MINISTRY OF EDUCATION AND HIGHER EDUCATION

GRADE 12 EXAMS, 2024

CHEMISTRY

2024

P/LAND NATIONAL EXAMINATION BOARD

SomExams

MINISTRY OF EDUCATION AND HIGHER EDUCATION
PUNTLAND NATIONAL EXAMINATIONS BOARD

Name of Student			
Roll Number			
Name of School			
Region:		District:	

FORM FOUR EXAMINATION, 2024
TIME: 2 HOURS PLUS 10 MINUTES FOR READING

CHEMISTRY

Instructions to candidates

- Answer all the Questions
- This paper consists of 11 pages, count it and if any is missing inform your invigilator
- Write your **name and roll number** on the exam paper
- No extra paper is allowed
- If you make a mistake, **cross out the incorrect answer and write your correct answer.**

This exam paper consists of following Parts

Parts	Marks
Part one: Multiple questions	15 marks
Part two: Structured questions	85 marks
Total:	**100 Marks**

For the markers only

PARTS	MARKS
Part one:	
Part two:	
Total:	

SOM EXAMS

Use this page for rough work. It will NOT be marked.

PART ONE : MULTIPLE CHOICE QUESTIONS (15 marKs)

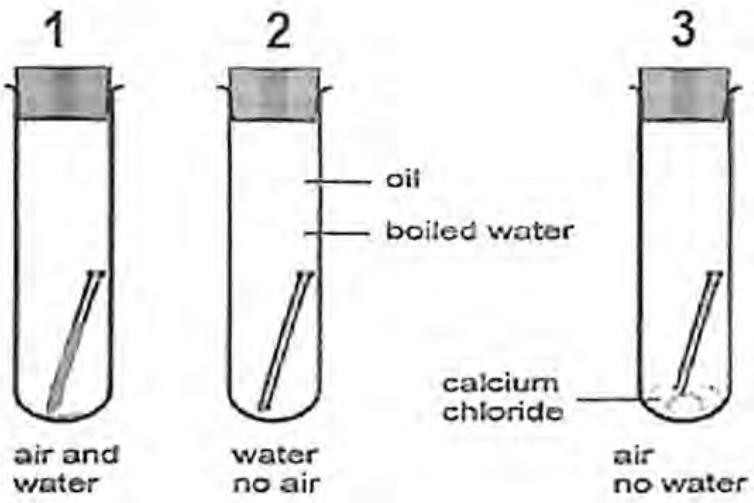
Instructions for this section, circle the correct answer from A, B, C, D.

For each question there is only one correct answer.

1. There are two types of acids namely mineral acids and organic acids. Which of the following acids is an organic acid?
   A. Sulphuric acid
   B. Carbonic acid
   C. Nitric acid
   D. Hydrochloric acid

2. Solubility of salts are different; sodium salts are:
   A. Very solubLe
   B. Slightly soluble
   C. Insoluble
   D. Poor soluble

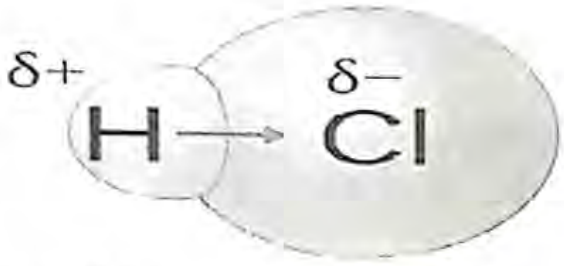
3. Which one of the nails in the test tubes corrodes first?



   A. 1
   B. 2
   C. 3
   D. 1 and 3

4. Which electron configuration would you expect to be for sodium atom $_{11}Na$ in its ground state?
   A. $1s^2\ 2s^2$
   B. $1s^2\ 2s^2\ 2p^6$
   C. $1s^2\ 2s^2\ 2p^6\ 3s^1$
   D. $1s^2\ 2s^2\ 2p^6\ 3s^2$

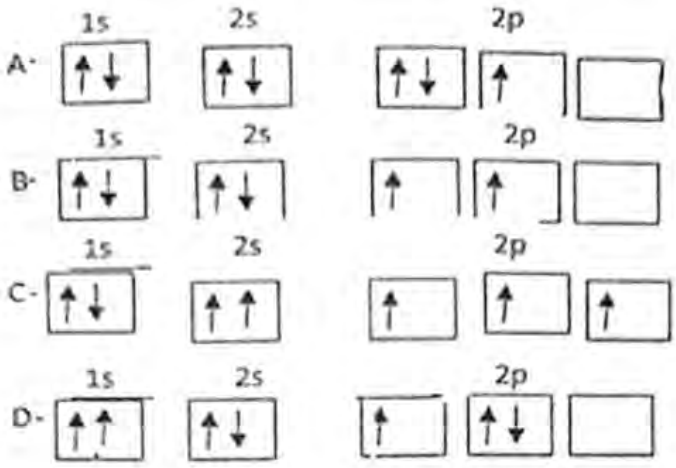
5. Giant ionic structures consist of many oppositely charged ions held together by:
   A. Covalent bond
   B. Dative bond
   C. Coordinate bond
   D. Electrostatic attraction
6. Which of the following statements best describes the polarity of the bond between hydrogen and chlorine molecules?



   A. The shared pair of electrons are shared equally
   B. Hydrogen is more electronegative than chlorine
   C. The bond between hydrogen and chlorine is non polar.
   D. The shared pair of electrons are not shared equally

7. A hydrocarbon with the molecular formuLa C_4H_8 decolorizes bromine water. Using this information, the hydrocarbon is liKely to be:
   A. Alkane
   B. Alcohol
   C. Alkene
   D. Saturated hydrocarbon
8. The molecular formula of 2-chloro-3-methayl pentane is:
   A. $C_6H_{13}Cl$
   B. $C_6H_{15}Cl$
   C. $C_6H_{12}Cl$
   D. $C_5H_{12}Cl$
9. What is the correct name of this compound $CH_3\text{-}C{\equiv}C\text{-}CH_3$?
   A. 2-butene
   B. 2-butyne
   C. 1-butene
   D. 1-butyne
10. Reaction which involves removal of atoms or group of atoms is called:
   A. Addition reaction
   B. Substitution reaction
   C. Nucleophilic reaction
   D. Elimination reaction
11. In exothermic reactions, the reactants have:
   A. Lower energy than the product
   B. Higher energy than the product
   C. Same energy with the product
   D. No energy released

12. Which of the following is the correct orbital diagram for Carbon atom?



13. What would be the concentration, if 0.25 moles of sodium hydroxide were dissolved in 250 cm^3 of distilled water?

A. 2.5 mol/dm^3
B. 0.1 mol/dm^3
C. 1 mol/dm^3
D. 5.2 mol/dm^3

14. In group 1 and 2, first ionization energy decrease down the group because:

A. Atomic radius gets smalLer
B. Nuclear charge decrease
C. The outer electrons are further from the nucleus
D. Shielding effect decrease

15. CH_3 CH_2OH is an example of:

A. Primary alcohol
B. Secondary Alcohol
C. Tertiary alcohol
D. Quaternary alcohol

PART TWO: STRUCTURED QUESTIONS (85 marKs)

Answer all the questions below in the space provided

QUESTION ONE: ACIDS AND RATE OF REACTION (17 MARKS)

1. Metals react with air, water and dilute acids in different ways.

A. Describe how magnesium reacts with oxygen? (2marks)

_____

_____

B. Write a baLanced equation for the reaction. (2marks)

_____

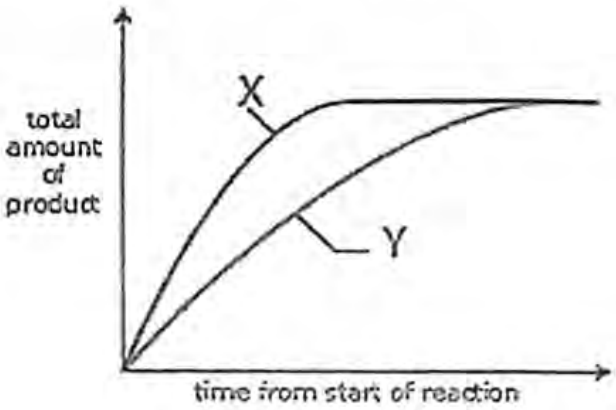
C. Which is more reactive magnesium and zinc? (1mark)

_____

2. LooK at the table below, then compare how they react with hydrochloric acid. The first one is done for you. (4 marks)

Metal	React with hydrochloric acid
Lead	Very slow
Magnedium	
Zinc	
Iron	
Gold	

3. Graph X and graph Y concerns about concentration.



A. Which graph has more concentration? (1marK)

_____

B. Which graph contains less concentration? (1mark)

_____

C. Which curve did the reaction come completion first? (1mark)

4. Complete the paragraph using the words beLow. (5 marks)

Faster	Collisions	Succeed	Collision theory	Effective collision

_____ refers that the rate of a chemical reaction is directly proportional to the number of collisions of reactant particles. The more number of _____ of reactant particles, the more they react with one another and thus the _____ the rate of a reaction. However not all collisions _____ In producing a reaction. Collisions that succeed in producing a reaction are called _____.

QUESTION TWO: ATOMIC STRUCTURE (11 MARKS)

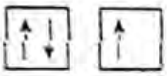
1. An orbital can hold a maximum of two electrons and with opposite spins.

A. Draw the electron orbitals of the following. (5 marks)

First one is done for you

Lithium	Helium	Boron	Carbon	Nitrogen	Oxygen

$1s^2$ $2s^1$

Lithium 

a) Helium _____

b) Boron _____

c) Carbon _____

d) Nitrogen _____

e) Oxygen _____

2. Aluminum is a metaL which has an atomic number of 13, ($_{13}$Al).

A) Which group it belongs in the periodic table? give a reason. (2marks)

_____

_____

B) Which period it belongs in the periodic table? give a reason. (2marks)

_____

_____

C) Which blocK is aluminum in the periodic table? give a reason. (2 marks)

_____

_____

QUESTION THREE: ENERGY IN CHEMISTRY (13 MARKS)

1. The standard enthalpy change of combustion of ethene is -1411kJ/mol.

A. Define enthalpy change of combustion. (2marks)

B. Write a baLanced equation for the reaction including state symbols. (3marks)

C. Draw the energy profile diagram for the combustion of ethene. (3 marks)

D. Draw the displayed formula of ethene. (2 marks)

2. Standard enthalpy change for a reaction taKes place under 3 standard conditions.

A. Write the 3 standard conditions needed for the reaction to take place. (3marks)

QUESTION FOUR: MOLE AND STOICHIOMETRY (16 marks)

1. Determine the relative molecular mass of the following:

a) Copper carbonate $CuCO_3$ (Cu= 64, C = 12, O = 16) (3marks)

b) Lead(II)nitrate $Pb(NO_3)_2$ (Pb=207, N =14, O =16) (3marks)

2. In a chemical reaction sodium carbonate reacts with hydrochloric acid. Here is a balanced equation for the reaction.

$Na_2CO_3(s) + 2HCl(aq) \longrightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$

a) How many moles of hydrochloric acid react with one mole of sodium carbonate?

_____ (1mark)

b) How many moles of sodium chLoride are formed in the reaction?

_____ (1mole)

c) How many moles of carbon dioxide are produced in the reaction?

_____ (1marK)

d) Calculate the relative molecular mass of sodium chloride NaCl. (2 mark)

_____

3. 1.843 g of an organic compound **M** containing hydrogen, carbon, oxygen and Sulphur, on combustion gave 3.08 g of carbon dioxide and 0.63 g of water. In a separate experiment, the same mass of **M** gave 2.7013 g of barium sulphate when the suphur in the compound was converted to barium sulphate .

a) Determine the empirical formula of **M**.

b) If the molecular mass of M is 158, determine the molecular formula of **M**.

(5marks)

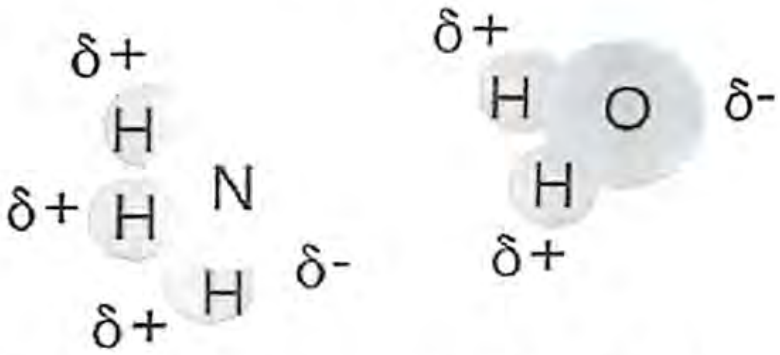
QUESTION FIVE: BONDING AND STRUCTURE (14 MARKS)

1. Some common ions are shown in the table below.

A. Complete the table below and write the formula of the ions. (5marks)
First one is done for you.

No	Name of ion	Formula of Ion
1.	Bicarbonate ion	HCO_3^-
2.	Hydroxide ion	
3.	Nitrate ion	
4.	Ammonium ion	
5.	Sulphate ion	
6.	Phosphate ion	

2. An ammonia molecule forms a hydrogen bond with a water molecule.
Use a line to show the bond between the two molecules. (1marK)



A. How many lone pairs and bonding pairs do water and ammonia have?

(4 marks)

Molecule	H_2O	NH_3
Number of Lone pair		
Number of bonding pairs		

B. Write down the three types of intermoLecular forces. (3 marks)

_____

_____

_____

C. Is the hydrogen bond strong or weak bond? (1 mark)

_____

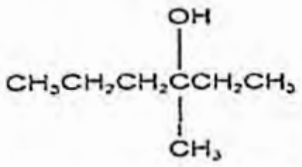
QUESTION SIX: ORGANIC COMPOUNDS (14 marks)

1. Name the following compounds. (5 marks)

a. $CH_3\,CH_2\,CH_2\,CH_2\,CH_3$ _____

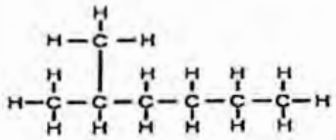
b. $CH_3\,CH_2\,CH_2CHO$ _____

c.

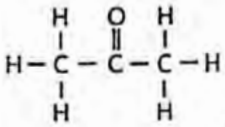


d. _____

e.



_____



_____

2. Define the folLowing

a) Addition reaction (2marKs)

_____

_____

_____

b) Substitution reaction (2 marks)

_____

_____

_____

c) Aliphatic hydrocarbons (2marks

_____

_____

_____

3. Write the 3 types of aliphatic hydrocarbons (3 marks)

_____

_____

END