Name…… …….…… Index No:…….
233/2 Candidate's Signature ……..……
CHEMISTRY Date: ……
PAPER 2
THEORY
JULY/AUGUST 2014
TIME: 2 HOURS

NYAMIRA SUB-COUNTY JOINT EVALUATION EXAM

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

233/2
Chemistry
Paper 2
2 Hours

INSTRUCTIONS TO CANDIDATES

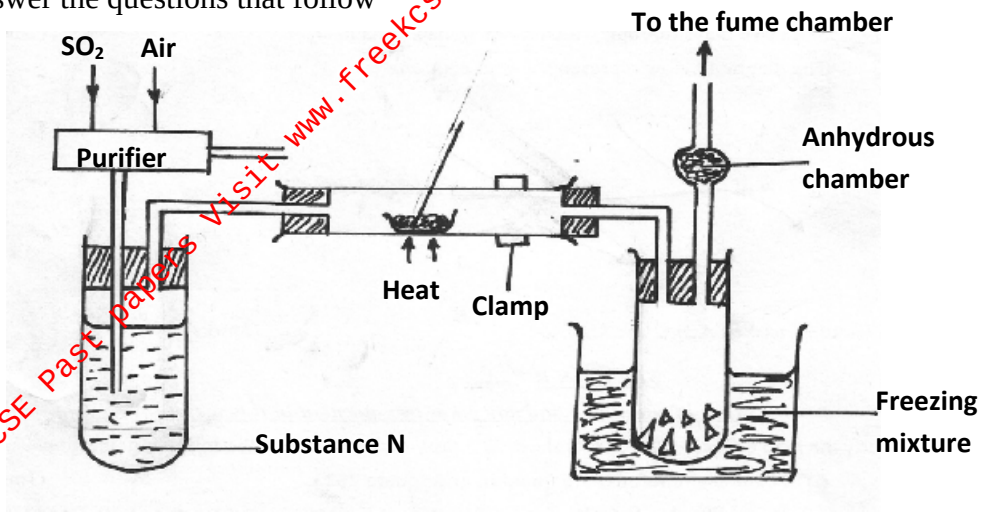
- Write your name and Index number in spaces provided above.
- Sign and write the date of examination in the spaces provided above
- Answer all the questions in the spaces provided above.
- KNEC Mathematical tables and silent electronic calculators may be used.
- All working must be clearly shown where necessary.
- Candidates should answer the questions in English.

For Examiners Use Only

Question	Maximum score	Candidate's score
1	14	
2	12 ½	
3	13	
4	13	
5	10 ½	
6	11	
7	7	
Total score	**80**	

This paper consists of 8 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. The figure below represents a set-up that can be used to prepare sulphur (VI) oxide. Study it and answer the questions that follow



(a) Name substances M and N (1mk)

M…….

N……

(b) State the function of substance N (1mk)

……

(c) Given that the equation for the reaction that occurs is

$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ ΔH=-197kJ

What information about the reaction is provided by ΔH=-197kJ? (1mk)

……

(d) Give the name of the method of gas collection shown above (1mk)

……

(e) What is the advantage of using calcium oxide instead of anhydrous calcium chloride in the experiment above? (1mk)

……

……

(II) Concentrated sulphuric (VI) acid is manufactured in large scale through contact process

(i) Identify two substances that are recycled during contact process (1mk)

……

(ii) Why is recycling necessary? Give two reasons (1mk)

……

……

(b)(i)Sulphur (IV) oxide gas is removed by scrubbing in the contact process. What is meant by scrubbing? (1mk)

……

……

(ii) Write an equation showing how Sulpur (IV) oxide is scrubbed (1mk)

……

……

(c) Explain why sulphur (VI) oxide is dissolved in concentrated sulphuric (VI) acid and not in water during contact process (1mk)

……

……

(III) Given that a concentrated solution of sulphurci (VI) acid 18.2M, determine the volume of the concertrated sulphuric (VI) acid that can be mixed with distilled water to make one litre of 2M sulphuric (VI) acid solution (2mks)

2. (a) Below is part of the periodic table. The letters do not represent the actual symbols of the elements. Study it and answer the questions that follow

											X
Q	S				U			V	W		
R	T										

(i) State and explain the difference in the melting points of S and U (2mks)

……

……

(ii) Select an element that is the strongest reducing agent. Give a reason (2mks)

……

(iii) Compare the atomic radius of elements R and T. Explain (2mks)

……

……

(iv) What is the difference in the nature of the aqueous solution of the oxides of Q and that of V. explain your answer (2mks)

……

……

(b) Study the table below and answer the questions that follow

Substance	M.p (K)	B.p(K)	Electrical conductivity	
			Solid	Molten
A	360	460	NIL	NIL
B	1319	2870	GOOD	GOOD
C	1146	1704	NIL	GOOD
D	2266	2944	NIL	NIL

Select the substance which represents

(i) Aluminium oxide (1mk)

……

(ii) Silicon oxide (1mk)

……

(iii) Magnesium metal (1mk)

……

(c)In terms of structure and bonding, explain why magnesium chloride is a solid while Silicon (IV) chloride is a liquid at room temperature (2mks)

……

……

3. (a) In a paper chromatography sample A was found to be more soluble than sample B. Sample C had the same solubility a sample A, while sample D was most sticky of all the samples. Mixture K contained samples B and D only. In the space provided below draw the chromatogram of A,B,C,D and mixture K (3 ½ mks)

(b) Using propanone describe how you can separate a mixture containing iodine crystals and common salt (2 ½ mks)

……

……

(c)Mixture of magnesium powder and zinc (II) oxide will react vigorously when heated but no reaction occurs when a mixture of magnesium oxide and zinc powder is heated

(i) Explain the observations made (1mk)

……

(ii) Write the equation for the reaction between magnesium and zinc (II) oxide (1mk)

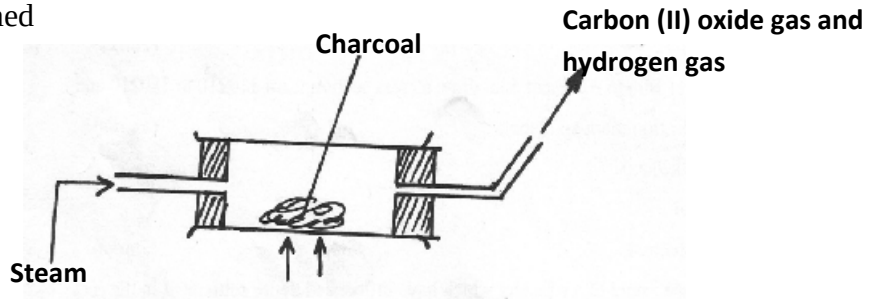
……

……

(iii) From the reaction above identify the oxidizing agent (1mk)

……

4. (a) When steam is passed over heated charcoal as shown below, Carbon (II) oxide and hydrogen gas are formed



(i) What name is given to the mixture of gases produced above? (1mk)

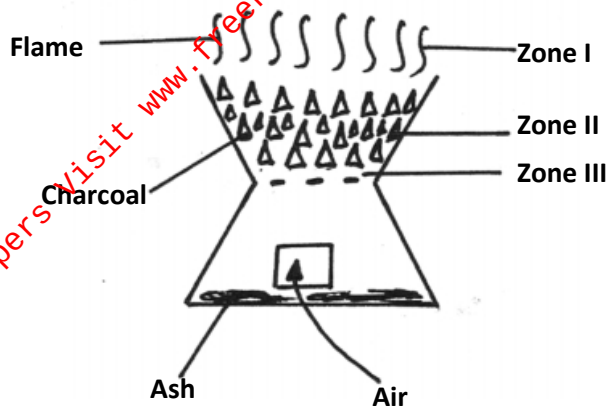
……

(ii) Give two uses of Carbon (II) oxide gas which are also uses of hydrogen gas (1mk)

……

……

(b) The diagram below represents a charcoal burner. Study it and answer the questions that follo



(i) Write equations for the reactions occurring at

Zone I……(1mk)

Zone II……(1mk)

(ii) What is the colour of the flame (1mk)

……

(iii) The ash that collects in the lower compartment was dissolved in water and filtered. Suggest the PH value of the resulting solution (1mk)

……

……

(c) Carbon (II) oxide gas can be prepared in the laboratory by a process shown below

$(COOH)_2 \xrightarrow{\text{Conc. } H2SO4} CO_{2(g)} + CO_{(g)} + H_2O_{(l)}$

(i) State the function of the concentration sulphuric (VI) acid in the process above (1mk)

……

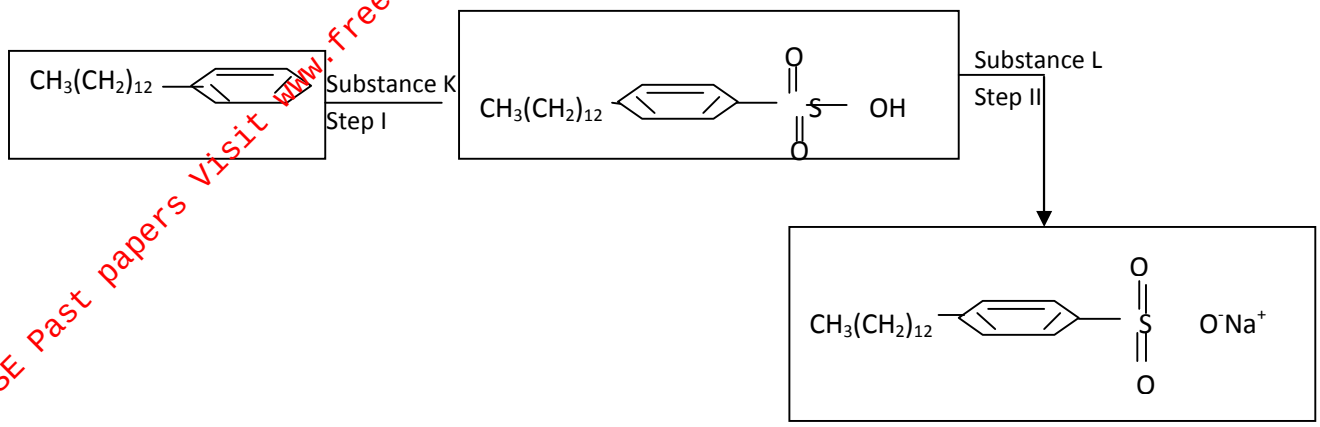
(ii) How would you remove Carbon (IV) oxide gas form the mixture of Carbon (II) Oxide and carbon (IV) oxide gas (1mk)

……

……

(d) What volume of Carbon (II) Oxide at r.t.p is needed to reduce 106g Iron (III) Oxide to iron metal? (O=16, Fe=56, Molar gas volume at r.t.p=24 litres) (3mks)

5. (a) The flow diagram below shows some of the steps followed during the large scale manufacture of a detergent



(i) What is a detergent ? (1mk)

……

(ii) Identify substances K and L

K …… (1mk)

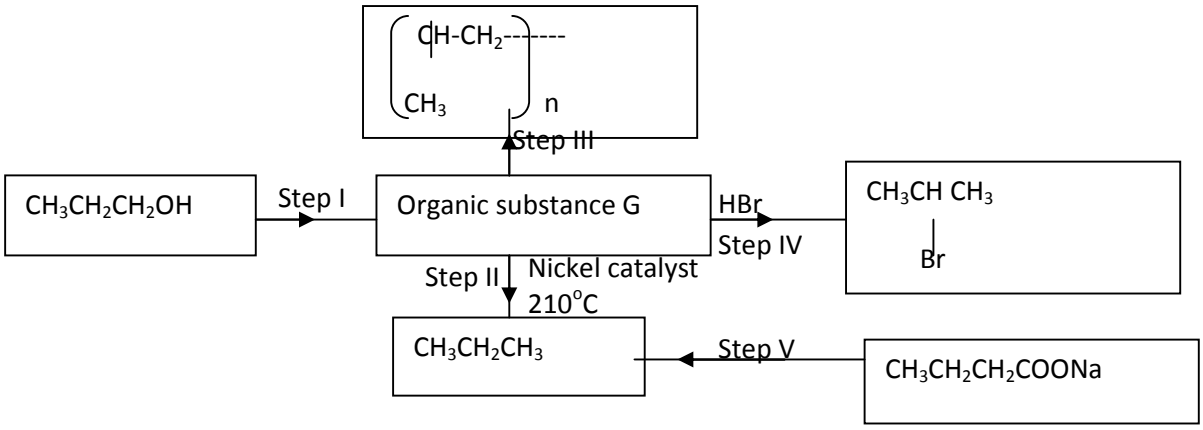
L …… (1mk)

(iii) Write an equation for the reaction that takes place when the detergent is added to water containing Calcium ions (1mk)

……

……

(b) The scheme below illustrates some reactions. Study it and answer the questions that follow



(i)Name the process that occurs in step

I……(½ mk)

V……(½ mk)

(ii) Identify organic substance G (½ mk)

……

(iii) Give the reagent and condition necessary for step I to occur (1mk)

Reagent (½ mk)

……

Condition (½ mk)

……

(iv) Write the chemical equation for the reaction that occur in Step V (1mk)

……

……

(v) Ethene gas cannot be dried using concentrated Sulphuric (VI) acid but ethane gas can.

Explain with the aid of an equation (1 ½ mks)

……

……

(vi) Ethene gas decolourises chlorine gas in darkness and in sunlight but ethane gas decolorizes chlorine gas only in the sunlight but not in darkness. Explain (2mks)

……

……

6. (I)(a) Name the enthalpy change represented by ΔH1 in the process below (1mk)

$K_{(s)} \longrightarrow K_{(g)}$ ΔH1=+ve

……

(b) The atomic numbers of Li and K are 3 and 19 respectively

$Li^+_{(g)} + aq \longrightarrow Li^+_{(aq)}$ -ΔH2=-519KJ/Mol

$K^+_{(g)} + aq \longrightarrow K^+_{(aq)}$ ΔH3=-322KJ/Mol

ΔH_2 is than ΔH_3 form the data given above. Give a reason (1mk)

……

……

(c) The table below gives some bond energies of some bonds

Bond	Bond energy KJ/Mol
H-H	435
Cl-Cl	243
H-Cl	431

Determine the heat change for the reaction (2mks)

$H_{2(g)} + Cl_{2(g)} \longrightarrow 2HCl_{(g)}$

(II) (a) Study the date provided below and answer the questions that follow. Letters do not represent the actual symbols of the elements

	Eθ Volts
$J^{+}_{(aq)}/J_{(s)}$	-0.41
$K^{2+}_{(aq)}/K_{(s)}$	0.00
$L^{+}_{(aq)}/L_{(s)}$	-2.87
$M^{+}_{(aq)}/M_{(s)}$	+1.81

(i) Arrange the elements in order of decreasing reducing power (1mk)

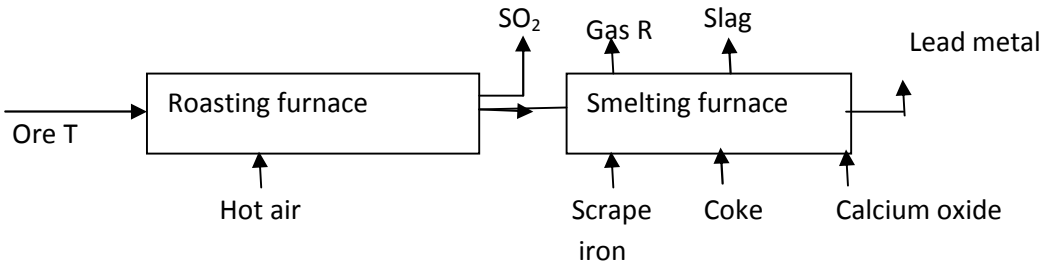
(ii) Select two half cells which when combined produce the lowest e.m.f (2mks)

……

……

(b) 50.0cm^3 of hydrogen gas was collected at r.t.p when a current of 0.1A was passes for 7.5 minutes through acidified water. Determine the quantity of electricity needed to deposit one mole of hydrogen gas at the same conditions *(molar gas volume at r.t.p=24cm^3)* (3mks)

7. (I) The reaction scheme below illustrates how lead metal is extracted form its ore



(a) Identify ore T which is commonly used in the extraction of Lead metal (1mk)

……

(b) Name gas R produced in the smelting furnace (1mk)

……

(c) Using an equation explain what happens in the roasting furnace (1mk)

……

(d)What is the purpose of adding the following to the smelting furnace?

(i) Scrape Iron (1mk)

……

(ii) Calcium oxide (1mk)

……

(e) State one environmental hazard likely to be associated with the extraction of lead metal (1mk)

……

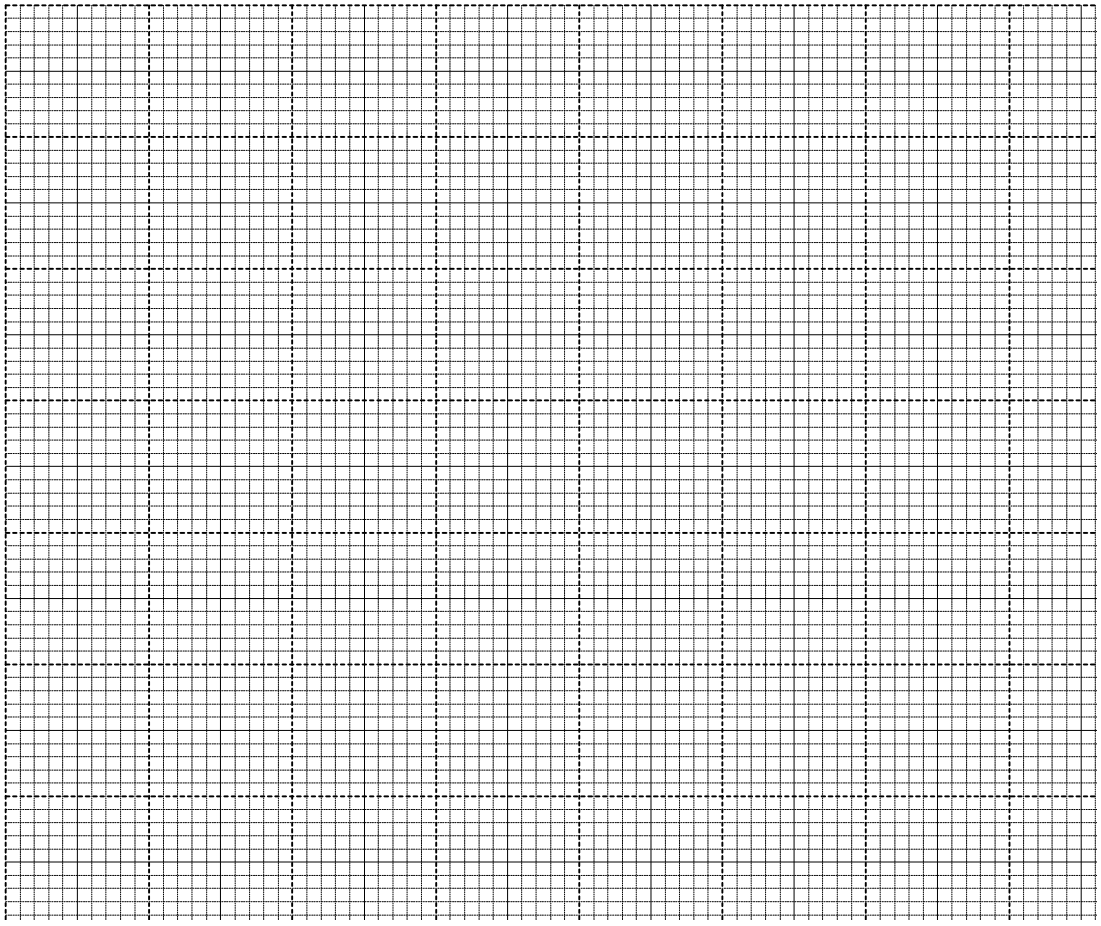
(II) Different volumes of 1M nitric (V) acid were each reacted with 2.07g of lead metal at room temperature and pressure. The following results were obtained

Volume of nitric (V) acid used (cm^3)	5.0	15.0	25.0	35.0	45.0	55.0
Volume of nitrogen (IV) oxide gas produced (cm^3)	60	180	300	420	480	480

(a) Nitric (V) acid is not used in the laboratory preparation of hydrogen gas. Give a reason(1mk)

……

(b) (i) In the grid provided below plot a graph of volume of the gas produced against volume of the acid (3mks)



Using the graph, determine the volume of:

(i) Nitrogen (IV) oxide produced when 30.0cm^3 of 1M nitric (V) acid were reacted with 2.07g of lead metal (1mk)

……

(ii) 1M nitric (V) acid which would react completely with 2.07g of lead metal (1mk)

……

(c) Explain how the rate of the reaction between lead and nitric (V) would be affected if the temperature of the reaction mixture was increased (2mks)

……

……

……