

KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016

233/2

CHEMISTRY

PAPER 2

(THEORY)

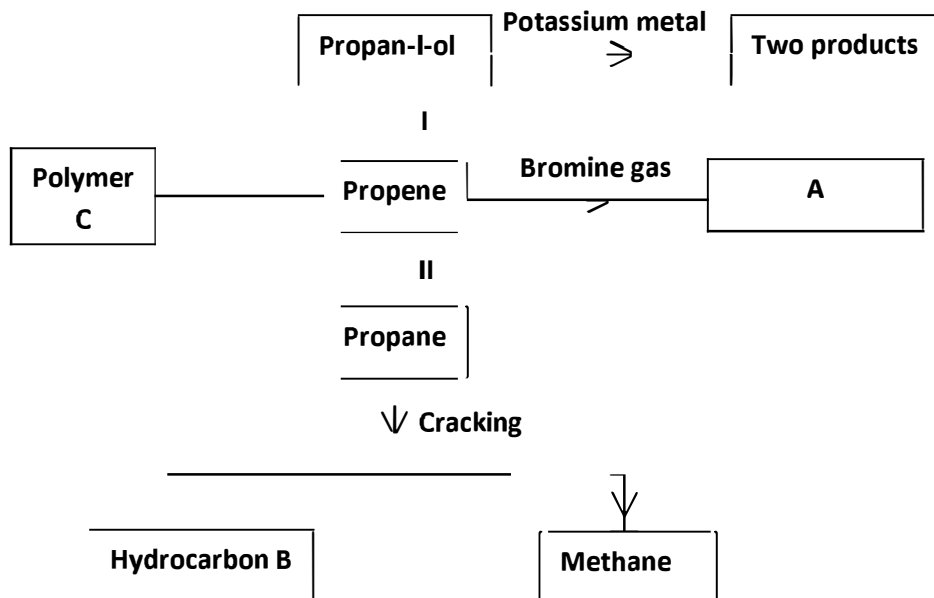
JULY/AUGUST, 2016

TIME: 2 HOURS

1. The grid below shows part of the periodic table. Use it to answer questions that follow. The letters do not represent the actual symbols of the elements.

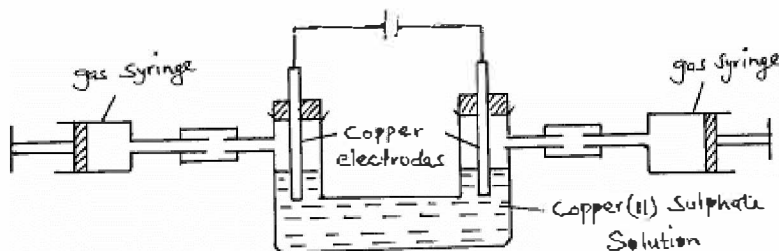
				S	U	V
P	R			T		W
Q						

- (a) (i) Which of the element has the lowest ionization energy? (1mk)
- (ii) Explain your answer in a(i) above. (1mk)
- (b) (i) Identify the most reactive non-metal. (1mk)
- (ii) Explain your answer in b(i) above. (1mk)
- (c) Give the electronic configuration of element.
- (i) S (½mk)
- (ii) Q (½mk)
- (d) Compare the atomic radius of P and R. Explain. (2mks)
- (e) The mass number of W is 40. Write down the composition of its nucleus. (1mk)
- (f) Write formula of oxides of P. (1mk)
- (g) (i) What is the name given to elements found in the shaded region. (1mk)
- (ii) Which elements can be used to provide an inert environment? (1mk)
2. (a) In which homologous series do the following compounds belong.
- (i) CH_3CCH_3 (1mk)
- (ii) $\text{CH}_3\text{CH}_2\text{COOH}$ (1mk)
- (b) Raw rubber is heated with sulphur in the manufacture of natural rubber.
- (i) What name is given to the process? (1mk)
- (ii) Why is the process necessary? (1mk)
- (c) Study the scheme given below and answer the questions that follow.



- (i) Write an equation for the reaction between propan-1-ol and potassium metal. (1mk)
- (ii) Name process I and II.
- (iii) Identify the products A and B. (1mk)
- (iv) Name **one** catalyst used in Process II. (1mk)
- (v) Draw the structural formula of the repeating unit in the polymer C. (1mk)
- (d) State **two** industrial uses of methane. (1mk)
- (e) Write the structural formula of 2, 3-dichloropropene. (1mk)

3. Aqueous copper (II) sulphate was electrolysed using the set up represented by the diagram below.

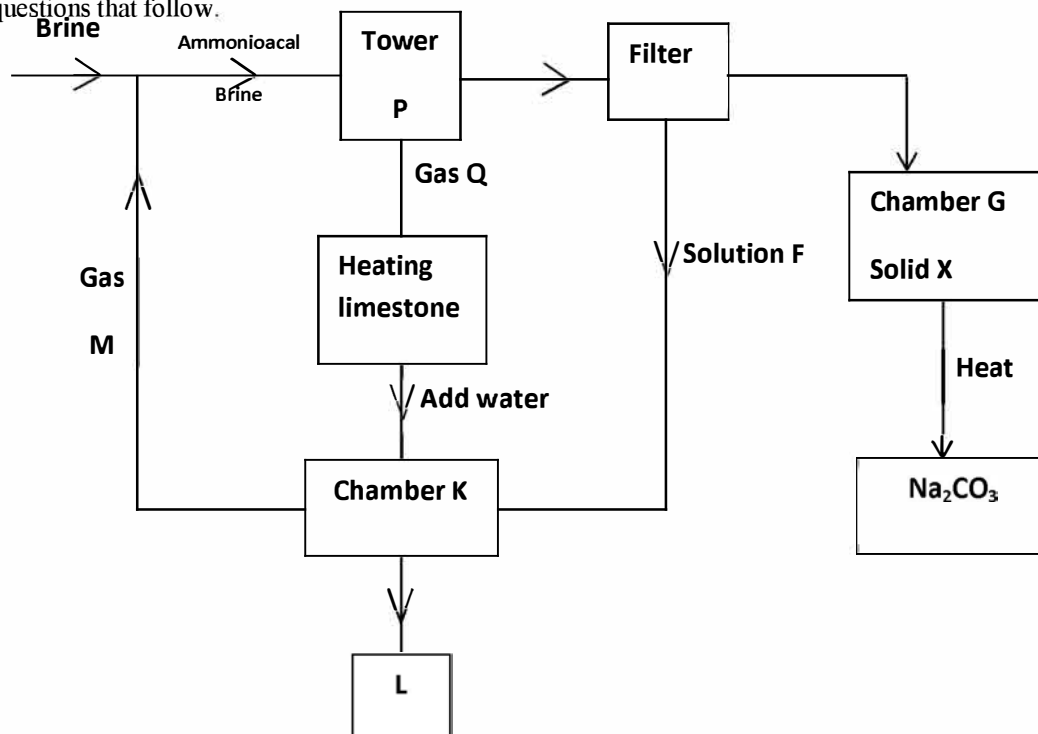


- (a) Apart from copper (II) ions and sulphate ions identify the ions in copper (II) sulphate solutions. (1mk)
- (b) Write an equation for the reaction at the:
- (i) Anode (1mk)
- (ii) Cathode (1mk)
- (c) Using an arrow (\rightarrow) indicate the direction of flow of electrons on the diagram. (1mk)
- (d) If in the above set up copper electrodes were replaced with inert electrodes. Write an equation for the reaction which would occur at the anode. (1mk)
- (e) An iron spoon was to be electroplated with silver. Draw a well labelled diagram of the set-up of apparatus that could be used to carry out the process. (3mks)
- (f) The table below shows ammeter readings obtained where different electrolytes of the same concentration were tested.

Electrolyte	Ammeter reading
Copper (II) sulphate solution	4.4
Ethanoic acid	1.2

Explain why ethanoic acid gave a lower ammeter reading the copper (II) sulphate solution. (2mks)

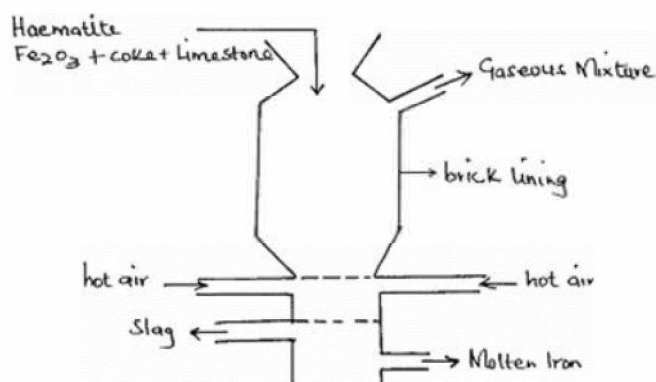
4. I The flow chart below is for the manufacture of sodium carbonate using Solvay process. Use it to answer the questions that follow.



- (a) Name:
- (i) Gas M (1mk)
- (ii) Solution F (1mk)
- (iii) Solid X (1mk)
- (iv) The product L (1mk)
- (b) Write an equation for the reaction in chamber K. (1mk)
- (c) Name **two** raw materials used in Solvay process. (2mks)
- (d) (i) Name **one** substance recycled in Solvay process. (1mk)
- (ii) Give **two** reasons why carbon (IV) oxide is used as fire extinguisher. (2mks)
- (iii) Explain why lead carbonate is not reacted with dil. H_2SO_4 in preparation of carbon (IV) oxide in the laboratory. (2mks)

5. In order to determine the molar heat of neutralization of 1M potassium hydroxide, 200cm³ of 1M hydrochloric acid both at the same temperature were mixed and stirred continuously with a thermometer. The temperature of the resulting solution was recorded after every 30 seconds until the highest temperature of the solution was attained.
- (a) (i) Why was it necessary to stir the mixture of the two solutions? (1mk)
(ii) Define the term molar heat of neutralisation. (1mk)
(iii) Write an ionic equation for the reaction. (1mk)
- (b) The initial temperature for both solution was 24.5°C and the highest temperature attained by the mixture was 30.9°C. Calculate the
(i) heat change for the reaction.
(Specific heat capacity of the solution is 4.2Jg⁻¹K⁻¹, Density of the solution is 1.0gcm⁻³).
The volume of KOH used was 200cm³. (2mks)
(ii) molar heat of the neutralisation. (2mks)
- (c) If ammonium hydroxide was used instead of potassium hydroxide the heat of neutralization would be different from the one obtained in b(ii) above. Explain the difference. (3mks)
- (d) Draw an energy level diagram for the reaction between potassium hydroxide and hydrochloric acid. (3mks)

6. I The extraction of iron from its ores takes place in the blast furnace. Below is a simplified diagram of a blast furnace. Study it and answer the questions that follow.



- (a) Name
(i) **One** substance in the slag.
(ii) Another iron ore material used in the blast furnace.
- (b) Describe the processes which lead to the formation of iron in the blast furnace. (3mks)
- (c) What is the use of limestone in the blast furnace? (1mk)
- (d) Give a reason why the melting point of the iron obtained from blast furnace is 1200°C while that of pure iron is 1535°C. (1mk)
- (e) State **two** uses of steel. (1mk)
- II (a) Write the formula of compound formed when iron reacts with dil hydrochloric acid.
(b) Name a compound of iron which sublimes on heating. (½mk)

7. The table below gives the volumes of the gas produced when different volumes of 2M hydrochloric acid were reacted with 0.6g of magnesium powder at room temperature.

Volume of 2M HCl (cm ³)	Volume of the gas (cm ³)
0	0
10	240
20	480
30	600
40	600
50	600

- (a) Write an equation for the reaction between magnesium and hydrochloric acid. (½mk)
- (b) On the grid provided plot a graph of the volume of the gas produced (vertical axis) against volume of acid added. (Note that before the reaction comes to completion, the volume of gas produced is directly proportional to the acid added. (3mks)
- (c) From the graph, determine
(i) the volume of gas produced if 12.5cm³ of 2M HCl had been used. (½mk)
(ii) The volume of 2M HCl acid which reacted completely with 0.6g of magnesium powder. (1mk)
- (d) State and explain the effect on the rate of production of the gas if
(i) 0.6g of magnesium ribbon was used. (2mks)
(ii) 2M hydrochloric acid at 15°C was used instead of room temperature.
- (e) Given that one mole of the gas occupies 24000cm³ at room temperature. Calculate the relative atomic mass of magnesium. (3mks)