KENYA HIGH SCHOOL MOCK 2020
CHEMISTRY PAPER 2

SECTION A:

1 (a) The table below shows some elements A to E. The letters are not chemical symbols.

Element	M.P (0c)	B.P (0c)
A	-219	-183
B	650	1117
C	-7	58
D	232	2687
E	1540	2887

(i) Which element is a gas at room temperature? Give a reason. (2mks)

(ii) Which element is a liquid at room temperature? (1mk)

(iii) State with a reason, the state of element E at 373K. (1mk)

(iv) Which of these elements are composed of simple molecular? Explain. (2mks)

(b) Below is a table of part of the periodic table. The letters do not represent actual symbols of elements.

								Q
J					M	S	N	
K	L						O	R
							P	

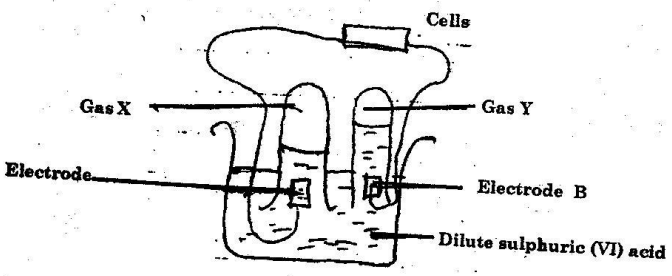
(i) How does the electronegativity of the elements vary from N, O, P? Explain. (2mks)

(ii) Give the formula of the compound formed between L and P. (1mk)

(iii) Interms of structure and bonding, explain the major differences between the compounds formed between K and O and M and O. (2mks)

(iv) An oxide of J was dissolved in water to form a solution. How would you distinguish between this solution and a solution made by dissolving an oxide of S in water. Explain. (2mks)

2. 2M Sulphuric VI acid solution was electrolysed using the set-up below.



(a) (i) Name the type of electrodes used. (1mk)

(ii) Identify gases X and Y. (2mks)

X: _____

Y: _____

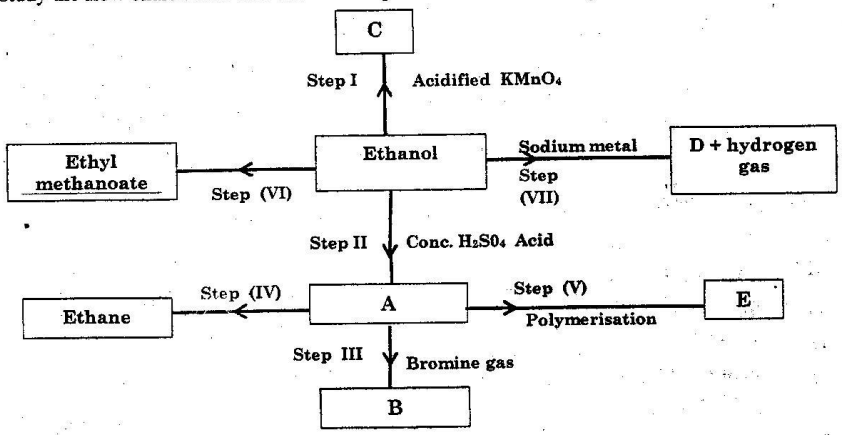
(iii) Write electrode equations at:
Anode (1mk)
Cathode (1mk)

(iv) With reasons, identify the cathode and anode. ($1\frac{1}{2}$mks)
Cathode

Anode

(b) Suppose 2M Copper II Sulphate solution was used instead, a current of 2A was passed for 2 hours. Calculate the volume of the gas produced at the anode. (1 Faraday = 96500C; Molar gas volume at room temperature = 24000cm^3) (3mks)

3. Study the flow chart below and answer the questions that follow.



(i) I. What observation will be made in step I. (1mk)

II. Describe a chemical test that can be carried out to show the identify of compound C. (2mks)

(ii) Give the names of the following: (2mks)

E _____
D _____

(iii) Give the formula of substance B. (1mk)

(iv) Name the type of reaction that occurs in:

Step II ($\frac{1}{2}$mk)

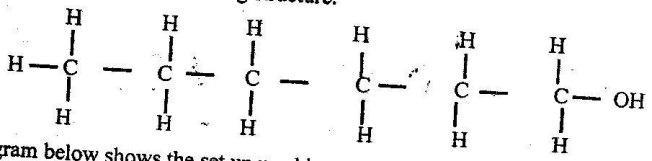
Step IV (½mk)

(v) Give the reagent and conditions necessary for step VI. (2mks)

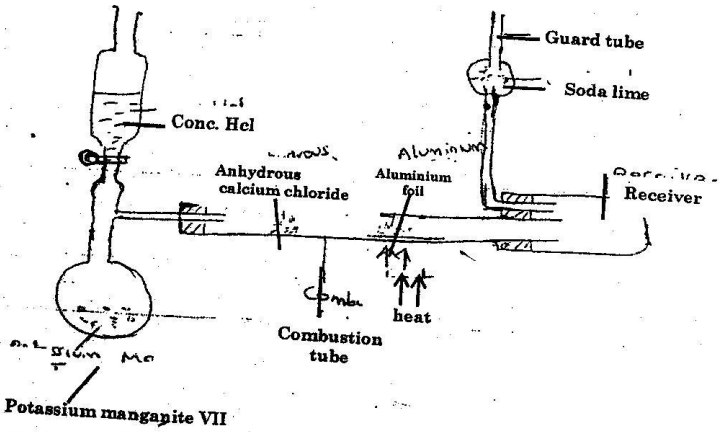
Reagent:

Conditions:

(b) (i) Name the following structure. (1mk)



4. The diagram below shows the set up used in an experiment to prepare chlorine gas and react it with aluminium foil. Study it and answer the questions that follow.



(a) In the experiment, conc. Hydrochloric acid and potassium manganite VII were used to prepare chlorine gas. State two precautions that should be taken in carrying out this experiment. (2mks)

(b) Write the formula of another compound that could be used instead of potassium manganate VII. (1mk)

(c) Explain why it is necessary to allow the acid to drip slowly onto the permanganate before aluminium foil is heated. (2mks)

(d) State the property of the product formed in the combustion tube that makes it possible for it to be collected in the receiver. (1mk)

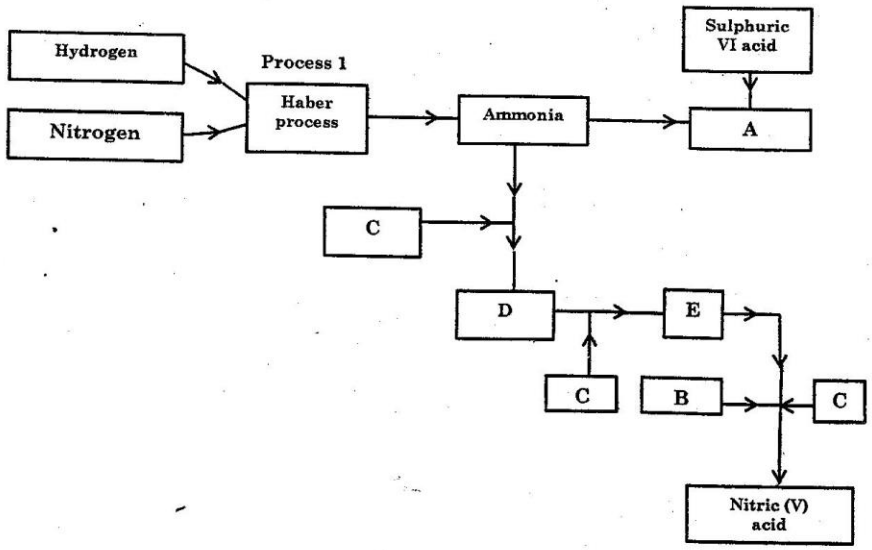
(e) When 1.08g of aluminium foil were heated in chlorine gas, the mass of the produced formed was 3.47g.

(i) Maximum mass of the product formed if chlorine was in excess: (Al = 27, Cl=35.5) (2mks)

(ii) Percentage yield of the product formed. (1mk)

(f) Phosphorous trichloride is a liquid at room temperature. What modification should be made to the set up if its to be used to prepare phosphorus trichloride. (1mk)

5.



(a) Write balanced chemical equations for:

(i) the reaction producing substance A (1mk)

(ii) the reaction in the Haber process. (1mk)

(b) Name the chemical substances. (4mks)

B: _____

C: _____

D: _____

E: _____

(c) Name the suitable catalyst used in process I. (1mk)

(d) State one commercial use of compound A. (1mk)

(e) With the aid of a chemical equation, explain the reason for the storage of nitric (V) acid in dark bottles. (2mks)

6. In an experiment to determine the heat of displacement of copper by iron, $50cm^3$ of 0.2M Copper II sulphate solution was reacted with excess iron filings and results obtained as follows:

- Initial temperature of $CUSO_4$ solution = 25.0^0c
- Final temperature of $CUSO_4$ + iron filings = 31.0^0c
- Mass of iron filings used = 1g

(Assume density of solution = $1g/cm^3$, specific heat capacity = 4.2J/g/k

Calculate:

(i) Temperature change. (1mk)

(ii) Mass of the solution used. (1mk)

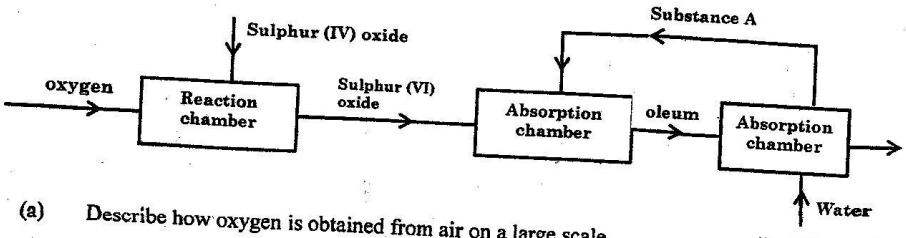
(iii) Heat evolved during the reaction. (2mks)

(iv) Molar heat of displacement in kJ/mol. (3mks)

(v) Write a thermochemical equation for the above reaction. (2mks)

(vi) Explain why excess iron filings were used in the experiment. (1mk)

7. The flow chart below shows some of the processes involved in large scale production of sulphuric (VI) acid. Use it to answer the questions that follow.



(a) Describe how oxygen is obtained from air on a large scale. (3mks)

(b) (i) Name substance A (1mk)

(ii) Write an equation for the process that takes place in the absorption chamber.

(c) Vanandium (V) oxide is a commonly used catalyst in the contact process. (1mk)

(i) Name another catalyst which can be used for this process.

(ii) Give two reasons why vanadium (V) oxide is the commonly used catalyst. (1mk)

(d) State and explain the observations made when concentrated sulphuric (VI) acid is added to crystals of copper (II) sulphate in a beaker. (2mks)

(e) The reaction of concentrated sulphuric (VI) acid with sodium chloride produces hydrogen chloride gas. State the property of concentrated sulphuric (VI) acid illustrated in this reaction. (1mk)

3. A mass of a marble chips (calcium carbonate) was reacted with excess of 1M hydrochloric acid. The volume of carbon dioxide produced was recorded every 10 seconds. The results are given below.

Time in seconds	Volume of carbon dioxide in cm^3
0	0
10	36
20	60
30	82
40	95
50	100
60	105
70	105

(a) (i) Write an equation for the reaction between calcium carbonate and hydrochloric acid. (1mk)

(ii) Why is an excess gas used? (1mk)

(b) On the grid provided, plot a graph of the volume of gas produced. (4mks)
(vertical axis) against time in seconds.

(c) From the graph; determine;

(i) The volume of gas produced at 35 seconds during the experiment. (1mk)

(ii) The time at which $75cm^3$ of carbon dioxide was produced. (1mk)

(d) State and explain the effect on the rate of production of the gas if calcium carbonate powder was used. (2mks)