

Name: Index No.
Date: Candidate's Sign.

233/2

CHEMISTRY

PAPER 2

JULY/AUG 2014

TIME: 2 HOURS

NYAMIRA NORTH SUB-COUNTY JOINT EVALUATION TEST-2014

Kenya Certificate of Secondary Education (K.C.S.E.)

Chemistry

Paper 2

INSTRUCTIONS TO CANDIDATES:

- Write your **name** and **index number** in the spaces provided above
- **Sign** and write the **date** of examination in the spaces provided.
- Answer **all** the questions in the spaces provided.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators can be used.

For Examiners Use Only

Question	Maximum score	Candidate's score
1	11	
2	10	
3	10	
4	10	
5	7	
6	10	
7	12	
8	10	
Total	80	

This paper consists of 9 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. Use standard electric potentials for elements **A**, **B**, **C**, **D** and **F** given below to answer the questions that follow.

		E^θ (Volts)
$A^{2+}_{(aq)} + 2e$	$A_{(s)}$	-2.90
$B^{2+}_{(aq)} + 2e$	$B_{(s)}$	-2.38
$2C^{2+}_{(aq)} + 2e$	$C_{2(g)}$	0.00
$D^{2+}_{(aq)} + 2e$	$D_{(s)}$	+0.34
$\frac{1}{2} F^{2+}_{(g)} + e$	$F_{(aq)}$	+2.87

- i) Which element is likely to be hydrogen? Give a reason for your answer (2mks)

.....

- ii) What is the E^θ value of the strongest reducing agent? (1mk)

.....

- iii) In the space provided draw a labeled diagram of the electrochemical cell that would be obtained when half-cells of elements **B** and **D** are combined. (3mks)

- iv) Calculate the E^θ value of the electrochemical cell constructed in (iii) above. (1mk)

b) During the electrolysis of aqueous copper (II) sulphate using copper electrode, a current of 0.2 amperes was passed through the cell for 5 hours.

- i) Write an ionic equation for the reaction that took place at the anode. (1mk)

.....

- ii) Determine the change in mass of the anode which occurred as a result of the electrolysis process (Cu = 63.5, 1 Faraday = 96,500 coulombs). (3mks)

2. The table below gives information on four elements by letters K, L, M, and N. study it answer the questions that follow. The letters do not represent the actual symbols of the elements.

Element	Electron arrangement	Atomic radius(nm)	Ionic radius (nm)
K	2.8.2	0.136	0.065
L	2.8.7	0.099	0.181
M	2.8.8.1	0.203	0.133
N	2,8,8,2	0.174	0.099

- a) Which **two** elements have two similar properties? Explain. (2mks)

.....

.....

- b) What is most likely formula of oxide of **L**? (1mk)

.....

.....

- c) Which element is a non-metal? Explain (1mk)

.....

.....

- d) Which **one** of elements is the strongest reducing agent? Explain (2mks)

.....

.....

- e) Explain why ionic radius of **N** is less than that of **M** (2mks)

.....

.....

- f) Explain why the ionic radius of **L** is bigger than its atomic radius (2mks)

.....

.....

3. a) Give the name of each of the processes described below which takes place when salts are exposed to air for some time.

i) Anhydrous copper forms an aqueous wet (1mk)

.....

ii) Magnesium chloride forms an aqueous solution. (1mk)

.....

iii) Fresh crystals of sodium carbonate. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ forms powder (1mk)

.....

b) Write formula of the complex ion formed in each of the reactions described below.

i) Zinc metal dissolves in hot alkaline solution (1mk)

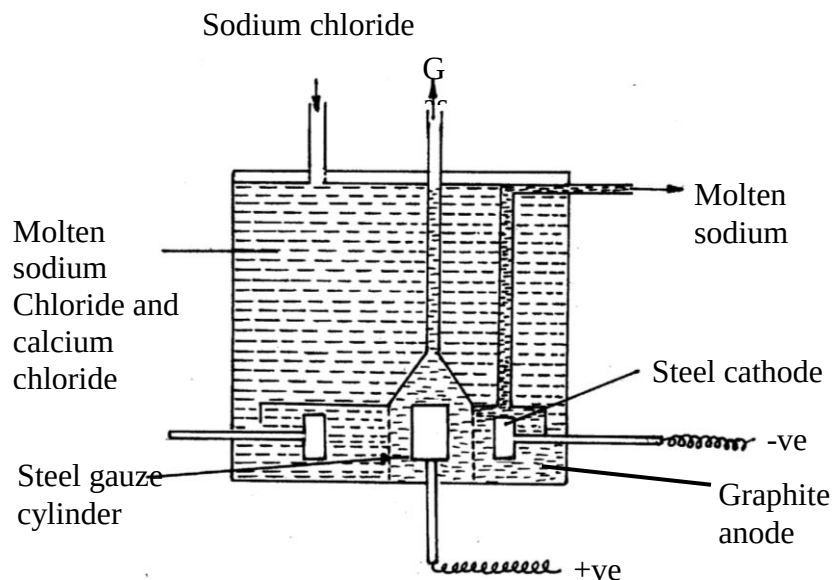
ii) Copper hydroxide dissolves in excess ammonia solution. (1mk)

c) A hydrated salt has the following composition by mass. Iron 20.2%, Oxygen, 23.0%, sulphur, 11.5% water, 45.3%. its relative formula mass is 278.

i) Determine the formula of the hydrated salt. (Fe = 56, S = 32; O = 16, H = 1) (3mks)

ii) 6.95g of the hydrated salt were dissolved in distilled water and the total volume made to 250cm^3 of solution. Calculate the concentration of the salt solution in moles per litre. (2mks)

4. a) The diagram below shows the extraction of sodium metal using the downs cell. Study it answer the questions that follow.



- i) Explain why in this process the sodium chloride is mixed with calcium chloride. (2mks)

.....

.....

- Why is the anode made of graphite and not steel? (1mk)

.....

.....

- ii) State **two** properties of sodium metal that make it possible for it to be collected as shown in the diagram. (2mks)

.....

.....

- iv) What is the function of the steel gauze cylinder? (1mk)

.....

.....

- v) Write ionic equations for the reactions which take place at: (2mks)

Cathode.....

Anode.....

- vi) Give **one** industrial use of sodium metal. (1mk)

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.....

- b) Explain why the sodium metal is kept stored under kerosene. (1mk)

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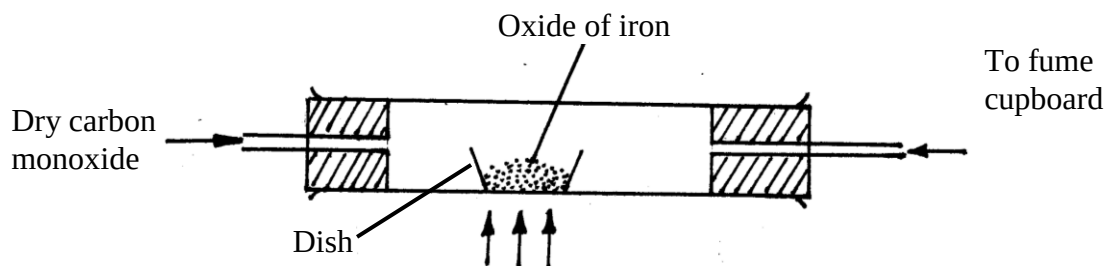
5. a) An ore is suspected to contain mainly iron. Describe a method that can be used to confirm the presence of iron in the ore. (3mks)

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.....

.....

- b) Excess carbon monoxide gas was passed over a heated sample of an oxide of iron as shown in the diagram below. Study the diagram and the data below it to answer the questions that follow.



Mass of empty dish	=	10.98g
Mass of empty dish + oxide of iron	=	13.30g
Mass of empty dish + residue	=	12.66g

- i) Determine the formula of the oxide of iron. (Relative formula mass of oxide iron = 232, Fe = 56.0, O = 16.0) (2mks)

- ii) Write an equation for the reaction which took place in the dish. (1mk)

.....

.....

- c) Corrosion is a destructive process in which iron is converted into hydrated iron (iii) oxide state:

- i) **Two** conditions necessary for rusting to occur. (2mks)

.....

.....

- ii) **One** method used to protect iron from rusting. (1mk)

.....

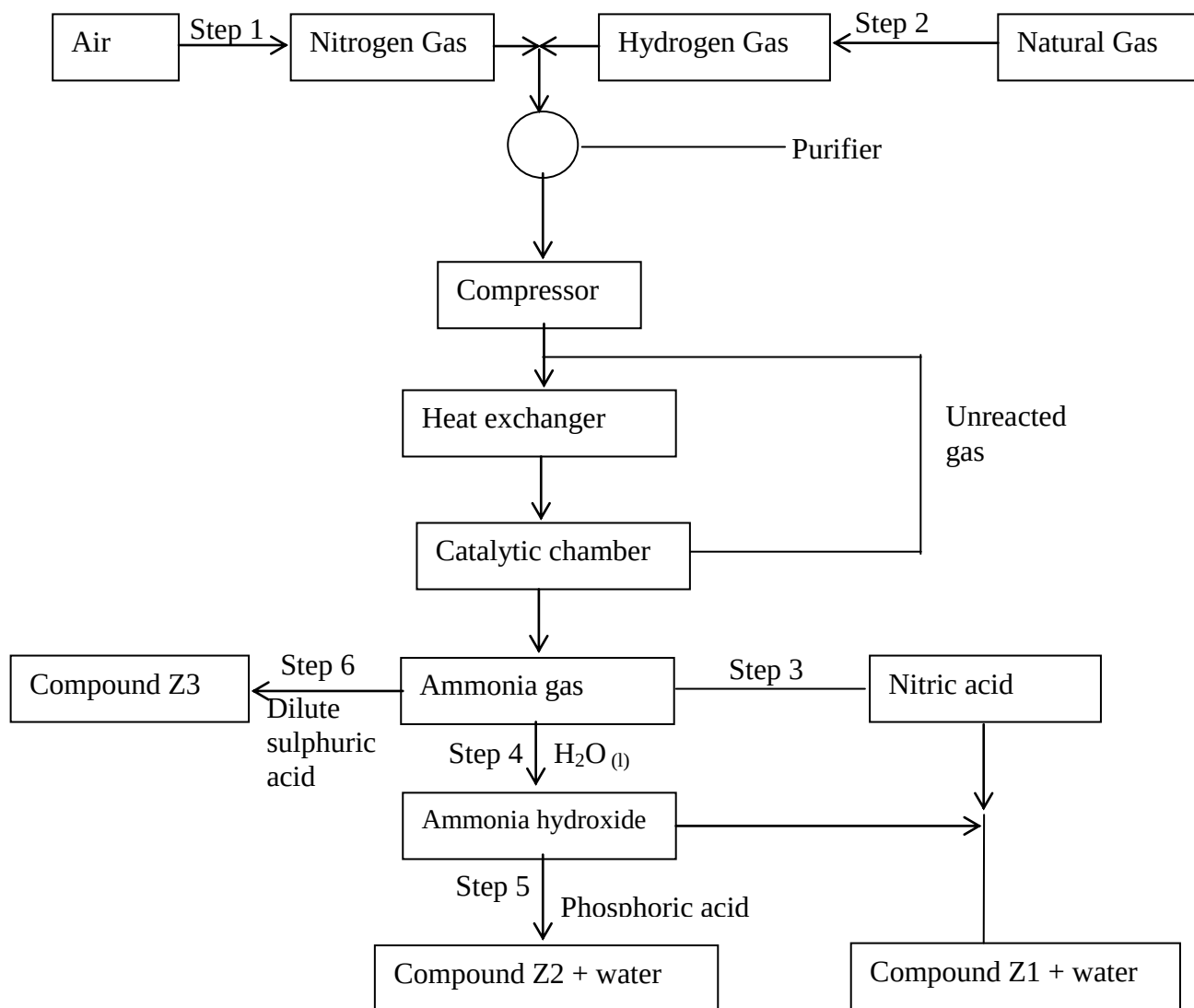
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- d) Explain why it is advisable to wash vehicles using seawater. (1mk)

.....

.....

6. The flow chart shows the industrial preparation of ammonia and the process used in the manufacture of some ammonium compounds. Study and answer the questions that follow.



a) Give the name of the

i) Process in step 1 (1mk)

ii) Reaction that takes place in step 5 1mk)

b) State **one** other source of hydrogen gas apart from natural gas (1mk)

.....

c) Explain why it is necessary to compress nitrogen and hydrogen in this process. (2mks)

.....

d) Write an equation which takes place in **step 6**. (1mk)

.....

e) Name the catalyst and the reagents used in **step 3** (2mks)

Catalyst.....

Reagent.....

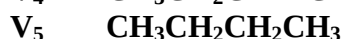
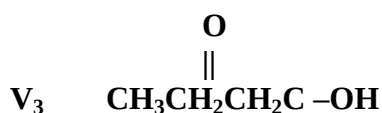
f) Name compound **Z1** (1mk)

.....

g) Give **one** commercial use of compound **Z2** (1mk)

.....

7. a) The list below shows the formulae of some organic compounds. Use it to answer the questions that follow.



i) Select **two** compounds which

I) Are not hydrocarbons (1mk)

.....

II) Belong to the same homologous series (1mk)

.....

ii) Identify the compound that is likely to undergo polymerization. Give a reason for your answer.

(2mks)

.....

.....

(a) The structure below represents two cleansing agents:



In the table below, give one advantage and one disadvantage of using each one of them. (2mks)

	Advantage	Disadvantage
R – COO ⁻ Na ⁺		
R – OSO ₃ ⁻ Na ⁺		

b) Under certain condition, ethanoic acid (C₂H₄O₂) and ethanol (C₂H₅OH) react to form a sweet smelling compound.

i) What is the general name of compound to which the sweet smelling compound belong? (1mk)

.....

ii) Write the formula of the sweet smelling compound. (1mk)

.....

iii) Give **one** use of ethanoic acid other than formation of the sweet smelling compounds (1mk)

.....

c) Fibres are either synthetic or natural. Give **one**:

i)Example of a natural fibre..... (1mk)

ii)Advantage of synthetic fibres have over natural fibres. (1mk)

.....

8. a)Distinguish between isotopes and allotropes. (2mks)

.....

.....

b) The chart below is part of the periodic table. Study it and answer the questions that follow. (The letters are not the actual symbols of the elements)

A				B			
C	D					E	

i)Select the element in period three which has the shortest atomic radius. Give a reason for your answer. (2mks)

.....

.....

ii)Element F has the electronic structure 2.8.18.4 on the chart above. Indicate the position of element **F**. (1mk)

.....

iii)State **one** use of the element of which **E** is a member. (1mk)

.....

iv) Write an equation to show the action of heat on the nitrate of element **C**. 1mk)

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c) When 3 litres of chlorine gas were completely reacted with element D. 11.875g of the product were formed. Determine the relative atomic mass of element D. (Atomic mass of chlorine = 35.5. molar gas volume = 24lites).

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ANSWERS:

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