

Confidential

In addition to the apparatus and fittings found in a chemistry ~~laboratory~~ laboratory, each candidate will require the following.

1. About 75cm^3 of solution M
2. About 100cm^3 of solution N
3. A burette
4. A pipette.
5. Two conical flasks
6. About 1.5g of metal P
7. About 1.6g of metal Q
8. About 40cm^3 of solution S
9. About 40cm^3 of solution T
10. A thermometer ($0-110^\circ\text{C}$)
11. 2 plastic beaker 100ml.
12. A measuring cylinder 50ml.
14. About 10cm^3 of solution U.
15. About 0.5g of solid J

Access to:

1. 2M Sodium hydroxide
 2. 2M Ammonium hydroxide
 3. 1M Lead nitrate
 4. 0.5M Barium nitrate
 5. 0.5M hydrochloric acid
- } Supplied with a dropper.

NOTES:

1. Solution M is prepared by dissolving 3.2g of KMnO_4 in 400cm^3 of sulphuric acid and diluting to one litre of solution using distilled water.
2. Solution N is prepared by dissolving 16.7g of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ in 400cm^3 of $1\text{M H}_2\text{SO}_4$ and

diluting to one litre of solution using distilled water. The solid should be dissolved in the sulphuric acid immediately after weighing

③ Metal T is magnesium powder.

④ Metal Q is iron powder.

⑤ Solution S is $0.5M FeSO_4$

⑥ Solution U is $0.5M AlCl_3$

⑦ Solid J is Mallic acid.

Anal. Marking. Skemo.

Table 1.

(b) Depending on the school value.

(c) Determine the:

(i) Concentration of ~~K₂Cr₂O₇~~ KMnO4 in moles per litre

$K=39, Mn=55, O=16$

$$\frac{3 \times 16}{158}$$

$$= 0.02 \text{ moles per litre.}$$

(ii) Number of moles of KMnO4 use = $\frac{\text{Molarity} \times \text{Volume}}{1000 \text{ cm}^3}$

$$= \frac{0.02 \times 15}{1000}$$

$$= 0.0003 \text{ moles}$$

(d) Concentration of solution N in g/litre.

$$\begin{array}{l} 4.17 \text{ g} \longrightarrow 250 \text{ cm}^3 \\ ? \longrightarrow 1000 \text{ cm}^3 \end{array} \quad \Bigg| \quad = \underline{16.68 \text{ g/litre}}$$

$$= \frac{1000 \times 4.17}{250}$$

e. ~~Ratio~~ Ratio of MnO^- ; Fe^{2+} is 1:5

(i) Number of moles present in 25 cm^3 of N is
 $= 5 \times 0.0003 = 0.0015 \text{ moles.}$

(ii) Number of moles of present in 1000 cm^3 of N

If 0.0015 moles are in 25 cm^3
 ? in 1000 cm^3

$$\frac{1000 \times 0.0015}{25}$$

$$= 0.06 \text{ M}$$

Procedure 1

(a) Table II

Final Temp (x)	48
Initial Temp (x)	24

(i) $\Delta T = 48 - 24 = 24^\circ$

(ii) $\Delta H = 25g \times 4.2 J/g^\circ C = 2520 J$ or $2.52 kJ$

(ii) Moles reacted = $\frac{2.5 \times 0.5}{1000} = 0.0125$ moles

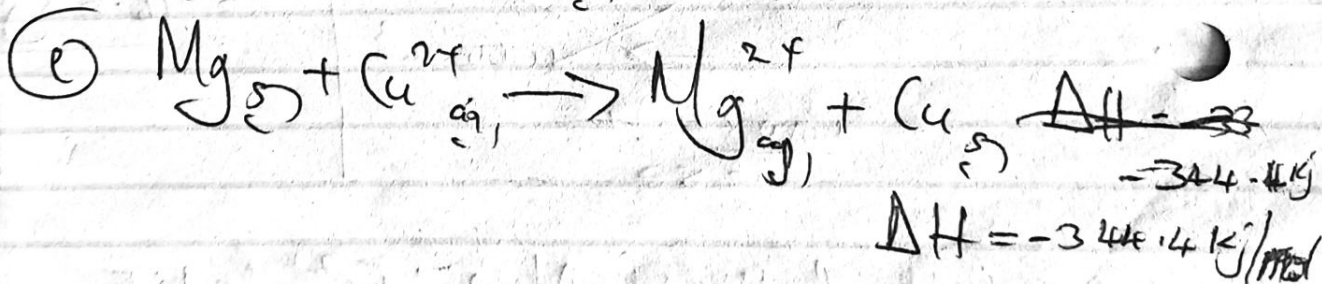
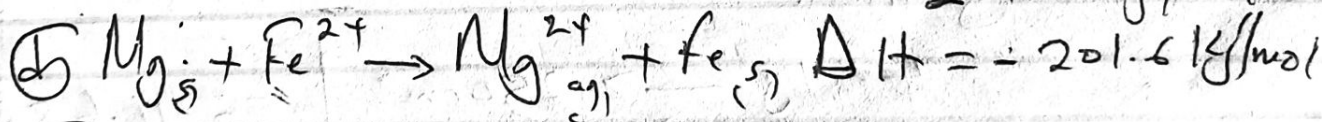
0.0125 moles = $2.52 kJ$

1 mole = ?

= $\frac{1 \text{ mole} \times 2.52 kJ}{0.0125 \text{ moles}}$

$201.6 kJ/mol$

= $201.6 kJ/mol$



⑤ Qualitative analysis

Observations	Inferences
① A white precipitate observed and dissolves in excess	$Al^{3+}, Zn^{2+}, Pb^{2+}$ present
② White precipitate observed and insoluble in excess	Al^{3+}, Pb^{2+} present or Zn^{2+} absent.
③ No white precipitate observed	Al^{3+} present
④ No white precipitate observed	$SO_3^{2-}, SO_4^{2-}, CO_3^{2-}$ ions absent
⑤ White precipitate observed but dissolves on warming	Cl^- ion confirmed present

Procedure II

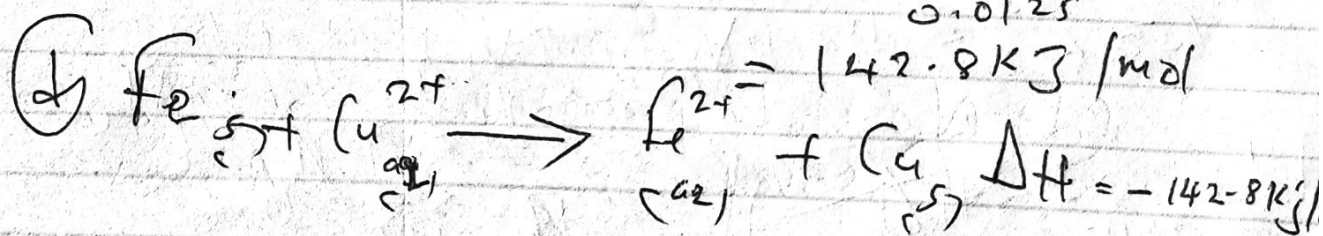
Table II

Final Temp °C	41
Initial Temp °C	24

$$\textcircled{b} \Delta T = 41 - 24 = 17^\circ\text{C}$$

$$\textcircled{c} \text{ (i) } \Delta H = 25\text{g} \times 4.2\text{J/g} \times 17\text{K} \\ = 1785\text{J} \text{ or } 1.785\text{KJ}$$

$$\text{(ii) } 0.0125 \text{ moles} \times 1.785 \text{ KJ} \\ \text{1 mole} \quad \quad \quad ? \\ = \frac{1 \text{ mole} \times 1.785}{0.0125}$$



Organic

Observations

(a) Dissolves to form a colourless solution

(b) $\frac{1}{2}$ (1/2 ml) Bromine water
↓ de-colourised
(1/2 ml)

(c) Effervescence or observed bubbles of gas evolves

Inferences

- Soluble salt
- polar substance
(1/2 ml)
~~pre~~ unsaturated hydrocarbons present or
- $C=C$ - , $C \equiv C$ -
present

~~pre~~ sence of R-coolt ions
H+