

- (c) Place about  $2\text{cm}^3$  of liquid F in a test-tube, add about  $1\text{cm}^3$  of acidified potassium dichromate (VI) and warm the mixture.

<b>Observations</b>	<b>Inferences</b>
(1 mark)	(1 mark)

K.C.S.E.

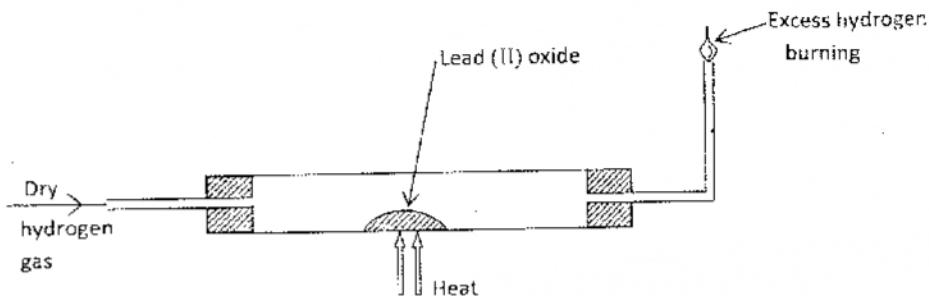
**CHEMISTRY PAPER 1 2012**

**1** Charcoal is a fuel that is commonly used for cooking. When it burns it forms two oxides.  
 (a) Name the **two** oxides. (2 marks)

(b) State **one** use of any of the two oxides. (1 mark)

**2** Iron (III) oxide was found to be contaminated with copper (II) sulphate. Describe how a pure sample of iron (III) oxide can be obtained. (3 marks)

**3** In an experiment, dry hydrogen gas was passed over heated Lead (II) Oxide as shown in diagram below.



State and explain the observations made in the combustion tube.

(3 marks)

**4.** The table below shows properties of some elements **A**, **B**, **C** and **D** which belong to the same period of the periodic table. The letters are not the actual symbols of the elements.

Element	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Mp (°C)	1410	98	-101	660
Atomic radii (nm)	0.117	0.186	0.099	0.143
Electrical conductivity	<b>Poor</b>	Good	<b>Non conductors</b>	Good

(a) Arrange the elements in the order they would appear in the period. Give a reason. (2 marks)

(b) Select the metallic element which is the better conductor of electricity. Give a reason.

(1 mark)

5. A sample of water in a beaker was found to boil at 101.5°C at 1 atmospheric pressure. Assuming that the thermometer was not faulty, explain this observation. (1 mark)

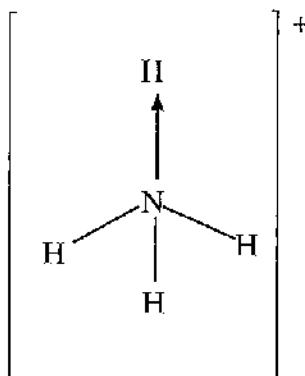
6. Study the information in the table below and answer the questions that follow:

Salt	Solubility (g/ 100g water)	
	at 40°C	at 60°C
CuSO <sub>4</sub>	28	38
Pb(NQ <sub>3</sub> ) <sub>2</sub>	79	98

A mixture containing 35g of CuSO<sub>4</sub> and 78g of Pb(NO<sub>3</sub>)<sub>2</sub> in 100g of water at 60°C was cooled to 40°C.

- (a) Which salt crystallised out? Give a reason (2 marks)
- (b) Calculate the mass of the salt that crystallised out. (1 mark)

7. Ammonium ion has the following structure:



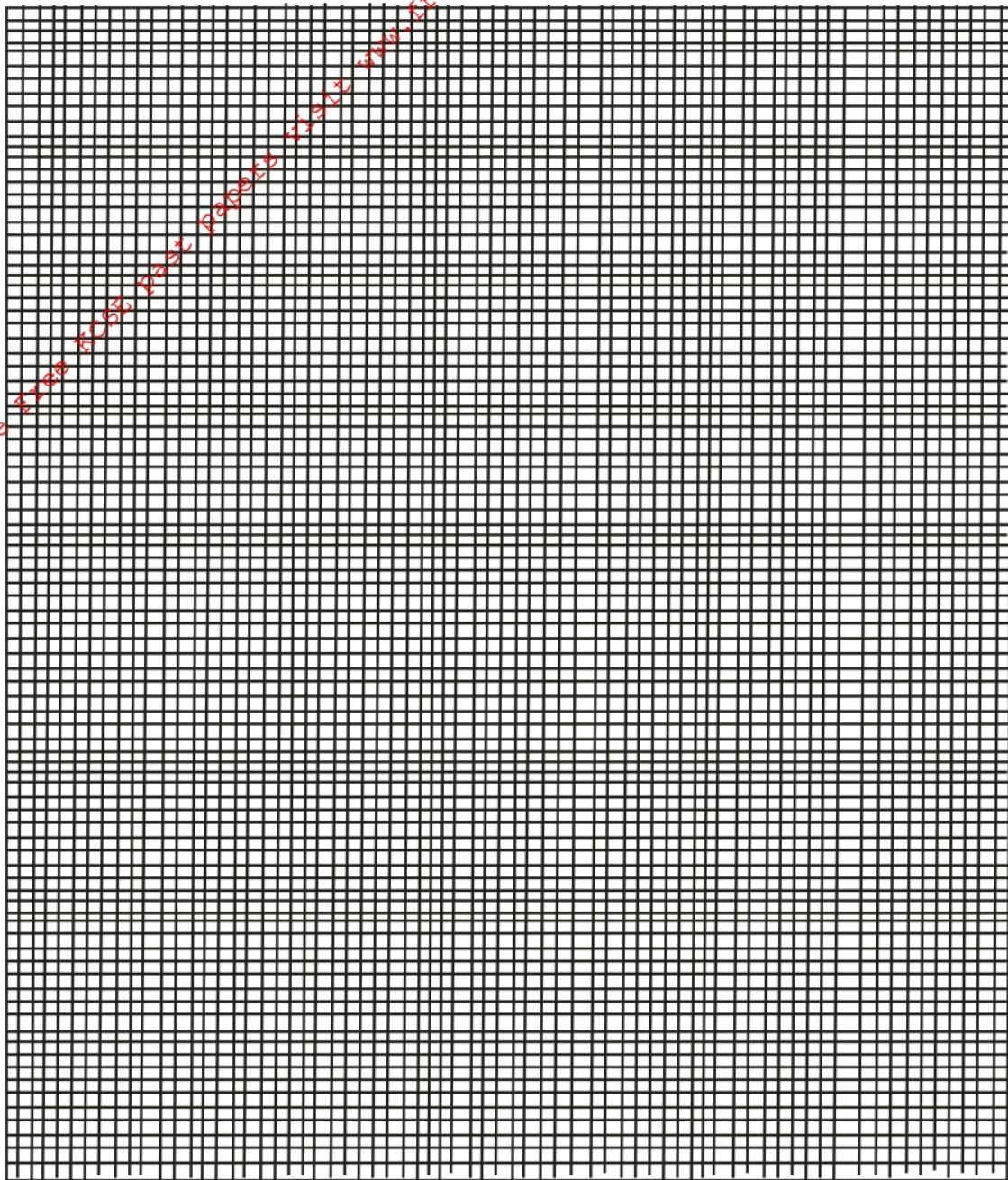
Label on the structure:

- (a) covalent bond; (1 mark)  
bond. (1 mark)

(b) coordinate (dative)

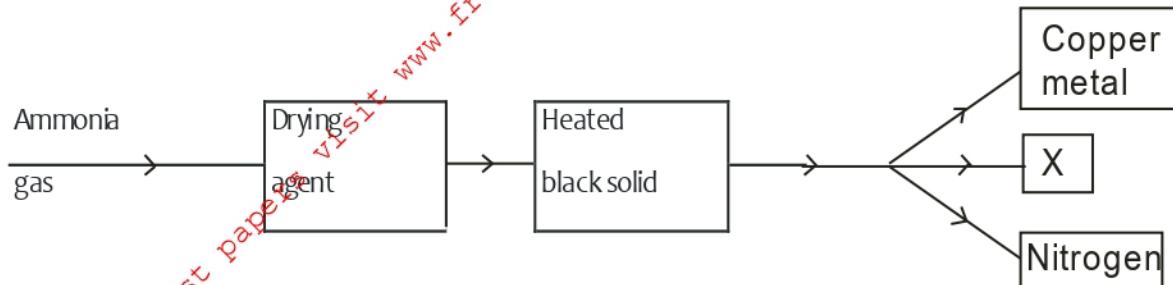
8. 10cm<sup>3</sup> of concentrated sulphuric (VI) acid was diluted to 100cm<sup>3</sup>. 10cm<sup>3</sup> of the resulting solution was neutralised by 36cm<sup>3</sup> of 0.1M sodium hydroxide solution. Determine the mass of sulphuric (VI) acid that was in the concentrated acid (S = 32.0; H = 1.0; O = 16.0). (3 marks)

- 9 120g of iodine - 131 has a half life of 8 days and decays for 32 days. On the grid provided, plot a graph of the mass of iodine - 131 against time. (3 marks)



- 10(a) Name **two** cations that are present in hard water. (1 mark)
- (b) Explain how the ion exchange resin softens hard water. (2 marks)
11. The empirical formula of A is  $\text{CH}_2\text{Br}$ . Given that 0.470g of A occupies a volume of  $56\text{cm}^3$  at  $546\text{K}$  and 1 atmospheric pressure, determine its molecular formula. ( $\text{H} = 1.0$ ,  $\text{C} = 12.0$ ,  $\text{Br} = 80.0$ , molar gas volume at STP =  $22.4 \text{ dm}^3$ ). (3 marks)

**12** Study the flow chart below and answer the questions that follow.



- (a) Name a suitable drying agent for ammonia. (1 mark)
- (b) Describe one chemical test for ammonia. (1 mark)
- (c) Name X. (1 mark)

**13** A dynamic equilibrium is established when hydrogen and carbon (IV) oxide react as shown below:



What is the effect of adding powdered iron catalyst on the position of the equilibrium? Give a reason. (2 marks)

**14** Distinguish between ionisation energy and electron affinity of an element. (2 marks)

**15** Below is a representation of an electrochemical cell.



- (a) What does // represent? (1 mark)
- (b) Given the following:

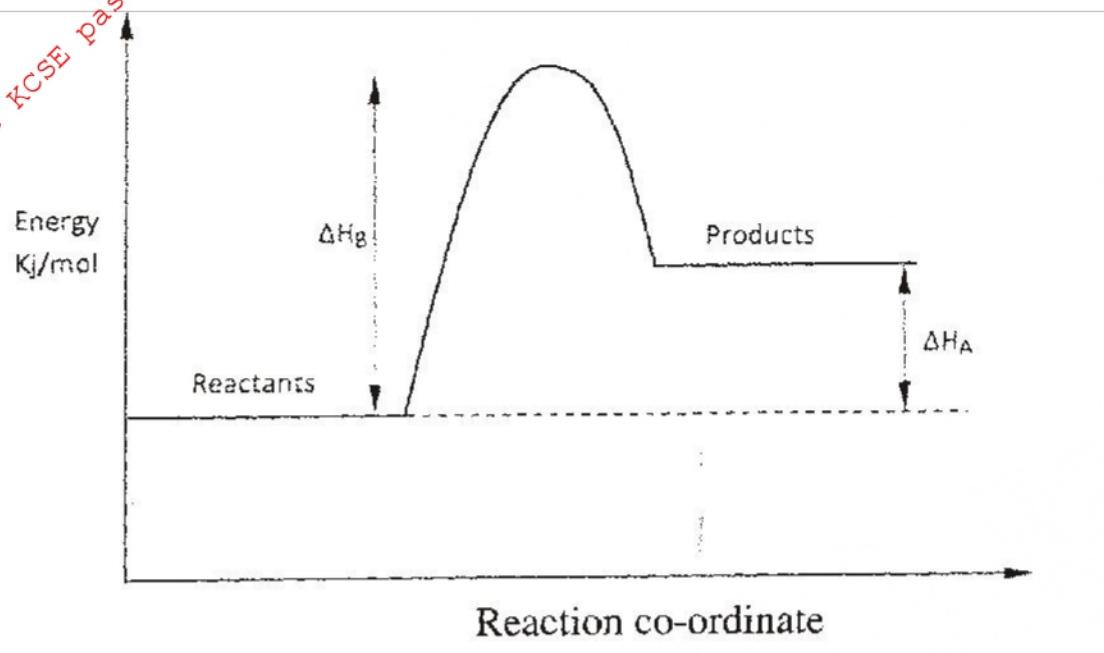


Calculate the E.M.F of the electrochemical cell. (2 marks)

**16** Use the following information on substances S, T, V and hydrogen to answer the questions that follow:

- (i) T displaces V from a solution containing V ions.
- (ii) Hydrogen reacts with the heated oxide of S but has no effect on heated oxide of V.
- (a) Arrange substances S, T, V and hydrogen in the order of increasing reactivity. (2 marks)
- (b) If T and V are divalent metals, write an ionic equation for the reaction in (i) above. (1 mark)

**17** Study the energy level diagram below and answer the questions that follow.



- (a) Give the name of  $\Delta H_A$  (1 mark)
- (b) How can  $\Delta H_B$  be reduced? Give a reason. (2 marks)

**18** Acidified potassium manganate (VII) solution is decolourised when sulphur (IV) oxide is bubbled through it. The equation for the reaction is given below.

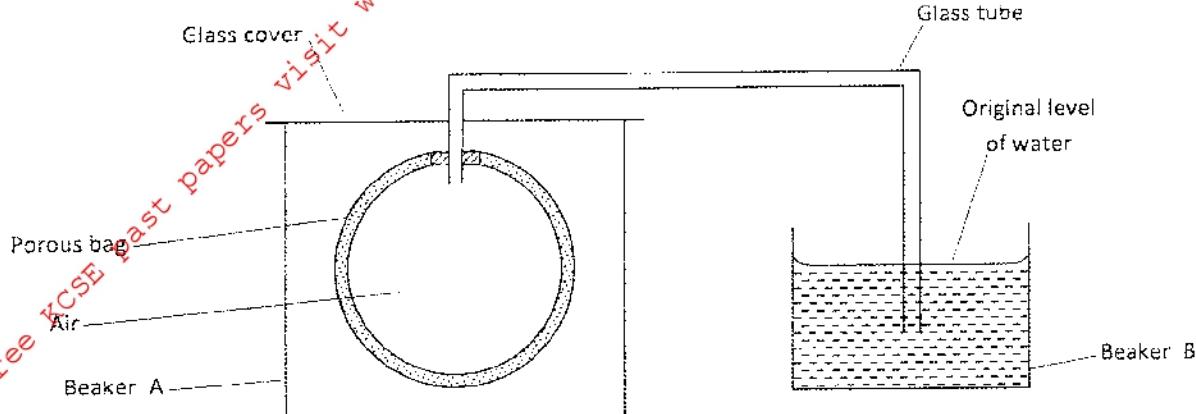


- (a) Which reactant is oxidised? Explain. (2 marks)
- (b) Other than the manufacture of sulphuric (VI) acid, state one other use of sulphur (IV)

oxide.

(1 mark)

- 19 The set up shown below was used to investigate a property of hydrogen gas.



State and explain the observation that would be made in the glass tube if beaker A was filled with hydrogen gas. (3 marks)

- 20 Draw and name the isomers of pentane. (3 marks)

- 21 Give **two** uses of the polymer polystyrene. (1 mark)

- 22 Aluminium is both malleable and ductile,

(a) What is meant by?

(i) malleable; (1 mark)

(ii) ductile. (1 mark)

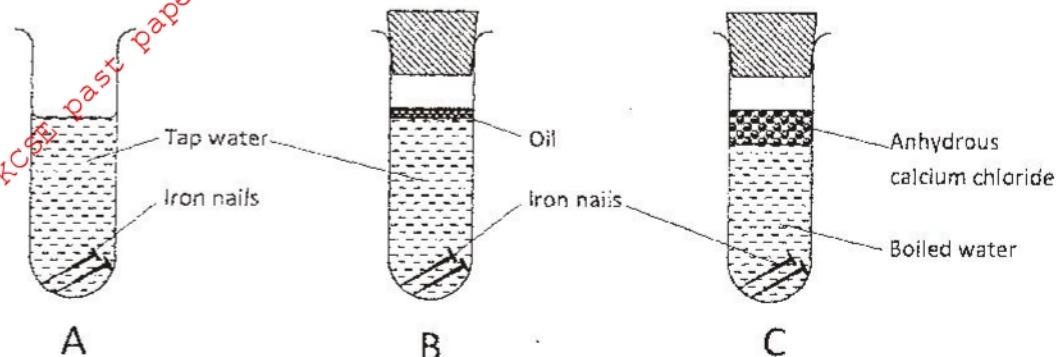
(b) State **one** use of aluminium based on:

(i) malleability (1mark)

(ii) ductility (1mark)

**23** Describe how the percentage by mass of copper in copper carbonate can be determined.  
(3 marks)

**24** and The following set up of three test-tubes was used to investigate rusting of iron. Study it and answer the questions that follow.



- (a) Give a reason why rusting did not occur in test-tube C. (1 mark)
- (b) Aluminium is used to protect iron sheets from rusting.  
Explain **two** ways in which aluminium protects iron from rusting. (2 marks)

**25** Describe how a solid sample of potassium sulphate can be prepared starting with 200cm<sup>3</sup> of 2M potassium hydroxide. (3 marks)

**26** Describe **two** chemical tests that can be used to distinguish ethanol from ethanoic acid. (3 marks)

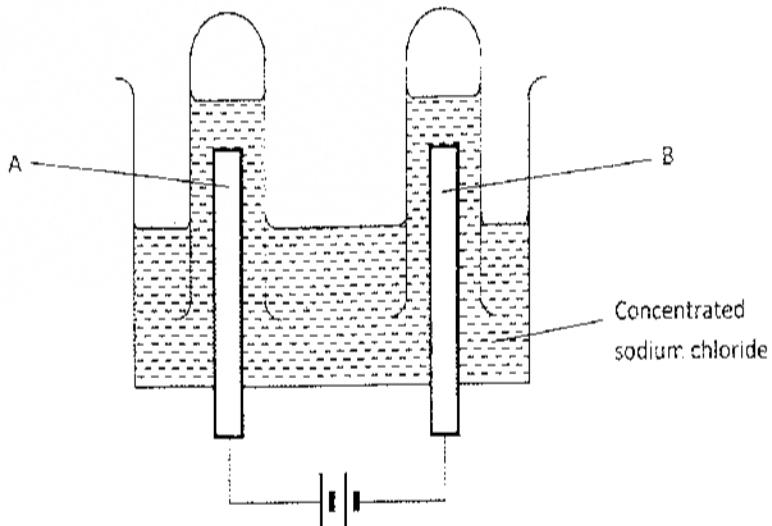
**27** (a) The electronic arrangement of the ion of element Q is 2.8.8. If the formula of the ion is Q<sup>3-</sup>, state the group and period to which Q belongs.

Group: (1/2 mark)

Period: (1/2 mark)

- (b) Helium, neon and argon belong to group 8 of the periodic table. Give:
- (i) the general name of these elements; (1 mark)
- (ii) one use of these elements. (1 mark)

**28** The apparatus shown in the diagram below were used to investigate the products formed when concentrated sodium chloride was electrolysed using inert electrodes.



- (a) Write the equation for the reaction that takes place at electrode A. (1 mark)
- (b) If the concentrated sodium chloride was replaced with dilute sodium chloride, what product would be formed at electrode A? Explain. (2 marks)
- 29.** a) State and explain what would happen if a dry blue litmus paper was dropped in a gas. (1mark)
- b) By using only dilute hydrochloric acid, describe how a student can distinguish between barium sulphite from barium sulphate. (2marks)