This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School

for Boys and Girls Loueizeh - Baabda

Stage Exam 04

20-25JUN2025

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 your 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. In a decomposition reaction, a single compound breaks down into two or more simpler substances.

2. All combustion reactions produce only carbon dioxide and water.

3. A catalyst increases the amount of product formed in a chemical reaction.

4. An endothermic reaction absorbs energy from the surroundings.

5. Homogeneous mixtures have visibly distinct parts.

6. A solution with a pH of 5 is 100 times more acidic than one with a pH of 7.

7. In a synthesis reaction, two or more reactants combine to form a single product.

8. A double replacement reaction involves the exchange of ions between two compounds.

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

1. When iron combines with oxygen and water in the air to form rust, what substance in the reaction is the product?

A. rust
B. iron
C. water
D. oxygen

2. Which of the following statements about energy-releasing reactions is true?

A. The products are less stable.
B. The products are more stable.
C. The energy released is always in the form of heat.
D. The bonds of the products have more energy than those of the reactants.

3. A(n) _____ is a substance that speeds up a chemical reaction without being permanently changed itself.

A. catalyst
B. exotherm
C. endotherm
D. inhibitor

4. What type of substance slows down a chemical reaction?

A. inhibitor
B. catalyst
C. endotherm
D. enzymes

5. The minimum amount of energy to start any chemical reaction is called the _____ of the reaction.

A. energy of catalyzation
B. energy requirement
C. activation energy
D. energy of inhibition

6. If electric current passes through water and initiates a reaction, what are the expected products?

A. oxygen and water
B. hydrogen peroxide
C. hydrogen and oxygen
D. water vapor

III- Below is a list of materials. Complete the table (a. through j.) by identifying:

(1pt. each)

1. Whether it is a **Substance** or a **Mixture**.
2. If it's a substance, state whether it's an **Element** or a **Compound**.
3. If it's a mixture, determine whether it is **Homogeneous** or **Heterogeneous**.

Material	Substance or Mixture	Element/compound/Homogenous/Heterogeneous
Salad	a.	f.
Air	b.	g.
Salt	c.	h.
Water	d.	i.
helium	e.	j.

IV- Fill in the blanks with the right terms *(1pt. each)*

Chemical reactions always involve a change in __a.__ to break bonds and form bonds. Reactions that absorb energy, like photosynthesis, are called __b.__ , while those that release energy, such as combustion, are __c.__ . The minimum energy needed to start a reaction is the __d.__ . To speed up reactions, factors like increased __e.__ (e.g., crushing a solid) or higher __f.__ (more particle collisions) can help. Biological __g.__ , like enzymes, lower activation energy, whereas __h.__ interfere with these helpers. Storing a battery in a refrigerator can __i.__ its reaction rate, extending its life. Ultimately, a catalyst doesn't increase the __j.__ formed—it just makes the reaction happen faster.

V- Identify the type of chemical reactions *(1pt. each)*

1. $FeS + 2HCl \rightarrow FeCl_2 + H_2S$
2. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
3. $2Mg + O_2 \rightarrow 2MgO$
4. $2H_2O_2 \rightarrow 2H_2O + O_2$
5. $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$
6. Two or more substances form a new substance
7. One substance breaks down into two or more simpler substances
8. One element replaces another element in a compound
9. Two compounds are combined and switch partners
10. Burning results in water and carbon dioxide

VI- Exercises

Scenario 1: A student tested two solutions, A and B, and recorded their pH values:

Solution A: pH = 2

Solution B: pH = 5

a. Which solution is more acidic? Explain your answer. ***(2pts)***
b. Calculate how many times more acidic Solution A is compared to Solution B. ***(2pts)***
c. If Solution C has a pH of 8, is it acidic, basic, or neutral? Justify your response. ***(2pts)***

Scenario 2: The table below lists common household items and their pH ranges:

Item	pH Range
Lemon juice	2.2–2.4
Baking soda	8–9
Water	7
Vinegar	2.4–3.4

a. Which item is the most acidic? Which is the most basic? ***(2pts)***
b. Explain why water is considered neutral. ***(1pt)***
c. Predict what might happen if you mix lemon juice (acid) with baking soda (base). ***(1pt)***

Scenario 3: Hydrochloric acid (HCl) dissolves in water, producing hydronium ions (H_3O^+). Ammonia (NH_3) dissolves in water, producing hydroxide ions (OH^-).

a. Write the chemical process (equation) for HCl dissolving in water. ***(1pt)***
b. Explain why ammonia (NH_3) is considered a base even though it doesn't contain hydroxide ions initially. *Hint: What happens when NH_3 reacts with water?* ***(1pt)***
c. How would litmus paper react if dipped in an HCl solution? What about in an NH_3 solution? ***(2pts)***
d. Why is a pH meter more reliable than pH strips for measuring pH? ***(1pt)***
e. Compare the conductivity of acidic and basic solutions. How do ions play a role in this property? ***(2pts)***

Bonus Point: *Balance the equation below*

$$FeCr_2O_4 + K_2CO_3 + O_2 \rightarrow K_2CrO_4 + Fe_2O_3 + CO_2$$

Chemistry Exam Solutions

Part I: True or False (with corrections if false)

1. **True** - A decomposition reaction involves a single compound breaking down into simpler substances.
2. **False** - Combustion reactions can produce other products besides CO_2 and H_2O, especially with incomplete combustion (e.g., carbon monoxide, soot).
3. **False** - A catalyst speeds up the reaction but doesn't increase the amount of product formed. It lowers activation energy.
4. **True** - Endothermic reactions absorb energy from surroundings.
5. **False** - Homogeneous mixtures have uniform composition throughout (no visibly distinct parts).
6. **True** - Each pH unit represents a 10-fold difference in acidity. pH 5 is 100 times (10^2) more acidic than pH 7.
7. **True** - Synthesis reactions combine reactants to form a single product.
8. **True** - Double replacement reactions involve ion exchange between two compounds.

Part II: Multiple Choice

1. **A. rust** (product of the reaction)
2. **B. The products are more stable.** (energy-releasing reactions form more stable products)
3. **A. catalyst** (speeds up reaction without being permanently changed)
4. **A. inhibitor** (slows down chemical reactions)
5. **C. activation energy** (minimum energy needed to start a reaction)
6. **C. hydrogen and oxygen** (electrolysis of water produces these gases)

Part III: Substance or Mixture Classification

Material	Substance or Mixture	Element/Compound/Homogeneous/Heterogeneous
Salad	Mixture (a.)	Heterogeneous (f.)
Air	Mixture (b.)	Homogeneous (g.)
Salt	Substance (c.)	Compound (h.)
Water	Substance (d.)	Compound (i.)
Helium	Substance (e.)	Element (j.)

Part IV: Fill in the Blanks

a. **energy**

b. **endothermic**

c. **exothermic**

d. **activation energy**

e. **surface area**

f. **temperature**

g. **catalysts**

h. **inhibitors**

i. **decrease**

j. **amount of product**

Part V: Reaction Types

1. **Double replacement** ($FeS + 2HCl \rightarrow FeCl_2 + H_2S$)
2. **Combustion** ($C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$)
3. **Synthesis** ($2Mg + O_2 \rightarrow 2MgO$)
4. **Decomposition** ($2H_2O_2 \rightarrow 2H_2O + O_2$)
5. **Single replacement** ($Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$)
6. **Synthesis**

7. **Decomposition**
8. **Single replacement**
9. **Double replacement**
10. **Combustion**

Part VI: Exercises

1. pH Calculations

a. **Solution A (pH=2) is more acidic** because lower pH values indicate higher acidity.

b. **Solution A is 1000 times more acidic** than Solution B:
Difference in pH units = 5 - 2 = 3
10^3 = 1000 times more acidic

c. **Solution C (pH=8) is basic** because pH > 7 indicates basic solutions, pH = 7 is neutral.

2. Household pH

a. **Most acidic**: Lemon juice (pH 2.2-2.4)
Most basic: Baking soda (pH 8-9)

b. **Water is neutral (pH=7)** because it has equal concentrations of H^+ and OH^- ions.

c. **Mixing lemon juice and baking soda** would cause a neutralization reaction, producing water, salt, and carbon dioxide gas (bubbles).

3. Acid-Base Chemistry

a. **$HCl + H_2O \rightarrow H_3O^+ + Cl^-$**

b. **Ammonia acts as a base** because it accepts protons (H^+) from water: $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$

c. **Litmus paper results**:

- HCl solution: Turns blue litmus red (acid)
- NH_3 solution: Turns red litmus blue (base)

d. **pH meter is more reliable** because it gives precise numerical values, while pH strips provide approximate color-based readings.

e. **Conductivity comparison**:
Both acidic and basic solutions conduct electricity due to ion presence (H_3O^+ in acids, OH^- in bases). Strong acids/bases with more ions conduct better than weak ones.

Bonus: Balancing Equation

$$\mathbf{4FeCr_2O_4 + 8K_2CO_3 + 7O_2 \rightarrow 8K_2CrO_4 + 2Fe_2O_3 + 8CO_2}$$