. tearing paper into strips
b. burning paper
c. picking up iron filings with a magnet
d. mixing salt and sugar in the same container

____ 23. _____ represents a formula for a chemical compound.
a. H
c. P
b. C
d. H_2O

____ 24. The nucleus of an atom contains _____.
a. protons and neutrons
c. protons and electrons
b. neutrons and electrons
d. protons, neutrons, and electrons

____ 25. Electrons move about the nucleus of an atom in regions called _____.
a. electron clouds
c. air
b. nuclei
d. isotopes

____ 26. What are the basic building blocks of proteins?
a. nucleic acids
c. amino acids
b. peptide bonds
d. glycerol and fatty acids

____ 27. Water dissolves many ionic and molecular compounds because of its _____.
a. ionic bonding
c. covalent bonding
b. polarity
d. hydrogen bonding

____ 28. When molecules of glucose and fructose combine to form sucrose, they do so by _____.
a. hydrolysis
c. condensation
b. electron clouds
d. radiation

____ 29. A chlorine atom becomes a chloride ion when it _____.
a. gains an electron
c. gains a neutron
b. loses an electron
d. loses a proton

____ 30. The various enzymes in our bodies are _____.
a. lipids
c. nucleotides
b. carbohydrates
d. proteins

____ 31. Glucose and fructose, with the formula $C_6H_{12}O_6$, differ in _____.
a. numbers of atoms
c. kinds of atoms
b. arrangement of atoms
d. arrangement of electrons

____ 32. A very strong base might have a pH of _____.

a. 3
b. 5
c. 9
d. 13

____ 33. Carbon-12, carbon-13, and carbon-14 are _____.
a. isotopes
b. polymers
c. radioisotopes
d. macromolecules

____ 34. The total number of atoms in a molecule of sucrose, $C_{12}H_{22}O_{11}$, is _____.
a. 11
b. 12
c. 22
d. 45

____ 35. An atom of fluorine has nine electrons. Its second energy level has _____.
a. two electrons
b. eight electrons
c. seven electrons
d. nine electrons

____ 36. An unsaturated lipid contains _____.
a. more oxygen than hydrogen
b. double bonds
c. ionic bonds
d. only one fatty acid

____ 37. Unlike carbohydrates and fats, proteins contain _____.
a. nitrogen
b. carbon
c. hydrogen
d. oxygen

____ 38. Diffusion continues until there is no _____.
a. dynamic equilibrium
b. turgor pressure
c. concentration gradient
d. homeostasis

____ 39. Brownian motion is evidence of _____.
a. polar ions
b. random motion of molecules
c. chemical energy
d. microorganisms

____ 40. Which of the atoms pictured in Figure 6-3 is most likely to form an ion?

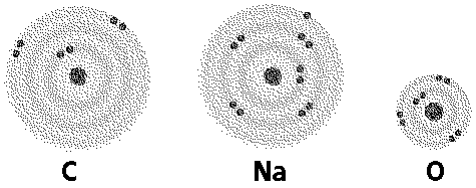

Figure 6-3

a. C
b. Na
c. O
d. they are all equally likely to form an ion

____ 41. Which of the images in Figure 6-4 depicts dynamic equilibrium?

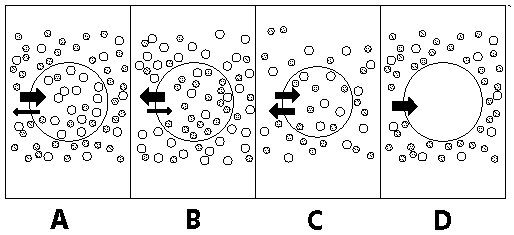

Figure 6-4

a. A
b. B
c. C
d. D

____ 42. Which element would need to be removed from the molecule in Figure 6-5 to make it unsaturated?

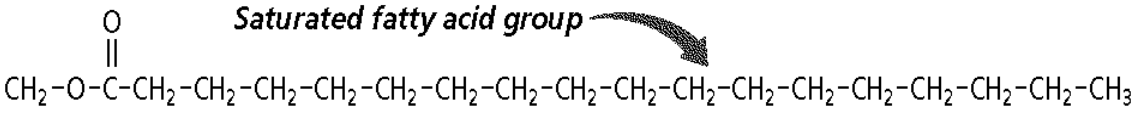

Figure 6-5

a. carbon
b. hydrogen
c. oxygen
d. phosphorus

Short Answer

43. Explain how polymers may be broken down in living things.
44. Explain how polymers may be made in living things.
45. Explain the importance of carbon's ability to form covalent bonds in straight chains, branched chains, or rings.
46. Why is the polar property of water important?
47. Explain how sodium and chlorine combine to form a stable compound in a chemical reaction.
48. Explain how isotopes can be utilized in medicine.
49. In the chemical reaction $6CO_2 + 12H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$, 6 molecules of carbon dioxide are represented by _____.
50. In the chemical reaction $6CO_2 + 12H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$, 1 molecule of sugar is represented by _____.
51. In the chemical reaction $6CO_2 + 12H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$, 1 molecule of oxygen that contains two atoms is represented by _____.

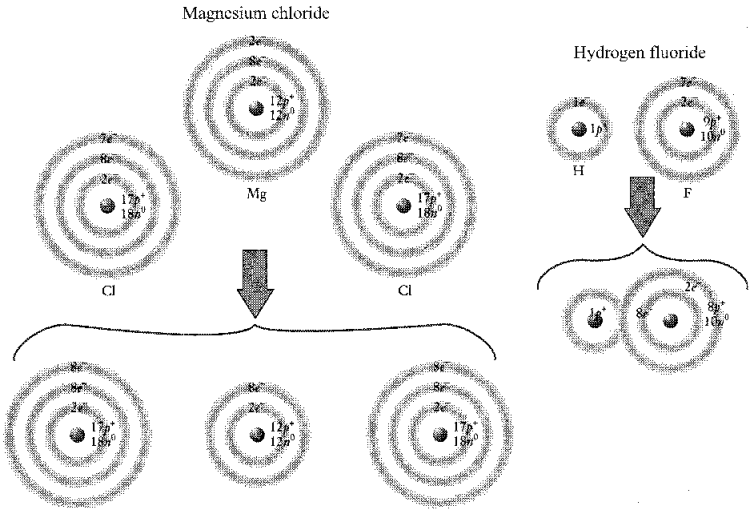

Figure 6-1

52. Which compound shown in Figure 6-1 is formed by covalent bonding? Explain.
53. Which compound shown in Figure 6-1 is formed by ionic bonding? Explain.

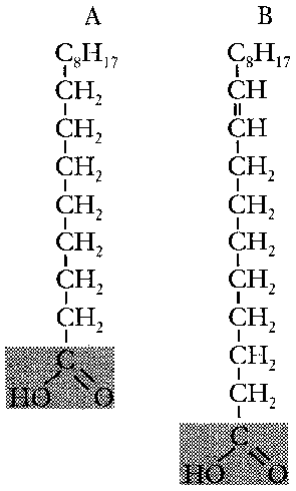

Figure 6-2

54. In most lipids, compounds like A and B of Figure 6-2 are attached to what 3-carbon molecule?

55. Classify A and B of Figure 6-2 as either saturated or unsaturated. Explain.

56. What types of biological compounds are A and B of Figure 6-2?

Table 6-1

Indicator	Color at lower pH values	pH range of color transition	Color at higher pH values
Methyl red	Red	4.4–6.0	Yellow
Litmus	Red	5.5–8.0	Blue
Bromothymol blue	Yellow	6.0–7.6	Blue
Phenol red	Yellow	6.8–8.4	Red
Phenolphthalein	Colorless	8.3–10.0	Red

57. If you exhale carbon dioxide (CO_2) into a solution of bromothymol blue, the solution turns from blue to yellow. Does CO_2 dissolve in water to form an acid or a base? Use Table 6-1 of acid-base indicators to answer.

58. Refer to Table 6-1 of acid-base indicators. A small volume of dilute hydrochloric acid is placed in a beaker, and two drops of phenolphthalein are added. The solution remains colorless. A dilute solution of sodium hydroxide is then added drop by drop until a color change occurs. In what pH range does the color change occur? Describe the color change that occurs.

Two students carry out an investigation to determine the action of the enzyme pepsin on protein digestion in the human stomach. They know that gastric juice in the stomach contains water, pepsin, and hydrochloric acid. They decide to use small, equal-sized pieces of cooked egg white as the protein to be digested.

They set up four test tubes and place equal, small amounts of egg white in each test tube. Then they fill each test tube with a different liquid to a height of 3 cm. To test tube 1 they add water, to test tube 2 they add dilute hydrochloric acid (HCl), to test tube 3 they add pepsin in water, and to test tube 4 they add pepsin and dilute hydrochloric acid. They place the four test tubes in an incubator set at 37°C (body temperature).

After one day, they observe the results. They return the test tubes to the incubator and observe them again the next day. Table 6-2 is the record of the results.

Table 6-2

Test tube	1 day	2 days
1. egg + water	no change	no change
2. egg + HCl	no change	no change
3. egg + pepsin	liquid slightly cloudy, egg white solid	liquid cloudy, egg white still solid
4. egg + pepsin + HCl	liquid cloudy, pieces of egg smaller	liquid very cloudy, almost no egg remains

59. Write a conclusion to the experiment. Base your conclusion on the experimental results shown in Table 6-2.
60. Was the hypothesis correct? Why?
61. From the experiment, does HCl digest protein? How do you know?
62. Which test tube is the control? Explain its purpose.
63. Which test tube or tubes are the experimental group? Why do you say so?
64. Imagine that a bottle of perfume is opened at the back of a classroom. Explain how your teacher can detect the odor on the other side of the room within a few minutes.

Completion

Complete each statement.

Using the choices below, choose the type of substance described.

compound element

65. H_2O, a liquid that no longer resembles either hydrogen or oxygen gas. _____
66. A substance that can be broken down in a chemical reaction. _____
67. Carbon, the substance represented by the symbol C. _____
68. An organic compound with a ratio of about two hydrogen atoms and one oxygen atom for each carbon atom is a(n) _____.
69. The smaller subunits that make up nucleic acids are _____.
70. Any substance that forms hydrogen ions in water is a(n) _____.
71. Two atoms that share electrons are held together by _____ bonds.
72. Atoms of the same element with different numbers of neutrons are _____.

Matching

Match each item with the correct statement below.

a. cellulose
b. polar molecule
c. nucleus
d. peptide bond
e. polymer
f. solution
g. enzyme
h. metabolism

____ 73. glucose polymer that forms the cell walls of plants
____ 74. large molecule formed when many smaller molecules bond together
____ 75. molecule with unequal distribution of charge
____ 76. protein that speeds up a chemical reaction
____ 77. bond formed between amino acids
____ 78. all the chemical changes that occur within an organism
____ 79. mixture in which one substance is distributed evenly in another
____ 80. center of an atom

Q1W5- Bio12-Qs Bank
Answer Section

TRUE/FALSE

1. ANS: F PTS: 1
2. ANS: F PTS: 1
3. ANS: T PTS: 1
4. ANS: F PTS: 1
5. ANS: T PTS: 1
6. ANS: T PTS: 1
7. ANS: F PTS: 1
8. ANS: F PTS: 1
9. ANS: T PTS: 1

MULTIPLE CHOICE

10. ANS: C PTS: 1
11. ANS: A PTS: 1
12. ANS: D PTS: 1
13. ANS: B PTS: 1
14. ANS: C PTS: 1
15. ANS: B PTS: 1
16. ANS: A PTS: 1
17. ANS: B PTS: 1
18. ANS: D PTS: 1 DIF: B OBJ: 6-9
    NAT: C5 | G1 | G3
19. ANS: D PTS: 1 DIF: B OBJ: 6-8
    NAT: C5 | G1
20. ANS: B PTS: 1 DIF: B OBJ: 6-7
    NAT: C5 | G1
21. ANS: D PTS: 1 DIF: B OBJ: 6-7
    NAT: C5 | G1
22. ANS: B PTS: 1 DIF: B OBJ: 6-2
    NAT: C5 | G1 | G2
23. ANS: D PTS: 1 DIF: B OBJ: 6-2
    NAT: C5 | G1 | G2
24. ANS: A PTS: 1 DIF: B OBJ: 6-1
    NAT: C5 | G1 | G2
25. ANS: A PTS: 1 DIF: B OBJ: 6-1
    NAT: C5 | G1 | G2
26. ANS: C PTS: 1 DIF: B OBJ: 6-9
    NAT: C5 | G1 | G3
27. ANS: B PTS: 1 DIF: B OBJ: 6-5
    NAT: C5 | G1
28. ANS: C PTS: 1 DIF: B OBJ: 6-8

NAT: C5 | G1

29. ANS: A PTS: 1 DIF: B OBJ: 6-2
NAT: C5 | G1 | G2

30. ANS: D PTS: 1 DIF: B OBJ: 6-10
NAT: C1

31. ANS: B PTS: 1 DIF: B OBJ: 6-7
NAT: C5 | G1

32. ANS: D PTS: 1 DIF: B OBJ: 6-4
NAT: C5 | G1 | G2

33. ANS: A PTS: 1 DIF: B OBJ: 6-1
NAT: C5 | G1 | G2

34. ANS: D PTS: 1 DIF: B OBJ: 6-9
NAT: C5 | G1 | G3

35. ANS: C PTS: 1 DIF: B OBJ: 6-1
NAT: C5 | G1 | G2

36. ANS: B PTS: 1 DIF: B OBJ: 6-9
NAT: C5 | G1 | G3

37. ANS: A PTS: 1 DIF: B OBJ: 6-9
NAT: C5 | G1 | G3

38. ANS: C PTS: 1 DIF: B OBJ: 6-6
NAT: C5 | G1 | G3

39. ANS: B PTS: 1 DIF: B OBJ: 6-6
NAT: C5 | G1 | G3

40. ANS: B PTS: 1 DIF: B OBJ: 6-2
NAT: C5 | G1 | G2

41. ANS: C PTS: 1 DIF: A OBJ: 6-4
NAT: C5 | G1 | G2

42. ANS: B PTS: 1 DIF: A OBJ: 6-9
NAT: C5 | G1 | G3

SHORT ANSWER

43. ANS:
Polymers may be broken down by hydrolysis, the reverse of condensation. Hydrogen is added to one part of the molecule, and hydroxide is added to another. This separates the two into smaller molecules, eventually forming monomers.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

44. ANS:
Polymers may be formed from a variety of monomers by condensation. Condensation is the combining of a hydrogen atom from one monomer with a hydroxide from a second monomer, forming water. As the water is formed, the two monomers are linked.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

45. ANS:
Carbon's ability to form covalent bonds is important in allowing for a wide variety of organic molecules. Living things require such a variety to carry out life processes.

PTS: 1 DIF: A OBJ: 6-7 NAT: C5 | G1

46. ANS:
Answers may include: Polarity allows water to dissolve many materials but not react with them chemically in the process.

PTS: 1 DIF: A OBJ: 6-5 NAT: C5 | G1

47. ANS:
Sodium (Na) atoms each lose one electron. Chlorine (Cl) atoms each gain one electron. When sodium chloride (NaCl) is formed by ionic bonding, the resulting molecule is stable.

PTS: 1 DIF: A OBJ: 6-2 NAT: C5 | G1 | G2

48. ANS:
Some isotopes are radioactive and can be used to diagnose a disease, such as measuring the function of the thyroid gland using radioactive iodine. They can also be used to treat some diseases such as cancer.

PTS: 1 DIF: A OBJ: 6-4 NAT: C5 | G1 | G2

49. ANS:
$6CO_2$

PTS: 1 DIF: A OBJ: 6-2 NAT: C5 | G1 | G2

50. ANS:
$C_6H_{12}O_6$

PTS: 1 DIF: A OBJ: 6-7 NAT: C5 | G1

51. ANS:
O_2

PTS: 1 DIF: A OBJ: 6-2 NAT: C5 | G1 | G2

52. ANS:
Hydrogen fluoride; it is formed by covalent bonding because two electrons, one from each atom, are shared by each hydrogen fluoride molecule.

PTS: 1 DIF: B OBJ: 6-2 NAT: C5 | G1 | G2

53. ANS:
Magnesium chloride; it is formed by ionic bonding because two electrons are transferred from the magnesium atom, one to each chlorine atom, to form two chloride ions and one magnesium ion.

PTS: 1 DIF: B OBJ: 6-2 NAT: C5 | G1 | G2

54. ANS:
glycerol

PTS: 1 DIF: B OBJ: 6-9 NAT: C5 | G1 | G3

55. ANS:
A is saturated because it contains only single bonds. B is unsaturated because it contains a double bond.

PTS: 1 DIF: B OBJ: 6-9 NAT: C5 | G1 | G3

56. ANS:
fatty acids

PTS: 1 DIF: B OBJ: 6-9 NAT: C5 | G1 | G3

57. ANS:

an acid

PTS: 1 DIF: B OBJ: 6-4 NAT: C5 | G1 | G2

58. ANS:
8.3-10.0; colorless to red

PTS: 1 DIF: B OBJ: 6-4 NAT: C5 | G1 | G2

59. ANS:
Pepsin digests the protein of egg white slightly at body temperature. In the presence of the acid, HCl, the digestion of the protein was much more efficient.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

60. ANS:
Yes; pepsin digested protein and did so most efficiently in the presence of HCl.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

61. ANS:
No; HCl alone did not digest the protein in egg white.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

62. ANS:
Tube 1 is the control because it contains the egg white but none of the experimental substances. It is important to observe what would happen to the egg white without any of the experimental substances.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

63. ANS:
Test tubes 2, 3, and 4. They contain substances that the experimenter believes might affect egg white.

PTS: 1 DIF: A OBJ: 6-8 NAT: C5 | G1

64. ANS:
As the molecules of the perfume enter the air, they diffuse from an area of greater concentration near the perfume to the area of lesser concentration in the room. As the molecules continue to diffuse, the concentration will increase enough so that the teacher can detect the odor.

PTS: 1 DIF: A OBJ: 6-6 NAT: C5 | G1 | G3

COMPLETION

65. ANS: compound

PTS: 1

66. ANS: compound

PTS: 1

67. ANS: element

PTS: 1

68. ANS: carbohydrate

PTS: 1 DIF: B OBJ: 6-9 NAT: C5 | G1 | G3

69. ANS: nucleotides

PTS: 1 DIF: B OBJ: 6-9 NAT: C5 | G1 | G3

70. ANS: acid

PTS: 1 DIF: B OBJ: 6-4 NAT: C5 | G1 | G2

71. ANS: covalent

PTS: 1 DIF: B OBJ: 6-2 NAT: C5 | G1 | G2

72. ANS: isotopes

PTS: 1 DIF: B OBJ: 6-1 NAT: C5 | G1 | G2

MATCHING

73. ANS: A PTS: 1 DIF: B OBJ: 6-9
NAT: C5 | G1 | G3

74. ANS: E PTS: 1 DIF: B OBJ: 6-8
NAT: C5 | G1

75. ANS: B PTS: 1 DIF: B OBJ: 6-2
NAT: C5 | G1 | G2

76. ANS: G PTS: 1 DIF: B OBJ: 6-10
NAT: C1

77. ANS: D PTS: 1 DIF: B OBJ: 6-8
NAT: C5 | G1

78. ANS: H PTS: 1 DIF: B OBJ: 6-8
NAT: C5 | G1

79. ANS: F PTS: 1 DIF: B OBJ: 6-3
NAT: C5 | G1 | G2

80. ANS: C PTS: 1 DIF: B OBJ: 6-1
NAT: C5 | G1 | G2