MANGU MOCK TRIAL 3

CHEMISTRY

233/2
PAPER 2
TIME: 2 HOURS

NAME…………………………………………………………………………………

SCHOOL…………………………………………………… SIGN………………………

INDEX NO……………………………………………. ADM NO………………………

Kenya Certificate of Secondary Education.

<u>**INSTRUCTIONS TO THE CANDIDATES:-**</u>

- *Write your **Name** and **Admission number** in the spaces provided.*
- *Answer **ALL** the questions in the spaces provided.*
- *Mathematical tables and electronic calculators may be used*
- *All working **MUST** be clearly shown where necessary.*

<u>***For Examiners Use Only***</u>

Question	Maximum score	Candidate's score
1	11	
2	11	
3	9	
4	11	
5	8	
6	7	
7	12	
8	11	
Total	**80**	

1. 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.

1.								
								F
A	G		E		B		D	
C								

(a) Show the electron arrangement of ions of elements: **(1mk)**

A ………………………..

B…………………..…..

(b) Show on the grid above the position of an element Y whose ion Y^{2-} has an electron configuration of 2.8.8.   **(1mk)**

(c) Compare the following with explanation.

i) The reactivity of A and C.   **(2mks)**

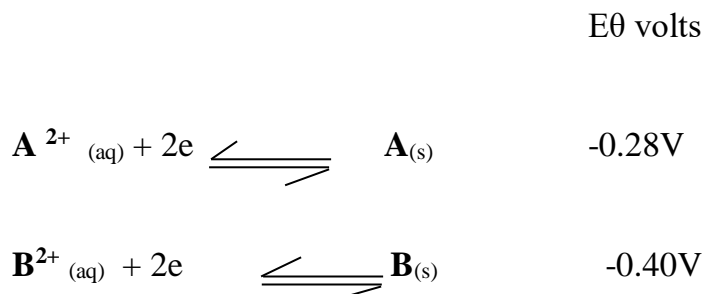ii) Atomic radii of elements A and B.   **(2mks)**

iii) The melting point of the oxide of element G and the oxide of D.   **(2mks)**

(d) Name the type of bond formed when E and D react. Explain your answer.   **(1mk)**

(e) The ionic radius of element D is bigger than its atomic radius. Explain.   **(2mks)**

2. The following are some standard electrode potentials of some elements. Use them to answer the   questions that follow:

<p style="text-align:right">Eθ volts</p>

$A^{2+}_{(aq)} + 2e \;\rightleftharpoons\; A_{(s)}$ -0.28V

$B^{2+}_{(aq)} + 2e \;\rightleftharpoons\; B_{(s)}$ -0.40V

(a) Write the overall equation when the two half cells are combined   **(1mk)**

(b) In the space below draw a diagram showing electrochemical cell when A and B are combined   **(3mks)**

(c) During electrolysis of a divalent element G a current of 0.06 amperes was passed for 99 minutes. Determine the amount of metal G deposited at the cathode. (If =96500C, G=184)
          (2 mk)

(d) Give one uses of **electrolysis** (½mk)

....

....

(e) Below is a diagram of a dry cell.
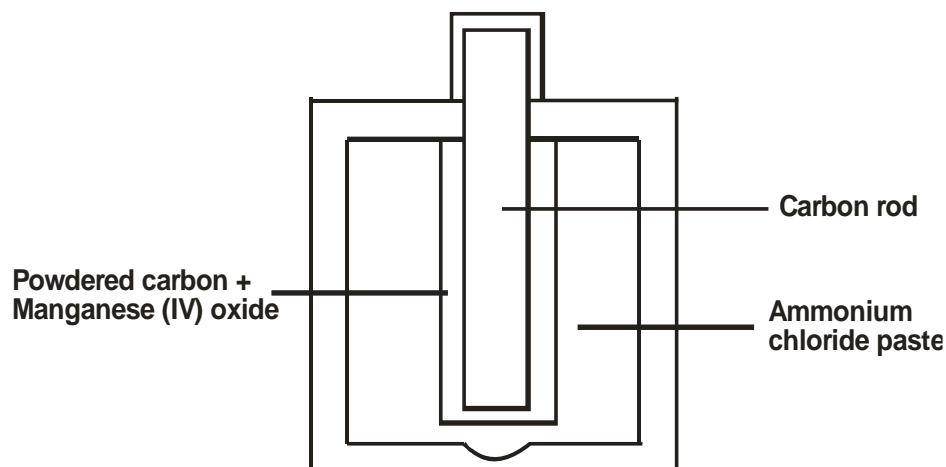
(i) State the use of manganese (iv) oxide (½ mk)

(ii) Write an ionic equation for the reaction at the:

        Anode- (½ mk)

        Cathode- (½ mk)

(iii) Why is aluminum chloride used as a paste rather than a dry solid? **(1 mk)**

(iv) Draw a diagram to show how an aluminium spoon can be electroplated with copper.

(2 mks)

3. A state of equilibrium between dichromate (VI) and chromate ions is established as shown in the equation below.

$$Cr_2O_{7(aq)} + 2OH^-_{(aq)} \longrightarrow 2CrO_{4(aq)} + H_2O_{(l)}$$

Orange   Yellow

(a) (i)What is meant by dynamic equilibrium? **(1mk)**

(ii) State one characteristics of dynamic equilibrium **(1mk)**

**(b)** State and explain observation made when a few pellets of potassium hydroxide are added to the equilibrium **mixture** **(2mks)**

(c) An experiment was done using magnesium ribbon and dilute hydrochloric acid of different concentrations. The time needed to produce 50cm³ of the gas for every experiment was recorded in   the table below.

Concentratio n Of HCl in mol/Litre	2.0	1.75	1.50	1.25	1.0 0	0.75	0.50	0.25
Time in Sec (s)	8.8	10.0	11.7	13.5	17.5	22.7	35.5	70.0
$\frac{1}{t}$ Sec $^{-1}$								

(i) Complete the table **above** **(1mk)**
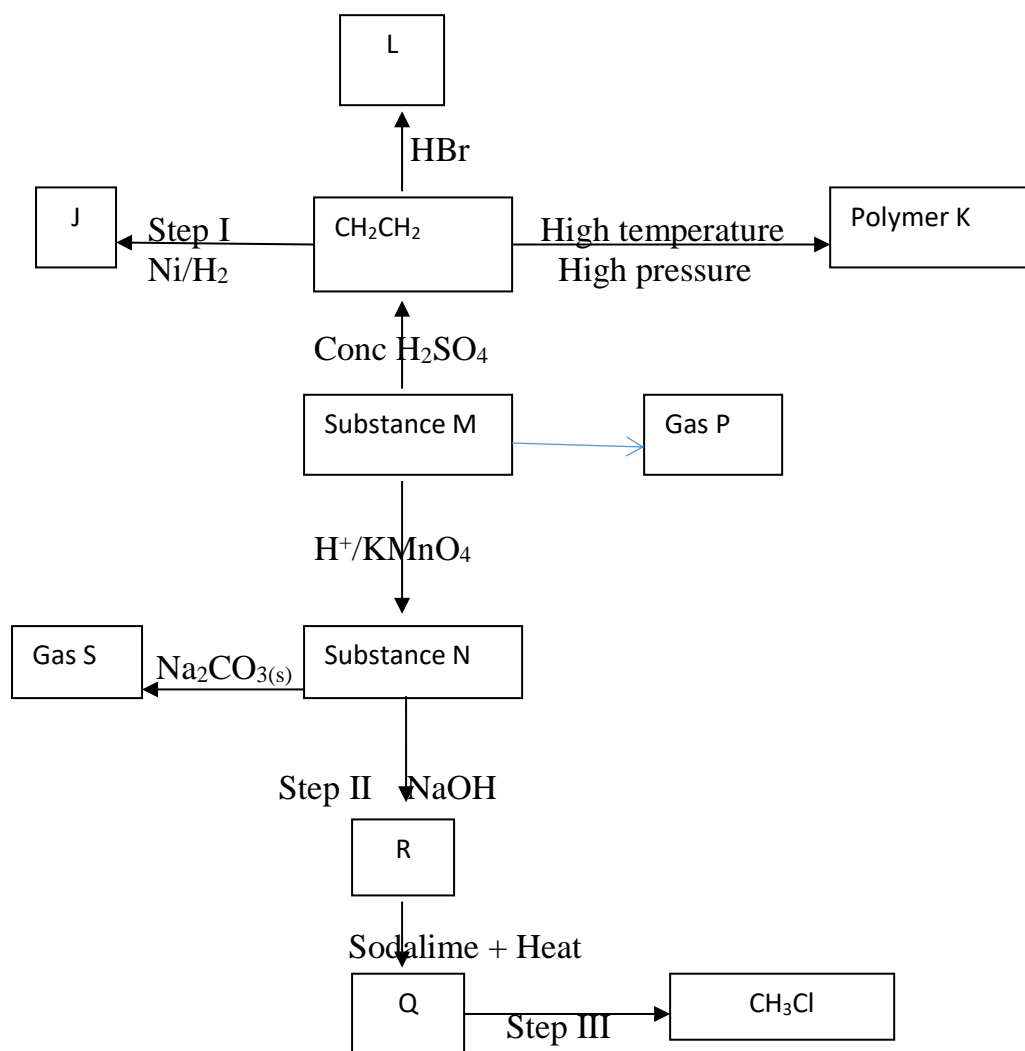
(ii) Plot a graph of rate (^{1}/time) against concentration **(3mks)**
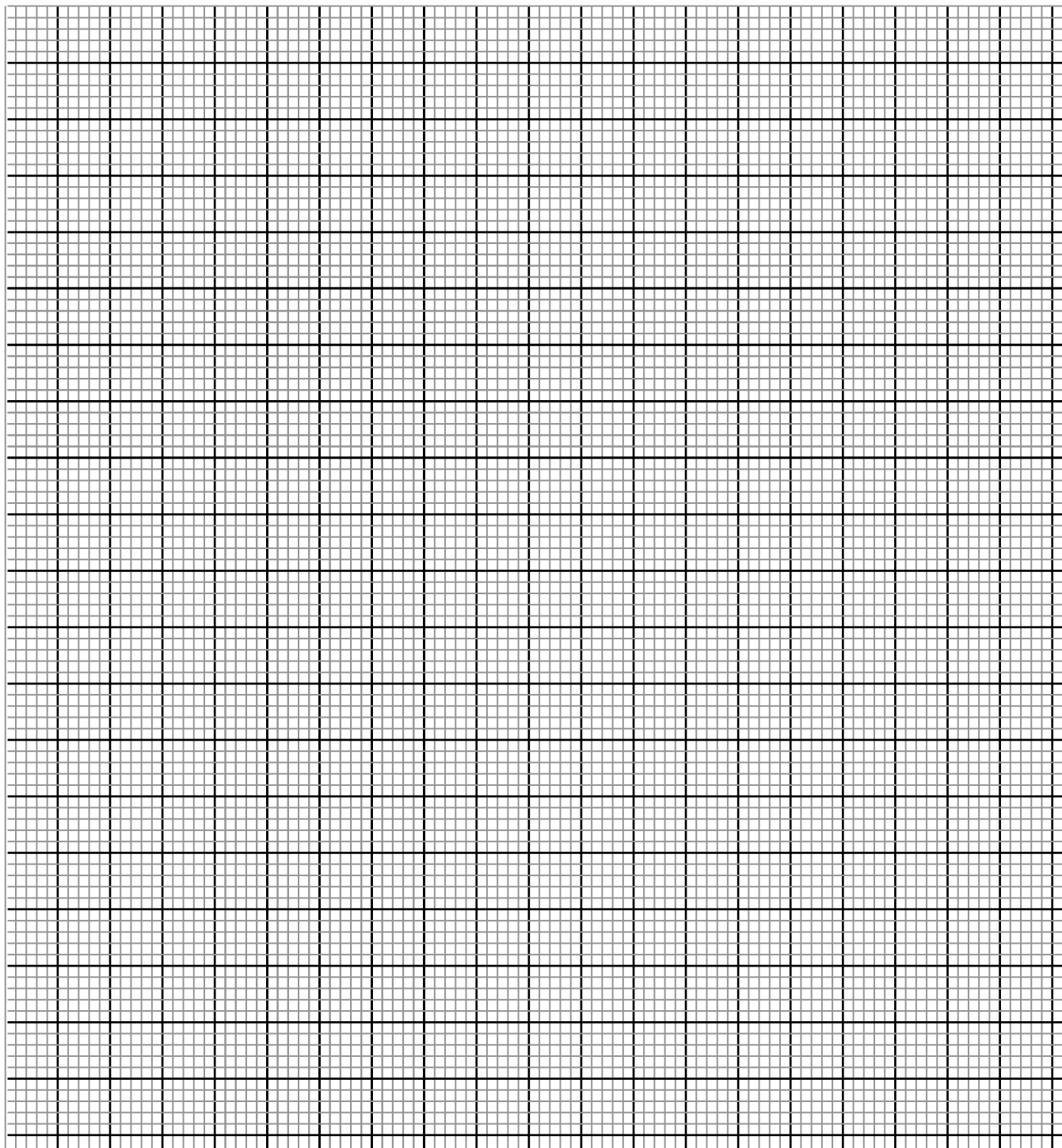
(iii) Determine from your graph the concentration needed to produce 50cm^3 of hydrogen gas, when time is 15 seconds **(1mk)**

4. Use the flow chart below to answer the questions that follow.

(a) Name the following: **(1 mk)**

(i) Gas P …………………………………………………

(ii) Gas J ………………………………………………….

(b) Name the process involved in the following step. **(1mk)**

(i) Step II ………………………………………………….

(ii) Step III ………………………………………………….

(c) Draw the possible structure of compound L. **(1 mk)**

(d) Write equation for;

(i) The complete combustion of substance M **(1 mk)**

(ii) Formation of substance R. **(1 mk)**

(e) Name the condition and reagent in step III. **(1mk)**

Reagent

Condition

(f) Draw the structural formula of compound N. **(1 mark)**

(g) Chlorine is used to prepare vinylchloride($CH_2 = CHCl$).

(i) State why chloroethene, undergoes addition polymization. **(1mk)**

(ii) Name one use the polymer formed **(1mk)**
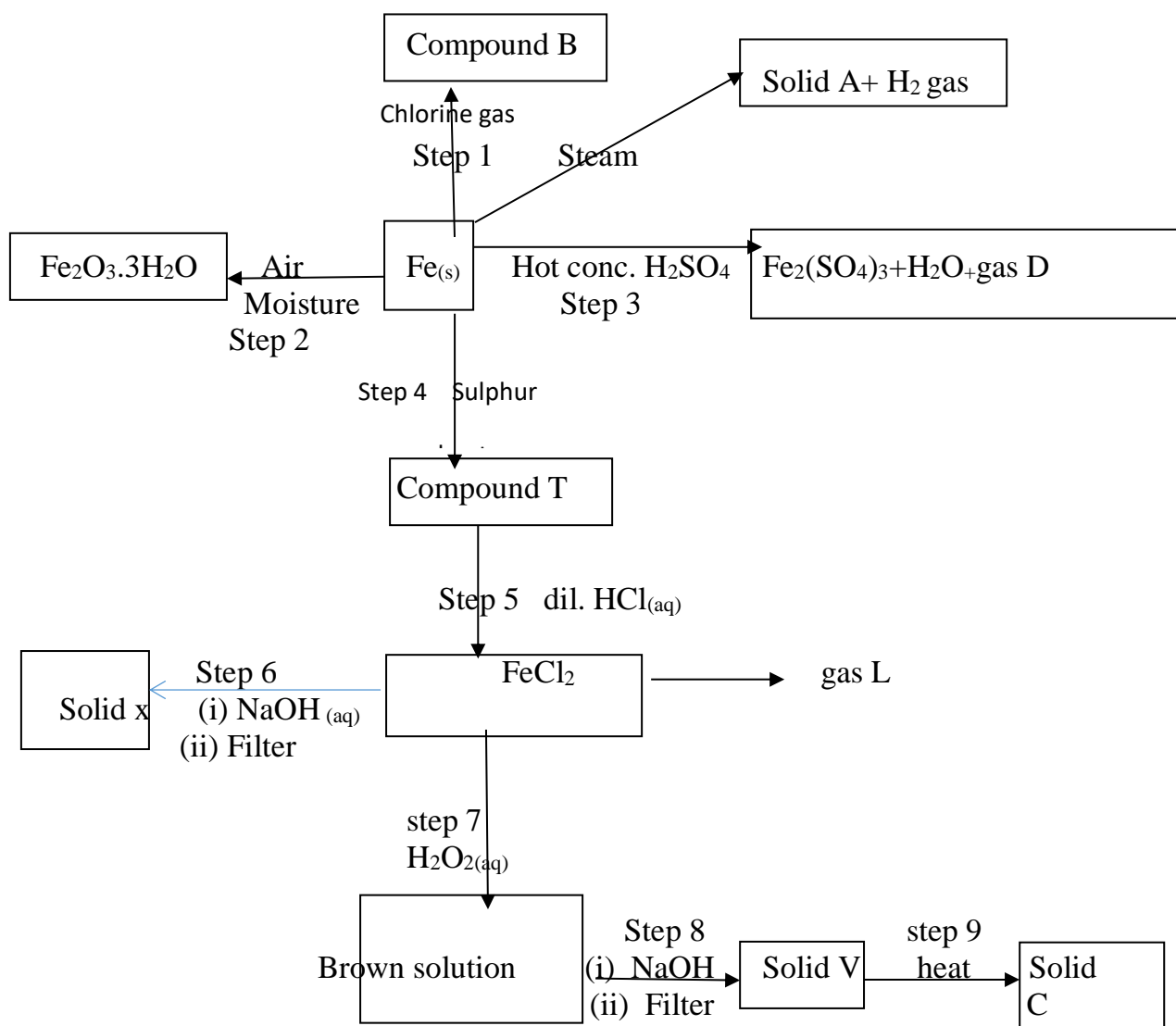
(h) Draw the structures of the following compounds. **(2mks)**

i) 3,4 dibromo-1- chloro-2-methylbut-2-ene

ii) hexan-1,6-dioic acid

5. Study the flow chart below starting from iron metal.

(a) Name gases   **(1mk)**

   D...

   L...

(b) Identify the following substances.   **(3mks)**

(i)   CompoundB...

(ii)   Compound T...

(iii) SolidA...

(iv) SolidV...

(v)   SolidX...

(vi) Solid C ....

(c) What name is given to the reaction in step 2?   **(1mk**

(d) Write balanced equations for the reactions that occurred in
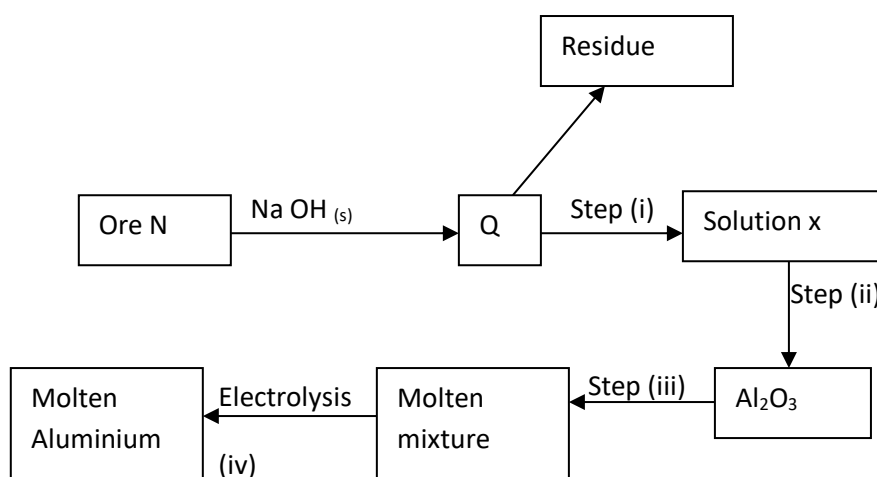
(i) Step 1   **1mk**

(ii) Step 5   **1mk**

(e) What property of hydrogen peroxide (H_2O_2) is indicated in step 7 of the flow chart? **1mk**

6. Study the flow chart below and answer the questions that follow.

(a) Name two Ores of **N.**   **(1mk)**

(b) Explain why the ore is first dissolved in excess sodium hydroxide solution   **(1mk)**

(c) Give the formula of the aluminium compound present in solution **X**   **(1mk)**

(d) Explain how to obtain aluminium hydroxide from solution **X**   **(1mk)**

(e) (i) Write an equation of the reaction that takes place in (d) above   **(1mk)**

(ii) What is the role of cryolite (Na_3Alf_6) in the extraction of Aluminium   **(1mk)**

(iii) Explain why Na^+ and F^- ions are not discharged during electrolysis in step (iv)   **(1mk)**

7. (a)In an experiment 10.6g of a mixture of a anhydrous Sodium Carbonate and Sodium chloride were dissolved in water to make $100cm^3$ of solution. $25cm^3$ of this solution required $20cm^3$ of 1M Hydrochloric acid solution for complete neutralization.

(i) Calculate the number of moles of Hydrochloric acid used   **(1mk)**

(ii) Write an equation for the reaction that occurs.   **(1mk)**

(iii) Calculate the mass of Sodium Carbonate in 25 cm^3n of this mixture.   **(1mk)**

(iv) Determine the moles of Sodium Carbonate in $100cm^3$ of the mixture.   **(1mk)**

(v) What is the mass of sodium carbonate in the mixture?   **(2 mks)**

(vi) Calculate the percentage of Sodium Chloride in the mixture.   **(2mks)**

(b). A gaseous compound P contains 55% Carbon, 9.1 % Hydrogen and the rest is Oxygen.

  (i) Determine the empirical formula of P.(C=12, H=1, O=16)   **(2mks)**
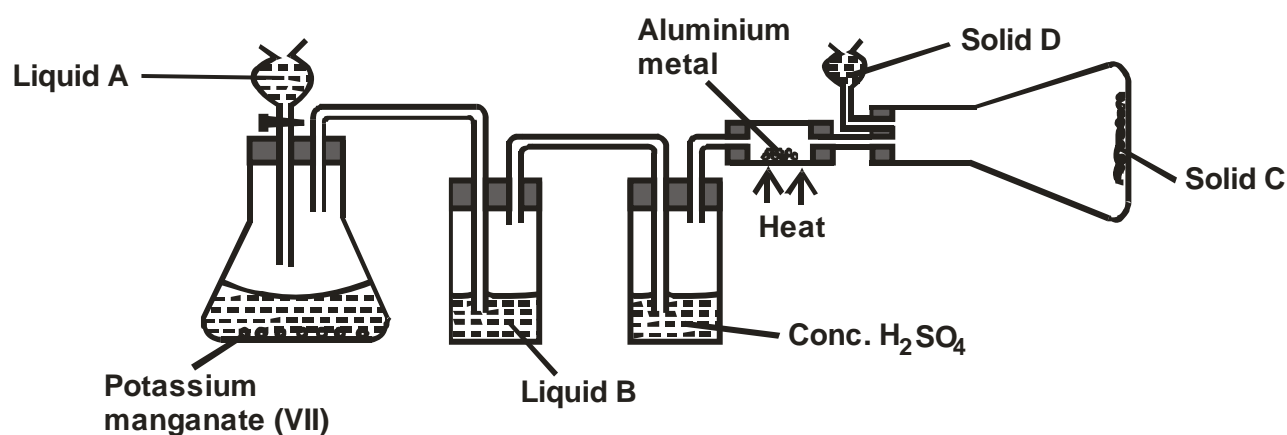
 (ii) Given that 0.262g of P occupies a volume of 67cm^3 at s.t.p

   I: Calculate the relative formula mass of P.   **(1mk)**

   II: Determine the molecular formula of P.   **(1mk)**

(Molar gas volume at s.t.p.=22.4 dm^3)

8. a)The diagram below show the preparation and properties of chlorine gas .Study it and
   answer the questions that follows.

i) Name liquids A and B

A…….   **(1mk)**

B……   **(1mk)**

ii) Suggest a suitable reagent that can be used as solid D.   **(1mk)**

iii) State the role of solid D. **(1mk)**

iv) Write a balanced chemical equation for the reaction in the conical flask. **(1mk)**

v) Explain why solid C collects further away from the heated aluminium metals. **(1mk)**

vi) In the combustion tube above, 0.675g of aluminium metal reacted completely with 1800cm^3 of chlorine gas at room temperature. Determine the molecular formula of solid C, given that its relative formula mass is 267.(Al = 27.0,Cl = 35.5, molar gas volume at r.t.p.= 24.0 litres) **(3mks)**

b) The reaction between hot concentrated sodium hydroxide and chlorine gas produces sodium chlorate (V) as one of the products.

i) Write the equation of the reaction. **(1 mk)**

ii) Give one use of sodium chlorate (V). **(1mk)**