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NYAHOKAKIRA CLUSTER III JOINT

EXAMINATIONS TERM 3, 2022

(The Kenya Certificate of Secondary Education 2022)

CHEMISTRY

Paper 2

(THEORY)

2 hours.

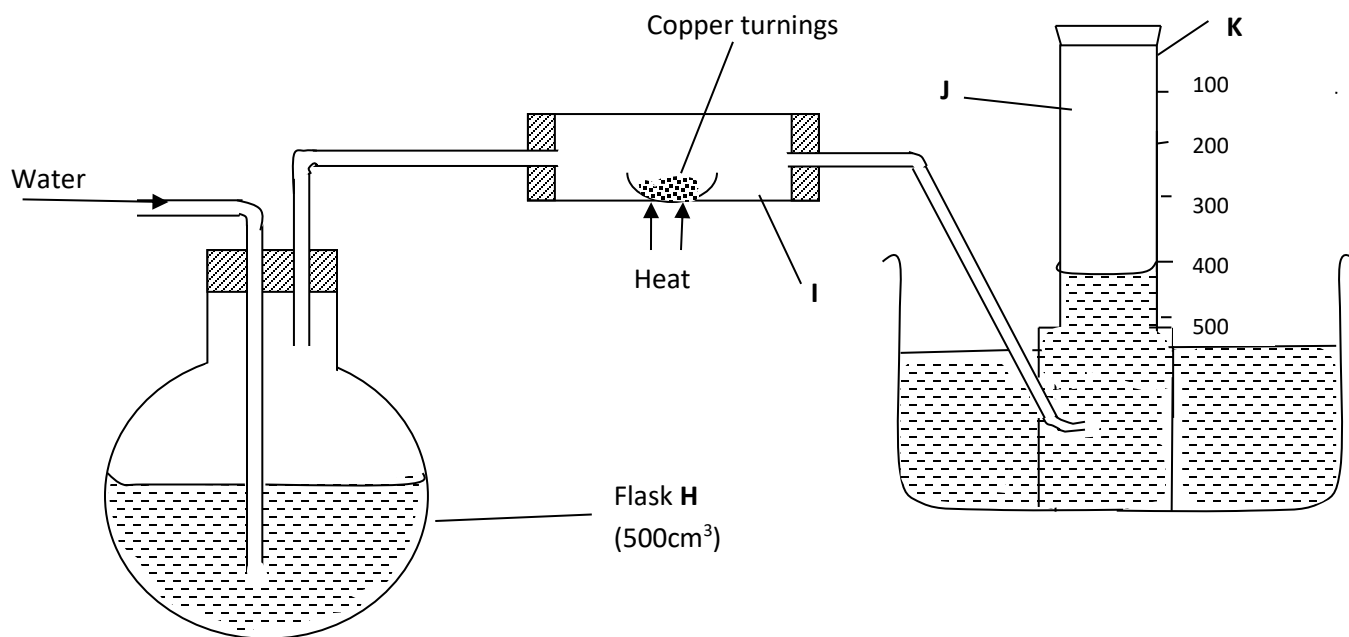
Instructions to Candidates

- Write your name class and class number in the spaces provided above
- Sign and write the date of the examination in the spaces provided above
- Answer ALL questions in the spaces provided.
- Mathematical tables and electronic calculators may be used.
- All working must be shown clearly where necessary.
- This paper consists of 13 printed pages
- Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing

For examiner's use only

Questions	Maximum score	Candidates score
1	10	
2	13	
3	11	
4	10	
5	11	
6	13	
7	12	
Total	80	

1. A. In an experiment to determine the percentage of oxygen in air, the apparatus below were set up. Study the set up and use the information provided to answer the questions that follow.



A 500cm³ measuring cylinder **K** was filled with water and assembled for gas collection. Copper turnings were heated red hot and water was slowly passed into 500cm³ flask **H** until it reached the 500cm³ mark. A colourless gas was collected in **K**.

(i) What was the purpose of passing water into flask **H**? **(1 mark)**

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(ii) What observations were made in the tube **I**? **(1 mark)**

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(iii) Name one of the gases that is likely to be found in **J**. **(1 mark)**

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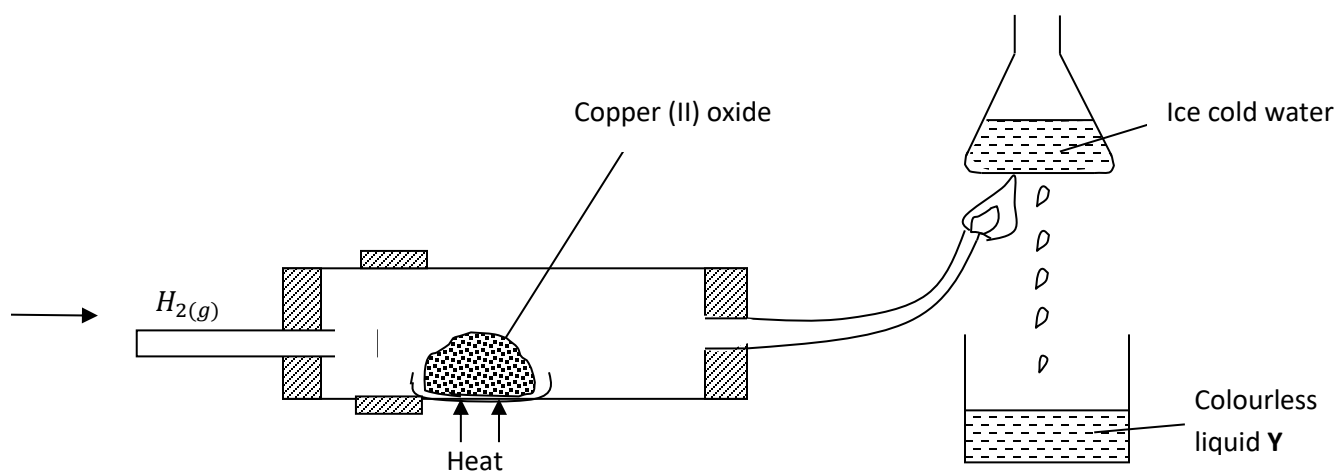
(iv) What was the volume of the gas collected in the measuring cylinder at the end of the experiment? **(1 mark)**

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.....

(v) Calculate the percentage of oxygen in air using the above results. **(2 marks)**

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B. Study the diagram below and answer the questions that follow.



(i) Give **one** observation made in the combustion tube after some time. **(1 mark)**

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(ii) Write an equation for the formation of the colourless liquid Y. **(1 mark)**

.....
.....

(iii) What was the aim of the above experiment as demonstrated in the combustion tube? Explain. **(2 marks)**

.....
.....

2. a) The table below shows some elements in the periodic table. Use it to answer the questions that follow. The letters are not the actual symbols of the elements.

								F
A	G			E		B		D
C								

i) Show the electron arrangement of ions of elements:

A..... (1mark)

B.....(1mark)

ii) Using dots (.) and crosses (x) to represent electrons draw a diagram to show how elements C and oxygen combine to form a compound. (O = 8). (1mark)

iii) Compare the following with explanation.

I. The reactivity of A and C. (2marks)

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II. Atomic radii of elements A and B. (2marks)

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III. The melting point of the oxide of element G and the oxide of D. (2marks)

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(b) The table below gives information on four elements by letters K, L, M and N. Study it and answer the questions that follow. (The letters do not represent the actual symbols of the elements)

Element	Electron arrangement	Atomic radius	Ionic radius
K	2.8.2	0.136	0.065
L	2.8.7	0.099	0.181
M	2.8.8.1	0.203	0.133
N	2.8.8.2	0.174	0.099

(i) Which two elements have similar properties? Explain. (2marks)

.....
.....(i)

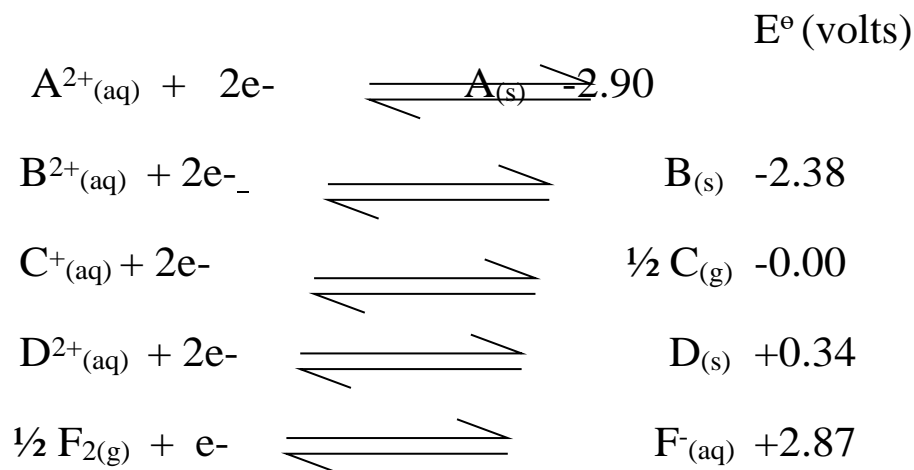
i) Which element is a non-metal? Explain. (1mark)

.....
.....(i)

ii) Which one of the elements is the strongest reducing agent? (1mark)

.....
.....

3. a) Use the standard electrode potentials for elements A, B, C, D and F given below to answer the questions that follow.



(i) Which element is likely to be hydrogen? Give a reason for your answer.
(1 mark)

.....

(ii) Can a solution of a nitrate of D be stored in container made of B? Explain. (2 marks)

.....

(iii). In the space provided, draw a labeled diagram of the electrochemical cell that would be obtained when half-cells of elements B and F are combined.
(3 marks)

(iv). Calculate the emf of the cell in (iii) above (1 mark)

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b) During the electrolysis of aqueous copper II Sulphate using copper electrodes, a current of 0.2 amperes was passed through the cell for 5 hours.

i) Write an ionic equation for the reaction that took place at the anode. (1 mark)

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ii) Determine the change in mass of the anode which occurred as a result of the electrolysis process. (Cu = 63.5, 1 Faraday = 96,500 coulombs) (3 mark)

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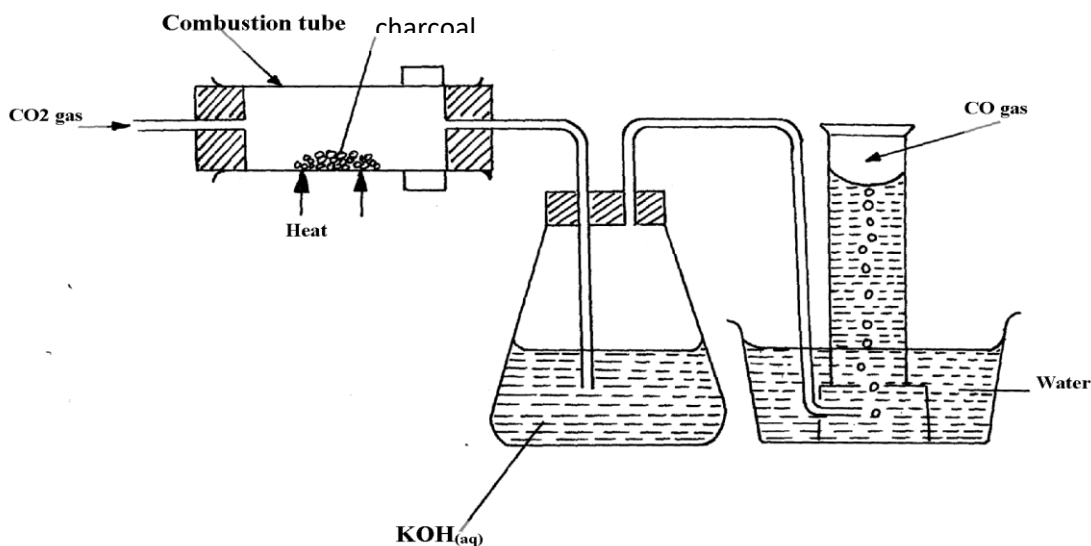
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4. I. The set-up below was used to prepare dry carbon (II) Oxide gas. use it to answer the questions below it:

(a) (i) State **one** mistakes committed in the set-up arrangement above (1 mark)

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(ii) The student produced carbon (IV) oxide gas from the reaction between Lead (II) Carbonate and dilute hydrochloric acid. The gas was produced for a short time and the reaction came to a stop. Explain

(1 mark)

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(b) Study the equation given below:



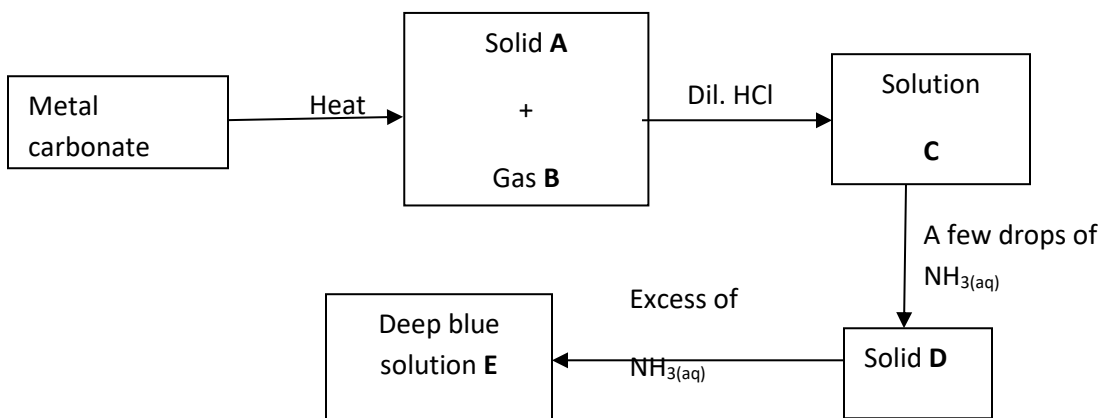
(i) Name process Y (1 mark)

(ii) Give one main physical difference between salt $Na_2CO_3 \cdot 10H_2O$ and $Na_2CO_3 \cdot H_2O$
(1 mark)

(iii) Explain why magnesium chloride should always be kept in a desiccator. (1 mark)

(iv). Write a chemical equation to show the effect of heat on lead (II) nitrate. (1 mark)

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



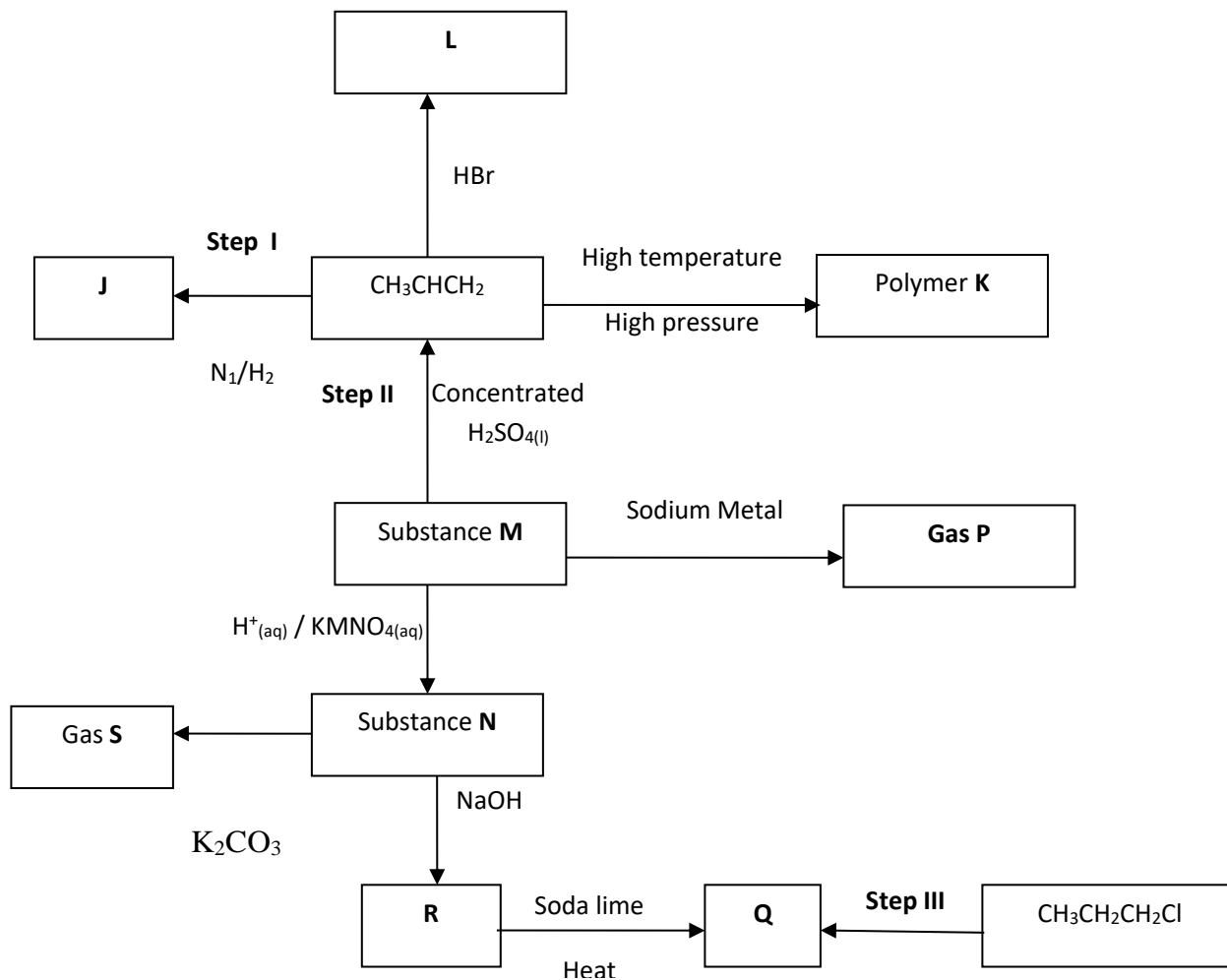
(i) Write an equation for the formation of solid A and gas B. (1 mark)

(ii) Name;
Solution C - (1 mark)

Solid D - (1 mark)

(c) Write the formula of the complex ion in solution E. (1 mark)

6. Use the flow chart below to answer the questions that follow:-



(i) Name the following :

(3mark)

I. Gas S

II. Gas P

III. J

(ii) Name the **processes** involved in the following steps:

(1 mark)

I. Step I

II. Step II

(iii) Write a chemical equation for the complete combustion of substance **M**. **(1 mark)**

(iv) Name the condition and reagent in step III **(1 mark)**

Condition

Reagent

(b).(i) Calculate the mass of salt **R** that would be formed by using 21.9 tonnes of **N** when it reacts with excess sodium hydroxide (C= 12.0 H= 1.0 Na = 23) **(2 marks)**

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.....
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(ii) Draw the structure of polymer **K** **(1 mark)**

(iii). State **one** use of the above polymer **(1 mark)**

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(c) (i) Name the class to which the following cleansing agents belong:- **(2 mark)**

i) $R - COONa^+$

(ii) $R - \text{C}_6\text{H}_4 - O - SO_3Na$

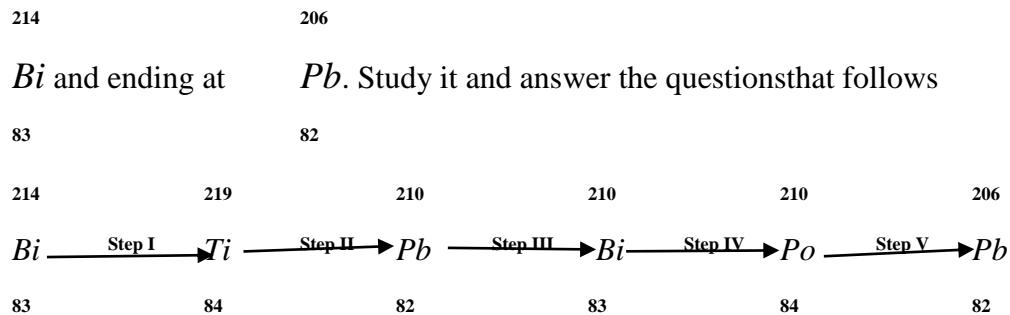
II. How can the quality of the detergent $R-COONa^+$ be improved **(1 mark)**

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7. (a) State the difference between chemical and nuclear reactions. (2 mark)

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(b) Below is a radioactive decay series starting from



(i) Identify the particle emitted in step I and II. (2 marks)

I

II

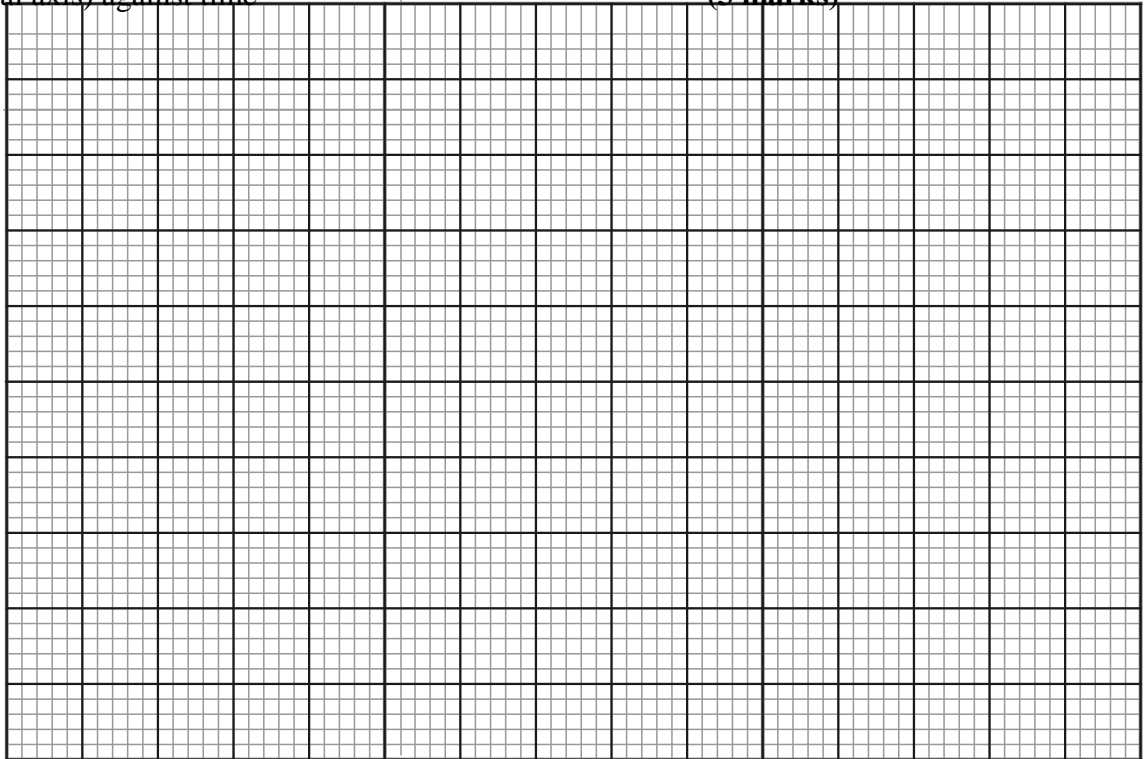
(ii) Write the nuclear equation for the reaction which takes place in step v. (1mark)

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(c) The table below gives the percentage of radioactive isotope of Bismuth that remains after decaying at different times.

Time (minutes)	0	6	12	22	38	62	100
Percentage of Bismuth	100	81	65	46	29	12	3

- (i) On the grid provided below, plot a graph of the percentage of bismuth remaining (vertical axis) against time (3 marks)



- (ii) Use the graph, determine the

I. Half life of the Bismuth

(1 mark)

II. Original mass of bismuth isotope given that the mass remained after 70 minutes was 0.16g (2 marks)

d. Give one use of radioactive isotope in medicine

(1 mark)

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