NAME: ……………………………………………. ..................INDEX. NO…………………………..…

SCHOOL………..….………………………………. CANDIDATE’SIGN……………..……..…………

DATE: …………………………………………….

**233/2**

**CHEMISTRY**

**Paper 2**

**MAY/JUNE, 2016**

**Time: 2 Hours**

**EKSIKA JOINT EVALUATION TEST**

**K. C. S. E. (Kenya Certificate of Secondary Education)**

233/2

CHEMISTRY

Paper 2

Time: 2 Hours

**INSTRUCTIONS TO CANDIDATES**

* *Write your name and index number in the spaces provided.*
* *Answer* ***all*** *questions in the spaces provided*
* *Mathematical tables and silent electronic calculators* ***may*** *be used for calculations.*
* *All workings* ***must*** *be clearly shown where necessary.*
* *Candidates should check the question paper to ascertain all the pages are printed as indicated and no questions are missing.*

**For Examiners Use Only**

|  |  |  |
| --- | --- | --- |
| **Questions** | **Maximum Score** | **Score** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| **TOTAL** | **80** |  |

1. Study the table below and answer the questions that follows

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ions | A+ | B2+ | C- | D2- |
| Electronic configuration | 2:8 | 2:8 | 2:8:8 | 2:8:8 |

1. Compare how the reactive of ions A+ and C- 1mk
2. Explain how the reactivity of C and D. Compare 2mks
3. 2.5g of A reacts completely with 1.2dm3 of gas C at s.t.p
4. Write a balanced chemical equation for the reaction between A and C 1mk
5. Determine the RAM of A (molar gas volume at s.t.p 22.4dm3) 3mks
6. State two observations that would be made when A is dropped in water in a trough 2mks
7. a) Draw a dot (.) and cross (x) diagram for the ALCL3 .NH3 (A1=13,N=14,H=1,CL=17)

1mk

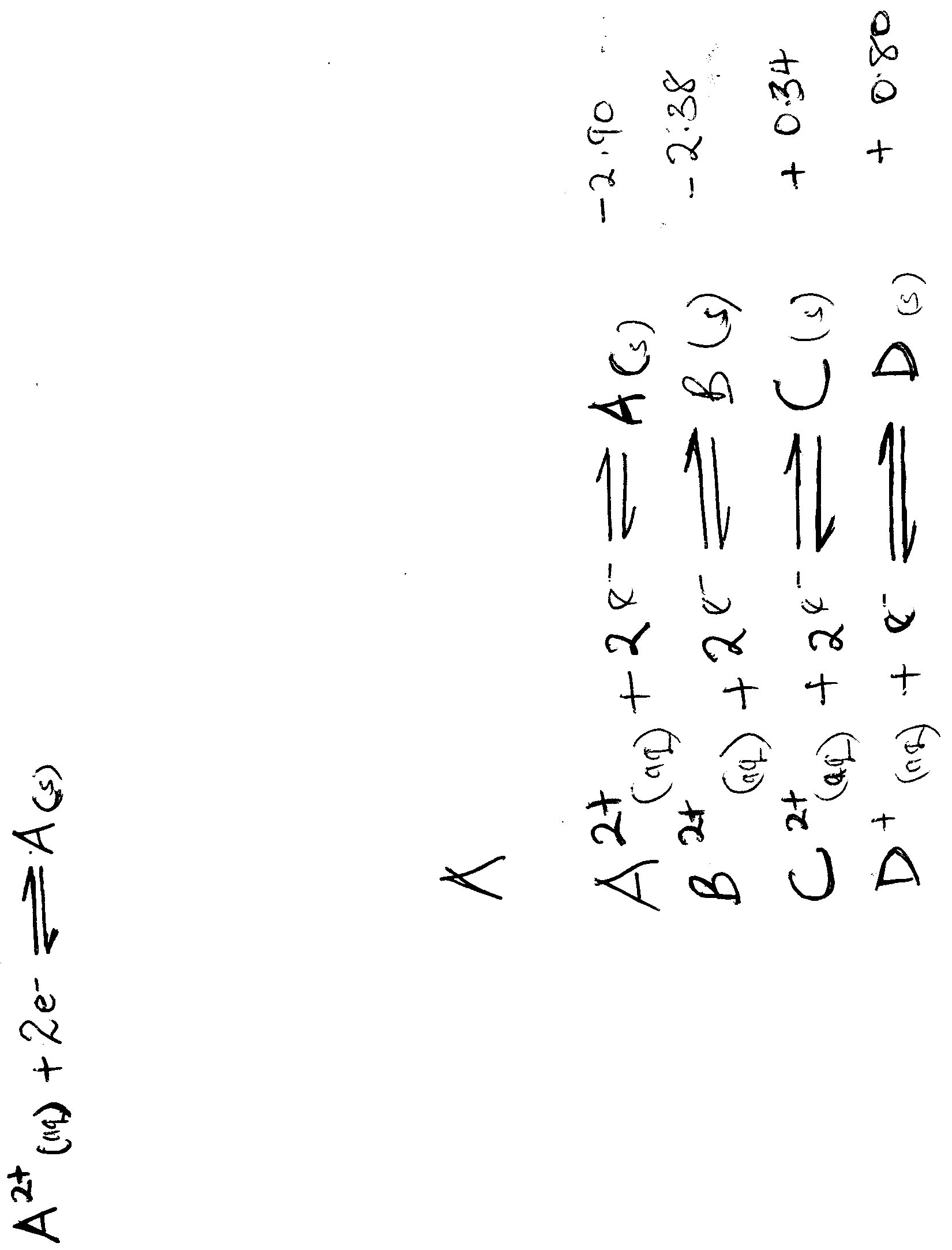
b) What type of bond is formed between AICL3 and NH3 1mk

v). An element X is just below carbon in the periodic table. State the type of structure its oxide would exhibit 1mk

2. a) During the electrolysis of concentrated copper (ii) chloride using graphite electrode, a current of 0.4 amperes was passed through the cell for 5 hours

i) Write an ionic equation for the reaction that took place at the cathode 1mk

ii) Calculate the volume of chlorine liberate at the anode (Molar gas volume at r.t.p 24.0dm3, IF=96500C 2mks

iii) What observation would be made at the cathode 1mk

b) Use the standard electrode potentials for elements A,B,C and D given below to answer the questions that follows. The letters are not then actual symbols of the elements

1. Compare the oxidizing power of C2+ and D+ 1mk
2. An aqueous solution containing B2+ ions are placed in a container made of A. determine whether a reaction occur or not. Showing how you arrive to your answer 2mks
3. in the space provided , draw a well labeled diagram of an electrochemical cell that would be obtained when half-cells of elements B and C are combined 3mks

c) What is the E0 value of the electrochemical cell constructed in b (iii) above 1mk

d) Which species is the most powerful oxidizing agent 1mk

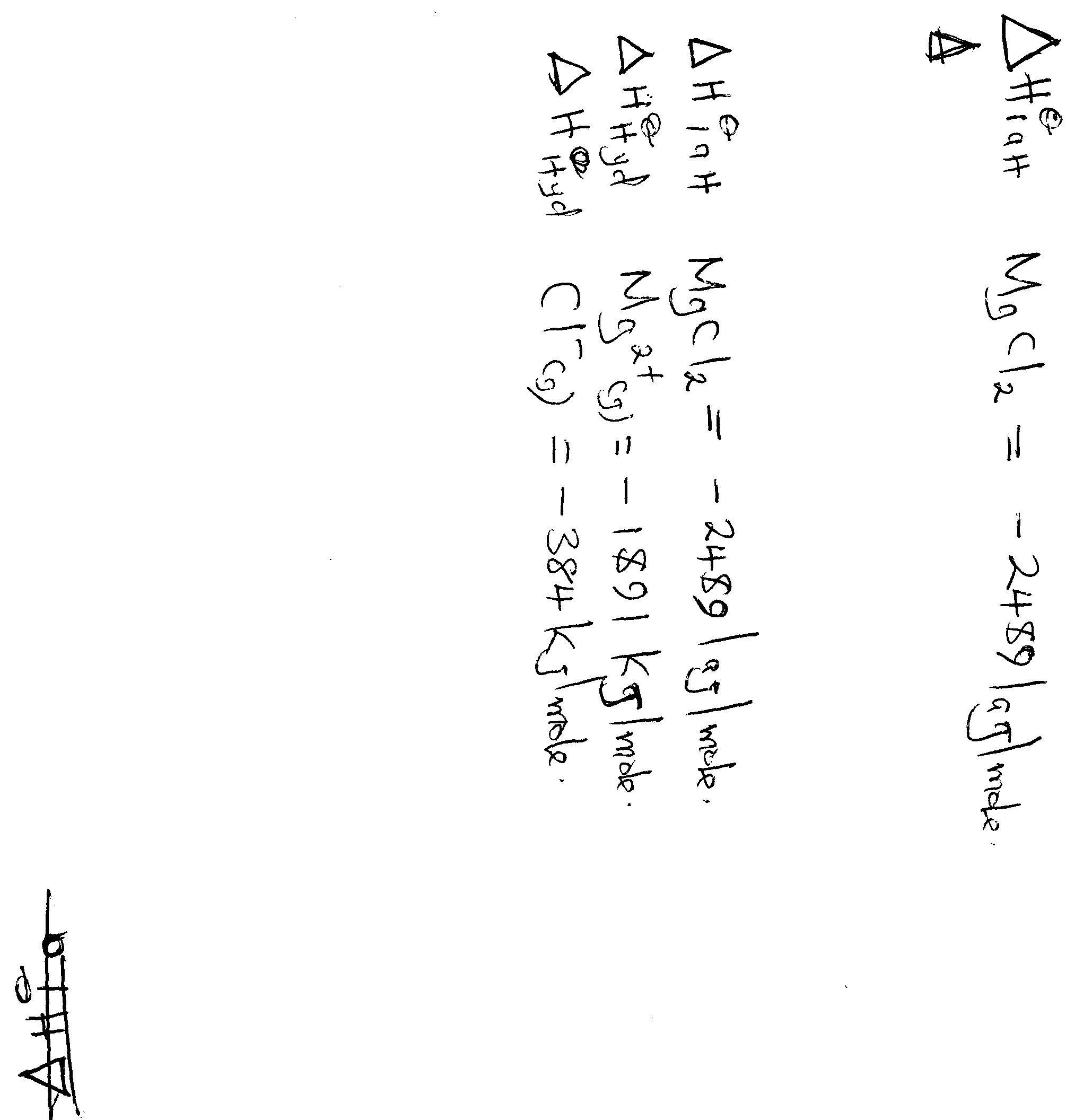
3.a) State Hess’s law 1mk

b) Use the information below to answer the questions that follow. X is not the actual symbol of the element.

X(S) +1/2(g) XO(s) ∆H= -635kj/mole

C(s) +O2(g) CO2(g) ∆H= -394kj/mole

X(s) + C(S) + 3/2 O2(g) XCO3(s) ∆H= -1207kj/mole

Calculate the enthalpy for the reaction below 2mks

XCO3(s) heat XO(s) + CO2(g)

c) Use the following information to answer the questions that follow

1. Draw an energy level diagram for the dissolving of magnesium chloride ( MgCl2(s) ) 2mks
2. Calculate the heat of solution of magnesium chloride 2mks
3. Use the equation below to answer the questions that follow.

Zn (s)+Cu2+(aq) Zn2++Cu(s)

1. What type of enthalpy change is shown on the equation above 1mk
2. If Zinc powder reacted completely with 50cm3 of 0.25M copper (ii) sulphate solution. Calculate the mass of zinc powder used in the above reaction (Zn=65) 2mks
3. What observations would be made during the reaction above 2mks
4. If this experiment was repeated with magnesium powder instead of zinc powder, how would you expect the molar enthalpy of that reaction to compare with the obtained would be obtained in (d) above 1mk

4. Below is a sketch required to investigate the reaction between chlorine and heated aluminium. Use it to answer the questions that follow

**Chlorine**

**Dry agent X**

**solution**

**Y**

**aluminium**

**Z**

**heat**

1. i) Name a suitable drying agent X 1mk

ii) Write the formula of the product collected in Y 1mk

iii) Box Z contains a chemical reagent used to absorb excess chlorine

1. Name the reagent 1mk
2. Apart from absorbing excess chlorine , what other role does the chemical reagent in (iii) above play 1mk

b) Using dots (.) and crosses (x) Al2Cl6 (Al=13, Cl=17) 1mk

c) Write an equation for the reaction between potassium manganate (vii) crystals and concentrated hydrochloric acid that lead to production of chlorine 1mk

d) Study the information in the table below and the questions that follow

|  |  |  |  |
| --- | --- | --- | --- |
| Formula of compound | NaCl | AlCl3 | SiCl4 |
| Boiling point(0l) | 1470 | Sublimes | 60 |
| Melting point(0l) | 800 | sublimes | -7 |

1. Why does the AlCl3 sublimes when heated 1mk
2. Explain why when sodium chloride (Nacl) is dissolved in water, the PH of the solution formed is 7 while when AlCl3 dissolved in water the PH of then solution formed is 3 2mks
3. What type of structure does AlCl3 dimer exhibit 1mk
4. Which chloride above is a liquid at room temperature 1mk
5. The table below shows results obtained when the first four halogens of the periodic table were reacted with their halides. A cross (x) shows no reaction and a tick (√) a reaction occurred

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Halogens | Halide ions | | | |
| A | B | C | D |
| A |  | X | X | X |
| B | √ |  | X | X |
| C | √ | √ |  | √ |
| D | √ | √ | X |  |

i) Which halide ion is the strongest reducing agent 1mk

ii) Arrange the halogens in order of reactivity least reactive 1mk

5. Study the reaction scheme below and answer the questions that follow

**Process 3**

**1 mole**

**of H2**

**HCL**

**water**

**Substance X**

**C2H3CL**

**Stage 2,**

**1 mole of**

**Substance Z**

**CaC2**

**Stage 1**

**Process**

**4**

**Polymer Y**

**CH3CH2OH**

**CH3CH2OSO3H**

**Addition**

**polymerization**

**H2SO4**

**Conc. H2SO4**

1. Identify substances 3mks

X

Y

Z

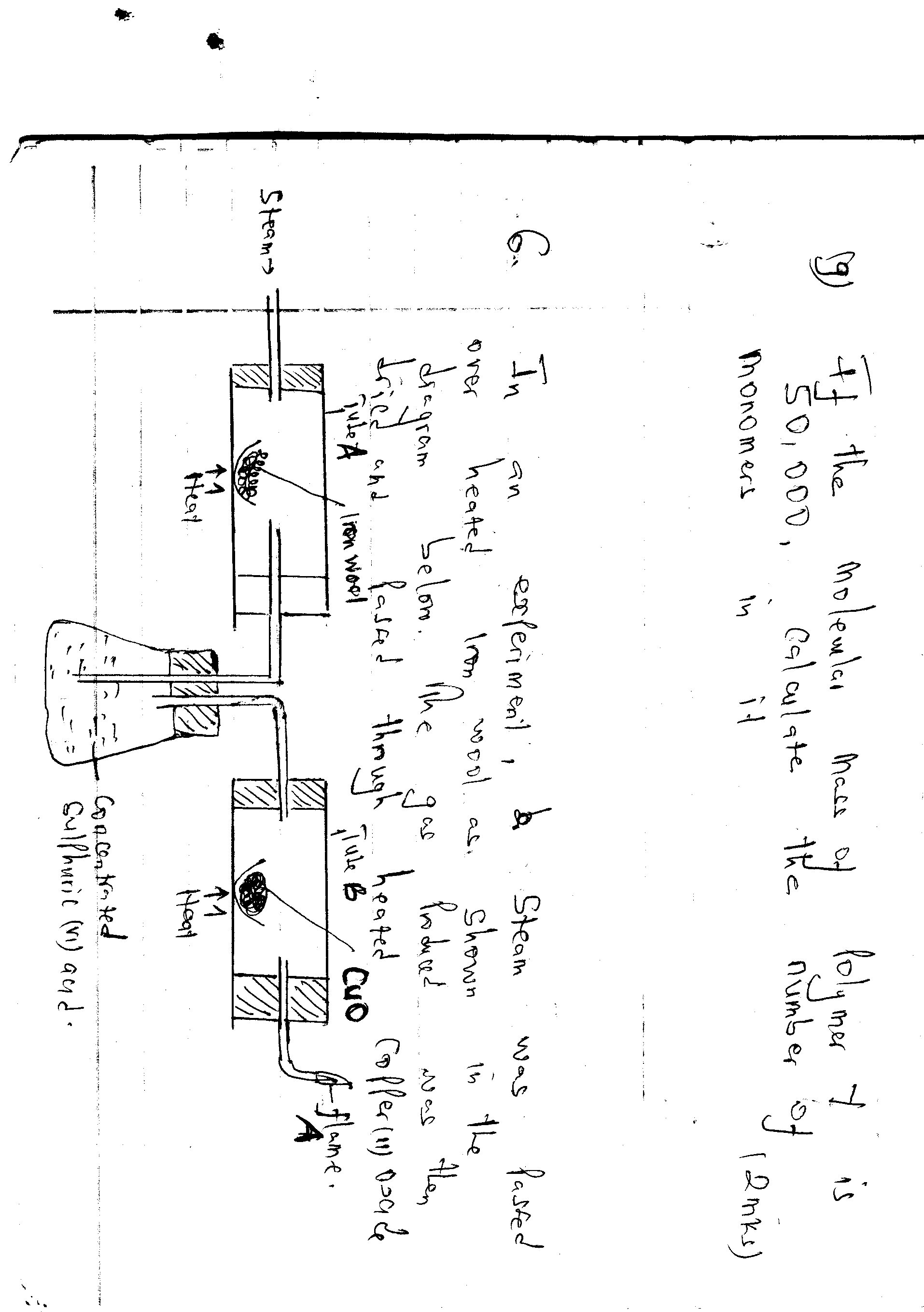
1. Draw the structural formula of polymer Y 1mk
2. What type of reaction is shown in process 3 1mk
3. Write an equation for the reaction between CaC2 and water in stage 1 1mk
4. Name the conditions needed for the process 3 and 4 2mks

|  |  |  |
| --- | --- | --- |
| Process | conditions | |
| Process 3 | |  |
| Process 4 | |  |

1. Describe a simple chemical process that can be used to differentiate CH3CH2OH and CH3COOH 2mks
2. If the molecular mass of polymer Y is 50,000. Calculate the number of monomers in it 2mks

(C=12, H=1, Cl=35.5)

6. In the experiment, steam was passed over heated iron wool as shown in the diagram below. The gas produced was then dried and passed through heated copper (ii) oxide



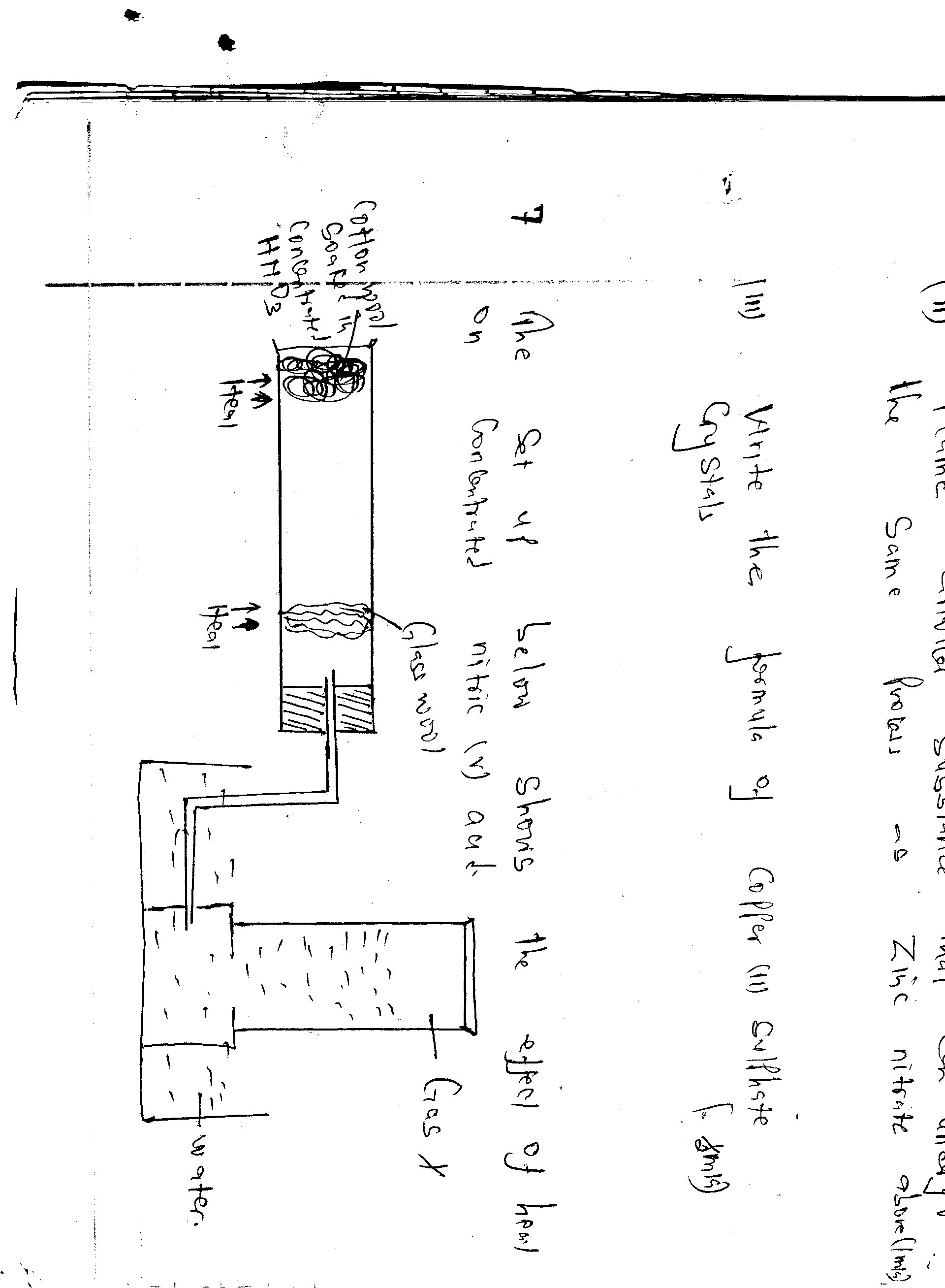
1. Write an equation for the reaction between steam and iron 1mk
2. What observation would be made in tube B at the end of reaction? Explain 2mks
3. What precaution should be taken into consideration before lighting the gas at A 1mk
4. What type of reaction takes place in the tube B 1mk
5. Give TWO uses that are for both carbon(ii) oxide and hydrogen gases 2mks
6. i)Give the name of the process described below 1mk

|  |  |  |
| --- | --- | --- |
| Substance | condition | Name of the process |
| Iron(ii) sulphate heptahydrate | Exposed to air ,changes from crystalline to powder form |  |
| Concentrated sulphuric(vi) acid | Exposd to air, volume of the acid increases |  |
| Zinc nitrate | Exposed to air changes in solution |  |

ii) Name another substance that can undergo the same process as zinc nitrate above 1mk

iii) Write the formula of copper (ii) sulphate crystals 1mk

7. The set up below shows the effects of heat on concentrated nitric (v) acid



a) Explain the observations made in the combustion tube 2mks

b) Write the equation for the reaction in the combustion tube 1mk

c) State the role of glass wool in the set up above 1mk

d) Identify gas X 1mk

e) The resultant solution formed in the basin containing water is found to be acidic at the end of the experiment. Explain 1mk

f) Nitric (v) acid is always stored in dark glass bottles. Explain 1mk

g) Concentrated nitric (v) acid reacts with carbon as shown in the equation below

C(s)+4HNO3(I) CO2(g)+2H2O(I)+4N02(g)

What property of nitric (v) acid is shown in the equation above 1mk