MANGU HIGH SCHOOL

233/2
CHEMISTRY
PAPER 2
JULY 2016
TIME: 2 HOURS

NAME: _____

ADM NO: _____ INDEX NO. _____ CLASS: _____

Kenya Certificate of Secondary Education
Mock Examinations
Chemistry
Paper 2
2 Hours.

- Answer **ALL** the questions in the spaces provided.

This paper consists of **11 printed pages.**
Make sure that all the pages are printed and that no page is missing.

Turn Over

1. The following is an extract of the periodic table. Study it and answer the questions that follow. (the letters are not the actual symbols of the elements)

S				Z			J	Q
	W		R	D			T	
V								

(a) Compare the atomic radius of elements V and S (1mk)

(b) The oxide of D has a higher melting point than the oxide of Z. Explain this observation (1mk)

(c) Compare the atomic and ionic radius of element T (2mks)

(d) The chloride of W does not conduct electricity in solid state but conducts in molten state. Explain this observation (1mk)

(e) Describe how you can separate a mixture of the carbonate of V and the carbonate of W. (2mks)

(f) Describe how you can separate a mixture of the carbonate of V and the carbonate of W (2mks)

(g) Compare the ionic radius of element W and A (2mks)

2. I. The reaction between lamps of calcium carbonate and excess 1M hydrochloric acid takes place according to the following equation.

$$CaCO_{3(s)} + 2HCl_{(g)} \longrightarrow CaCl_2 + H_2O_{(l)} + CO_2(g)$$

(a) A part from concentration state two other factors that affects the rate of reaction (1mk)

(b) Such an experiment produced carbon (IV) oxide at different time intervals as indicated below.

Time (sec)	0	10	20	30	40	50	60	70	80	90
Volume (cm^3)	0	30	60	75	82	86	88	90	90	90

(c) Plot a graph of volume of gas against time (3mks)

(d) Use the graph to find the volume of gas produced after 15 seconds (3mks)

(e) Explain why the volume of CO_2 produced does not exceed $90cm^3$. (1mk)

(f) The lamp of calcium carbonate used was found 2.5g in mass. It was impure. Calculate the percentage purity of the lamp. (C=12, O=16, Ca=40) (2mks)

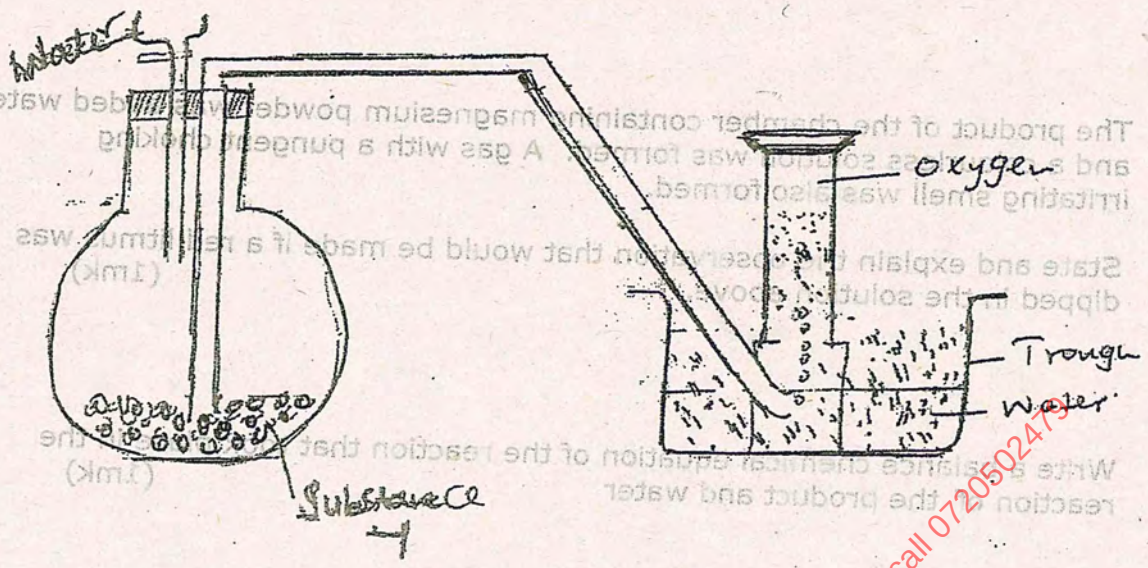
(M.G.V.= $24dm^3$)

II. The conversion of SO_2 to SO_3 takes place and reaches equilibrium as per the following equation.

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \quad DH\ -197Kjmol^{-1}$$

(a) State and explain the effect of a decrease in pressure on the yield of (2mks)

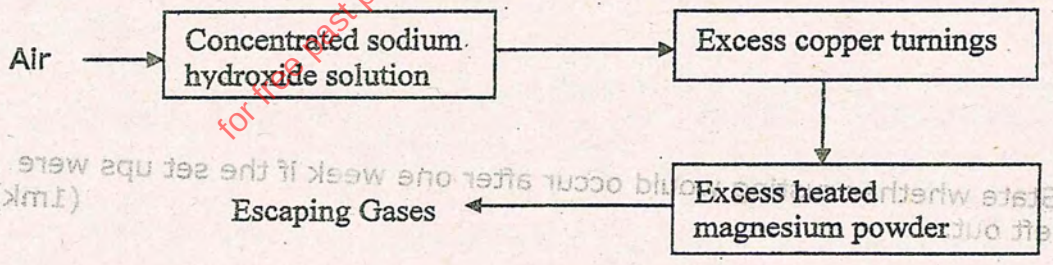
3. I. The following is a set up used to prepare oxygen gas in the lab. Study it and answer the questions that follow.



(a) Identify a mistake in the set-up above. (1mk)

(b) Name substance Y (1mk)

II. Air was passes through several reagents as shown below.



(a) Give another solution that can be used in place of sodium hydroxide solution (1mk)

(b) State the observation made at the chamber containing copper (1mk)

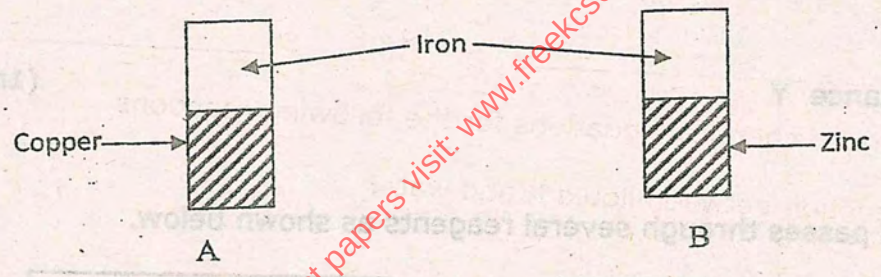
(c) Name one gas which escapes from the chamber containing magnesium powder. Give a reason for your answer. (1mk)

(d) The product of the chamber containing magnesium powder was added water and a colourless solution was formed. A gas with a pungent choking irritating smell was also formed.

(i) State and explain the observation that would be made if a red litmus was dipped in the solution above. (1mk)

(ii) Write a balance chemical equation of the reaction that took place in the reaction of the product and water (1mk)

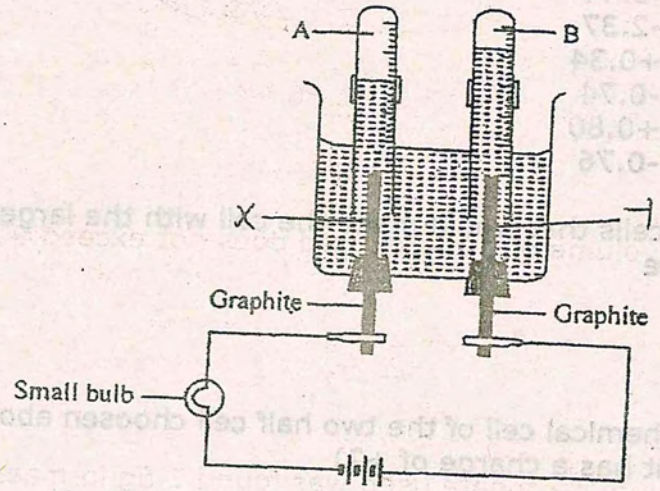
(e) A form two student in an attempt to stop rust put copper and zinc in contact with iron was shown



(i) State whether rusting would occur after one week if the set ups were left out. (1mk)

(ii) Explain your answer (1mk)

4. I. A form four student set up an apparatus as shown below into in order to electrolyze dilute sulphuric (VI) acid.



(a) Name gas B (1mk)

(b) Name electrode X (1mk)

(c) The volume of gas B is half that of gas A. Give the net ionic equation that explains this observation (2mks)

(d) The sulphuric (IV) acid used above was 1M, separately a 1M solution of ethanoic acid was electrolyzed using such a set up. Explain the difference you would expect to observe on the bulb. (2mks)

(e) Study the electrode potentials of the following elements given below and answer questions that follow (the letter are not actual symbols of the elements)

Element	E value
X	-0.44
Y	-2.37
R	+0.34
S	-0.74
T	+0.80
Z	-0.76

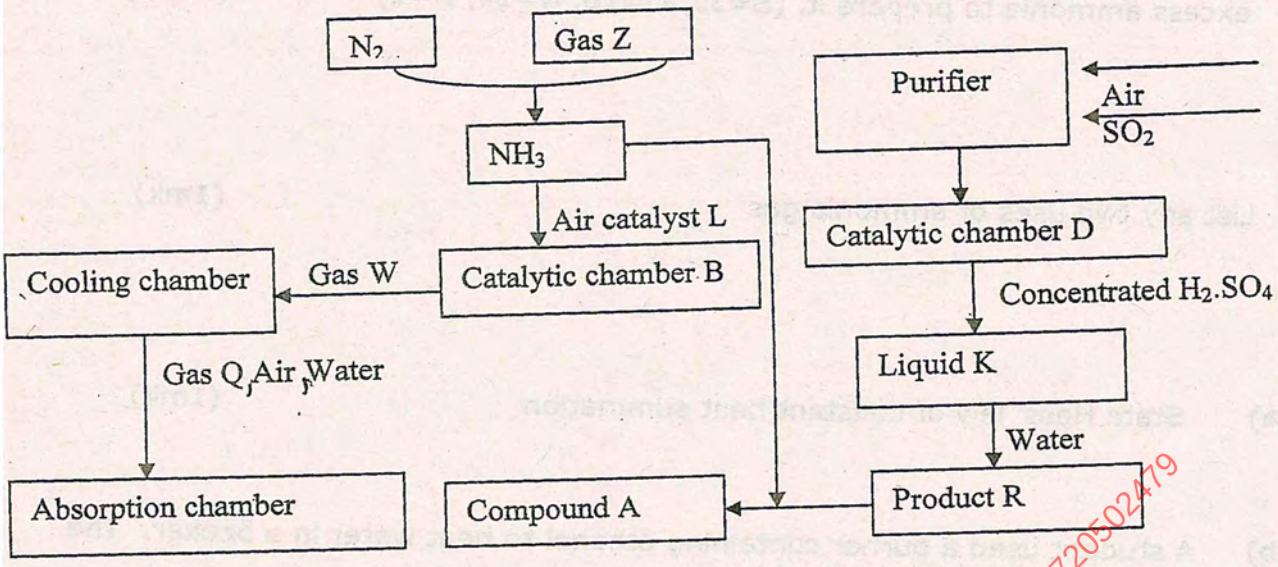
II. (i) Give the two half cells that would make the cell with the largest electromotive force (1mk)

(ii) Draw an electrochemical cell of the two half cell choosen above (Assume that each element has a charge of +2) (3mks)

(iii) Calculate the electromotive force of a cell consisting of S and T cells. (2mks)

(iv) Explain whether it's advisable to store a solution containing S ions in a container made of Z (2mks)

5. Study the scheme below and answer the questions that follow.



(a) Name the following (2mks)

(i) Gas Z _____ Gas W _____

(ii) Gas Q _____ Liquid K _____

(b) Identify the catalyst used in catalytic chambers (2mks)

(i) B _____ (ii) D _____

(c) Write balanced chemical equations for the following reactions

(i) Reaction between liquid K and water (1mk)

(ii) Reaction at the absorption chamber (1mk)

(iii) Catalytic chamber B (1mk)

(d) Explain why it is not advisable to dissolve the product of chamber D in water (1mk)

(e) Calculate the mass of compound A formed if 315kg of product R is reacted with excess ammonia to prepare it. (S=32, O=16, N=14, H=1) (2mks)

(f) List any two uses of ammonia gas (1mk)

6. (a) State Hess' law of constant heat summation (1mk)

(b) A student used a burner containing ethanol to heat water in a beaker. The following data was obtained.

Mass of water = 500g
Initial mass of burner + ethanol = 265.8g
Before burning
Final mass of burner + Ethanol = 264.65g
After burning
Initial temperature of water = 22.0°C
Final temperature of water = Z

(i) Determine the mass of ethanol burnt (1mk)

(ii) Determine the moles of ethanol burnt (1mk)

(iii) If the molar enthalpy of combustion of ethanol is $-1370 kjmol^{-1}$, calculate the heat gained by water during the combustion above (2mks)

(iv) Hence calculate the final temperature of water Z. (2mks)

(c) The heat of combustion of propane, carbon and hydrogen are given below.

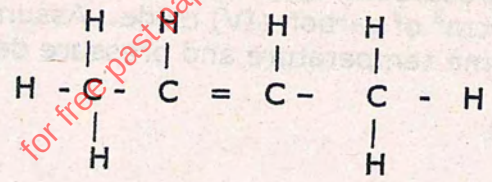
$\Delta Hc \quad C_3H_8 = -2220 KJmol^{-1}$
$\Delta Hc \quad C = -393 KJmol^{-1}$
$\Delta Hc \quad H_2 = -286 KJ\ mol^{-1}$

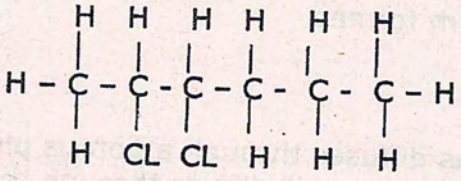
(i) Draw an energy level diagram linking the enthalpy of formation of propane and the above enthalpies of combustions (2mks)

(ii) Use the energy cycle to calculate the enthalpy of formation of propane (2mks)

7. I. (a) Describe how a pure and dry sample of lead (II) carbonate can be prepared in the lab starting with lead oxide (3mks)

(b) Give the IUPAC names of the following compounds





II. Under certain conditions, Hexane can be converted to two products. The formula of one of the products is C_3H_8

(i) Write the formula of the other product (1mk)

(ii) Describe a simple chemical reaction to show the difference between the two products formed in (i) above. (2mks)

III. Give the name and structural formulae of the compound formed when butanol and ethanoic acid react in the presence of concentrated sulphuric (IV) acid.

(i) Name (1mk)

(ii) Structural formulae (1mk)

8. (a) State Gay Lussac's law (1mk)

(b) $20cm^3$ of a gaseous hydrocarbon, C_2H_x required $70cm^3$ oxygen for complete combustion, forming $40cm^3$ of carbon (IV) oxide. Assuming that all volumes were measure at the same temperature and pressure determine;

(i) The value of X (1mk)

(ii) The volume of steam formed (1mk)

(c) $100cm^3$ of sulphur (IV) oxide gas diffuses through a porous plug in 40 seconds. What volume of nitrogen (IV) oxide gas will diffuse through the same plug in 20 seconds (N= 14, S=32, O=16) (3mks)