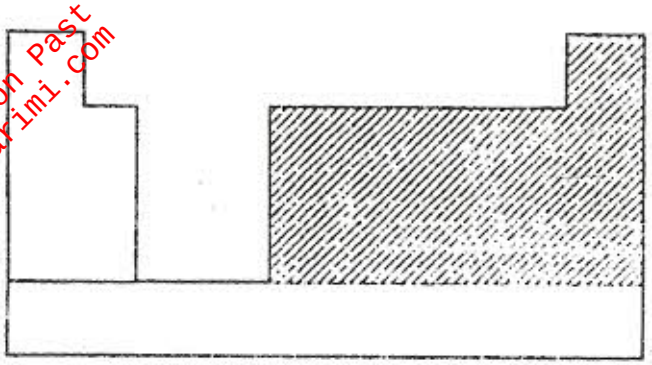
K.C.S.E CHEMISTRY PAPER 233/1B 2003

1. a) The chart below is an outline of part of the periodic table



i) With the help of vertical and horizontal lines, indicate the direction of increasing metallic nature and the elements (2 marks)

ii) Which type of elements are represented in the shaded area? (1 mark)

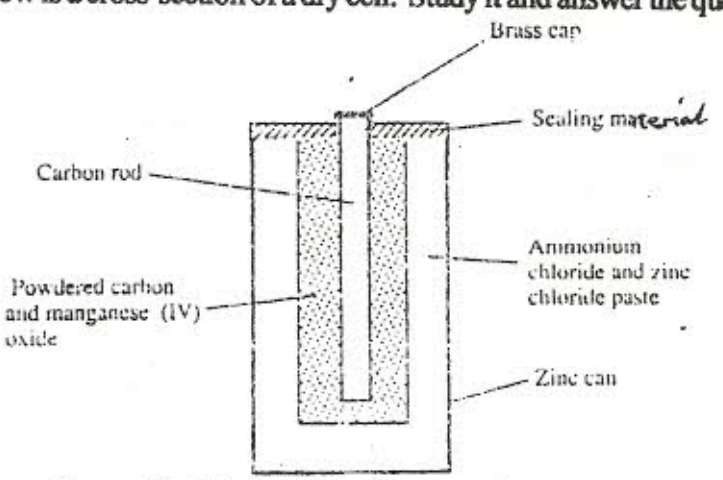
b) i) Element A is in the same group of the periodic table as chlorine. Write the formula of the compound formed when A reacts with potassium metal. (1 mark)

ii) What type of bonding exists in the compound formed in (b) (i) above? (3 marks)

c) Starting with aqueous magnesium sulphate, describe how you would obtain a sample of magnesium oxide (3 marks)

d) Write two ionic equations to show that aluminium hydroxide is amphoteric (2 marks)

2. a) The diagram below is a cross-section of a dry cell. Study it and answer the questions that follow



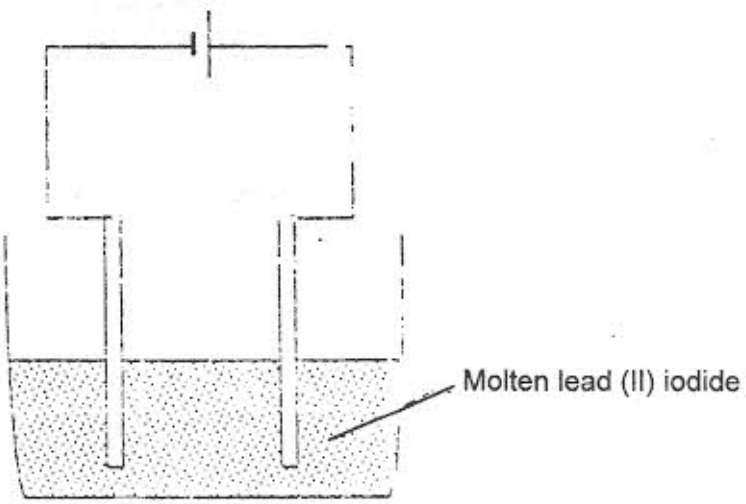
i) On the diagram, show with a (+) sign the positive terminal (1 mark)

ii) Write the equation for the reaction in which electrons are produced (1 mark)

iii) The zinc can is lined with ammonium chloride and zinc chloride paste. What would happen if the mixture was to become dry? Give a reason (2 marks)

iv) Give one advantage and one disadvantage of dry cells (2 marks)

b) The set-up below was used to electrolyse molten lead (II) iodide



i) State the observation that was made at the anode during the electrolysis. Give a reason for your answer (2 marks)

ii) A current of 0.5A was passed for two hours. Calculate the mass of lead that was deposited. (Pb= 207 1 Faraday = 96 500C) (3 marks)

3. a) State two differences between chemical and nuclear reactions (2 marks)

b) Below is a radioactive decay series starting from $^{214}_{83}Bi$ and ending at $^{214}_{83}pb$. Study it and answer the questions that follow

$$^{214}_{83}Bi \xrightarrow{step\ I} {}^{210}_{81}Tl \xrightarrow{step\ II} {}^{210}_{82}Pb \xrightarrow{step\ III} {}^{210}_{83}Bi$$

$$^{210}_{83}Bi \xrightarrow{Step\ IV} {}^{210}_{84}Po \xrightarrow{step\ V} {}^{206}_{82}Pb$$

i) Identify the particles emitted in steps I and III (2 marks)

I _____

III _____

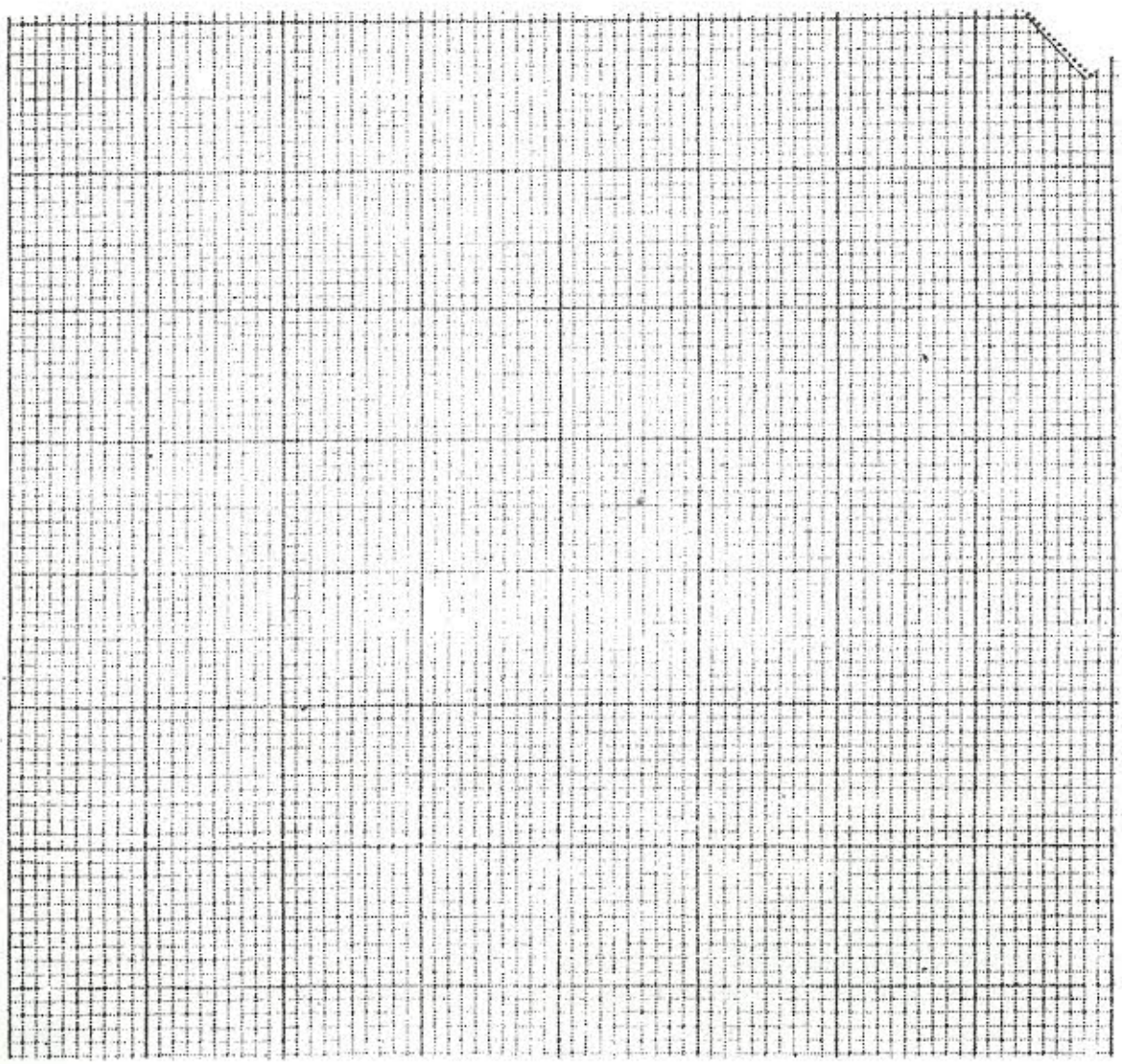
ii) Write the nuclear equation for the reaction which takes place in step V (1 mark)

_____

c) The table below gives the percentages of a radioactive isotope of Bismuth that remains after decaying at different times

time (min)	0	6	12	22	38	62	100
percentage of Bismuth	100	81	65	46	29	12	3

i) On the grid provided plot a graph of the percentage of Bismuth remaining (Vertical axis) against time. (3 marks)



ii) Using the graph, determine the:

I half-life of the Bismuth (1 mark)

_____

II original mass of the Bismuth isotope given that the mass that remained after 70 minutes was 0.16g (2 marks)

d) Give one use of radioactive isotopes in medicine (1 mark)

4. Excess marble chips (calcium carbonate) was put in a beaker containing 100cm3 of dilute hydrochloric acid. The beaker was then placed on a balance and the total loss in mass recorded after every two minutes as shown in the table below

Time (min)	0	2	4	6	8	10
Total loss in mass (g)	0	1.8	2.45	2.95	3.2	3.3

a) Why was there a loss in mass? (1 mark)

b) Calculate the average rate of loss in mass between (1 mark)
i) 0 and 2 minutes

ii) 6 and 8 minutes

iii) Explain the difference in the average rates of reaction in (b) (i) and (ii) above (2 marks)

c) Write the equation for the reaction which takes place in the beaker (1 mark)

d) State three ways in which the rate of the reaction above could be increased (3 marks)

e) The solution in the beaker was evaporated to dryness. Explain what would happen if the open beaker and its contents were left in the laboratory overnight (2 marks)

f) Finally some water was added to the contents of the beaker. When aqueous sodium sulphate was added to the contents of the beaker, a white precipitate was formed.
i) Identify the white precipitate (1 mark)

ii) State one use of the substance identified in (f) (i) above (1 mark)

5. The basic raw material for extraction of aluminium is bauxite

a) Name the method that is used to extract aluminium from bauxite (1 mark)

b) Write the chemical formula of the major component of bauxite (1 mark)

c) i) Name two major impurities in bauxite (2 marks)

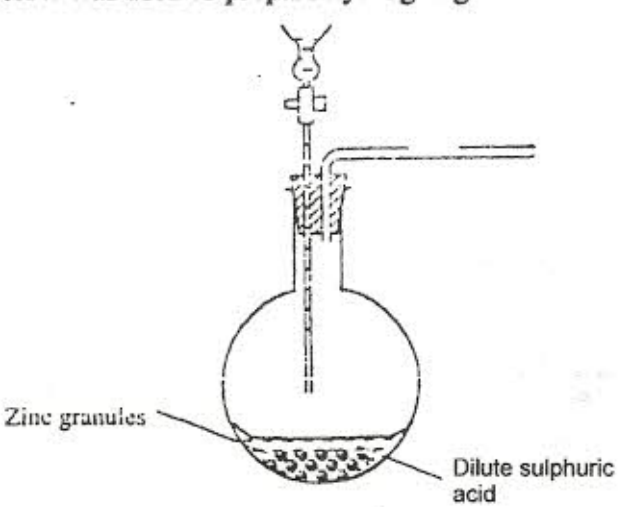
ii) Explain how the impurities in bauxite (3 marks)

d) Cryolite is used in the extraction of aluminium from bauxite. State its function (1 mark)

e) Describe how carbon dioxide is formed during the extraction of aluminium (2 marks)

f) Aluminium is a reactive metal yet utensils madeof aluminium do not corrode easily. Explain this observation. (2 marks)

6. The set-up below was used to prepare hydrogen gas.



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

b) Write an equation for the reaction which takes place when hydrogen gas burns in air (1 mark)

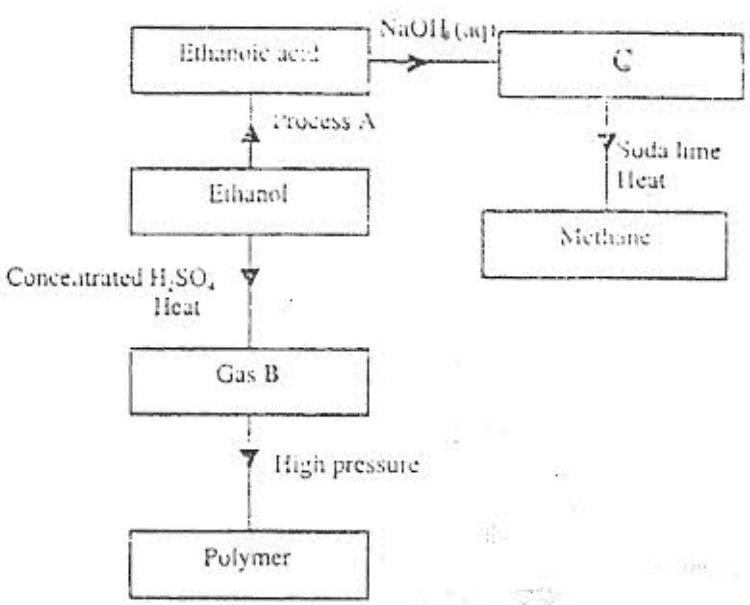
c) 1.2 litres of hydrogen gas was produced at room temperature and pressure when 3.27 of zinc were used. Determine the relative atomic mass of zinc.
(Molar gas volume is 24 litres) (4 marks)

d) State two industrial uses of hydrogen gas (2 marks)

7. a) State how burning can be used to distinguish between ethane and ethyne. Explain your answer (3 marks)

b) Draw the structural formula of the third member of the homologous series of ethyne (1 mark)

c) The flowchart below shows a series of reactions starting with ethanol. Study it and answer the questions that follow.



i) Name

I Process A

II Substances B and C

B

C

ii) Write the equation for the combustion of ethanol (1 mark)

iii) Explain why it is necessary to use high pressure to change gas B into the polymer (1 mark)

iv) State one use of methane (1 mark)