This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 02

26MAR2025

Do NOT write in this box. Your MARK will be placed here.

Subject :	Chemistry
Class :	8A, 8B, 8C and 8E
Teacher :	Mrs. Dina Geha
Duration :	1 hour

Please write you answers on a separate lined paper NOT on the question sheet

You are to answer the questions to this exam on : Lined paper

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

I- Indicate whether the statement is true or false. If false, correct the underlined words. (1pt. each)

1. When nonmetals combine with other nonmetals, they usually form covalent bonds.
2. A covalent bond is a chemical bond formed when two or more atoms share one or more pairs of valence electrons.
3. A molecule is a group of atoms held together by covalent bonding that acts as an independent unit.
4. Compounds formed with covalent bonds usually have high melting and boiling points.
5. Compounds formed with covalent bonds are good conductors of electricity.
6. A polar molecule has a slight positive end and a slight negative end because of the unequal sharing of electrons.
7. Water is an example of a nonpolar molecule.

II- Identify the letter of the choice that best completes or answers the statement. (1pt. each)

1. Which feature distinguishes polar molecules from nonpolar molecules?
   A. Polar molecules contain atoms that are chemically bonded together.
   B. Polar molecules can contain more than one atom of the same element
   C. Polar molecules can contain atoms of different elements.
   D. Polar molecules contain electrons that are not shared equally by the atoms.

2. What is a covalent bond?
   A. A covalent bond is a bond in which two atoms share electrons.
   B. A covalent bond is a bond in which one atom gains an electron.
   C. A covalent bond is a bond in which two atoms contribute unequal numbers of electrons.
   D. A covalent bond is a bond in which all electrons remain with their original atoms.

3. Which of these is true of covalent compounds?
   A. They are usually solid at room temperature.
   B. They usually conduct electricity well.
   C. They usually have low boiling points.
   D. They usually have high melting points.

4. Which statement is true?
   A. The bigger an atom, the more electrons it will share in a bond.
   B. The smaller an atom, the more electrons it will share in a bond.
   C. The more valence electrons two atoms share, the stronger the bond is between those atoms.
   D. The more valence electrons two atoms share, the weaker the bond is between those atoms.

5. Which two elements are likely to form an ionic bond?
   A. an atom with 1 valence electron and an atom with 8 valence electrons
   B. an atom with 1 valence electron and an atom with 2 valence electrons
   C. an atom with 2 valence electrons and an atom with 6 valence electrons
   D. an atom with 7 valence electrons and another atom with 7 valence electrons

III- Analyze **what happens to sodium and chlorine atoms in the formation of the compound sodium chloride. Write the answers of (a.) to (n.) on your answer sheet** ***(0.5 pt. each)***

	Na (sodium)	Cl (chlorine)
Number of protons	11	17
Type of element	*a.*	*h.*
Atomic number	*b.*	*i.*
Number of valence electrons	*c.*	*j.*
Stable or unstable?	*d.*	*k.*
Electron transfer	*e.*	*l.*
Description after transfer	*f.*	*m.*
Type of ion	*g.*	*n.*

IV- **For each description, write *C* if it represents covalent bonding, *I* if it represents ionic bonding, and *M* if it represents metallic bonding.** ***(1 pt. each)***

1. pooled electrons
2. transferred electrons
3. between nonmetals
4. forms molecules
5. electrons moving freely among atoms
6. single, double, or triple bonds

V- Fill in the blanks with the term that correctly completes each sentence. (1pt. each)

Many atoms are stable with __1.__ valence electrons. An atom with at least one unpaired electron is __2.__ .

__3.__ atoms do not easily react or form bonds with other atoms.

Column 18 includes the __4.__ ; with the exception of helium, each of these gases has eight valence electrons and is stable.

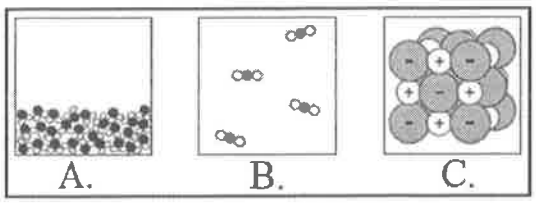
Unstable atoms can become stable only by forming __5.__ with other atoms.

Atoms tend to gain, lose, or share valence electrons until each atom has the same number of valence electrons as the __6.__ .

Stable atoms have __7.__ pairs of valence electrons.

VI- The structures of three substances A., B. and C. are represented in figure 1. (1pt. each)

Figure 1

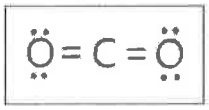


Use the correct letter, A., B. and C. to answer each question:

1. Which substance is a gas?
2. Which substance is a liquid?
3. Which substance is made of ions?

Figure 2 shows the bonding in <u>substance B</u>.

Figure 2



4. What is the formula of substance B?
   a. C_2O b. CO_2 c. CO

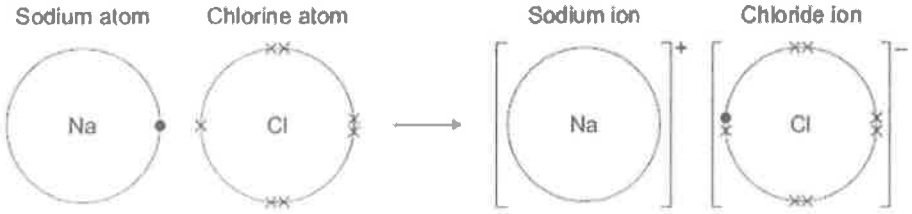
Complete:

When a carbon atom and two oxygen atoms bond to produce substance B, electrons are ___5.___

6. What is the type of bonding in substance B?

7. What is the type of bonding in substance C?

VII- Sodium reacts with chlorine to produce sodium chloride. The diagram shows how the reaction happens.



*<u>Complete each sentence.</u> **(1pt. each)***

A sodium atom changes into a sodium ion by __1.__ an electron.
A sodium ion has a __2.__ charge.
The ions in sodium chloride are held together by strong __3.__ forces.

Sodium chloride is an ionic compound.

4. List **two** properties of ionic compounds. ***(2pts.)***

VIII- Use Lewis (electron dot) structures to illustrate how the following atoms combine through covalent bonding. Represent the shared pairs of electrons clearly. (1pt. each)

1-
Carbon ($_6$C)
Hydrogen ($_1$H)
Illustrate the bonding between **one carbon atom** and **four hydrogen atoms**.

2-
Nitrogen ($_7$N)
Hydrogen ($_1$H)
Show how **one nitrogen atom** bonds with **three hydrogen atoms**.

3-
Oxygen ($_8$O)
Oxygen ($_8$O)
Represent the bonding between **two oxygen atoms**.

IX- Balance the following chemical equations. (1pt. each)

1. ___ CO_2 + ___ H_2O → ___ $C_6H_{12}O_6$ + ___ O_2
2. ___ Na + ___ H_2O → ___ NaOH + ___ H_2
3. ___ $CuCl_2$ + ___ H_2S → ___ CuS + ___ HCl

X- Identify signs of a chemical reaction.

1. Name the two changes in properties ***(2pts)***
2. What is one way to be certain ***(1pts)***
3. Name two changes in energy ***(2pts)***

XI- Short answers. (2pts. each)

1. **Explain** Why the hydrogen atoms in a hydrogen gas molecule (H_2) form nonpolar covalent bonds whereas the oxygen and hydrogen atoms in water molecules (H_2O) form polar covalent bonds.
2. **Analyze** How do two polar molecules interact when they come into contact with each other?
3. **Contrast** Why are metals good conductors of electricity while covalent compounds are poor conductors

Bonus point: (optional)

Challenge Problem: Give it your best shot!

___ $Ca_3(PO_4)_2$ + ___ SiO_2 + ___ C → ___ $CaSiO_3$ + ___ CO + ___ P

I – True or False (Correct False Statements) *(1pt each)*

1. True
2. True
3. True
4. False – **Low**
5. False – **Poor**
6. True
7. False – **polar**

II – Multiple Choice *(1pt each)*

1. D
2. A
3. C
4. C
5. C

III – Sodium & Chlorine Table *(0.5 pt each)*

	Sodium (Na)	Chlorine (Cl)
Type of element	a. Metal	h. Nonmetal
Atomic number	b. 11	i. 17
Number of valence electrons	c. 1	j. 7
Stable or unstable?	d. Unstable	k. Unstable
Electron transfer	e. Loses 1 electron	l. Gains 1 electron
Description after transfer	f. 2,8 (stable after losing 1 electron)	m. 2,8,8 (stable after gaining 1 electron)
Type of ion	g. Positive ion (cation)	n. Negative ion (anion)

IV – Bonding Type *(1pt each)*

1. M
2. I
3. C
4. C
5. M
6. C

V – Fill in the Blanks *(1pt each)*

1. 8
2. unstable
3. stable
4. noble gases
5. bonds
6. noble gas
7. four

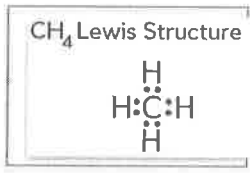
VI – Interpreting Substances *(1pt each)*

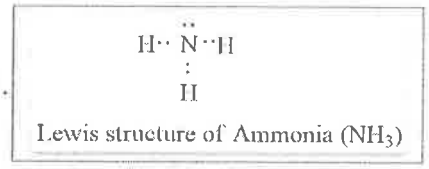
1. B
2. A
3. C
4. b. CO_2
5. shared
6. Covalent bonding
7. Ionic bonding

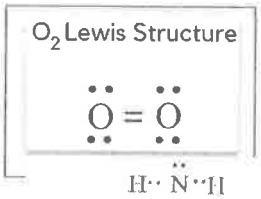
VII – Sodium and Chlorine Reaction

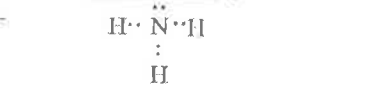
1. losing *(1pt)*
2. positive *(1pt)*
3. electrostatic *(1pt)*
4. - High melting and boiling points*(0.5pt)*
   - Usually solids at room temperature *(0.5pt)*

VIII – Lewis Structures (Description) *(1pt each)*

1. 

2. 

3. 



IX – Balancing Chemical Equations *(1pt each)*

1. $6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + 6\ O_2$
2. $2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$
3. $1CuCl_2 + 1H_2S \rightarrow 1CuS + 2\ HCl$

X – Signs of a Chemical Reaction

1. Change in color, formation of a gas (bubbles) *(2pts)*
2. Formation of a new substance *(1pt)*
3. Temperature change, production of light *(2pts)*

XI – Short Answers *(2pts each)*

1. In H_2, both atoms have equal attraction(electronegativity), so electrons are shared equally (nonpolar). In H_2O, oxygen is more electronegative, so electrons are shared unequally (polar).
2. A polar molecule has a positively charged side and a negatively charged side because of an unequal share of electrons. Because opposite charges attract each other, polar molecules are strongly attracted to other polar molecules.
3. Metals have free-moving electrons; covalent compounds have localized electrons and don't conduct electricity well.

Bonus – Challenge Problem *(1pt)*

$1Ca_3(PO_4)_2 + 3\ SiO_2 + 5\ C \rightarrow 3\ CaSiO_3 + 5\ CO + 2\ P$