**Name:………......................................................Index Number ……………………Date ......................**

**Candidate’s Signature:……...........................................**

**233/1**

**CHEMISTRY**

**Theory**

**PAPER 1**

**JULY - 2015**

**2 Hours**

**STAREHE GIRLS’ CENTRE**

**FORM 4 MOCK EXAMS, JULY 2015**

**CHEMISTRY PAPER 1**

**2 Hours**

***Instructions to candidates:***

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of the examination in the spaces provided above.*
3. *Answer ALL the questions in the spaces provided in the question paper.*
4. *Mathematical tables and silent electronic calculators may be used.*
5. *All working MUST be clearly shown where necessary.*

**For Examiner’s Use Only**

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| --- | --- | --- |
| **Questions** | **Maximum Score** | **Candidate’s**  **Score** |
| **1- 29** | **80** |  |

*This paper consists of* ***13*** *printed pages. Candidates should check to ascertain that all pages are*

*printed as indicated and that no questions are missing*

1. The first step in the manufacture of nitric (V) acid from ammonia involves the exothermic

oxidation of ammonia to nitrogen (II) oxide.

a) Write an equation for this reaction. (1 mark)

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b) (i) Name the catalyst used for this reaction. ( ½ mark)

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(ii) Other than the catalyst state one other condition necessary for optimum yield of

nitrogen (II) oxide from this reaction. ( ½ mark)

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c) Using equations only explain how the nitrogen (II) oxide is converted to nitric (V) acid.

(2 marks)

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2. Butanol reacts with ethanoic acid to form a liquid, X, which has the sweet smell of bananas. Its empirical formula is C3H6O and its RMM is 116.

i) What type of compound is liquid X? (1 mark)

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ii) Give the molecular formula of liquid X. (1 mark)

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iii) Draw the structural formula of X. Show all the individuals bonds. (1 mark)

3. a) Write an ionic equation for the chemical test for hydrogen sulphide. (1 mark)

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b) State two features of alpha sulphur. (1 mark)

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4. a) Explain why a luminous flame appears yellow. (2 marks)

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b) State the role of the collar in a Bunsen burner. (1 mark)

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5. Explain the trend in melting and boiling points among the Halogens. (3 marks)

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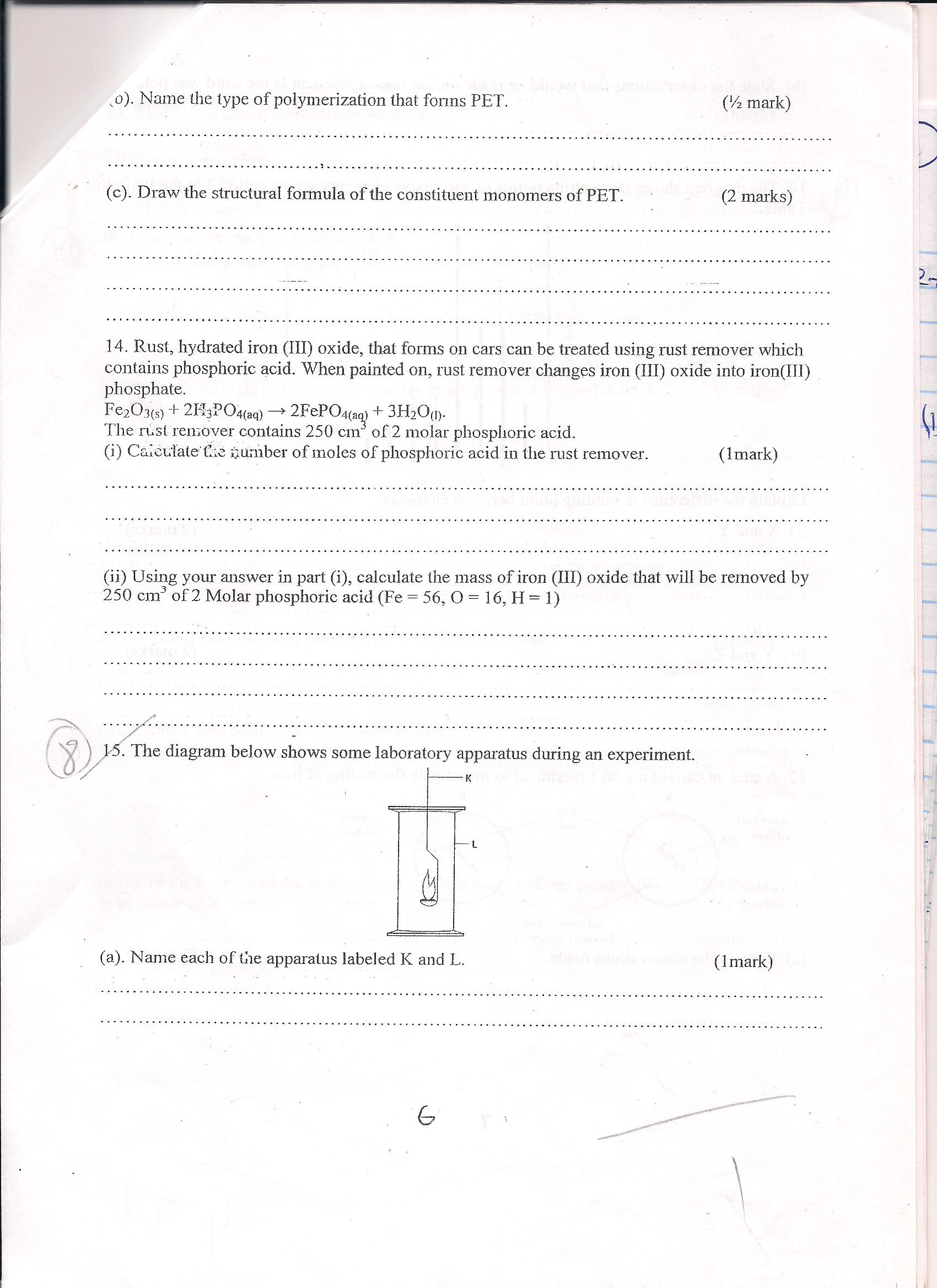
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6. Draw a dot and cross diagram to show the Hydroxonium ion ((H3O+) . (2 marks)

7. What volume of 0.25Molar calcium nitrates is required to make, by dilution with water, 500cm3 of a solution with a nitrate ion concentration of 0.1 Molar? (3 marks)

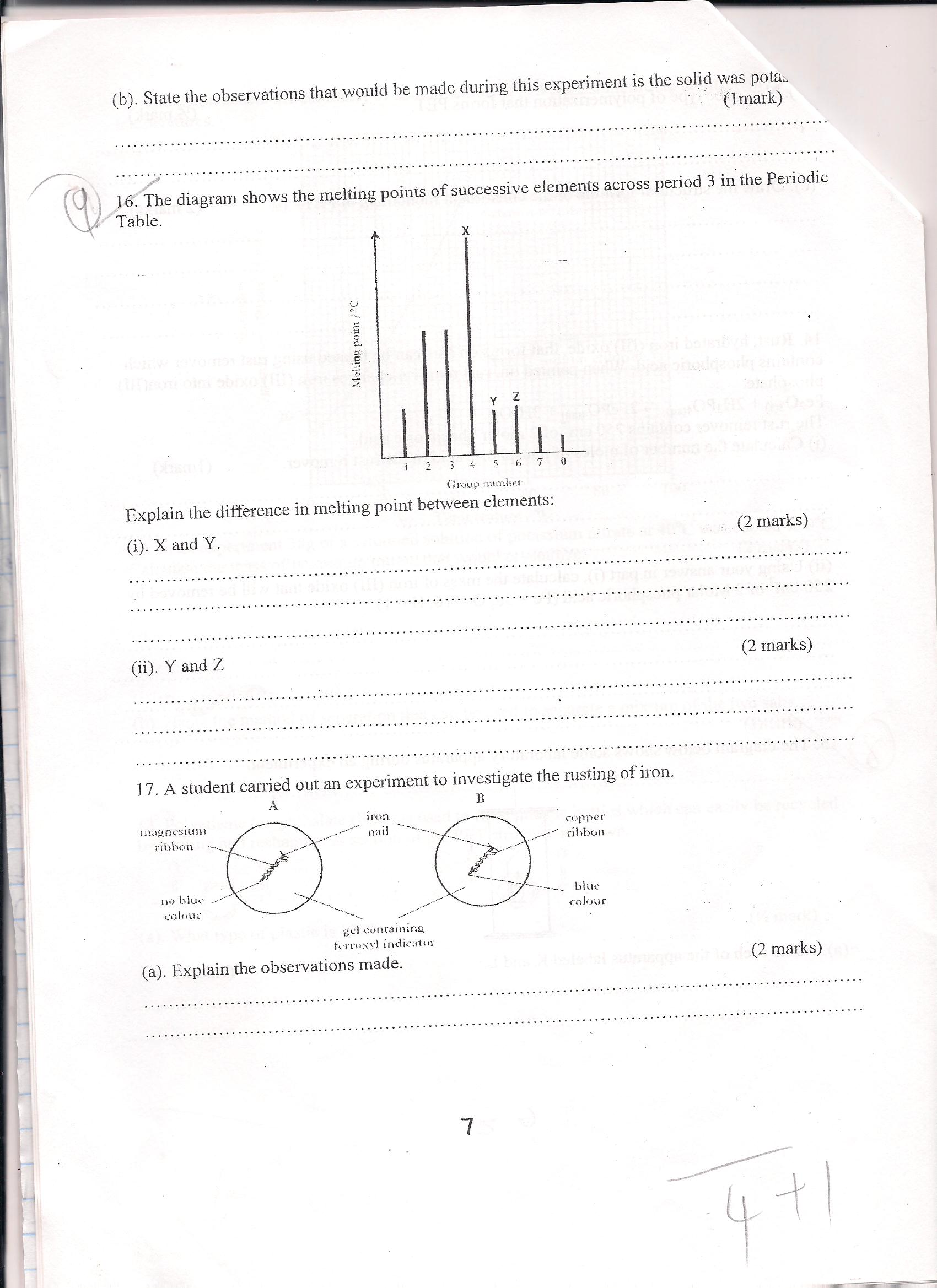
8. The diagram below shows some laboratory apparatus during an experiment.



a) Name each of the apparatus labeled K and L. (1 mark)

K………………………………………………………………………………….......………

L………………………………………………………………………………….......………

9. The diagram shows the melting points of successive elements across period 3 in the Periodic Table.

Explain the difference in melting point between elements:

i) X and Y. (2 marks)

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ii) Y and Z (2 marks)

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10. Examine the reaction scheme below.

CuSO4(s) H2O(l) Blue solution A Dil.NH3(aq) Blue precipitate C

Excess conc.NH3(aq)

Excess Conc. HCL(aq)

Yellow-green solution B Deep blue solution D

a) Give the formula of each of the species in the products lettered A to D. (2 marks)

A…………………………………………………………………………………….......………

B………………………………………………………………………………….......…...……

C…………………………………………………………………………………….......………

D………………………………………………………………………………….......…...……

b) Write the equation for the reaction that forms product D. (1 mark)

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11. a) Name two ions that cause permanent water hardness. (1 mark)

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b) Explain how boiling is used to soften water. (1 ½ marks)

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c) Give the formula of the product formed when soap, sodium stearate (C17H35COONa) is used in

temporary hardness. ( ½ mark)

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12. a) Write an equation for the preparation of carbon (II) oxide from ethanedioic acid.

(1 mark)

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b) Explain how the carbon (II) oxide is removed and collected form this process.

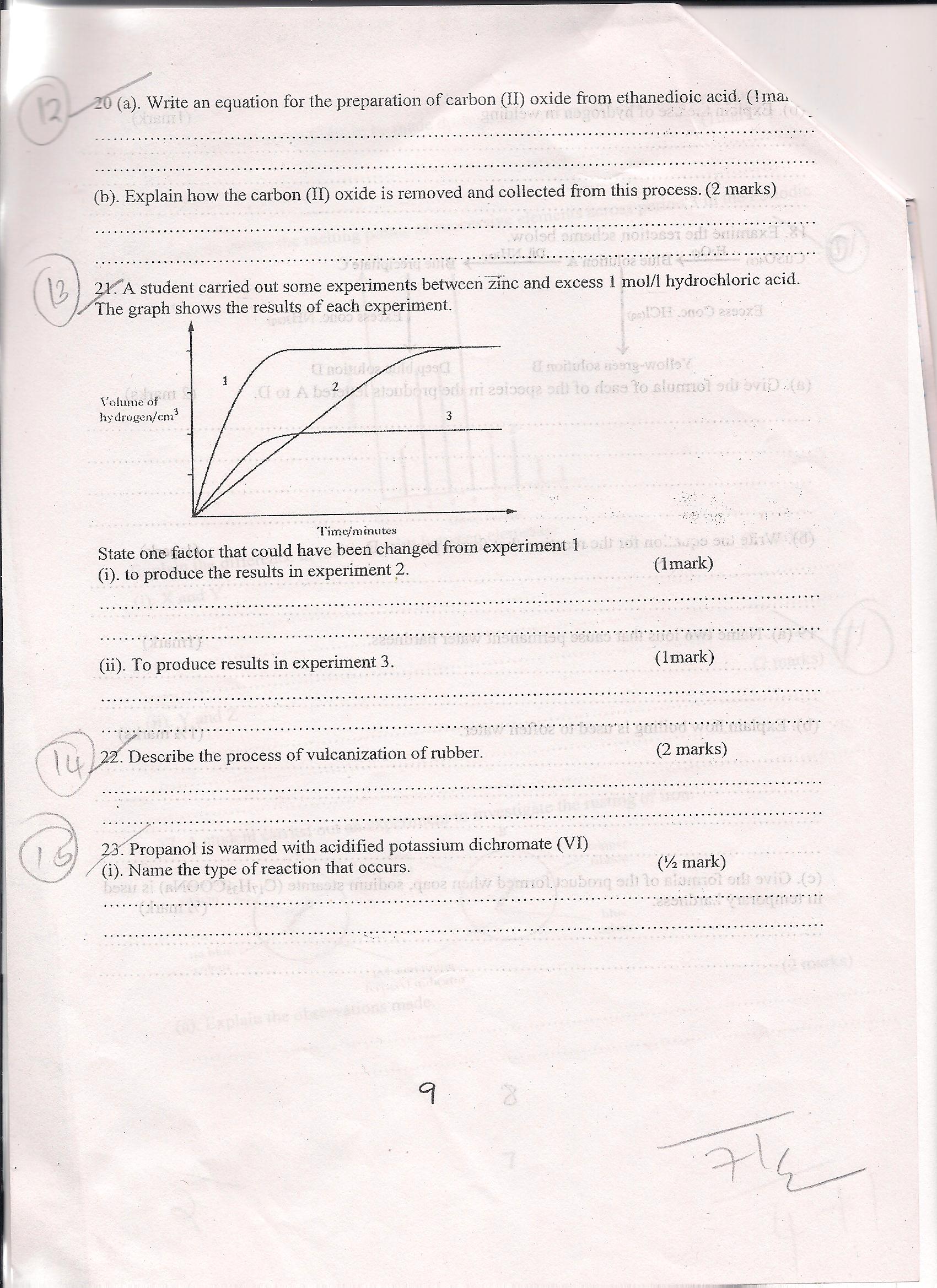
(2 marks)

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13. A student carried out some experiments between zinc and excess 1M hydrochloric acid.

The graph shows the results of each experiment.



State one factor that could have been changed form experiment 1.

i) to produce the results in experiment 2. (1 mark)

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ii) To produce results in experiment 3. (1 mark)

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14. Describe the process of vulcanization of rubber. ( 2 marks)

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15. Propanol is warned with acidified potassium dichromate (VI)

i) Name the type of reaction that occurs. ( ½ mark)

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16. The equation below shows a reaction at equilibrium;

Fe2O3(s) + 3CO(g) 2Fe(s) + 3CO2(g)

Explain the effect of:

i) Increase in pressure. ( 1 ½ mark)

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ii) Addition of drops of sodium hydroxide. ( 1 ½ marks)

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17. Write the equation for the laboratory preparation of sulphur (IV) oxide gas. (1 mark)

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18. Describe the bleaching action of sulphur (IV) oxide. (2 marks)

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19. Dilute nirtic acid reacts with copper according to the equation:

3Cu (s) + 8H+(aq) + 2N(aq) 3Cu2+(aq) + 2NO2 (g) + 4H2O(L)

a) What is the oxidation number of nitrogen in: (2 marks)

i) N

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ii) NO

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b) With respect to nitrogen, explain whether the above reaction is an oxidation or reduction

process. (1 mark)

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20. The table below gives the standard reduction potentials of elements represented by letters A,

B, C, D and E. The letters do not represent the actual symbols of elements.

**(V)**

A2+(aq) + 2e-  A(s) -2.90

B2+(aq) + 2e- B(s) -2.38

C+(aq) + e- C(g) 0.00

D2+(aq) + 2e- D(s) +0.35

F(aq) + e- F-(g) +2.87

a) Identify:

i) Element C, stating your reasons. (1 mark)

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ii) The strongest reducing agent. (1 mark)

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b) i) In the space provided, draw a well labeled diagram of an electrochemical cell whose electrodes are elements B and D. (3 marks)

c) Calculate the e.m.f of the electrochemical well above. (1 mark)

d) Give the cell’s overall reaction’s equation. (1 mark)

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21. A current of 0.25A was passed through aqueous sodium sulphate for one hour, twenty minutes and thirty seconds. Determine the quantity of the gaseous substance produced at the anode in terms of volume at room temperature.

(M.G.V = 24,000cm3, IF = 96,500C) (3 marks)

22. Nylon is a condensation polymer and has the structure.

O

N CH2  N C CH2  C

6 4

H O

i) Identify the smaller molecule produced together with the polymer. (1 mark)

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ii) Draw the structures of the two monomers. (2 m arks)

23. a) What is meant by isomerism? (1 mark)

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b) Draw and name two isomers of butane. (2 marks)

24. Write a balanced equation for each of the following reactions. (3 marks)

i) Magnesium with steam.

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ii) Decomposition of sodium nitrate.

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iii) Heating potassium hydrogencarbonate.

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25. Consider the equation below:

H2O2 (aq) + H2O(l) H3O+(aq) + (aq)

State and explain the species acting as ; (2 marks)

i) A base in the backward reaction.

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ii) An acid in the forward reaction.

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26.a) State Hess’ Law. (1 mark)

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b) Calculate the heat of formation of ethane from the formation of ethane from the following data.

(2 marks)

C(s) + O2(g) CO2(g) H = -406kJ/mol

H2 (g) + ½ O2(g) H2O(l) H = -286kJ/mol

C2H6(g) + O2(g) 2CO2(g) +3H2O(l) H = -1209kJ/mol

27. If isotope decays pb as result of X – alpha particles and Y – beta particles emission.

a) Find the numerical value of X and Y. (1 m ark)

b) Write the nuclear equation. (1 mark)

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28. 10g of certain salt can dissolve in 30g of water at 200C forming a saturated solution. A rise in

temperature by 100C doubles it solubility. Calculate the solubility of the salt at the new

temperature. (2 marks)

29. A form three student carried out electrolysis of silver nitrate solution using inert electrodes.

i) Give equations for the reactions at the electrodes.

Cathode (1 mark)

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Anode (1 mark)

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ii) State and explain what happens to the pH of the electrolyte as the experiment progresses.

(2 marks)

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