

NAME DATE

INDEX NO. CANDIDATE'S SIGNATURE

233/1
CHEMISTRY
PAPER 1
JULY/AUGUST, 2010
TIME: 2 HOURS.

MBOONI WEST DISTRICT JOINT EVALUATION TEST

Kenya Certificate of Secondary Education.

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CHEMISTRY
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INSTRUCTIONS TO CANDIDATES.

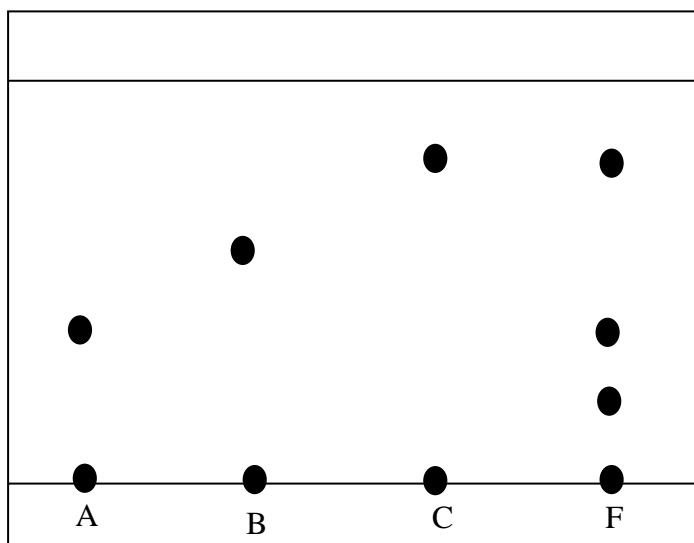
- Write your **NAME** and **INDEX NUMBER** in spaces provided above.
- Answer **ALL** the questions in the spaces provided.
- Mathematical tables and silent electronic calculators may be used.
- All working **MUST** be clearly shown.

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1 – 25	80	
Total score	80	

*This paper consists of 12 printed pages.
Candidates should check to ensure that all pages are printed as indicated and no questions are missing*

1. Three pure pigments were prepared and their spots placed on a filter paper as shown below. The pure pigments are A, B, and C. A mixture F was also placed on the filter paper at the same time with the pure pigments. The filter paper was then dipped in ethanol solvent and left for some half an hour. The results obtained were as follows:



- (i) Which of the three pure pigments is most sticky? Give a reason for your answer. 1 mark

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- (ii) Which pure pigment is not present in the mixture F? 1 mark

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- (iii) Show on the diagram the base line 1 mark

2. When 50cm^3 1M potassium hydroxide was reacted with 50cm^3 of 1M hydrochloric acid, the temperature rose by 8°C . When the same volume of Potassium hydroxide was reacted with 50cm^3 of 1M Pentanoic acid, the temperature rose by 3°C .

- i) Give reasons for the above difference in temperature. 2 marks

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- ii) Write an equation to show dissociation of pentanoic acid? 1 mark

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3. (i) Using a dot (●) and cross (X) show how NH_4^+ ion is formed from NH_3 molecule and H^+ ion.

2 marks

(ii) State the type of bond that exists between the NH_3 and the H^+ ion ½ mark

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(iii) Molecular substances have low melting points. Give one reason why they have low melting points. ½ mark

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4. A heavy metal P was dissolved in dilute nitric acid to form a solution of compound $\text{P}(\text{NO}_3)_2$. Portions of the resulting solution were treated as follows:

- i) To the first portion a solution of dilute hydrochloric acid is added, where a white precipitate (S) is formed, which dissolves on warming.
- ii) The second portion is treated with two drops of 2M Sodium hydroxide solution where a white precipitate T is formed. The white precipitate dissolved in excess sodium hydroxide to form a colourless solution.
- iii) A solution of potassium iodide is added to the third portion where a yellow precipitate (U) is formed.
- iv) When the resulting solution is evaporated to dryness and heated strongly a yellow solid (V) is formed and a brown gas (W) and a colourless gas (X) are formed.

a. Identify the substances P, S, T, U, V, W 3 marks

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b. Write an ionic equation of the reaction that occurs in part (iii) 1 mark

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5. A student from Kathonzwani District fetched water from a pond in their village. She used part of it to wash her uniform using bar soap where it took her a lot of time to produce lather for the process. She boiled part of the remaining water for drinking. On washing her hands using some of the boiled water, she noted that it lathered very easily with the same bar soap.

i) Identify the type of water hardness in the water she used. Give a reason for your answer. 1 mark

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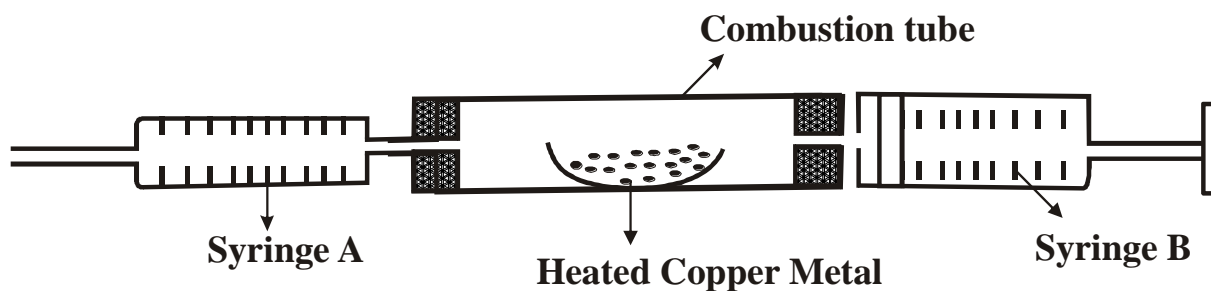
ii) State the ions that cause the hardness you have mentioned above 1 mark

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iii) State two disadvantages of water hardness 1 mark

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6. 100cm^3 of air is continuously passed through a combustion tube connected to two syringes as shown below. The combustion tube contains some clean granules of copper metal which are heated. The process is repeated until there is no further change in the volume of air. The volume of air remaining is 80cm^3



i) State one observation made in the combustion tube ½ mark

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ii) Work out the percentage of air used after the reaction ½ mark

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iii) List two gases remaining after the reaction 1 mark

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7. A white solid salt was heated in a boiling tube, connected to a delivery tube directed to some freshly prepared lime water. The limewater forms a white precipitate with the gas evolved. The residue was scrapped off using a dry metallic spatula and subjected to the non- luminous flame of a Bunsen burner where it burns with a yellow flame.

i) Identify the white solid salt ½ mark

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ii) Identify the white residue that remains 1 mark

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iii) State one use of the gas evolved on heating the solid white salt. 1 mark

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8. The electronic configuration of the ions of X^{3+} and Y^{-} are 2, 8 and 2, 8 respectively.

i) Write the electronic configuration of the neutral atoms of X and Y 1 mark

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ii) Write the formula of the compound formed between element X and O 1 mark

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iii) Compare the atomic radius of element X and Y 2 marks

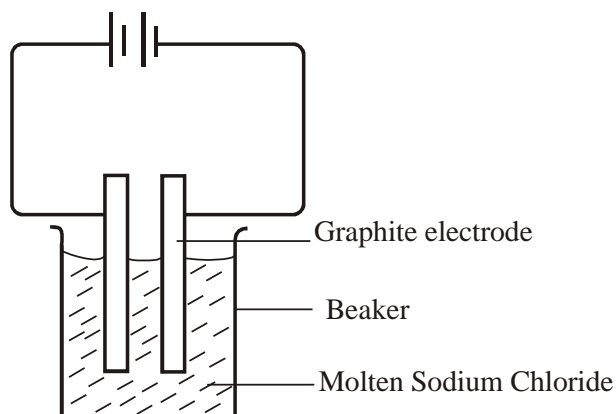
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9. The diagram below represents an experiment which was carried out by a student, to investigate the effect of passing an electric current on molten sodium chloride.



- i) Molten sodium chloride is a binary electrolyte. State the meaning of the term binary electrolyte. ½ mark

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- ii) State two observations made at the anode 1 mark

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- iii) Write an equation to show what happens at the cathode. 1 mark

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- iv) Show the direction of flow of electrons on the set up ½ mark

10. 100cm^3 of propane gas diffuses through a porous plug in 20 seconds. How long would it take for 80cm^3 of methane gas to diffuse through the same plug? (C = 12, H = 1) 3 marks

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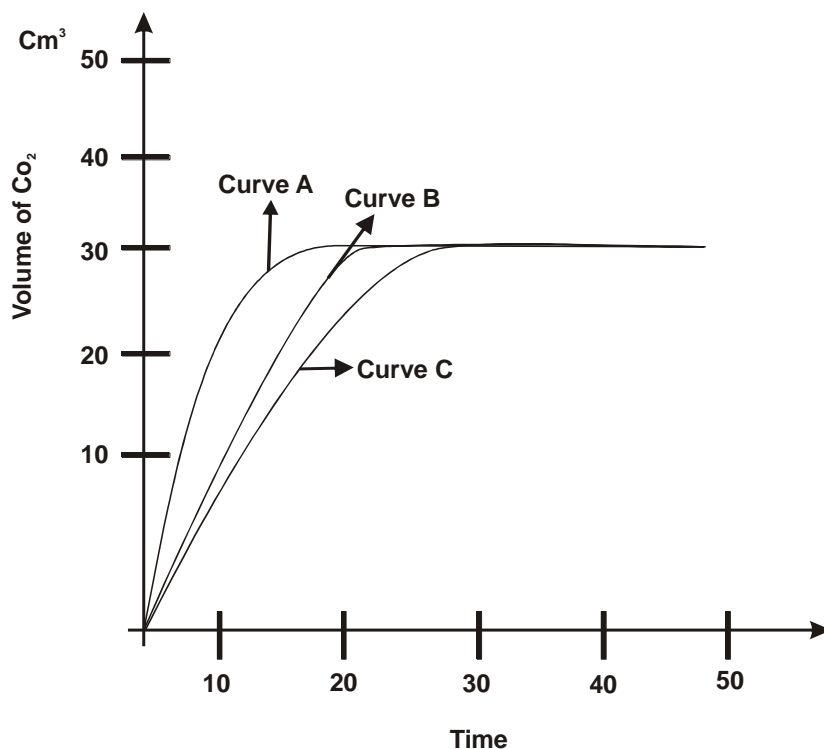
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11. The graphs below were drawn when 15g of marble chips in different physical states were reacted with 50cm³ of 2M Hydrochloric acid. They are drawn by measuring the volume of carbon (iv) oxide produced with time.



- i) Which curves corresponds to the reactions involving powdered calcium carbonate and large sized marble chips with the dilute acid?

a. Powdered calcium carbonate ½ mark

b. Large sized calcium carbonate ½ mark

- ii) All the graphs eventually flatten out at the same level but at different time. Why do the graphs flatten out at the same level? 1 mark

iii) Why is curve A very steep at any given point compared to the other curves 1 mark

12. One mole of ethane gas was mixed with excess chlorine gas in a gas jar at room temperature and kept in dark conditions. On observation, no reaction occurred in the dark conditions. On exposure to light the chlorine gas was decolourised.

i) State the importance of light in the above reaction. 1 mark

ii) Write an equation for the reaction that occurs once the mixture is exposed to light. 1 mark

iii) Name the organic product formed in the above reaction

1 mark

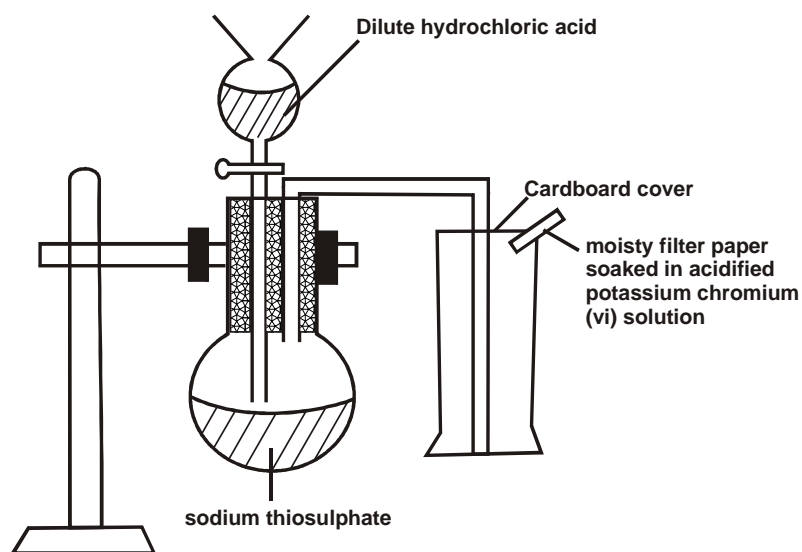
13. Below is an equation showing an equilibrium



State and explain the observation that would be made if some drops of concentrated sodium hydroxide solution were introduced to the equilibrium mixture

3 marks

14. Sodium thiosulphite was reacted with dilute hydrochloric acid in a round bottomed flask as shown below. The gas evolved was collected by downward delivery in a gas jar.



i) Write an equation to show the reaction going on in the reaction in vessel.

1 mark

ii) State the observation noted on the filter paper. Give a reason for your answer

1 mark

iii) Give a reason why the filter paper soaked in the acidified potassium chromium (VI) is used at the top of the flask

1 mark

15. Pentanoic acid reacts with butan-1-ol to form an organic compound.

i) Write an equation to show the above reaction. 1 mark

ii) Give the name given to the above type of reaction ½ mark

iii) A few drops of a certain catalyst must be added to the mixture to increase the rate of the reaction

(a) Name the catalyst. ½ mark

(b) Explain the role of the catalyst in the above reaction 1 mark

iv) Name the product formed in part (i) above ½ mark

16. A mixture of dilute nitric acid (50% water + 50% acid) was reacted with copper turnings in a round bottomed flask.

i) Name the gas that is produced in the above case. ½ mark

ii) Write a balanced equation to show the reaction 1 mark

iii) State two physical properties of the gas evolved above. 1 mark

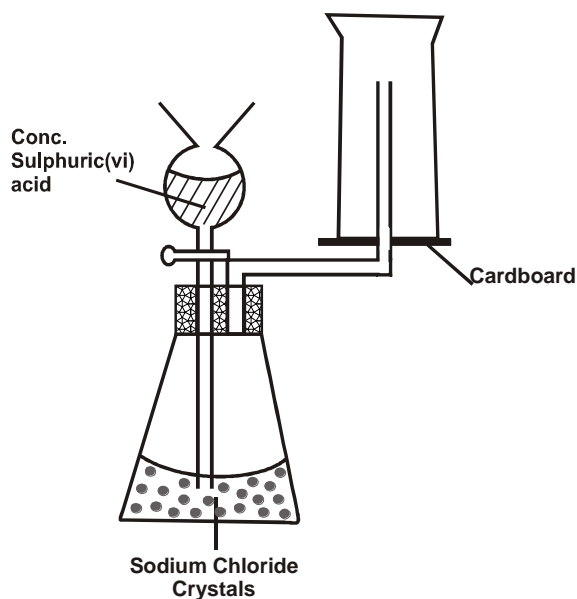
17. The molar enthalpy of combustion of propanol is 1560KJmol^{-1}

i) Write an equation to show the combustion of ethanol completely in oxygen 1 mark

ii) Calculate the amount of energy in joules released when 10g of propanol is burnt in excess oxygen 2 marks

- iii) The practically obtained value of enthalpy of combustion of propanol is less than the value obtained from books. Give two reasons for the above variation. 1 mark

18. An experiment was carried out by a student as shown below to prepare gas B. The student tried to collect the gas B as shown in the diagram but never succeeded in getting any gas. Study the diagram well and answer the questions that follow:



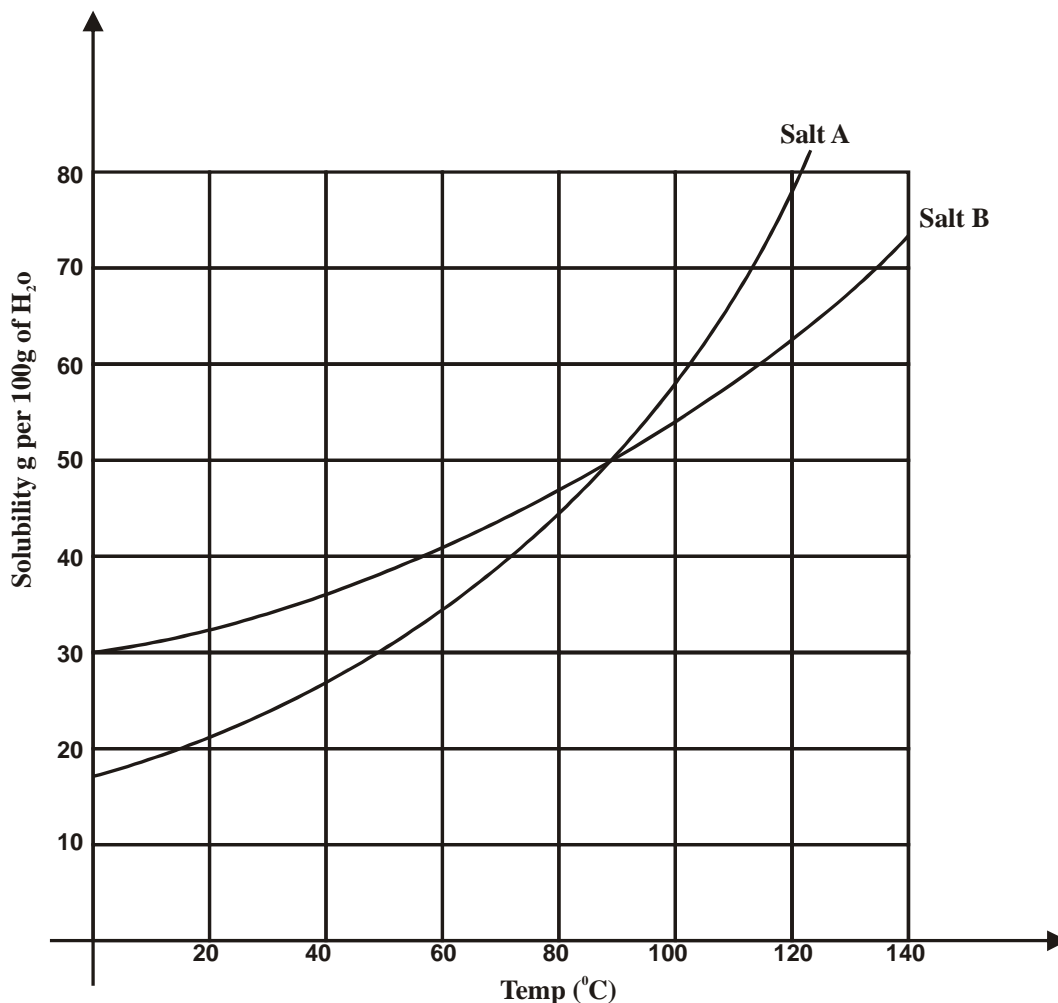
- i) Name the expected gas B ½ mark

- ii) Why was it not possible to collect the gas as shown above? ½ mark

- iii) In case the gas obtained above is exposed to ammonia gas, state the main observation made. 1 mark

19. Given a solid sample of calcium carbonate and sodium chloride, explain how you can obtain some pure crystals of sodium chloride. 3 marks

20. The solubility curves below shows the solubility of two salts A and B in water. Study it and answer the questions that follow:



i) Which salt is more soluble in water at 70°C

1 mark

ii) What is the amount of salt in 50g of saturated solution of salt A at 120°C?

1 mark

21. 3.78g of a hydrated salt of iron (II) sulphate, $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$, in H_2O were heated until all the water of crystallization was driven off. The anhydrous salt left had a mass of 1.52g. Determine the formula of the hydrated salt.

(Fe = 56, S = 32, H = 1, O = 16)

3 marks

22. A steady current of 0.2 Amperes was passed through molten silver bromide for 80 minutes.

i) Calculate the quantity of electricity that passed through the set up.

1 mark

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ii) Calculate the mass of product deposited at the cathode.

($1F = 96500C$; $Ag = 108$, $Br = 80$)

2 marks

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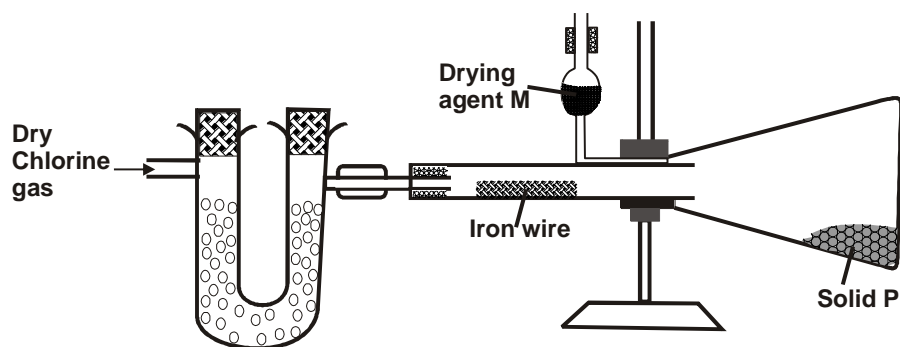
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23. The apparatus set up below was used to prepare an anhydrous solid P



i) Identify solid P

1 mark

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ii) Write an equation for formation of solid P

1 mark

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iii) Suppose the gas used in the set up was dry hydrogen chloride gas; what would be the product obtained after the reaction? Give a reason for your answer

1 mark

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24. Aluminium is obtained from the ore with the formula $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$. The ore is first heated and refined to obtain pure aluminium oxide (Al_2O_3). The oxide is then electrolysed to get Aluminium and oxygen gas using carbon anodes and carbon as cathode.

i) Give the common name of the ore from where aluminium is extracted from ½ mark

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ii) What would be the importance of heating the ore first before refining it? 1 mark

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iii) The refined ore has to be dissolved in cryolite first before electrolysis. Why is this necessary? 1½ mark

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iv) Why are the carbon anodes replaced every now and then in the cell for electrolysing aluminium oxide? 1 mark

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25. A radioactive cobalt (${}_{28}^{61}\text{Co}$) undergoes decay by emitting a beta particle and forming Nickel atom,

i) Write a balanced decay equation for the above change 1 mark

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ii) If a sample of the cobalt has an activity of 1000 counts per minute, determine the time it would take for its activity to decrease to 62.50 if the half-life of the element is 30years 2 marks

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iii) Define the term half-life. 1 mark

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