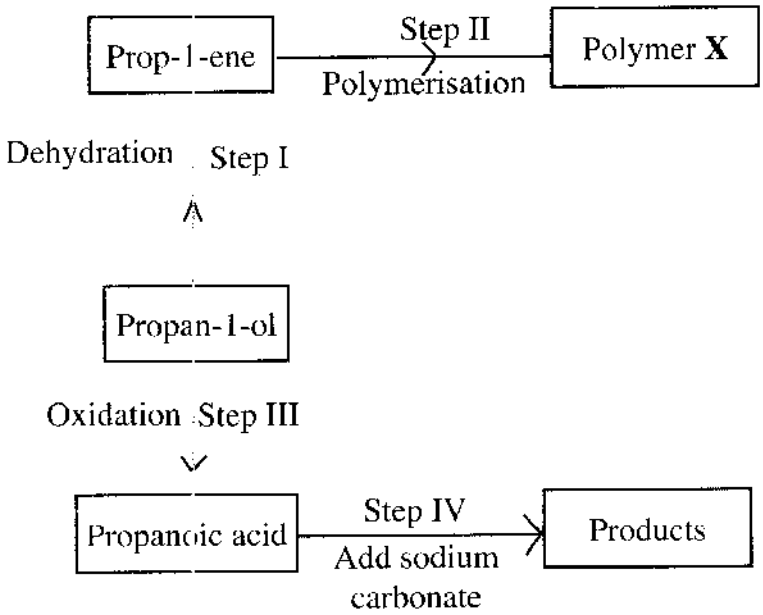
K.C.S.E CHEMISTRY PAPER 2 2012

1. a) Draw the structural formula for all the isomers of $C_2H_3CL_3$ (2marks)

b) Describe two chemical tests that can be used to distinguish between ethane and ethane. (4marks)

c) The following scheme represents various reactions starting with propan-i- ol. Use it to answer the questions that follow.



i) Name one substance that can be used in step I. (1mark)

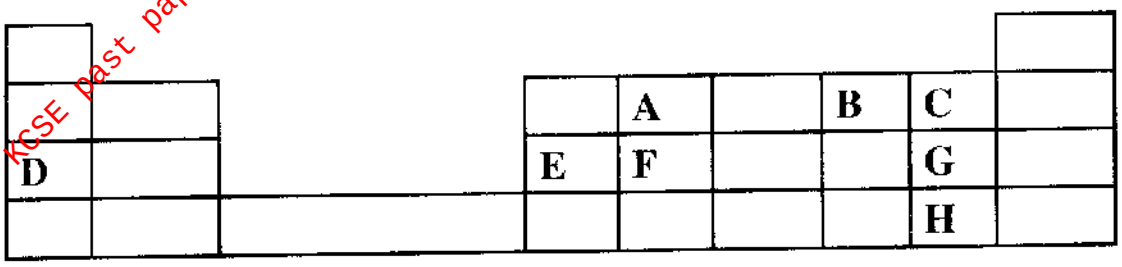
ii) Give the general formula of X. (1 mark)

iii) Write the equation for the reaction in step IV. (1mark)

iv) Calculate the mass of propan-I-ol which when burnt completely in air at room temperature and pressure would produce 18dm^3 of gas. (C =

12.0; O = 16.0; H = 1.0; Molar gas volume = 24dm^3)
(3marks)

2. The grid below is part of the periodic table. Use it to answer the questions that follow. (The letters are not the actual symbols of the elements.)



a) Which is the most reactive non-metallic element shown in the table? Explain. (2marks)

b) i) Write the formula of the compound formed when element A reacts with element B. (1mark)

ii) Name the bond type in the compound formed in b (i) above. (1mark)

c) i) What is the name given to the group of elements where C, G and H belong? (1mark)

ii) Write an equation for the reaction that occurs when C in gaseous form is passed through a solution containing ions of element H. (2marks)

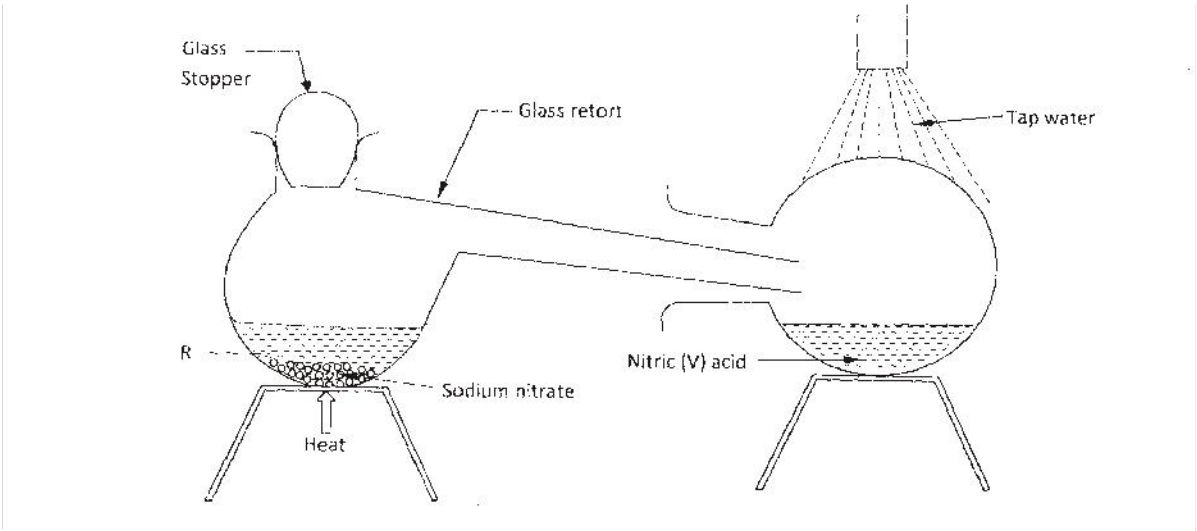
d) The melting points of elements F and G are 1410oC and -101oC respectively. In terms of structure and bonding, explain why there is a large difference in the melting points of F and G. (2marks)

e) D forms two oxides. Write the formula of each of the two oxides.(1mark)

f) J is an element that belongs to the 3rd period of the periodic table and a member of the alkaline earth elements. Show the position of J in the grid.

(1mark)

3. In the laboratory, small quantities of nitric (V) acid can be generated using the following set up. Study it and answer the questions that follow.



a) i) Give the name of substance R. (1mark)

ii) Name one other substance that can be used in place of sodium nitrate. (1mark)

iii) What is the purpose of using tap water in the set up above? (1mark)

b) Explain the following;

i) It is not advisable to use a stopper made of rubber in the set-up (1mark)

ii) the reaction between copper metal with 50% nitric (V) acid in an open test-tube produces brown fumes. (1mark)

c) i) Nitrogen is one of the reactants used in the production of ammonia, name two sources of the other reactant. (2marks)

ii) A factory uses nitric (V) acid and ammonia gas in the preparation of a fertilizer. If the daily production of the fertilizer is 4800kg; calculate the mass of ammonia gas used in kg. (N = 14.0; O = 16.0; H = 1.0) (3marks)

iii) State two other uses of nitric (V) acid other than the production of fertilizers. (2marks)

4. The factors which affect the rate of reaction between lead carbonate and dilute nitric (V) acid were investigated by carrying out three experiments;

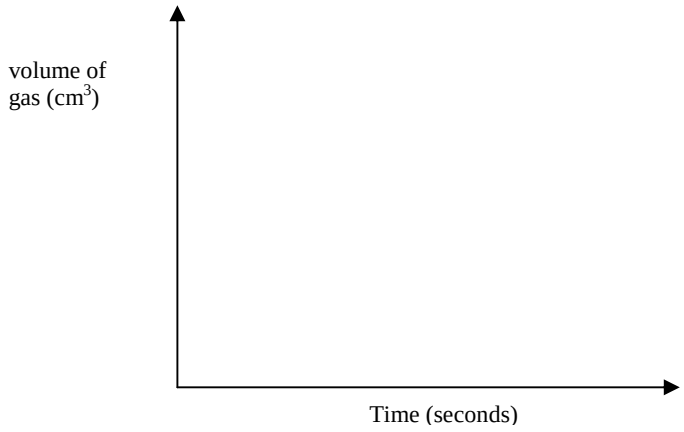
Experiment number	Lead carbonate	Concentration of nitric (V) acid
1	Lumps	4M
2	Powdered	4M
3	Lumps	2M

a) Other than concentration , name the factor that was investigated in the experiments. (1mark)

b) For each experiment, the same volume of acid (excess) and mass of lead carbonate were used and the volume of gas liberated measured with time.

i) Draw a set up that can be used to investigate the rate of reaction for one of the experiments. (3marks)

ii) On the grid provided, sketch the curves obtained when the volume of gas produced was plotted against time for each of the three experiments and label each as 1, 2 or 3. (4marks)



iii) Write an equation for the reaction that took place. (1mark)

c) If the experiments were carried out using dilute hydrochloric acid in place of dilute nitric (V) acid, the reaction would start, slow down and eventually stop. Explain these observations. (2marks)

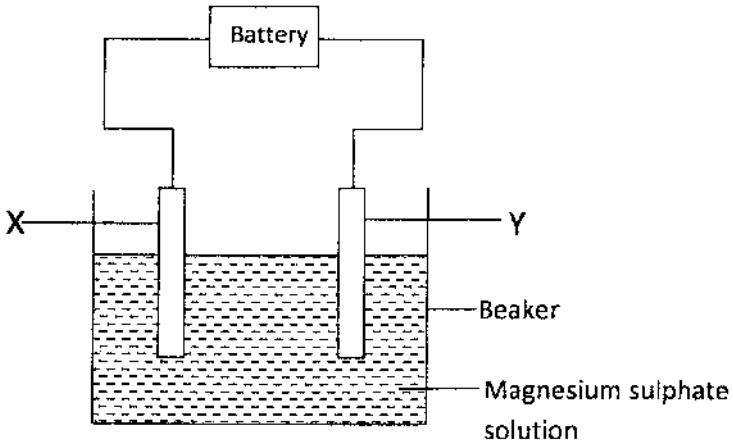
d) A solution of bromine gas in water is an example of a chemical reaction in a state of balance. The reaction involved is represented by the equation below.

$Br_{2(g)} + H_2O_{(L)} \rightleftharpoons 2H^+_{(aq)} + Br^-_{(aq)} + OB^-_{(aq)}$

Yellow/orange Colourless

State and explain the observation made when hydrochloric acid is added to the mixture at equilibrium. (2marks)

5. a) The set up below was used to investigate the products formed at electrodes during electrolysis of aqueous magnesium sulphate using inert electrodes. Use it to answer the questions that follow.



i) During the electrolysis, hydrogen gas was formed at electrode Y. identify the anode. Give a reason for your answer. (2marks)

ii) Write the equation for the reaction with takes place at electrode X. (1mark)

iii) Why is the concentration of magnesium sulphate expected to increase during electrolysis? (2marks)

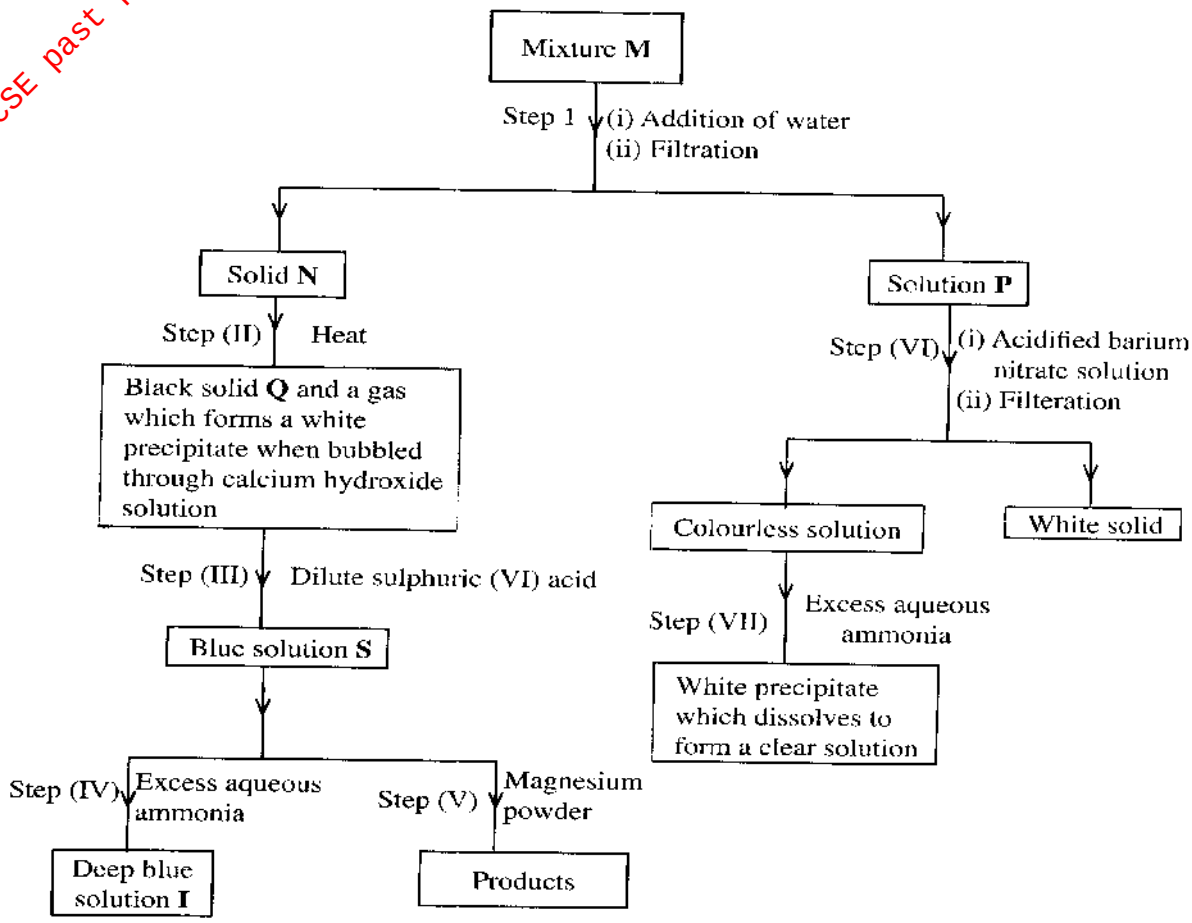
iv) What will be observed if red and blue litmus papers were dipped into the solution after electrolysis? (2marks)

b) During electrolysis of magnesium sulphate, a current of 0.3A was passed for 30 minutes. Calculate the volume of gas produced at the anode.

(Molar gas volume = 24dm3; 1 Faraday = 96,500C.). (3marks)

c) State two applications of electrolysis. (1mark)

6. The flow chart below shows a sequence of reactions involving a mixture of two salts, mixture M. Study it and answer the questions that follow.



a) Write the formula of the following;

i) anion in solid Q (1mark)

ii) the two salts present in mixture M. (2marks)

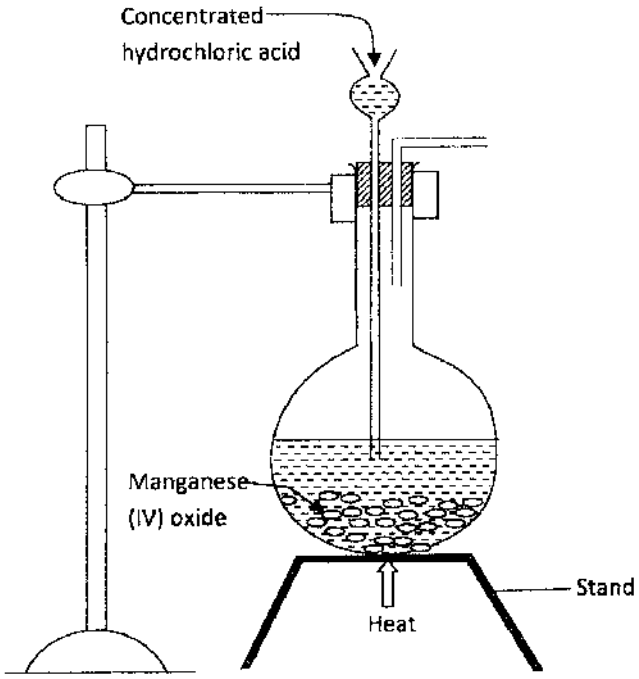
b) Write an ionic equation for the reaction in step (VI) (1mark)

c) State and explain the observations made in step (V). (3marks)

d) i) Starting with Lead (II) oxide, describe how a pure solid sample of lead sulphate can be prepared in the laboratory.
(2marks)

ii) How can one determine whether the lead sulphate prepared is pure?
(2marks)

7. a) The diagram below is part of set up used to prepare and collect dry chlorine gas.



i) Complete the diagram to show how a dry sample of chlorine gas can be collected. (3marks)

ii) Name another substance and condition that can be used instead of manganese (VI) oxide. (1mark)

iii) Write an equation for each of the following;
I. chlorine gas reacting with iron (1 mark)

II. chlorine gas reacting with hot concentrated sodium hydroxide solution. (1mark)