



MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

THE MOCK EXAMINATIONS, 2026

233/2

CHEMISTRY

PAPER 2

JUNE 2026

Time: 2 Hours

Name: Marking Guide Admission No:

Stream: Signature: Monday, 8th June, 2026; 11:00-1.00pm

Instructions

- Write your name, admission number, stream and signature in the spaces provided above.
- All answers must be written in the spaces provided in the booklet.
- This paper consists of 13 printed pages with 7 questions. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing
- Candidate should answer the questions in English

FOR EXAMINERS USE ONLY

Questions	Maximum Score	Candidate's Score
1	12	
2	12	
3	13	
4	12	
5	11	
6	12	
7	08	
TOTAL	80	

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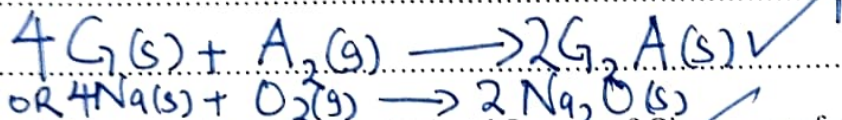
Turn Over

[illegible]

(1 mark)

E has a smaller atomic radius than C. E has more protons hence stronger / more effective nuclear charge.

(1 mark)



(2 marks)

G chloride has a higher pH value than C chloride.
G chloride is neutral while C chloride is acidic.

(1 mark)

Absorbs water and becomes wet/damp.

b) (i) On the grid indicate with a tick (✓) the position of the element Z which is the third. found on the period and forms Z^{3-} ions. (1 m)

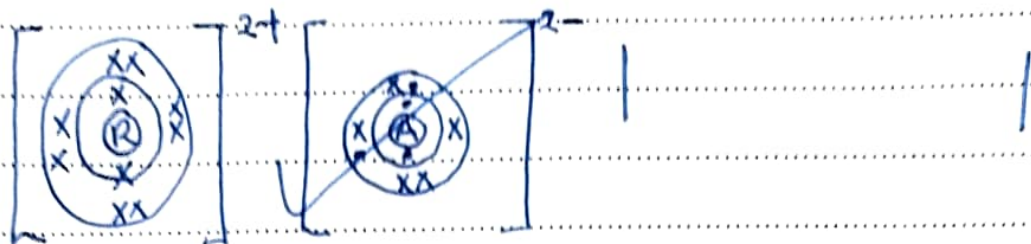
(1 mark)

Joshua



U6

ii) Using dots (•) and crosses (X) to represent outermost electrons, show how bonding in the compound formed when R and A react. (1 mark)



c) Study the information in the table below and use it to answer the questions that follow. (Letters do not represent the actual symbols of the elements)

Element	Atomic number	Melting point(°C)	Formula of chloride	Melting of chloride point(°C)
G	11	98	GCl	801
H	12	650	HCl ₂	715
J	14	1410	JCl ₄	-70
L	20	851	LCl ₂	780

(i) Which elements are metals? Give a reason

(2 marks)

G, H and L. Have delocalised electrons

2

(ii) What is the oxidation state of J in its chloride?

(1 mark)

$$J + (-1 \times 4) = 0$$

$$J = +4$$

(iii) How does the reactivity of H and L with water compare? Explain.

(2 marks)

L is more reactive than H. L has a larger atomic radius hence loses electrons more readily/easily.

2

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Edwine

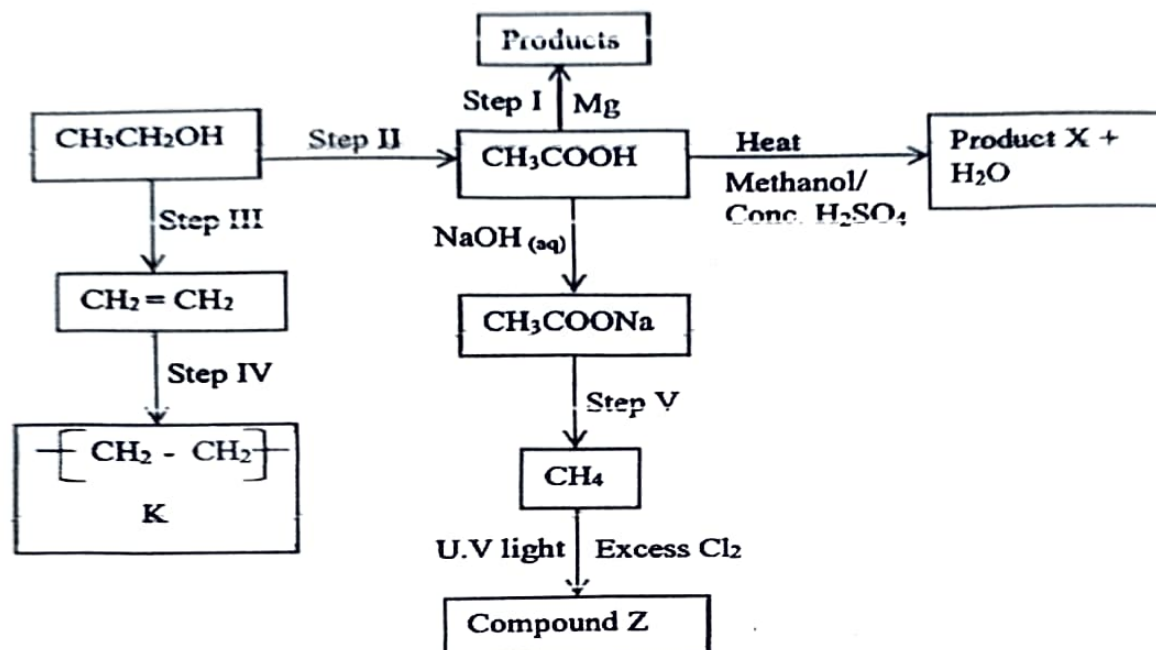


06

2. (I) Give the systematic names of the following compounds.

- (i) $\text{CH}_3\text{CH}_2\text{COOH}$ Propanoic acid ✓ (1 mark)
- (ii) $\text{CH}_3\text{COOCH}_2\text{CH}_3$ Ethyl ethanoate ✓ (1 mark)
- (iii) $\text{CHCCH}_2\text{CH}_3$ But-1-ene ✓ (1 mark)

II) The scheme below shows a series of reactions starting with ethanol. Study it and answer the questions that follow:



(a) Name the types of reactions, reagents and conditions in steps:-

(i) Step II

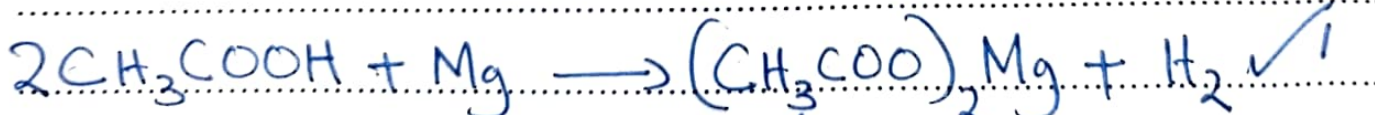
Name Oxidation ✓
 Condition Heat ✓
 Reagents H^+/KMnO_4 ✓
 (1 mark)

(ii) Step III

Name Dehydration ✓
 Condition 170°C ✓
 Reagents Concentrated H_2SO_4 ✓
 (1 mark)

(b) Write the equation for the reaction that take place in step I

(1 mark)



(c) Name the product X

..... Methyl ethanoate ✓ (1 mark)



(d) Identify the process leading to the formation of compound Z

(1 mark)

Substitution ✓ 1

(e) Name compound K and state one of its uses.

(2 marks)

Polyethene ✓

ray Polythene

- Making plastic pipes/bags/bottles ✓
- insulators for electric cables.

Any 10 ink

(f) If the RMM of K is 39,200. Determine the value of n.

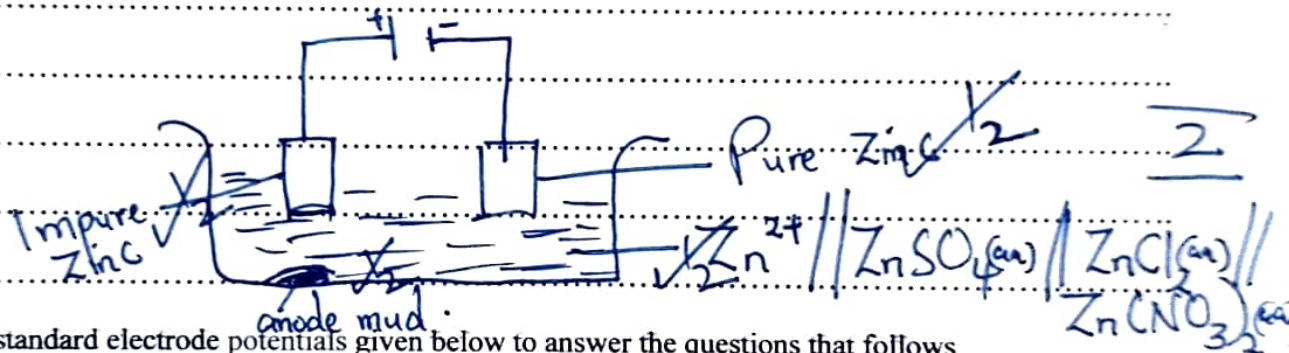
(1 mark)

$$n = \frac{39,200}{28} = 1400 \checkmark$$

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3.a) Draw a well labelled diagram to show how zinc metal is purified by electrolysis.

(2 marks)



b) Use the standard electrode potentials given below to answer the questions that follows

Reaction	$E^{\circ}(\text{V})$
$\text{MnO}_4^{-}(\text{aq}) + 8\text{H}^{+}(\text{aq}) + 5\text{e}^{-} \longrightarrow \text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}(\text{l})$	+1.44
$\text{M}^{3+}(\text{aq}) + \text{e}^{-} \longrightarrow \text{M}^{2+}(\text{aq})$	+0.77
$\text{A}^{2+}(\text{aq}) + 2\text{e}^{-} \longrightarrow \text{A}(\text{s})$	+0.34
$\text{P}^{2+}(\text{aq}) + 2\text{e}^{-} \longrightarrow \text{P}(\text{s})$	-0.23
$\text{T}_{2(\text{g})} + 2\text{e}^{-} \longrightarrow 2\text{T}^{-}(\text{aq})$	+2.86

c) i) State whether acidified $\text{MnO}_4^{-}(\text{aq})$ can oxidise M^{2+} . Give a reason for your answer.

(2 marks)

Yes. MnO_4^{-} has a more positive E° value



- ii) Write the e.m.f of the half-cell of A if P was used as a reference electrode. Show working. (1 mark)

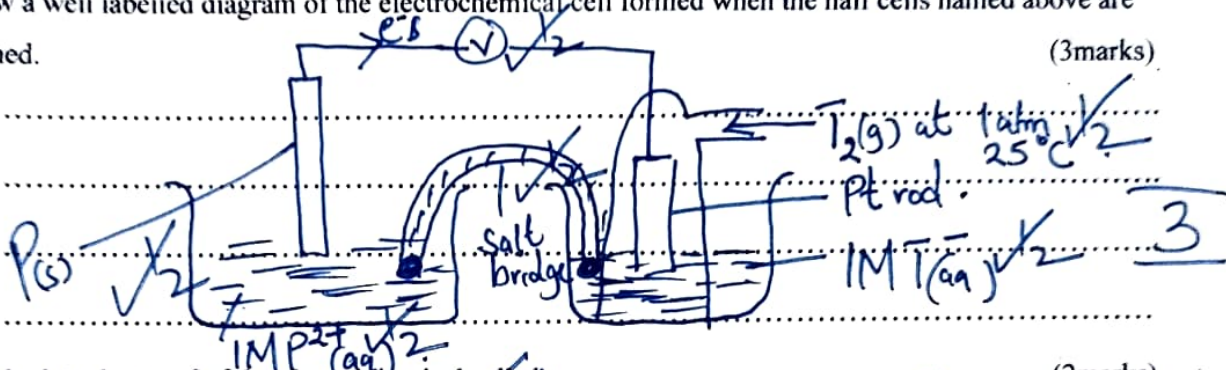
$$+0.34 - 0.23 = +0.51 \text{ V}$$

- iii) Select two half cells which would produce the highest e.m.f when combined. (1 mark)

Half cell of $\text{P} \parallel \text{P}^{2+}(\text{aq})$ and $\text{I}_2(\text{g}) \parallel \text{I}^-(\text{aq})$

Accept equations

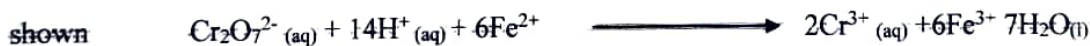
- d) Draw a well labelled diagram of the electrochemical cell formed when the half cells named above are combined. (3 marks)



- e) i) Calculate the e.m.f of the electrochemical cell above. (2 marks)

$$E^\ominus = +2.86 - 0.23 = +3.09 \text{ V}$$

- ii) An alloy containing iron was dissolved in an acid and the total volume made up to 250 cm^3 . 25 cm^3 of this solution required 18.0 cm^3 of 0.15 M acidified potassium dichromate VI to react with completely as shown



Calculate the mass of iron in the alloy. (Fe=56)

(2 marks)

$$\text{Moles of } \text{Cr}_2\text{O}_7^{2-} = \frac{18 \times 0.15}{1000} = 0.0027$$

$$= 0.0027$$

$$\text{Moles of } \text{Fe}^{2+} = 0.0027 \times 6 = 0.0162$$

$$\text{Mass} = 0.0162 \times 56 = 0.9072 \text{ g}$$

$$\text{Moles in } 250 \text{ cm}^3 = \frac{250 \times 0.0162}{25} = 0.162$$

(Consequential marking)

4. a) What is meant by molar heat of neutralization

(1 mark)

Enthalpy change that occurs when one mole of H^+ in an acid reacts with one mole of OH^- in a base to form one mole of water.

Joshua

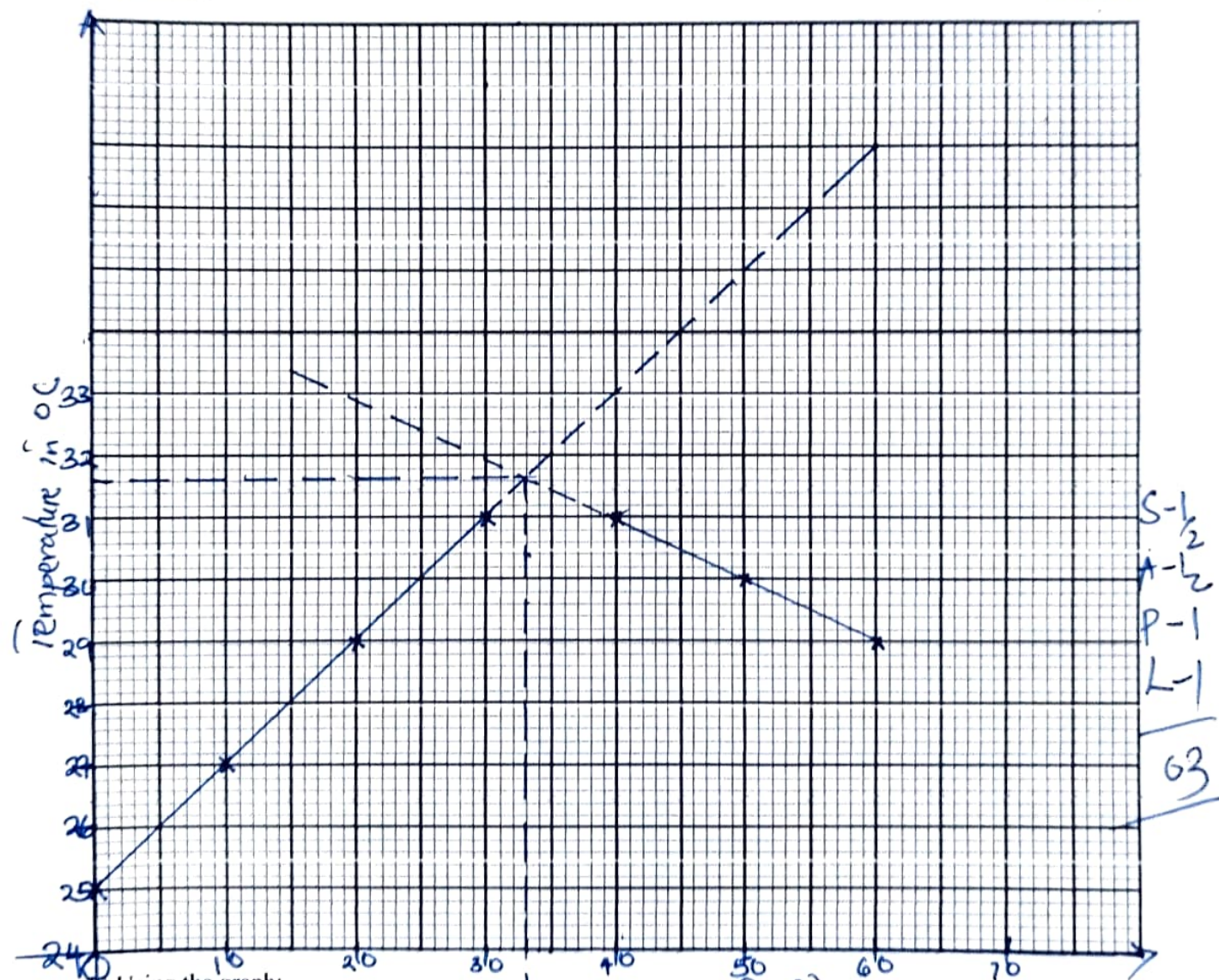


b) In an experiment to determine the molar heat of neutralization, 50.0 cm³ of 1M hydrochloric acid was neutralized by adding 10cm³ portion of dilute sodium hydroxide. During an experiment, the data in the table below was obtained.

Volume of sodium hydroxide (cm ³)	0	10	20	30	40	50	60
Temperature of the mixture (°C)	25.0	27.0	29.0	31.0	31.0	30.0	29.0

i) On the grid provided, plot a graph of temperature(y-axis) against volume of sodium hydroxide(x-axis) added

(3 marks)



ii) Using the graph:

1) Determine the volume of sodium hydroxide which completely neutralize 50cm³ of 1M hydrochloric acid.

(1 mark)

33 ± 0.2 cm³



04

II) Determine the change in temperature ΔT when complete neutralization occurred

(1 mark)

$$31.6 - 25.0^\circ\text{C} = 6.6^\circ\text{C} \pm 0.2$$

III) Calculate.

i) The heat change, when complete neutralization occurred.

(Specific heat capacity = 4.2 J/g/K , density of solution = 1 g/cm^3)

(2 marks)

$$\Delta H = 83 \times 4.2 \times 6.6 = 2300.76 \text{ J}$$

ii) Molar heat of neutralization of hydrochloric acid with sodium hydroxide

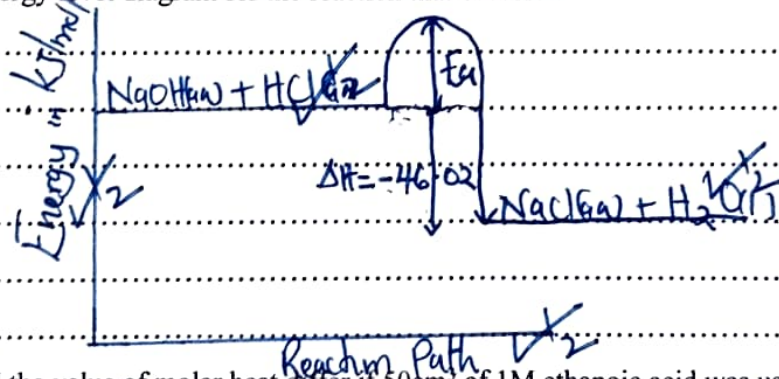
(2 marks)

$$\text{Moles of HCl} = \frac{50 \times 1}{1000} = 0.05 \text{ moles}$$

$$\Delta H = \frac{2300.76}{0.05} = -46.02 \text{ kJ/mol}$$

iii) Draw an energy level diagram for the reaction that occurred

(2 marks)



iv) How would the value of molar heat differ if 50 cm^3 of 1 M ethanoic acid was used instead of 1 M hydrochloric acid? Give a reason

(1 mark)

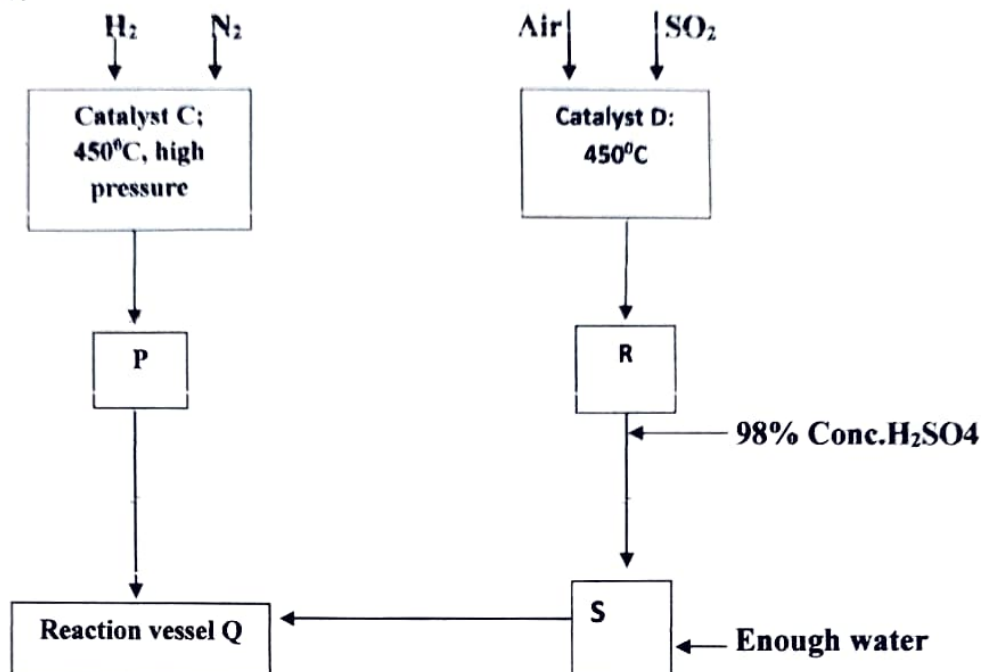
Lower value. Ethanoic acid is a weak acid; some energy used to complete its ionization.

Kevin/Brian

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5. The flow chart below shows how a fertilizer can be manufactured. Use it to answer the questions that follow.



1(a) Name catalyst C and catalyst D.

C Finely divided iron ✓ Accept Iron. (1 mark)
 D Vanadium (V) oxide ✓ Accept Platinum

(b) Give the identities of substance:

P Ammonia ✓
 S Sulphuric (VI) acid ✓
Sulphur (VI) oxide ✓
 R Acid ✓ Accept Formulae. (2 marks)

All - 2 mks
 2 - 1mk
 1 - 1/2 mark
2

(c) Give the identity of the fertilizer formed.

Ammonium Sulphate ✓ Accept Formula. (1/2 mark)

(d) Write an equation for the reaction at vessel Q.

$2\text{NH}_3(\text{g}) + \text{H}_2\text{SO}_4(\text{l}) \rightarrow (\text{NH}_4)_2\text{SO}_4(\text{aq})$ ✓ (1 mark)

(e) Explain why substance R is absorbed in 98% sulphuric (VI) acid first before adding water.

Reaction between R and water is highly exothermic. (1 mark)

(f) Name ~~one~~ methods by which pollution is controlled in contact process.

(½ mark)

✓ Recycling of SO_2 gas. Any @ ½ mk.
 ✓ Scrubbing using $\text{Ca}(\text{OH})_2(\text{aq})$

II (a) When hydrogen sulphide gas was bubbled into an aqueous solution of Iron (III) chloride, a yellow precipitate was deposited.

State another observation that was made.

(1 mark)

Yellow/Brown solution changes to green.

(b) Write an equation for the reaction that took place.

(1 mark)



(c) Explain why old newspapers slowly change to brown when exposed to air and sunlight.

(1 mark)

Oxygen removed during bleaching is restored.

(d) Describe a chemical test that can be used to distinguish sodium sulphate and sodium sulphite.

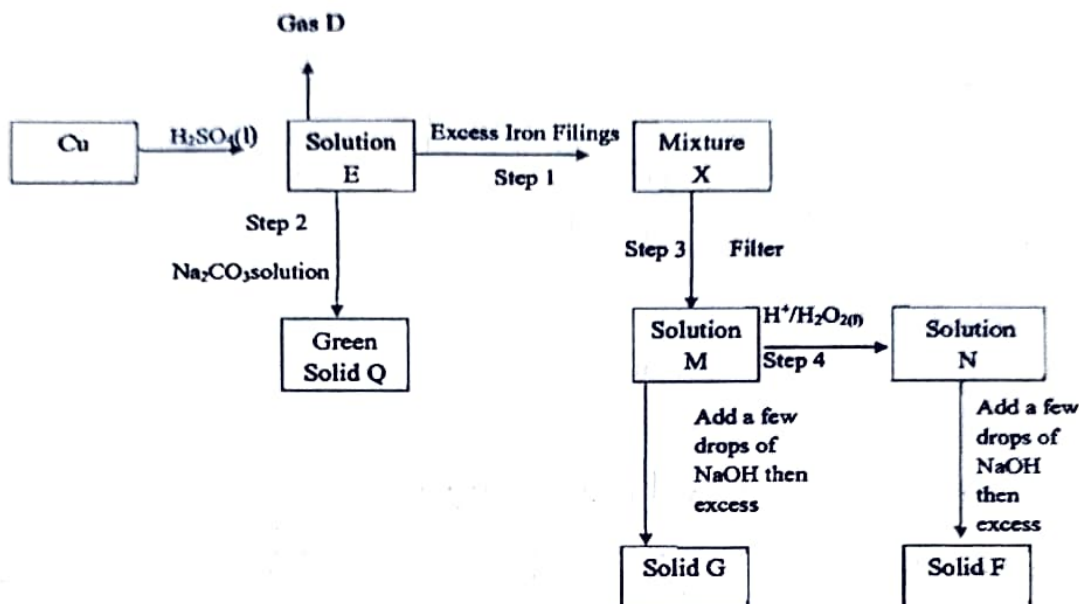
(2 marks)

To each test tube containing sample solutions of $\text{Na}_2\text{SO}_4(\text{aq})$ and Na_2SO_3 add a given volume of HCl / HNO_3 . $\text{Na}_2\text{SO}_3(\text{aq})$ produces bubbles of a colourless gas while Na_2SO_4 does not.

Accept-use of H^+/BaCl_2 & H^+/BaNO_3
 - use of $\text{H}^+/\text{K}_2\text{Cr}_2\text{O}_7$ & H^+/KMnO_4



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



(i) Name the following substances.

(2 marks)

Solution E... Copper (II) sulphate ✓2 Green solid Q... Copper (II) carbonate ✓2
Solid F... Iron (III) hydroxide ✓2 Solution M... Iron (II) sulphate ✓2 2

(ii) State and explain the observation made at step 4.

(2 marks)

Green solution changes to yellow/brown. Fe²⁺ is oxidized to Fe³⁺ 2

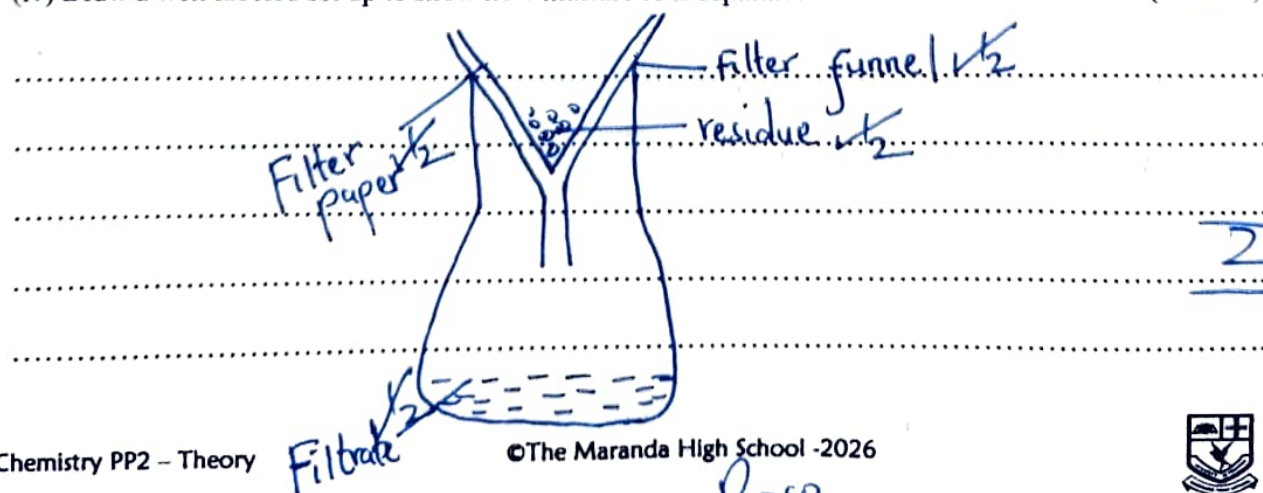
(iii) Name the reaction that takes place at step 2.

(1 mark)

Double decomposition / Precipitation 1

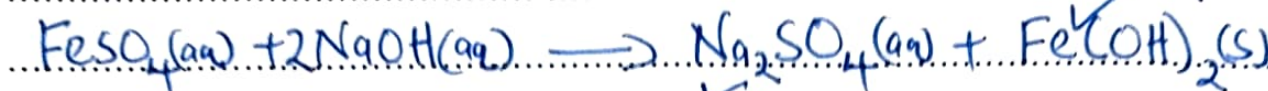
(iv) Draw a well labeled set up to show how mixture X is separated.

(2 marks)



(v) Write chemical equation to represent the formation of solid G.

(1 mark)



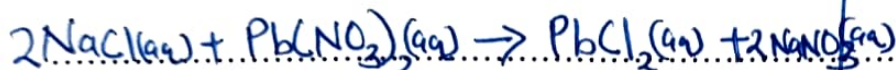
(vi) Explain what happens if Sulphur (IV) oxide gas was bubbled through solution N

(1 mark)

Brown / Yellow solution changes to green / pale green. SO_2 reduces Fe^{3+} to Fe^{2+}

II .8.08g of sodium chloride solution at 25°C was reacted with excess Lead (II) nitrate. After filtration, washing and drying 4.8g of Lead (II) chloride was obtained. Determine the solubility sodium chloride at 25°C (Na = 23, Pb = 207, Cl = 35.5)

(3 marks)



$$\text{Moles of PbCl}_2 = \frac{4.8}{278} = 0.0173$$

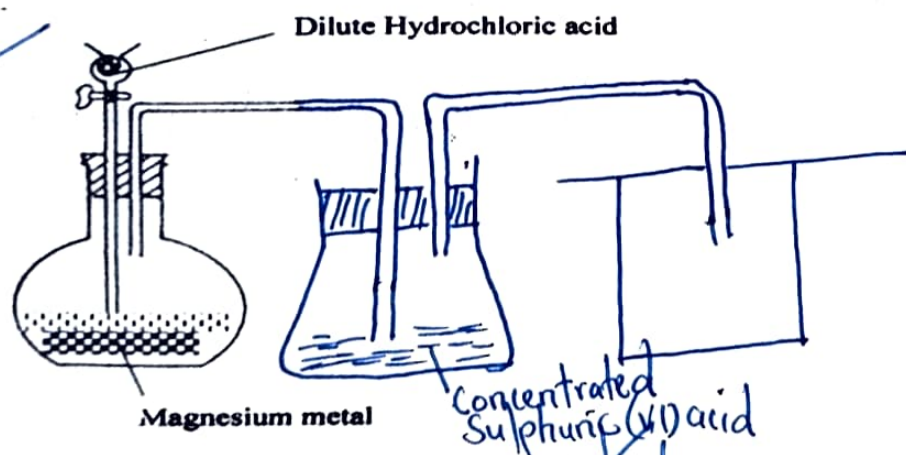
$$\text{Solubility} = \frac{2.0241 \times 100}{6.0559}$$

$$\text{Moles of NaCl} = 0.0173 \times 2 = 0.0346$$

$$\text{Mass of NaCl} = 0.0346 \times 58.5 = 2.0241\text{g}$$

$$\text{Mass of solvent} = 8.08 - 2.0241 = 6.0559\text{g}$$

7. A form four student wanted to prepare carbon (IV) oxide gas. The diagram below is part of the set up.



(a) Identify two mistakes in the set up

(2 marks)

- Use of Magnesium metal / Wrong reagents used.
- Dropping is dipped into the reagents / Dropping funnel is not hanging.

(b) Complete the set up showing how a sample of dry carbon (IV) oxide can be collected.

(2 marks)

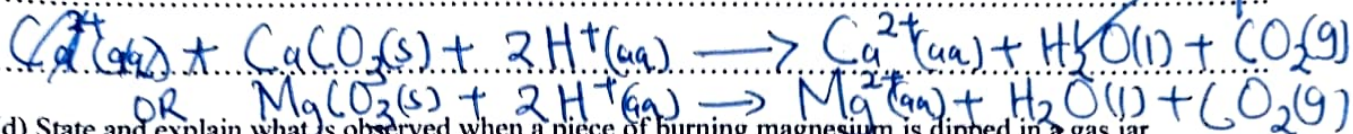
Drying agent — Ink Accept CaCl_2 in a U-tube.
Collection — Ink Accept Syringe.



08

(c) Write an ionic equation for the above reaction if the mistakes are corrected

(1 mark)



(d) State and explain what is observed when a piece of burning magnesium is dipped in a gas jar

full of carbon (IV) oxide

(2 marks)

White solid $\frac{1}{2}$ and black solid $\frac{1}{2}$ formed.
 Heat from burning Mg decomposes CO_2 into C and O_2 . O_2 oxidizes Mg to MgO . $\frac{1}{2}$

(e) (i) During Manufacture of sodium carbonate in Solvay process it is said to be the most efficient

process. State one factor that makes it efficient.

(1 mark)

- Some products are recycled $\frac{1}{2}$
 - Pollution is reduced. Any @ 1mk $\frac{1}{2}$

(ii) Explain why potassium carbonate cannot be manufactured through Solvay process.

(1 mark)

KHCO_3 is highly soluble $\frac{1}{2}$ hence does not easily crystallize $\frac{1}{2}$

(iii) State one use of sodium carbonate

(1 mark)

- Manufacture of glass // Paper // Borax salt $\frac{1}{2}$
 - Softening hard water. Any 1 @ 1mk $\frac{1}{2}$
 - Textile industry.

08

Edwine / Seth

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