

CHEMISTRY**THEORY**

- Briefly describe how you can separate a mixture of copper (II) oxide and potassium chloride into pure separate samples. (3mks)
- The table below shows results obtained from experiment carried out on a suspect salt solution M.

Experiment	Results
I. A few drops of Barium nitrate added to solution M	No ppt/ colourless solution
II. A few drops of lead (II) nitrate added to solution M.	White ppt
III. Ammonia solution added dropwise until in excess	White precipitate Colourless solution

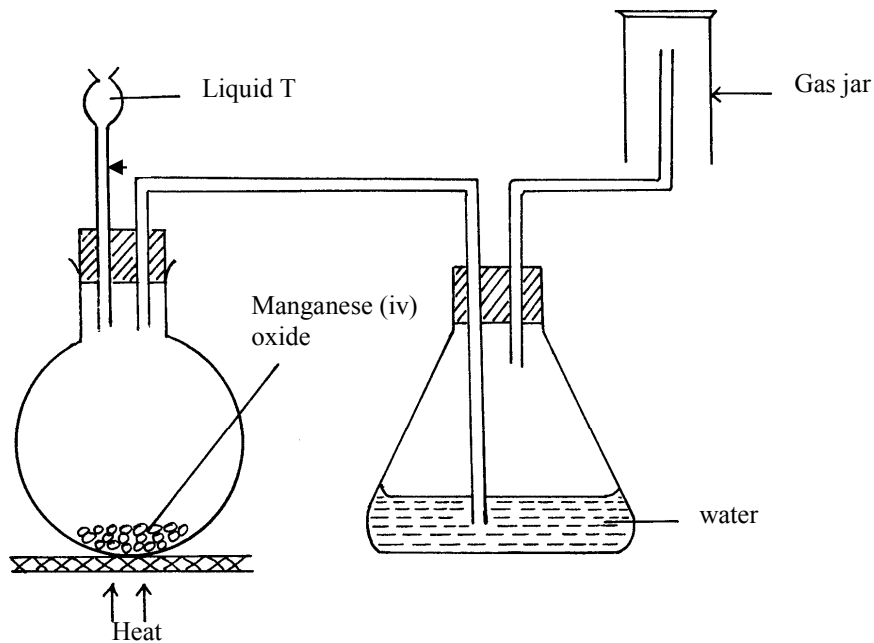
- Identify the cation and anion present in solution M.

Cation ½ mk

Anion ½ mk
 - Write an ionic equation for the formation of white precipitate in experiment II (1mk)
 - Write the formula of the Ion responsible for formation of colourless solution in experiment III
- Concentrated magnesium chloride solution is electrolysed using inert electrodes.
 - Name the products formed at
 - Anode (½ mk)
 - Cathode (½ mk)
 - Write the equation of the reaction that occurred at the anode. (1mk)
 - Study the reaction equation given below.

$$\text{H}_{2(\text{g})} + \text{Br}_{2(\text{g})} \rightleftharpoons 2\text{HBr}_{(\text{g})} \quad \Delta H = -74.4\text{KJ}$$
 - Draw an energy level diagram showing the catalysed and uncatalysed reaction. (2mks)
 - State the effect on formation of hydrogen bromide if pressure was increased in equation above. Explain. (1mk)
 - An organic compound has a formula of $\text{C}_4\text{H}_{10}\text{O}$.
 - Write the structural formula of the organic compound. (1mk)

- b) To which homologous series does the compound belong? (1mk)
- c) Name the compound formed when this compound is reacted with propanoic acid. (1mk)
6. $X\text{cm}^3$ of 0.25M sodium chloride was added to lead (II) Nitrate until in excess, 3.86g of a white precipitate were formed. [Na=23, Pb=207 Cl=35.5 N = 14 O=16]
- (i) Write an ionic equation for the formation of white precipitate. (1mk)
- (ii) Work out the value of X. (2mks)
7. One mole of hydrogen chloride gas was reacted with one mole of ethyne.
- (i) Write a balanced equation for the reaction that occurred. (1mk)
- (ii) Name the product formed in 7 (i), above (1mk)
- (iii) Name the product that would be formed when the product named in 7(ii) above undergoes self addition reaction. (1mk)
8. Using equations, describe how sulphuric (VI) acid is prepared starting with sulphur (IV) oxide. (3mks)
9. Below is a set up of apparatus used to prepare a sample of chlorine gas.



- a) No gas was collected in the gas jar. Explain. (1mk)
- b) Name liquid T. (1mk)
- c) Why was water used in the set up? (1mk)
10. 5.1g of sodium sulphite was reacted with excess dilute hydrochloric acid. Calculate the volume of the gas collected at room temperature and pressure. (M.G.V = 24000cm^3) [Na=23; O=16; S=32] (3mks)

11. Ammonia reacts with oxygen as shown by the thermochemical equation shown below.



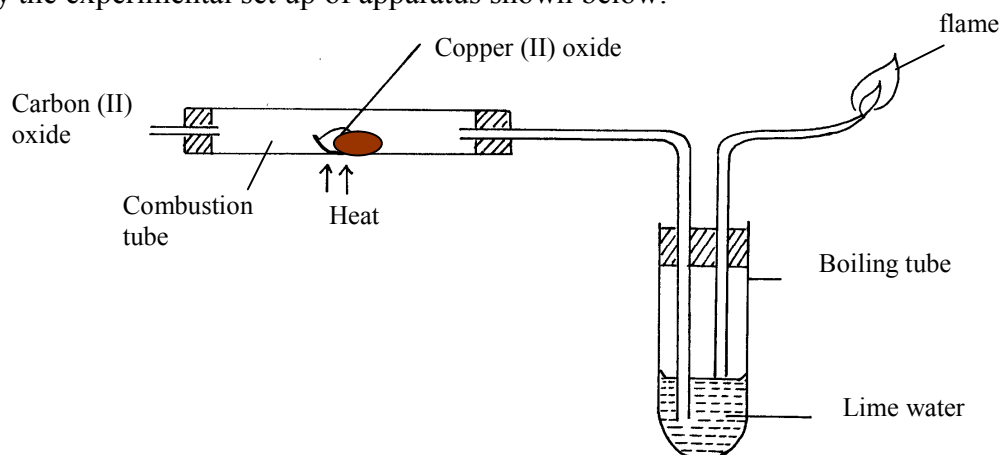
a) Work out

(i) Energy evolved when one mole of ammonia reacts with oxygen. (1mk)

(ii) Enthalpy change when 2.4dm^3 of ammonia reacts as shown in the equation at r.t.p. (1mk)

b) Name the catalyst used in this reaction (1mk)

12. Study the experimental set up of apparatus shown below.



(i) State two observations made in the set up as the experiment progressed.(2mks)

b) Using an equation; Explain the change that occurred in the boiling tube. (1mk)

c) Why was the gas burned in the flame? (1mk)

13. An oxide of metal G was mixed with carbon then heated, a red glow spread on the same surface of mixture and the oxide was reduced into metal G. The same experiment was repeated with an oxide of metal H and there was no reaction.

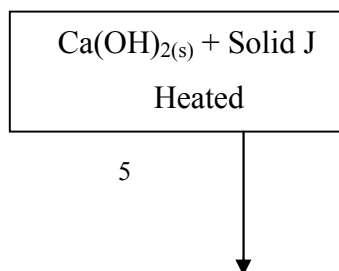
(a) State the method one would use to extract metal.

H (1mk)

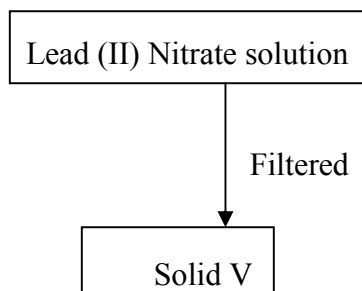
G (1mk)

(b) Name one major use of iron (1mk)

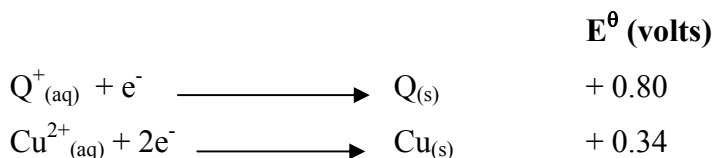
14. Study the flow chart below



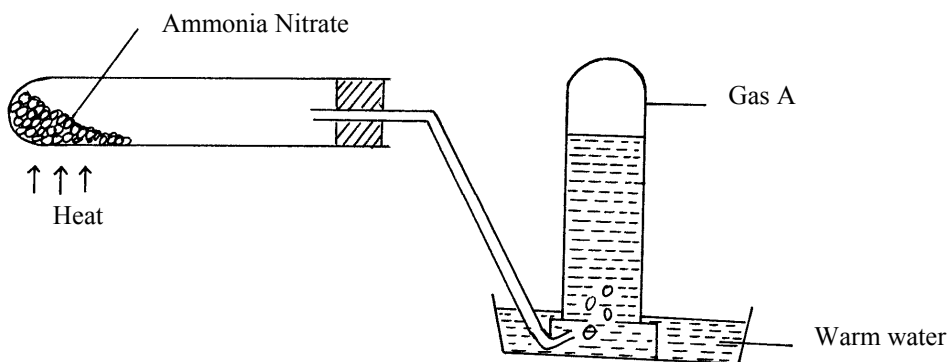
Ammonia gas



- a) Identify
Solid J (1mk)
Solid V (1mk)
- b) Write an ionic equation for the formation of solid V. (1mk)
15. When a current 5A was passed for 19 minutes and 18 seconds through molten metal chloride MCl_n , 1.04g of metal M were deposited. Work out the formula of metal chloride. (R.A.M of metal M = 52 1F = 96500c) (3mks)
16. A strip of copper metal was immersed into a nitrate solution of metal Q overnight. Use the information given below to answer the questions that follow.



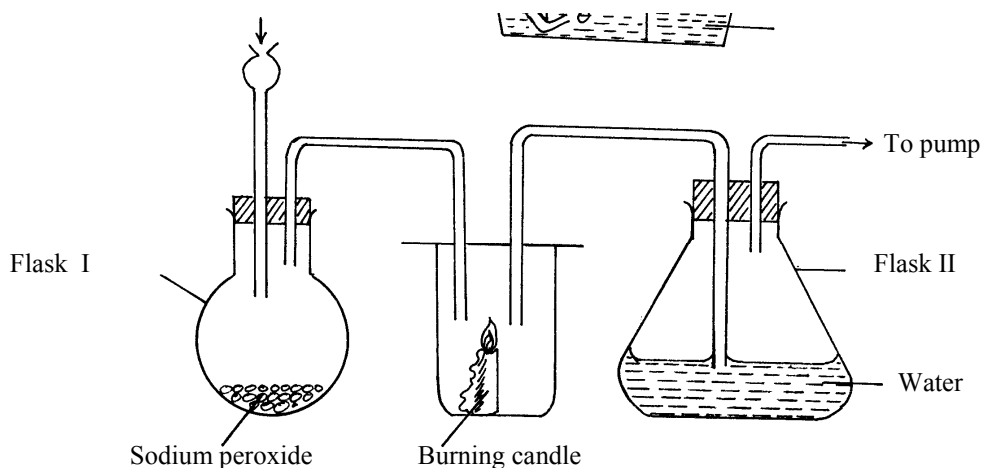
- a) State the observations made at the end of experiment. (1mk)
- b) Give a reason for the observations made in (a) above. (1mk)
17. Study the set up below.



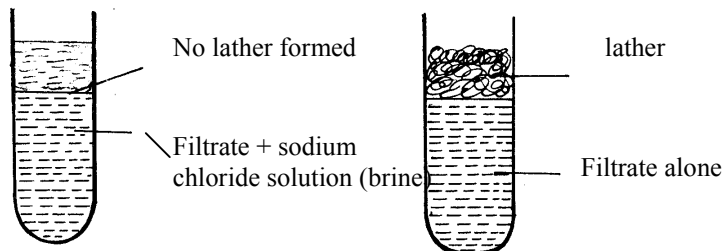
- (i) Identify gas A. (1mk)
- (ii) Why is gas A collected over warm water. (1mk)

- (iii) State and explain one precaution that should be taken when carrying out the experiment above. (2mks)
18. Equal volume of Nitrogen gas and gas B took 25 seconds and 30 seconds respectively to diffuse through a porous pot under similar conditions. Work out the molar mass of gas B. $N=14$. (3mks)
19. Using dots (.) and crosses (x) to represent electrons. Show the bonding in the compounds formed between
- a) Magnesium and chlorine. (1 ½ mks)
- b) Silicon and Fluorine chlorine. (1 ½ mks)
20. a) 60g of a radioactive isotope Q was reduced to 3.75 g after 32 days. Determine the half-life of isotope Q. (1mk)
- b) An isotope of protium emitted a total of four Alpha particles and two beta particles to form an atom Z. Work out the mass number and atomic number of atom Z. (2mks)
21. The diagram below shows a set up of apparatus used to prepare oxygen gas and pass it over burning candle. The experiment was allowed to run for several minutes.

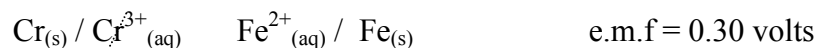
Liquid M



- (i) Identify liquid M. (1mk)
- (ii) The pH of the solution in flask II was found to be less than 7. Explain. (2mks)
- (iii) Write an equation for the reaction that forms oxygen gas in the set up. (1mk)
22. When a sample of water was boiled, a white solid was obtained. The solid was filtered off and the filtrate divided into two portions, A and B, soap was added in both and each shaken. The results are as shown in the diagrams below.



- (i) State the type of hardness present in water initially. (½ mk)
- (ii) Write the chemical formula of the white solid. (1mk)
- (iii) Why did soap not form lather in sample A. (1mk)
- (iv) State cause of hardness named in 22 (i) above. (½ mk)
23. a) Work out the oxidation numbers of phosphorous in the following compounds.
- (i) H_3PO_3 (½ mk)
- (ii) H_3PO_4 (½ mk)
- b) Study the equation below
- $$3\text{CuO}_{(s)} + 2\text{NH}_3(g) \longrightarrow 3\text{Cu}_{(s)} + \text{N}_2(g) + 3\text{H}_2\text{O}(l)$$
- Which species has undergone oxidation. Explain (2mks)
24. Study the cell representation below.

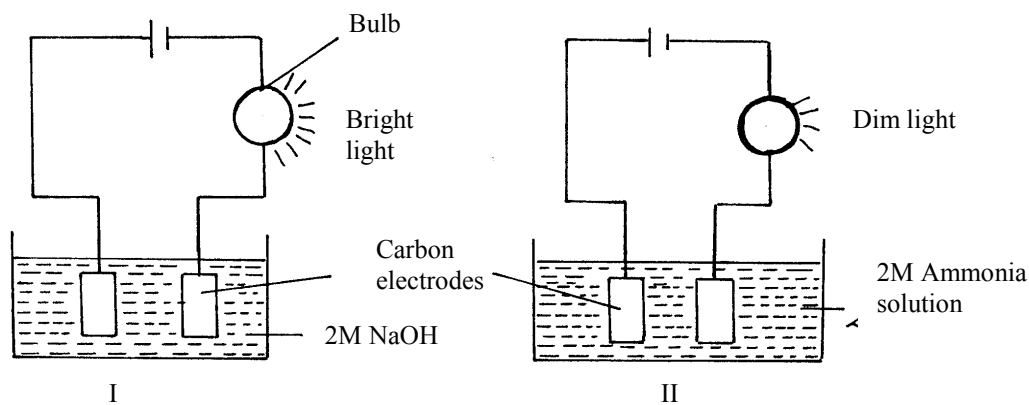


a) Write an overall cell reaction for the cell above. (1mk)

b) The E^θ value of $\text{Fe}^{2+}_{(aq)} / \text{Fe}_{(s)}$ is 0.44volts. Calculate the E^θ value for $\text{Cr}^{3+}_{(aq)} / \text{Cr}_{(s)}$.

(2mks)

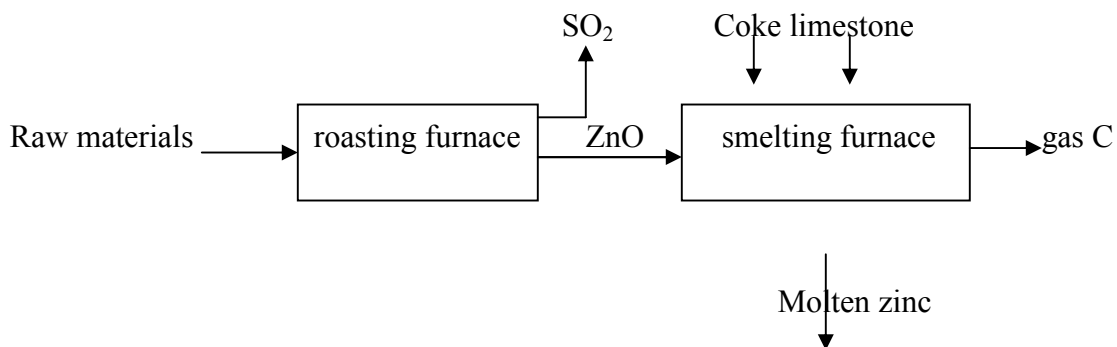
25. The electrical conductivity of two equimolar solutions was investigated as shown in the diagram below



a) State the observations made in the electrodes. (1mk)

b) Explain the difference in the brightness of the bulbs. (2mks)

26. Below is a simple flow chart showing the extraction of zinc metal.



(i) Name the raw materials fed into the roasting furnace. (1mk)

(ii) Identify gas C (1mk)

(iii) State the pollution effect of extraction of zinc and state one way of controlling it. (2mks)