

**CHEMISTRY PAPER 3**  
**LANJET 2022**  
**MARKING SCHEME**

1. a) Table I

Completer table√ (CT)
Decimal √ (D)
Principal of averaging (PA)√
Accuracy ± 001√ (A) ± 0.2√
Final accuracy
<u>FA</u>
<u>5.</u>

i) School value  
= 21.6 cm<sup>3</sup>

ii) R.F.M of Na<sub>2</sub>CO<sub>3</sub> = 23 x 2 + 12 + 16 x 3 = 106√ ½  
Molarity in mol/l =  $\frac{8g\sqrt{1/2}}{106}$

$$= 0.0754M \sqrt{1/2}$$

iii) Moles of Na<sub>2</sub>CO<sub>3</sub> used =  $\frac{0.07547 \times 25}{1000} = 0.001887$  moles

Moles of B: Solution A<sub>1</sub>

1:1 moles of A1 = 0.001887 moles

Molarity solution A1 =  $\frac{0.001887 \times 1000}{21.6} = 0.08736$

iv) M<sub>1</sub>V<sub>1</sub> = M<sub>2</sub>V<sub>2</sub>

$$M_1 = \frac{M_2 V_2}{V_1} = \frac{0.08736 \times 250}{25} = 0.8736M$$

b)

Test tube no	1	2	3	4	5	6
Volume of A cm <sup>3</sup>	2	4	6	8	10	12
Volume of C cm <sup>3</sup>	14	12	10	8	6	4
Initial temp C <sup>0</sup> C	20.5	20.5	20.5	20.5	20.5	20.5

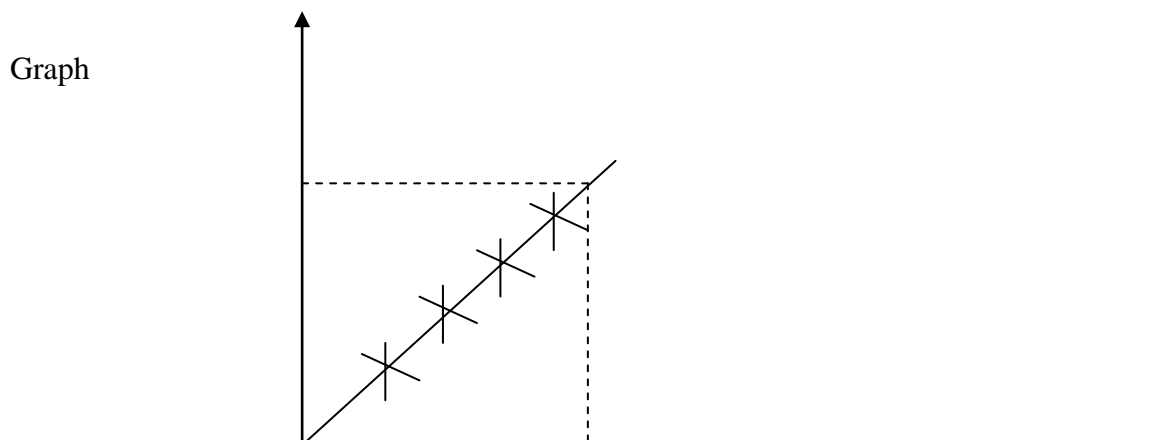
Highest temp ( $^{\circ}\text{C}$ )	22.0	24.0	25.5	26.5	27.0	25.5
Temperature change $\Delta T$	1.5	3.5	5.0	6.0	6.5	5.0

CT = Award  $\frac{1}{2}$  mark for each practical done. (3mks)

D = Decimal tied to fourth row 0.05.- $\checkmark$  (1mk)

A = Accuracy: Temperature first  $\pm 0.2$   $\checkmark$  (1mk)

Tr = Trend continuous rise, oriental then dye (1mk)



ii) Correct values  $\Delta T$  from extrapolated graph.

$$\checkmark 1\text{mk} = 7^{\circ}\text{C}$$

b) Extrapolated graph show correct

$$\text{volume} = 1\text{mk}\checkmark$$

$$= 8.7\text{cm}^3$$

iii) a) Ans in (b) x ans in (iv)

$$= \frac{8.7 \times 0.8736}{1000} = 0.007576$$

b) Molar heat =  $\frac{MC\Delta T}{\text{ans in (iii)} \times 1000}$

$$\text{ans in (iii)} \times 1000$$

$$= \frac{16 \times 4.2 \times 7}{0.007576 \times 1000}$$

$$= \underline{62.0908 \text{ kJ/mol}}$$

N/B 16 is total volume of A & C ie  $8.7 + 7.3 = 16$

Q2 a) Green powdery solid  $\checkmark$

Observations	Inferences
b) - Green solid changes black - Colourless liquid on cooler parts of the test tube - Blue litmus changes to red, red litmus changes remains red Each observation ½ mark	- Hydrated solid/ compound contains powder of crystallization - $\text{CO}_3^{2-}$ present  Each ½ mark
c) - Black solid dissolved forming a green solution	- Black is basic $\text{Fe}^{2+}$ or $\text{Cu}^{2+}$ present each ½ mark.
d) - i) Blue precipitate dissolves in excess forming deep blue solution.	$\text{Cu}^{2+}$ present
ii) Effervescence occurred - Brown residue - Green filtrate	E above $\text{Cu}^{2+}$ in reactivity series // E displaces $\text{Cu}^{2+}$
iii) Green solution changes to yellow// brown Brown precipitate formed	$\text{Fe}^{2+}$ oxidized to $\text{Fe}^3$
Q 3. a) Solid dissolved forming colourless solution. ✓ ½ mk	Polar substance // polar organic compound ✓ ½ mk
b) i) Orange colour of potassium chromate VI persists ✓ ½ mk	R-OH absent ✓ ½ mk
ii) Purple potassium manganate VII changes to colourless ✓	$\begin{array}{c}   \quad   \\ \text{C} = \text{C} \\   \quad   \end{array}$ - $\text{C} \equiv \text{C}$ - present
iii) $\text{PH}_3$ ✓	Strongly acidic solution ✓

