Q1W4- Qs. Bank- Chemistry of life

Multiple Choice

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

- 1. A particle is found to have 8 protons, 10 electrons, and 10 neutrons. What is it?
 - a. Oxygen-20 c. Oxygen-18 b. Oxygen-20 ion with a -2 charge d. Oxygen-18 ion with a -2 charge
 - 2. An aqueous solution of compound X has a pH of 12. Which of the following is a possible identity of compound X?
 - a. HCl
 - c. KOH b. Na d. H₂O
- The early atmosphere lacked an ozone layer to protect early life forms from the sun's harmful UV rays. 3. Which property of water would allow life to continue under these unfavorable conditions?
 - a. Water is polar, allowing it to dissolve other polar substances.
 - b. Water contains the oxygen necessary for life.
 - c. Water expands when it freezes, which allows a protective layer of ice to form at the surface of a body of water.
 - d. All of the above
 - 4. How does temperature affect the rate of diffusion?
 - a. An increase in temperature causes faster diffusion by increasing the speed of molecular movement.
 - b. An increase in temperature causes faster diffusion by decreasing the speed of molecular movement.
 - c. An increase in temperature causes slower diffusion by eliminating Brownian movement.
 - d. An increase in temperature has no effect on the rate of diffusion.
 - 5. A polymer most closely resembles
 - a. a circle.

- c. a chain.
- b. a link in a chain. d. an intersection.
- 6. Different organisms store glucose in various forms. You discover a new species, and upon chemical analysis find that it is comprised of significant amounts of glycogen. To which of the following organisms is this new species probably closely related?
 - a. Fern

- c. Dog
- b. Potato d. Sea horse
- 7. Which of the following is NOT true of lipids?
 - a. They are commonly called fats and oils.
 - b. They are hydrophobic.
 - c. They are good for energy storage.
 - d. They are polar.
 - 8. Which of the following is NOT true of trace elements?
 - a. They are obtained from foods.
 - b. They are found in very small quantities.
 - c. They are nonessential to most organisms.
 - d. None of the above
 - 9. Which of the following can NOT occur during a chemical reaction?
 - a. New atoms can be made.

- c. New molecules can be made.
- b. Bonds between atoms can be broken. d. Bonds between atoms can be formed.
- 10. Which of the following is true of enzymes?

	a. They act on nonspecific, randomly chosen substrates.									
	b. After a reaction, they cannot be reused.	b. After a reaction, they cannot be reused.								
	c. They can speed up metabolic processes in	the	body.							
	d. They cannot change shape.									
11.	Which of the following compounds may be po	olym	ers?							
	a. carbohydrates	c.	proteins							
	b. nucleic acids	d.	all of these							
12.	Which of the following does NOT describe a	polyı	mer?							
	a. Polymers are made of monomers.									
	b. Polymers are large molecules.									
	c. Polymers usually form by covalent bondin	ng.								
	d. Polymers are broken down by the process	of h	ydrogenation.							
13.	Carbon compounds that come from living orga	anisn	ns are called compounds.							
	a. water	c.	homogeneous							
	b. organic	d.	biological							
14.	How many electrons can a carbon atom share?	?								
	a. one	c.	three							
	b. two	d.	four							
15.	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 contained	er								
16.	represents a formula for a chemical con	npou	ınd.							
	a. H	c.	Р							
	b. C	d.	H_2O							
17.	The nucleus of an atom contains									
	a. protons and neutrons	c.	protons and electrons							
	b. neutrons and electrons	d.	protons, neutrons, and electrons							
18.	Electrons move about the nucleus of an atom i	in reg	gions called							
	a. electron clouds	c.	air							
	b. nuclei	d.	isotopes							
19.	What are the basic building blocks of proteins	?								
	a. nucleic acids	c.	amino acids							
	b. peptide bonds	d.	glycerol and fatty acids							
20.	Water dissolves many ionic and molecular con	mpoi	unds because of its							
	a. ionic bonding	c.	covalent bonding							
	b. polarity	d.	hydrogen bonding							
21.	When molecules of glucose and fructose comb	oine	to form sucrose, they do so by							
	a. hydrolysis	c.	condensation							
	b. electron clouds	d.	radiation							
22.	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							
23.	The various enzymes in our bodies are									
	a. lipids	c.	nucleotides							
	b. carbohydrates	d.	proteins							
24.	Glucose and fructose, with the formula C_6H_{12}	0 ₆ , d	liffer in							
	0 12	-								

	a. numbers of atoms	c.	kinds of atoms
	b. arrangement of atoms	d.	arrangement of electrons
 25.	A very strong base might have a pH of		
	a. 3	c.	9
	b. 5	d.	13
 26.	Carbon-12, carbon-13, and carbon-14 are	_•	
	a. isotopes	c.	radioisotopes
	b. polymers	d.	macromolecules
 27.	The total number of atoms in a molecule of suc	rose	$c, C_{12}H_{22}O_{11}, is$
	a. 11	c.	22
	b. 12	d.	45
 28.	An atom of fluorine has nine electrons. Its seco	nd e	energy level has
	a. two electrons	c.	seven electrons
	b. eight electrons	d.	nine electrons
 29.	An unsaturated lipid contains		
	a. more oxygen than hydrogen	c.	ionic bonds
	b. double bonds	d.	only one fatty acid
 30.	Unlike carbohydrates and fats, proteins contain		·
	a. nitrogen	c.	hydrogen
	b. carbon	d.	oxygen
 31.	Diffusion continues until there is no		
	a. dynamic equilibrium	c.	concentration gradient
	b. turgor pressure	d.	homeostasis
 32.	Brownian motion is evidence of		
	a. polar ions	c.	chemical energy
	b. random motion of molecules	d.	microorganisms
 33.	Which of the atoms pictured in Figure 6-3 is m	ost l	ikely to form an ion?



a. C b. Na

- 0 c.
- d. they are all equally likely to form an ion
- 34. Which of the images in Figure 6-4 depicts dynamic equilibrium?



a.	А	c.	С
h	B	d	D

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



Completion

Complete each statement.

36. The smaller subunits that make up nucleic acids are ______.
37. Any substance that forms hydrogen ions in water is a(n) ______.
38. Two atoms that share electrons are held together by ______ bonds.
39. Atoms of two or more elements chemically combined are ______.
40. Atoms of the same element with different numbers of neutrons are ______.

Matching

Match each item with the correct statement below.

- a.cellulosee.polymerb.polar moleculef.solutionc.nucleusg.enzyme
- d. peptide bond h. metabolism
- _____ 41. glucose polymer that forms the cell walls of plants
- 42. large molecule formed when many smaller molecules bond together
- _____ 43. molecule with unequal distribution of charge
- _____ 44. protein that speeds up a chemical reaction
- _____ 45. bond formed between amino acids
- _____ 46. all the chemical changes that occur within an organism
- 47. mixture in which one substance is distributed evenly in another
- _____ 48. center of an atom

Short Answer

- 49. Describe the atomic structure of a carbon atom, including the electron energy levels.
- 50. Explain how polymers may be broken down in living things.
- 51. Explain how polymers may be made in living things.
- 52. Explain the importance of carbon's ability to form covalent bonds in straight chains, branched chains, or rings.
- 53. Why is the polar property of water important?

- 54. Explain how sodium and chlorine combine to form a stable compound in a chemical reaction.
- 55. Explain how isotopes can be utilized in medicine.
- 56. 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 _____.
- 57. In the chemical reaction $6CO_2 + 12H_2O + \text{sunlight} \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$, 12 molecules of water are represented by _____.
- 58. 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 _____.
- 59. 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

- 60. In Figure 6-1, which atom forms an ion by the loss of electrons?
- 61. How many electrons are in the third energy level of a magnesium atom? Refer to Figure 6-1.
- 62. Which compound shown in Figure 6-1 is formed by covalent bonding? Explain.
- 63. Which compound shown in Figure 6-1 is formed by ionic bonding? Explain.

А	В
$C_{8}H_{17}$	C_8H_{17}
ĊH2	ĊН
ĊН,	Ċн
$\dot{C}H_2$	ĊH₂
ĊH2	ĊΗ2
$\dot{C}H_2$	ĊH₂
ĊH ₂	$\dot{C}H_2$
ĊH,	$\dot{C}H_2$
C C	ĊH,
но́ `он	ĊH,
	l -
	<u> 46 No</u>
	3332

Figure 6-2

- 64. In most lipids, compounds like A and B of Figure 6-2 are attached to what 3-carbon molecule?
- 65. Classify A and B of Figure 6-2 as either saturated or unsaturated. Explain.
- 66. 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					

- 67. 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.
- 68. 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						

- 69. Write a conclusion to the experiment. Base your conclusion on the experimental results shown in Table 6-2.
- 70. Was the hypothesis correct? Why?
- 71. What is the hypothesis on which this experiment is based?
- 72. From the experiment, does HCl digest protein? How do you know?
- 73. Which test tube is the control? Explain its purpose.
- 74. Which test tube or tubes are the experimental group? Why do you say so?
- 75. 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.

Q1W4- Qs. Bank- Chemistry of life Answer Section

MULTIPLE CHOICE

1. ANS: D

A particle with 8 protons must be oxygen. Since it has two more electrons than protons, it is an ion with a -2 charge. Finally, with 8 protons and 10 neutrons, it is an isotope of oxygen with a mass number of 18.

PTS: 1

2. ANS: C

A pH of 12 indicates that compound X is basic. Potassium hydroxide (KOH) forms hydroxide ions (OH-) in water. Thus, KOH is also basic.

PTS: 1

3. ANS: C

Because ice is less dense than water, it will float on top of liquid water. Thus, a layer of ice could have protected the evolving life forms that existed in the water beneath it by screening out UV rays.

PTS: 1

4. ANS: A

Increasing the temperature of molecules increases the kinetic energy of those molecules. Higher kinetic energy results in more rapid molecular movement, thus increasing the rate of diffusion.

PTS: 1

5. ANS: C

Polymers are large molecules composed of many smaller molecules. These smaller subunits are covalently bonded to form a long chain.

PTS: 1

6. ANS: C

Glycogen is a polysaccharide found in the livers of mammals and used to store food. It is similar to starch but more highly branched, and it is a glucose polymer that is formed and degraded in order to regulate glucose levels.

PTS: 1

7. ANS: D

Lipids are nonpolar, hydrophobic molecules that are important for energy storage, insulation, and protection.

PTS: 1

8. ANS: C

Trace elements, though found at very low concentrations within an organism, are essential for many biological processes. Examples of trace elements are iron, iodine, magnesium, and fluorine.

PTS: 1

9. ANS: A

Chemical reactions involve the breaking and forming of interatomic bonds. Molecules can be created and degraded. Atoms, however, cannot be created or destroyed.

PTS: 1

10. ANS: C

Enzymes are proteins that can change the rate of a chemical reaction. They act on specific substrates, such as sucrose, they change shape to fit with a substrate, and they can go on to carry out the same reaction again and again.

PTS: 1

11.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-9
	NAT: C5 G1 G3						
12.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-8
	NAT: C5 G1	576			-		
13.	ANS: B	PTS:	1	DIF:	В	OBJ:	6-7
	NAT: C5 G1				_		
14.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-7
	NAT: C5 GI				_		
15.	ANS: B	PTS:	1	DIF:	В	OBJ:	6-2
	NAT: C5 G1 G2				_		
16.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-2
	NAT: C5 G1 G2				_		
17.	ANS: A	PTS:	1	DIF:	В	OBJ:	6-1
	NAT: C5 G1 G2				_		
18.	ANS: A	PTS:	1	DIF:	В	OBJ:	6-1
	NAT: C5 G1 G2				_		
19.	ANS: C	PTS:	1	DIF:	В	OBJ:	6-9
•	NAT: C5 G1 G3	576			-		
20.	ANS: B	PTS:	1	DIF:	В	OBJ:	6-5
	NAT: C5 G1				_		
21.	ANS: C	PTS:	1	DIF:	В	OBJ:	6-8
	NAT: C5 G1						
22.	ANS: A	PTS:	1	DIF:	В	OBJ:	6-2
	NAT: C5 G1 G2						
23.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-10
	NAT: C1						
24.	ANS: B	PTS:	1	DIF:	В	OBJ:	6-7
	NAT: C5 G1						
25.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-4
	NAT: C5 G1 G2						
26.	ANS: A	PTS:	1	DIF:	В	OBJ:	6-1
	NAT: C5 G1 G2						
27.	ANS: D	PTS:	1	DIF:	В	OBJ:	6-9
	NAT: C5 G1 G3						
28.	ANS: C	PTS:	1	DIF:	В	OBJ:	6-1
	NAT: C5 G1 G2						
29.	ANS: B	PTS:	1	DIF:	В	OBJ:	6-9
	NAT: C5 G1 G3						
30.	ANS: A	PTS:	1	DIF:	В	OBJ:	6-9
	NAT: C5 G1 G3						
31.	ANS: C	PTS:	1	DIF:	В	OBJ:	6-6

		NAT:	C5 G1 G3						
	32.	ANS:	В	PTS:	1	DIF:	В	OBJ:	6-6
		NAT:	C5 G1 G3						
	33.	ANS:	B	PTS:	1	DIF:	В	OBJ:	6-2
	24	NAT:	C5 G1 G2	DTC.	1	DIE.	•	OD I.	6.4
	54.	ANS: NAT·	C_{5}	P15:	1	DIF:	A	OP1:	0-4
	35.	ANS:	B	PTS:	1	DIF:	А	OBJ:	6-9
		NAT:	C5 G1 G3	1 1.0.	-	2111		020	0 /
COM	PLEI	TION							
	36.	ANS:	nucleotides						
		ρτς.	1	DIE	в	OBI	6-9	ΝΔΤ·	$C5 \mid G1 \mid G3$
	37.	ANS:	acid	DII.	D	ODJ.	0 7	11111.	01 05
	011	11.01							
		PTS:	1	DIF:	В	OBJ:	6-4	NAT:	$C5\mid G1\mid G2$
	38.	ANS:	covalent						
		Ρ Τς·	1	DIE	В	OBI	6.2	ΝΛΤ·	$C5 \mid C1 \mid C2$
	39	ANS.	compounds	DII'.	D	ODJ.	0-2	11/11.	01 02
	57.	1 1 10.	compounds						
		PTS:	1	DIF:	В	OBJ:	6-2	NAT:	$C5\mid G1\mid G2$
	40.	ANS:	isotopes						
		Ρ Τς·	1	DIE	В	OBI	6 1	ΝΛΤ·	$C5 \mid C1 \mid C2$
		115.	1	DII'.	Ъ	ODJ.	0-1	11/11.	01 02
	TIIN								
MAI		G							
	41.	ANS:	А	PTS:	1	DIF:	В	OBJ:	6-9
		NAT:	C5 G1 G3						
	42.	ANS:	E	PTS:	1	DIF:	В	OBJ:	6-8
	12	NAI:	C5 GI	DTC.	1	DIE	D		67
	45.	NAT:	C5 G1 G2	г г з.	1	DII'.	В	ODJ.	0-2
	44.	ANS:	G	PTS:	1	DIF:	В	OBJ:	6-10
		NAT:	C1						
	45.	ANS:	D	PTS:	1	DIF:	В	OBJ:	6-8
	10	NAT:	C5 G1	DTTC	1	DIE	D	ODL	6.0
	46.	ANS:	H C5 G1	P15:	1	DIF:	В	OB1:	6-8
	47	ANS.	F	PTS∙	1	DIF	В	OB.I.	6-3
	• • •	NAT:	- C5 G1 G2		-	211.	-	0.000	
	48.	ANS:	С	PTS:	1	DIF:	В	OBJ:	6-1
		NAT:	C5 G1 G2						

SHORT ANSWER

49. ANS: A carbon atom has six neutrons and six protons in its nucleus and two electrons in the first energy level and four electrons in the second energy level. **PTS**: 1 DIF: A OBJ: 6-1 NAT: C5 | G1 | G2 50. 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 51. 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 52. 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 53. 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 54. 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 55. 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 56. ANS: 6CO₂ **PTS:** 1 DIF: A OBJ: 6-2 NAT: C5 | G1 | G2 57. ANS: $12H_2O$ NAT: C5 | G1 | G2 PTS: 1 DIF: A OBJ: 6-2 58. ANS:

 $C_{6}H_{12}O_{6}$

59.	PTS: 1 ANS: O ₂		DIF:	A	OBJ:	6-7	NAT:	C5 G1
60.	PTS: 1 ANS: magnesiu	ım	DIF:	А	OBJ:	6-2	NAT:	C5 G1 G2
61.	PTS: 1 ANS: two		DIF:	В	OBJ:	6-1	NAT:	C5 G1 G2
62.	PTS: 1 ANS: Hydroger by each b	n fluoride; it 1ydrogen fluo	DIF: is form oride m	B ed by covalent olecule.	OBJ: bonding	6-1 g because two	NAT: electror	C5 G1 G2
63.	PTS: 1 ANS: Magnesia atom, one	um chloride; e to each chlo	DIF: it is for prine at	B rmed by ionic b om, to form two	OBJ: onding o chlori	6-2 because two el de ions and on	NAT: lectrons le magn	C5 G1 G2 are transferred from the magnesium besium ion.
64.	PTS: 1 ANS: glycerol		DIF:	В	OBJ:	6-2	NAT:	C5 G1 G2
65.	PTS: 1 ANS: A is satur	rated because	DIF: e it cont	B tains only single	OBJ: e bonds	6-9 s. B is unsaturat	NAT: ted bec	C5 G1 G3 ause it contains a double bond.
66.	PTS: 1 ANS: fatty acid	ls	DIF:	В	OBJ:	6-9	NAT:	C5 G1 G3
67.	PTS: 1 ANS: an acid		DIF:	В	OBJ:	6-9	NAT:	C5 G1 G3
68.	PTS: 1 ANS: 8.3-10.0;	colorless to	DIF: red	В	OBJ:	6-4	NAT:	C5 G1 G2
69.	PTS: 1 ANS: Pepsin di digestion	igests the pro of the protei	DIF: tein of in was r	B egg white sligh much more effi	OBJ: tly at b cient.	6-4 ody temperatur	NAT: re. In th	C5 G1 G2 ne presence of the acid, HCl, the
	PTS: 1		DIF:	А	OBJ:	6-8	NAT:	C5 G1

70. ANS:

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

71.	PTS: ANS:	1	DIF:	A	OBJ:	6-8	NAT: C5 G1				
	In the presence of stomach acid (HCl), the enzyme pepsin digests protein.										
72.	PTS: 1 ANS:	1	DIF:	А	OBJ:	6-10	NAT: C1				
	No; HC	No; HCl alone did not digest the protein in egg white.									
73	PTS:	1	DIF:	А	OBJ:	6-8	NAT: C5 G1				
75.	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.										
74.	PTS: ANS:	1	DIF:	А	OBJ:	6-8	NAT: C5 G1				
	Test tub	bes 2, 3, and 4	. They	contain substan	ces that	t the experimen	ter believes might affect egg white.				
75.	PTS: 1 ANS:	1	DIF:	А	OBJ:	6-8	NAT: C5 G1				
	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