

NAME INDEX NUMBER

SIGNATURE

DATE

133/2

CHEMISTRY
PAPER 2 (THEORY)
JULY/AUGUST
TIME: 2 HRS

NYANDARUA SOUTH FORM FOUR JOINT EVALUATION
Kenya Certificate of Secondary Education (K.C.S.E)

CHEMISTRY
Paper 2 (Theory)
July/August 2016
Time: 2 hours

INSTRUCTIONS TO CANDIDATES

- 1) Attempt **all** questions in the spaces provided.
- 2) All working must be clearly shown where.
- 3) Electronic calculators may be used.

FOR EXAMINERS USE ONLY

Questions	Max. Score	Candidate's Score
1	13	
2	13	
3	12	
4	9	
5	13	
6	10	
7	10	
TOTAL	80	

1. a) The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters given do not represent the actual symbols of the elements.

				A	
		C	D	E	
F	G				
				H	

- i) Select the element that can form an ion with a charge of -2. Explain your answer. (2 marks)

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- ii) What type of structure would the oxide of C have? Explain your answer. (1 mark)

.....

.....

- iii) How does the reactivity of H compare with that of E? Explain your answer. (1 mark)

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.....

- iv) 2.6g of B reacts completely when heated with 2.42 litres of chlorine gas (Cl_2) at s.t.p. (1 mole of gas occupies 22.4 litres at s.t.p.)

I) Write a balanced equation for the reaction between B and chlorine gas. (1 mark)

II) Determine the relative atomic mass of B. (2 marks)

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.....

- v) Explain how you would expect the atomic radii of F and G to compare. (2 marks)

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b) The table below shows physical properties of some substances. Use the information on the table to answer the questions that follow.

Substance	Melting point (°C)	Boiling point (°C)	Electrical conductivity	
			Solid	Liquid
U	1083	2595	Good	Good
V	801	1413	Poor	Good
W	5.5	80.1	Poor	Poor
X	-114.8	-84.9	Poor	Poor
Y	3550	4827	Poor	Poor

i) Which substance is likely to be (with a reason)
I) a metal

(1 mark)

II) a liquid at room temperature

(1 mark)

ii) Which substance is likely to have the following structures.

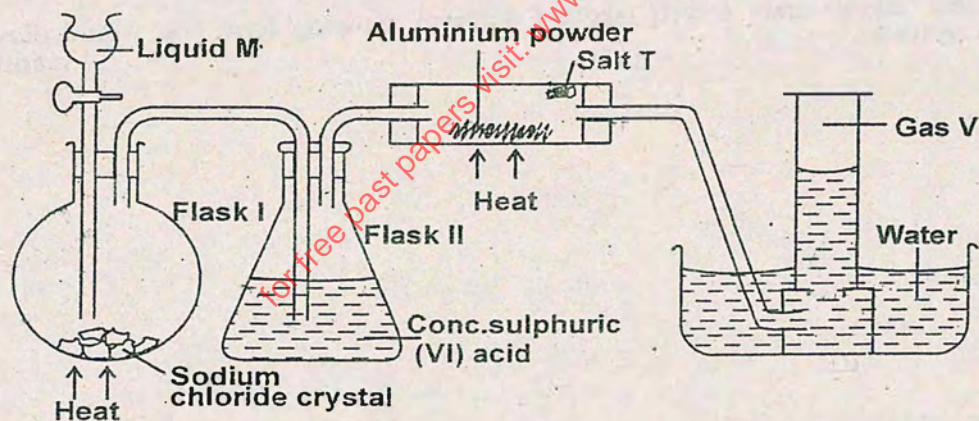
I) Simple molecular

(1 mark)

II) Giant atomic

(1 mark)

The set up below was used to prepare hydrogen chloride gas and salt T.



a) Identify the following.

Liquid M

(½ mark)

Gas V

(½ mark)

Salt T

(½ mark)

b) Write balanced chemical equations for reactions that occur at;

i) Flask I

(1 mark)

ii) Combustion tube

(1 mark)

c) Name the process that formed salt T as shown in the diagram. (½ mark)

d) Sulphuric (VI) acid is used as a drying agent in this experiment. Explain why calcium oxide is unsuitable for the same purpose in this reaction. (2 marks)

e) The water in the beaker was found to have a pH of 2.0 at the end of the experiment. Explain. (1 mark)

f) Calculate the mass of salt T formed if 480cm³ of hydrogen chloride gas measured at r.t.p was reacted with aluminium powder. (Al = 27, Cl = 35.5, molar gas volume 24dm³) (2 marks)

g) In the space provided below, draw a well-labelled diagram showing how you would dissolve hydrogen chloride gas in water. (1 mark)

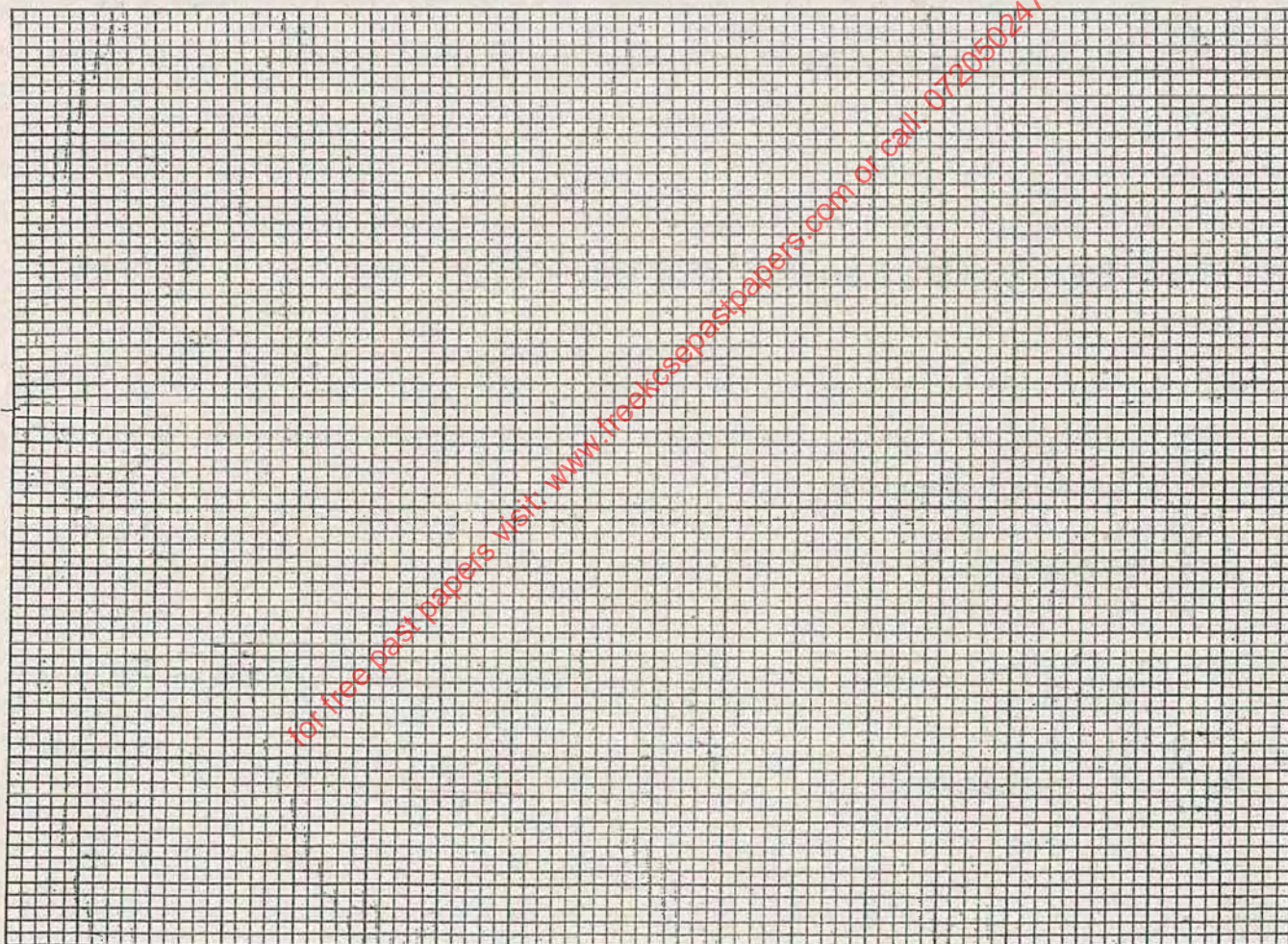
h) A solution of hydrogen chloride in methylbenzene does not react with carbonates. However on adding water and then shaking the resulting mixture, there is vigorous effervescence. Explain the above observation. (2 marks)

i) Using an equation, state the observation made when a gas jar containing hydrogen chloride gas is opened near an open bottle of liquid ammonia. (1 mark)

3. The table below shows the results obtained when potassium carbonate was reacted with excess of 1.0M sulphuric (VI) acid at room temperature.

Time	5	10	15	20	30	40	50	60	70	80
Total volume of gas(cm ³).	20	35	50	61.5	82.5	95	100	103	104	104

a) Plot a graph of volume (Y-axis) against time taken, (3 marks)



b) i) Find out from the graph the total volume of gas produced at the end of the 35th second. (½ mark)

ii) Determine the total volume of gas produced by the end of the reaction. (½ mark)

iii) Calculate the mass of Potassium Carbonate used in this reaction.
($K=39$, $C=12$, $O = 16$, molar gas volume = 24.0 litres)

(2 marks)

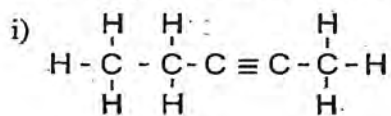
iv) Calculate the average rate of production of the gas in the interval 25 by 40 seconds. (2 marks)

v) If the same experiment was repeated using excess 2.5M sulphuric (VI) acid in place of the 1.0M sulphuric (VI) acid, what would be the effect of

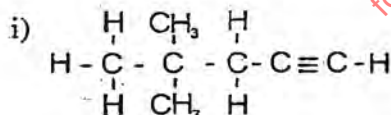
I) The total volume of the gas produced at the end of the experiment. Explain. (2 marks)

II) The total time taken for the completion of the reaction. Give a reason. (2 marks)

a) Name the following hydrocarbons.

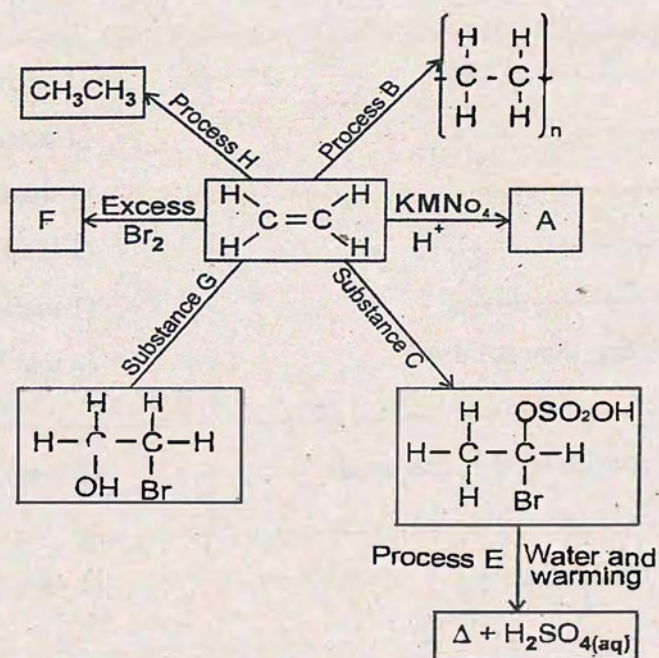


(1 mark)



(1 mark)

b)



i) Draw the structural formula of substance A. (1 mark)

ii) Name the processes;

B: (1 mark)

E: (1 mark)

H: (1 mark)

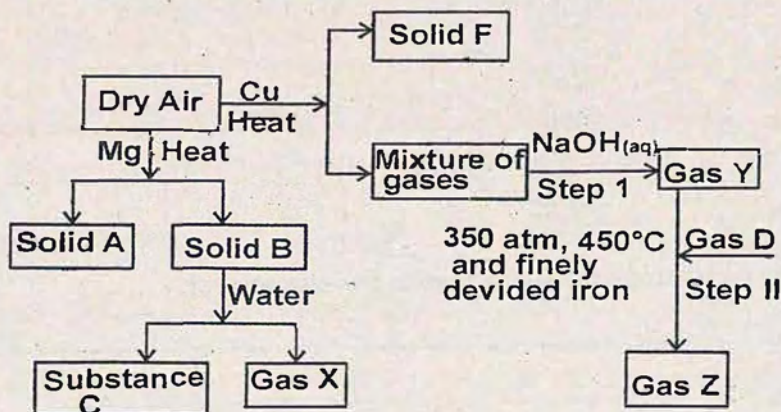
iii) Name the following substances;

C: (½ mark)

G: (½ mark)

iv) State the conditions necessary for process H to take place. (2 marks)

Study the diagram below that shows some reactions of dry air, then answer the questions that follow.



a) Identify;

i) Solid A (1 mark)

ii) Solid B (1 mark)

iii) Gas D..... (1 mark)

iv) Gas Z (1 mark)

v) Gas X (1 mark)

b) Why is the amount of solid B obtained much less than solid A? (1 mark)

c) Write a balanced equation for the reaction between solid B and water. (1 mark)

d) i) How can gas Y be obtained from gas X in the laboratory? (1 mark)

ii) Write an equation for the process in (d) i above. (1 mark)

e) Which gas is absorbed by sodium hydroxide in step I. (1 mark)

f) Gas Y obtained in step 1 is impure. Name one impurity it contains. (1 mark)

g) i) What name is given to the process that occurs in step II. (1 mark)

ii) Explain the effect of using much lower temperature than that in step II. (1 mark)

Use the standard potentials for elements G, M, N, P and Q given below to answer the questions that follow.

	E° Volts
$G^{+}_{(aq)} + e^{-} \rightleftharpoons G_{(s)}$	-2.71
$M^{2+}_{(aq)} + 2e^{-} \rightleftharpoons M_{(s)}$	-2.37
$2N^{+}_{(aq)} + 2e^{-} \rightleftharpoons N_{2(g)}$	0.00
$P^{2+}_{(aq)} + 2e^{-} \rightleftharpoons P_{(s)}$	+0.34
$\frac{1}{2}Q_{2(g)} + e^{-} \rightleftharpoons Q_{(aq)}$	+2.87

a) i) Which element is likely to be hydrogen? Give a reason to your answer. (2 marks)

ii) What is the E^0 of the strongest oxidising agent?

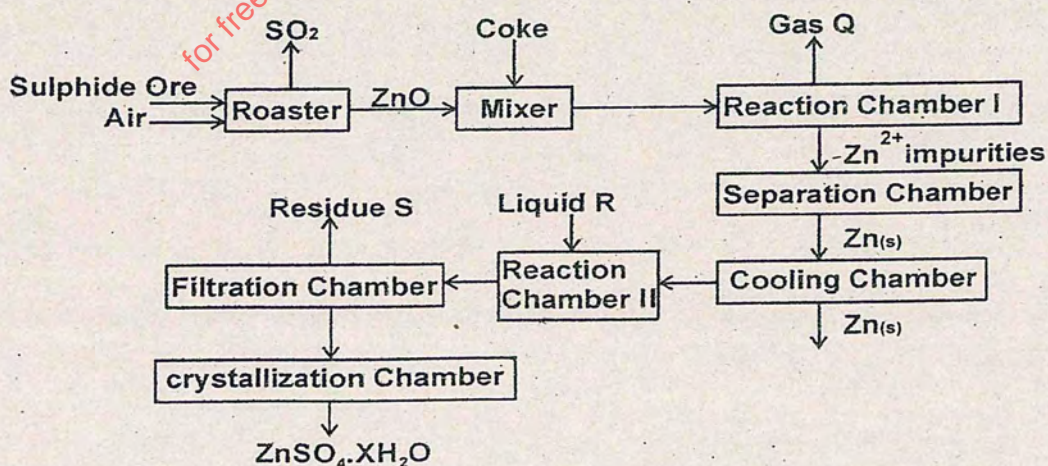
(1 mark)

iii) Draw a well labelled diagram of the electrochemical cell that would be obtained when half cells of M and P are combined. (2 marks)

iv) Calculate the E^0 value of the electrochemical cell constructed in (iii) above. (2 marks)

v) During the electrolysis of aqueous copper (II) sulphate using copper electrodes a current of 0.8 amperes was passed through the cell for 10 hours. Determine the change in mass of the anode which occurred as a result of the electrolysis process. ($Cu = 63.5$, 1 Faraday = 96500 coulombs) (3 marks)

7. The flow chart below illustrate the extraction of Zinc. Study it and answer the questions that follow.



a) Name; (3 marks)

i) Gas Q

ii) Liquid R

iii) Residues S

b) Name the sulphide ore used. (1 mark)

c) Before the ore is roasted, it is first concentrated;

i) Explain why it is necessary to concentrate the ore; (1 mark)

ii) Explain briefly the process of concentrating the ore. (1 mark)

d) Write an equation for the reaction that takes place in the;

i) Roaster (1 mark)

ii) Reaction chamber II (1 mark)

e) i) Name one major impurity present in the sulphide ore used. (1 mark)

ii) Write an equation to show how the impurity in (e) (i) above is removed. (1 mark)