MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2014

CHEMISTRY

2014

P/LAND NATIONAL EXAMINATION BOARD

PUNTLAND STATE OF SOMALIA

MINISTRY OF EDUCATION

NATIONAL EXAMINATIONS BOARD

NAME OF THE STUDENT	
NAME OF THE SCHOOL	
ROLL NUMBER	

FORM FOUR CHEMISTRY EXAMINATION MAY 2014

TIME 2:10 HOURS

INSTRUCTIONS TO CANDIDATES

Instructions to the candidate (please read carefully)

This paper consist of 16 pages, count them now, if there is missing please inform the invigilator.

- Answer **ALL** questions in part 1 and 2.
- Write your working on the space provided below the question.
- This paper consist of two parts
- PART 1: (10 multiple choices) = 10 marks
- PART 2: (9 structured questions) = 90 marks

Total = 100 marks

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

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SECTION ONE: MULPLE CHOICE QUESTIONS (10 MARKS)

For each question in this section, Circle the most correct answer.

1- Which of the following products are obtained when limestone (calcium carbonate) is heated?

A- Calcium oxide and carbon

B- Calcium oxide and carbon dioxide

C- Calcium, oxygen and carbon

D- Calcium hydroxide and carbon dioxide

2- Which of the following properties is typical of the elements in group VII (7) of the periodic table?

A- They form negative two ions (-2).
B- They have definite colours.
C- They are strongly electropositive.
D- They react with water to form bases

3- How many moles of calcium oxide (CaO) are needed to react with an excess of water to form 370g of calcium hydroxide?

A- 2 B- 3

C- 4 D- 5

4- Which of the following gases dissolves in water to form an alkaline solution?

A- Nitrogen dioxide
B- Ammonia
C- Hydrogen chloride
D- Carbon dioxide

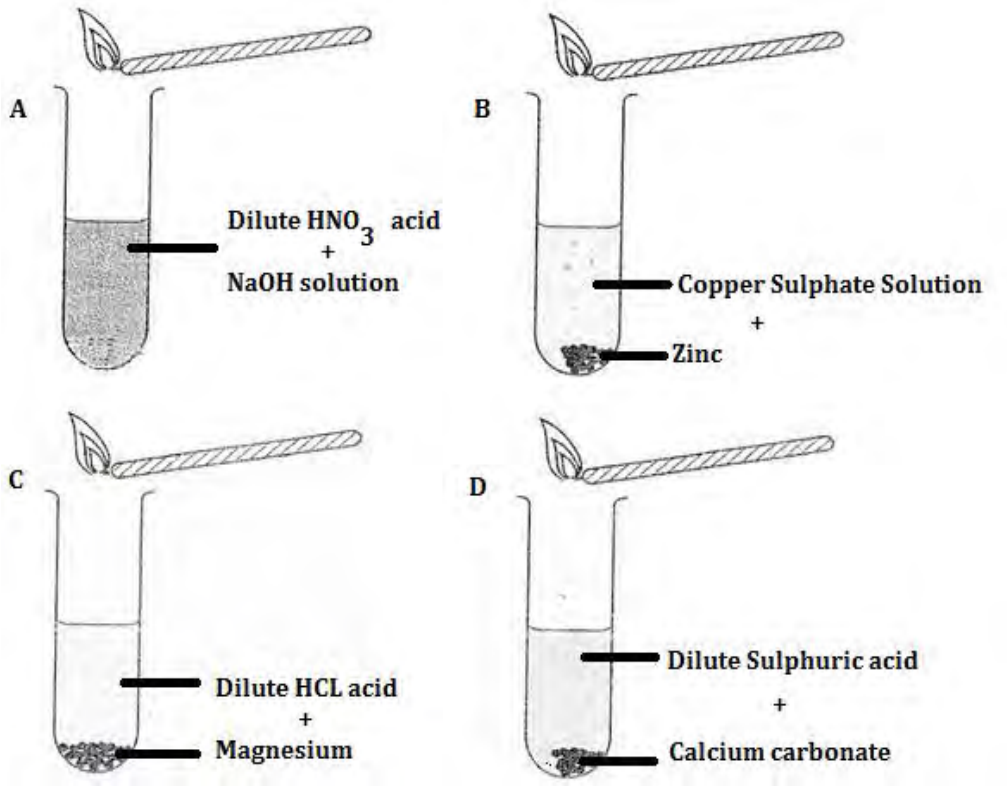
5- Ethene is burned, carbon dioxide and water are formed.

$C_2H_4 + 3O_2 \longrightarrow \mathbf{X}CO_2 + \mathbf{Y}H_2O$

Which of the following values of **X** and **Y** balances the equation.

	X	**Y**
A-	1	2
B-	2	4
C-	2	2
D-	3	2

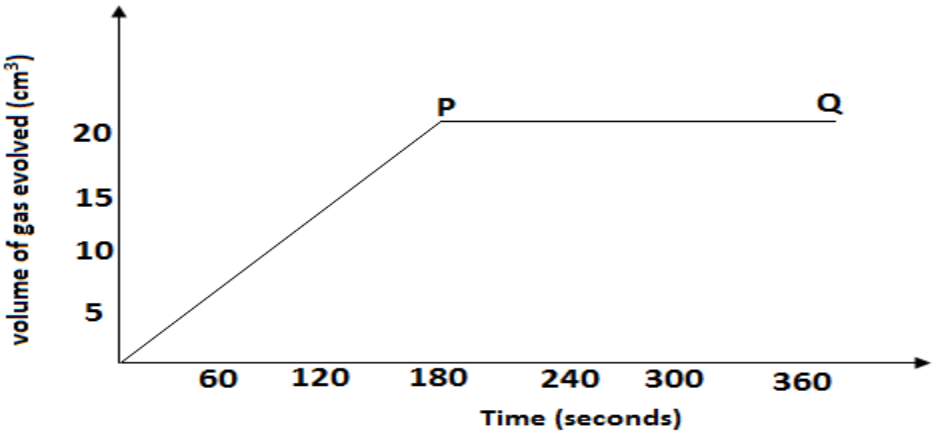
6- In which of the following set ups a will "pop" sound (hydrogen gas) be produced when a burning splint is introduced as shown?



7- Which of the following metal oxides is most easily reduced to the metal.

A- Iron(II) oxide
B- Tin(II) oxide
C- Zinc(II) oxide
D- Lead(II) oxide

8- The graph below shows the variation in the volume of hydrogen evolved with time when zinc reacts with dilute sulphuric acid, using copper sulphate solution.



The best explanation of the shape of the graph between **P** and **Q** is:

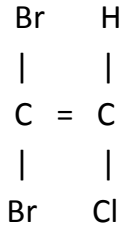
A- The reaction completely stopped
B- The zinc is used up
C- The acid is used up
D- The catalyst is used up

9- Only one of these changes is endothermic. Which one?

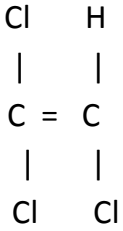
A- Dissolving ammonium chloride with water.
B- Sodium hydroxide reacts with sulphuric acid
C- Water with quicklime
D- Methane burns with oxygen

10- Which one of the following is geometric isomerism is possible

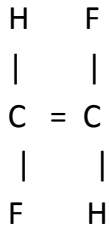
A-



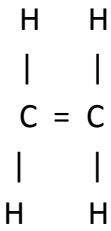
B-



C-



D-



SECTION TWO: STRUCTURED QUESTIONS (90 MARKS)

ANSWER ALL THE QUESTIONS IN THE SPACE PROVIDED

QUESTION ONE **(10 MARKS)**

1- **A**) With the help of the information in the data, find the missing terms in the table below. (7marks)

Element	Symbol	Atomic Number	Electron arrangement
i) Boron		5	2,3
ii) Lithium		3	
iii)	Mg		2,8,2
iv) Nitrogen	N		

B) The following statements are about the particles that make up the atom. Using the particles listed below; match the particles with their descriptions.

Protons	**Electrons**	**Neutrons**

i) The particles with no charge _____(1mark)

ii) Held in shells around the nucleus_____ (1mark)

iii) Positive charged particle_____ (1mark)

QUESTION TWO: **(10 MARKS)**

2- A) Look at these formulae representing different types of substances.

H_2O	**Ca**	**H_2**
HF	**KCl**	**SiO_2**

i) Identify the covalent molecular substance which does ***not*** contain polar covalent bonds._____ (1mark)

ii) Identify the ionic compound _____ (1mark)

iii) Identify the ***two*** covalent molecular substances which contain polar covalent compounds._____

_____(2marks)

iv) Identify the substance which has a giant covalent structure

_____ (1mark)

B) Write balanced formulae equations for each of the following sentence descriptions.

i) Calcium hydroxide and carbon dioxide react to give calcium carbonate and water.

_____(1mark)

ii) Barium oxide and water react to give barium hydroxide.

_____ (1mark)

iii) Lead(II) nitrate and potassium iodide reacts to give lead(II)iodide and potassium nitrate. _____ (1mark)

iv) Lithium oxide and water reacts to give lithium hydroxide

_____(1mark)

v) Nitrogen and hydrogen reacts to form ammonia

_____(1mark)

QUESTION THREE: (10 MARKS)

3- A) The table below shows some organic acids and their sources. Complete the blank spaces. (3marks)

Organic acid	**Source**
Tartaric	Grapes
Lactic acid	
Tannic acid	
Citric acid	

B) Briefly explain the effect of acids on the following substances:

i) Litmus paper _____

_____(1mark)

ii) Metals _____

_____(1mark)

iii)Bases _____

_____(1mark)

iv) Carbonates_____ (1mark)

C) *Zinc sulphate can be prepared by adding excess zinc carbonate to dilute Sulphuric acid in a beaker and mixture warmed until no further reaction occurs. The mixture is then filtered and the filtrate heated to saturation and then cooled. The crystals obtained and then dried.*

i) Write the formula equation for the reaction between zinc carbonate and sulphuric acid.

_____(1mark)

ii) Explain why zinc carbonate is added in excess ?

_____

_____(1mark)

iii) How could you tell the reaction is over?_____

_____(1mark)

QUESTION FOUR **(10 MARKS)**

A) Neon has three isotopes $^{20}_{10}Ne$ (abundance 90.5%), $^{21}_{10}Ne$(abundance 0.3%), $^{22}_{10}Ne$ (abundance 9.2%).

i) Explain the meaning of the word isotope?

_____(1mark)

ii) Determine the relative atomic mass of neon?

_____

_____

_____

_____(2marks)

iii) Write two uses of noble gases

_____

_____(2marks)

B) *When a hydrated copper (II) sulphate is heated in a test tube, a white anhydrous copperIIsulphate is formed. On adding a few drops of water to anhydrous copper II sulphate, the blue colour is restored and heat is envolved.* The following equation shows the process.

$$CuSO_4 . 5H_2O\ (s) \rightleftharpoons CuSO_4\ (s) + 5H_2O\ (g)$$

i) Give two reasons why this process is a chemical change.

_____

_____

_____ (2 marks)

ii) State the meaning of these terms:

a) Solute

_____

_____(1 mark)

b) Saturated solution

_____

_____(1mark)

c) Residue

_____

_____ (1mark)

QUESTION FIVE **(10 MARKS)**

4- A) chloroethene also called vinyl chloride, can be polymerized to a high molecular weight polymer.

i) Draw a section of the polymer showing four molecules joined together.

_____(1mark)

ii) Name the polymer

_____(1mark)

iii) Draw the repeating unit of the polymer

_____(1mark)

iv) What type of polymerization is formed when chloroethene monomers polymerise.

_____(1mark)

v) What is a monomer?

_____(1mark)

B) Butane reacts with chlorine in a substitution reaction.

i) What conditions are essential for this reaction?

_____(1mark)

ii) Write an equation for this reaction.

_____(1 mark)

iii) Write the structural formula of ***two*** possible isomers of the product.

_____

_____(2 marks)

iv) What do you understand by the term substitution reaction?

_____(1 mark)

QUESTION SIX **(10 MARKS)**

6-A) Match up the metals on the left to their descriptions on the right. One has been done for you? (3 marks)

Metal	Description	Matching Number
1. Silver	A metal used to make aircraft bodies	2
2. Aluminium	A metal used in jewelers	
3. Potassium	An unreactive metal used for electrodes	
4. Platinum	A very soft metal	

B) Aluminium is resistance to corrosion while iron corrodes very fast.

i) Explain why aluminium does not corrode as quickly as iron?

_____

_____(1mark)

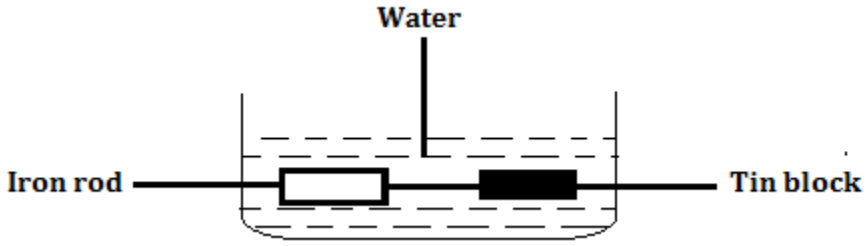
ii) Give the common name and the chemical formula of the substance formed when iron corrodes._____

_____ (2 marks)

iii) Why is aluminium a better option then copper for overhead electric cables

_____(1mark)

C) The set-up below was used by a student to try to prevent the rusting of an iron rod.



i) Which method of rust prevention was the student investigating?

_____(1 mark)

ii) Did the student succeed in preventing the rusting of iron using the set-up above? Explain your answer.

_____

_____(2 marks)

QUESTION SEVEN **(11 MARKS)**

7-A) Pairs of electrons in molecules may be represented as bonding or as lone pairs.

i) Complete the table below for water, ammonia and boron triflouride.

(4marks)

Molecule	**H_2O**	**NH_3**	**BF_3**
Number of bonding pairs of electrons			3
Number of lone pairs of electrons	2		

ii) Draw the shape of the molecules of ***ammonia*** and ***wate****r* and name them.

Ammonia

_____

_____(2 marks)

Water

_____

_____(2 marks)

B) Predict the polarity of the following molecules.

i) H_2

_____(1 mark)

ii) HF

_____(1mark)

iii) $CHCl_3$

_____ (1mark)

QUESTION EIGHT **(10 MARKS)**

8- A) the balanced equation for the decomposition of magnesium carbonate is:

$$MgCO_3(s) \longrightarrow MgO(s) + CO_2(g)$$

I) Draw an enthalpy cycle showing the formation of each of the reactants and products from their elements in their standard states. (2 marks)

iii) Use the following enthalpy changes of formation to calculate the enthalpy Change for the decomposition of magnesium carbonate.

	$MgCO_3$	**MgO**	**CO_2**
H°_f △ (kj/mol^{-1})	-1096	-602	-394

_____

_____

_____

_____

_____(3 marks)

B) State the trends in atomic radius and electronegativity of halogens from fluorine to iodine.

i) Atomic radius

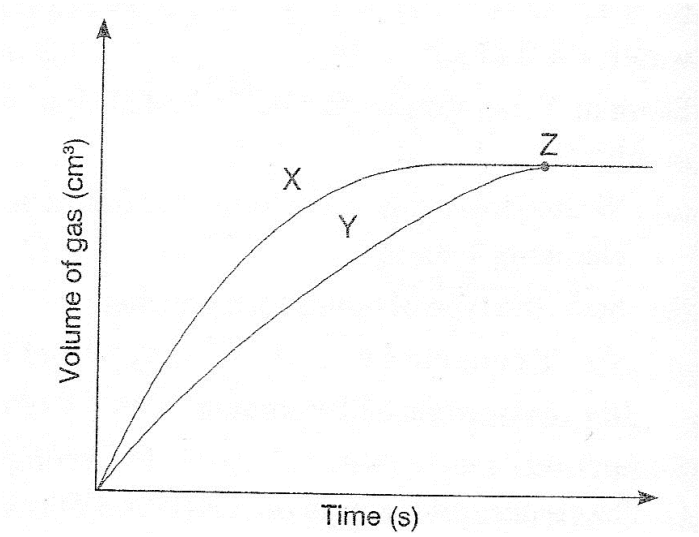
_____(1mark)

ii) Electronegativity

_____(1 mark)

C) Equal masses of magnesium ribbon were reacted separately with equal volumes of 1 molar hydrochloric acid and 1 molar ethanoic acid. The results were plotted on a graph as shown below. Two curves, **X** and**Y** were obtained.

Which curve represents:



i) 1 M hydrochloric acid

_____(1 mark)

ii) 1 Methanoic acids

_____(1 mark)

iii) State the significance of point **Z**.

_____(1 mark)

QUESTION NINE **(9 MARKS)**

9- A) A covalent bond may be broken into two ways: (homolytic fission or heterolytic fission).

Define the following terms:

i) Hemolytic fission

_____

_____(1 mark)

ii) Heterolytic fission

_____

_____(1 mark)

B) Classify the following species as free radical, electrophile, or nucleiphile: (7 marks)

$Br^{\bullet}$	Cl^{-}	CH_3^{+}	CH_3^{--}	$CH_3^{\bullet}$	NH_3	BF_3

Free radical_____ _____

Electrophiles_____

Nucleophiles_____

END