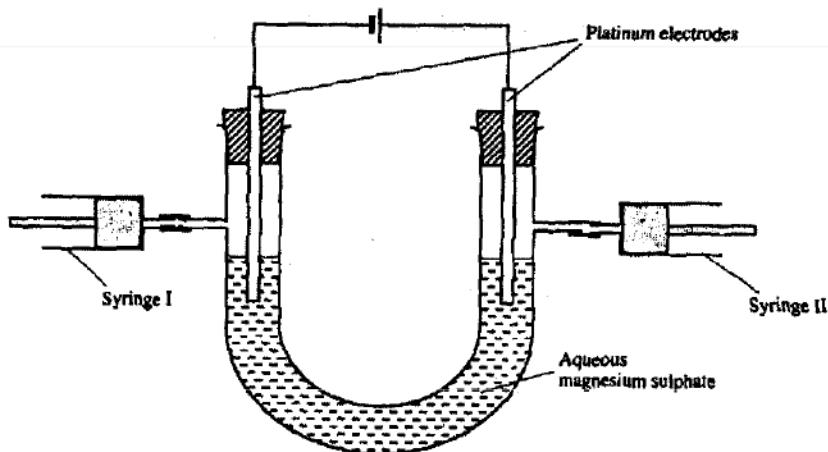


THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education
CHEMISTRY
Paper 2
2006

1. (a) What is an electrolyte? (1 mark)
- (b) State how the following substances conduct electricity:
- (i) molten calcium chloride (1 mark)
- (ii) graphite. (1 mark)
- (c) The diagram below shows a set up that was used to electrolyse aqueous magnesium sulphate.

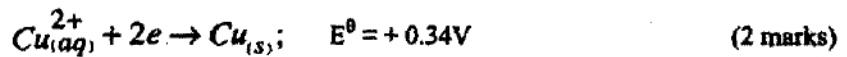
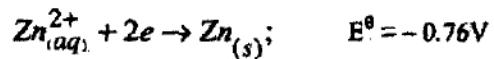


- (i) On the diagram above, using an arrow, show the direction of flow of electrons. (1 mark)
- (ii) Identify the syringe in which hydrogen gas would be collected. Explain. (1 mark)
- (d) Explain why the concentration of magnesium sulphate was found to have increased at the end of the experiment. (2 marks)
- (e) During the electrolysis, a current of 0.72A was passed through the electrolyte for 15 minutes. Calculate the volume of gas produced at the anode. ($1\text{ Faraday} = 96\,500\text{ coulombs}$; molar gas volume is 24000 cm^3 at room temperature). (4 marks)
2. (a) In an experiment to determine the molar heat of reaction when magnesium displaces copper, 0.15g of magnesium powder were added to 25.0cm^3 of 2.0M copper (II) chloride solution. The temperature of copper (II) chloride solution was 25°C . while that of the mixture was 43°C .
- (i) Other than increase in temperature, state and explain the observations which were made during the reaction. (3 marks)
- (ii) Calculate the heat change during the reaction (Specific heat capacity of the solution = $4.2\text{J g}^{-1}\text{K}^{-1}$ and the density of the solution = 1g/cm^3). (2 marks)
- (iii) Determine the molar heat of displacement of copper by magnesium. ($\text{Mg} \approx 24.0$). (2 marks)

(iv) Write the ionic equation for the reaction. (1 mark)

(v) Sketch an energy level diagram for the reaction. (2 marks)

- (b) Use the reduction potentials given below to explain why a solution containing copper ions should not be stored in a container made of zinc.



3. (a) Distinguish between isotopes and allotropes. (2 marks)

- (b) The chart below is part of the periodic table. Study it and answer the questions that follow. (The letters are not the actual symbols of the elements).

A					B			
C	D					E		

- (i) Select the element in period three which has the shortest atomic radius. Give a reason for your answer. (2 marks)

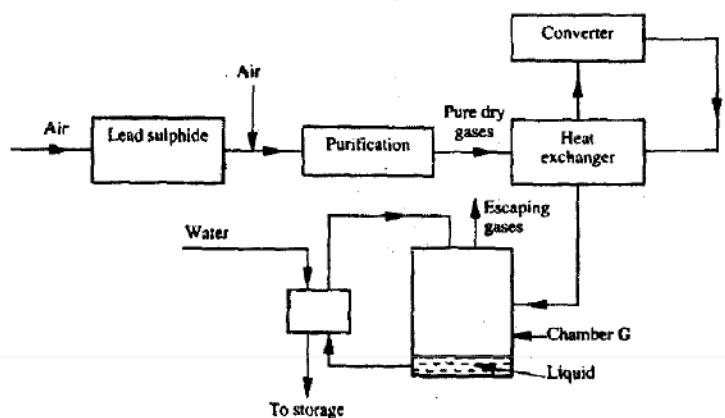
- (ii) Element F has the electronic structure, 2.8.18.4. On the chart above, indicate the position of element F. (1 mark)

- (iii) State one use of the elements of which E is a member. (1 mark)

- (iv) Write an equation to show the action of heat on the nitrate of element C. (1 mark)

- (c) When 3 litres of chlorine gas were completely reacted with element D, 11.875g of the product were formed. Determine the relative atomic mass of element D. (Atomic mass of chlorine = 35.5; molar gas volume = 24 litres). (3 marks)

4. (a) The diagram below shows some processes that take place during the industrial manufacture of sulphuric acid.



- (i) Write the equation for the reaction in which sulphur dioxide gas is produced. (1 mark)
- (ii) Why is it necessary to keep the gases pure and dry? (1 mark)
- (iii) Describe the process that takes place in chamber G. (1 mark)
- (iv) Name the gases that escape into the environment. (1 mark)
- (v) State and explain the harmful effect on the environment of one of the gases named in (iv) above. (1 mark)
- (vi) Give one reason why it is necessary to use a pressure of 2 - 3 atmospheres and not more. (1 mark)
- (b) (i) Complete the table below to show the observations made when concentrated sulphuric acid is added to the substances shown. (2 marks)

Substance	Observation
Iron filings	
Crystals of white sugar	

- (ii) Give reasons for the observations made using:

I iron filings

(1 mark)

II crystals of white sugar.

(1 mark)

- (c) Name one fertilizer made from sulphuric acid. (1 mark)

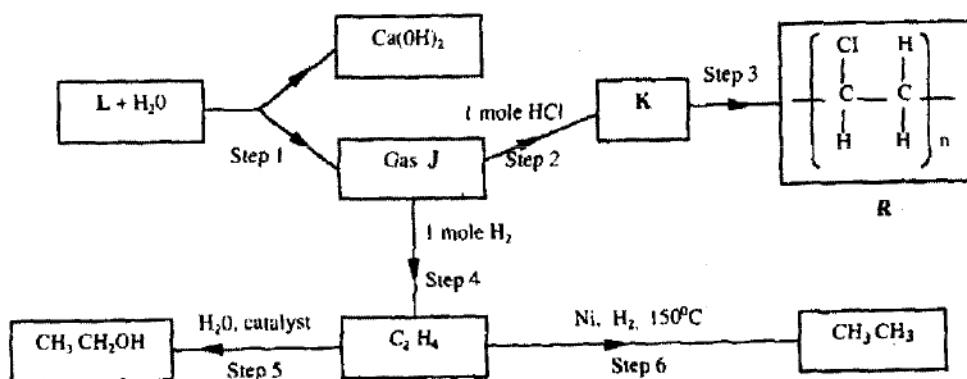
- (d) Suggest a reason why BaSO_4 (A pigment made from sulphuric acid) would be suitable in making paint for cars. (1 mark)

5. (a) What name is given to a compound that contains carbon and hydrogen only? (1/2 mark)

- (b) Hexane is a compound containing carbon and hydrogen.

- (i) What method is used to obtain hexane from crude oil? (1 mark)
(ii) State one use of hexane. (1 mark)

- (c) Study the flow chart below and answer the questions that follow.



- (i) Identify reagent L. (1 mark)

- (ii) Name the catalyst used in Step 5. (1 mark)

- (iii) Draw the structural formula of gas J. (1 mark)

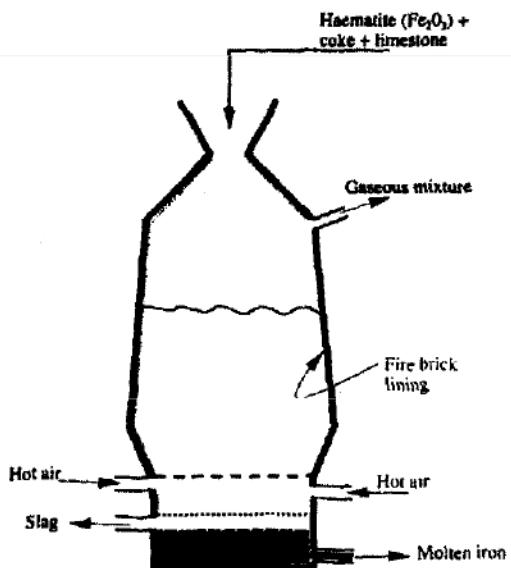
- (iv) What name is given to the process that takes place in step 5? (1/2 mark)

- (v) State:
1 one use of product R (1 mark)

II a commercial application of the process which takes place in step 6.
(1 mark)

- (d) (i) Write the equation for the reaction between aqueous sodium hydroxide and aqueous ethanoic acid.
(1 mark)
- (ii) Explain why the reaction between 1g of sodium carbonate and 2M hydrochloric acid is faster than the reaction between 1g of sodium carbonate and 2M ethanoic acid.
(2 marks)

6 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.



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