

4.7.3 Chemistry Practical Paper 3 (233/3)

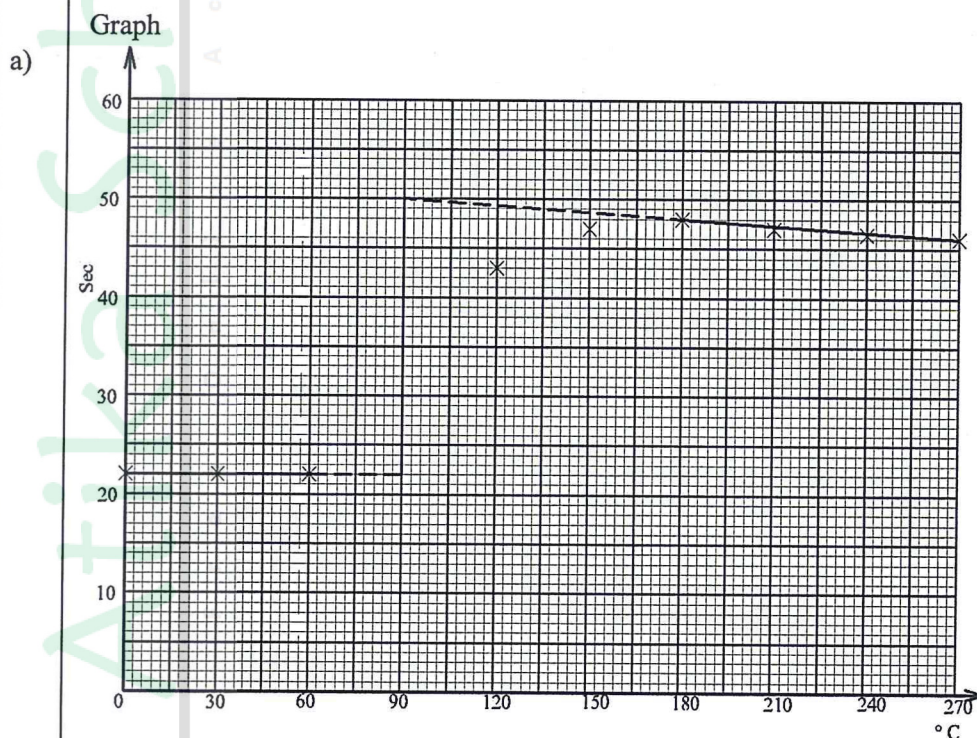
1.

Table 1

Time, s	0	30	60	90	120	150	180	210	240	270
Temperature, °C	22.0	22.0	22.0	X	43.0	47.5	48.0	47.0	46.5	46.0

- Complete table -----(1 mark)
- Use of decimals (Either whole numbers, one decimal place as .0 , .5 ----(1 mark)
- Accuracy -----(¹/₂ mark)
- Trends - constant readings from t=0 sec to t=60sec, continuous rise in temperature readings from t=120 sec to maximum followed by a drop-----(¹/₂ mark)

(3marks)



- Scale -----(¹/₂ mark)
- Labeling of axes -----(¹/₂ mark)
- Plotting -----(1 mark)
- Curve / lines -----(1 mark)

(3 marks)

b) On graph paper,

$$\Delta T = (50.0 - 22.0)^{\circ}\text{C} \checkmark^{1/2} = 28.0^{\circ}\text{C} \checkmark^{1/2}$$

(1 mark)

c) Heat change = $4.2 \times 50 \times 28.0$ Joules \checkmark^1

$$= 5880 \text{ Joules} \checkmark^1$$

(2 marks)

d)	<p>Moles of magnesium = $\frac{0.30}{24} = 0.0125$</p> <p>Enthalpy change, $\Delta H = \frac{-5880}{0.0125} \times 1 \text{ J mol}^{-1} \checkmark \frac{1}{2}$</p> <p style="text-align: center;">$= -470400 \text{ J mol}^{-1} \checkmark \frac{1}{2}$ OR $-470.4 \text{ kJ mol}^{-1} \checkmark$</p> <p>-ve sign must be shown otherwise penalize $\checkmark \frac{1}{2}$</p>	(1 mark)
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	<p>Table 2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">I</th> <th style="text-align: center;">II</th> <th style="text-align: center;">III</th> </tr> </thead> <tbody> <tr> <td>Final burette reading</td> <td style="text-align: center;">24.80</td> <td style="text-align: center;">33.50</td> <td style="text-align: center;">41.50</td> </tr> <tr> <td>Initial burette reading</td> <td style="text-align: center;">1.00</td> <td style="text-align: center;">10.00</td> <td style="text-align: center;">18.00</td> </tr> <tr> <td>Volume of Solution C used, cm³</td> <td style="text-align: center;">23.80</td> <td style="text-align: center;">23.50</td> <td style="text-align: center;">23.50</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Complete table with three titrations----- (1 mark) • Use of decimals (1 or 2) consistently----- (1 mark) <li style="padding-left: 20px;">For 2 decimal places, the second decimal should be 0 or 5 • Accuracy (any one value compared to the school value that is within 0.10 cm³ or 0.20 cm³ of the school value)----- (1 mark) • Principles of averaging – average of volumes that are within $\pm 0.10\text{cm}^3$ to 0.20 cm³ from each other. • Final accuracy- should be within 0.10 cm³ to 0.20 cm³ of the school value. 		I	II	III	Final burette reading	24.80	33.50	41.50	Initial burette reading	1.00	10.00	18.00	Volume of Solution C used, cm ³	23.80	23.50	23.50	(3 marks)
	I	II	III															
Final burette reading	24.80	33.50	41.50															
Initial burette reading	1.00	10.00	18.00															
Volume of Solution C used, cm ³	23.80	23.50	23.50															

a)	<p>Average volume of solution C used</p> $= \frac{23.50 + 23.50}{2} \text{ cm}^3 \checkmark \frac{1}{2}$ $= 23.50 \text{ cm}^3 \checkmark \frac{1}{2}$	(1 mark)
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b)	<p>(i) Moles of sodium carbonate = $\frac{0.15 \times \text{average titre}}{1000}$</p> $= \frac{23.50 \times 0.15}{1000} \checkmark \frac{1}{2}$ $= 3.525 \times 10^{-3} \checkmark \frac{1}{2}$	(1 mark)
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<p>(ii) Reaction ratio is 1 mole Na_2CO_3 : 2 moles HCl</p> <p>Moles of hydrochloric acid in $25.0\text{cm}^3 = 2 \times \text{Answer in b(i)}$</p> $= 2 \times 3.525 \times 10^{-3} \checkmark_{1/2}$ $= 7.05 \times 10^{-3} \checkmark_{1/2}$	<p>(1 mark)</p>
<p>(iii) Moles of hydrochloric acid in $250\text{ cm}^3 = \frac{\text{Answer in b(ii)} \times 250}{25}$</p> $= 10 \times 7.05 \times 10^{-3} \checkmark_{1/2}$ $= 0.0705 \checkmark_{1/2}$	<p>(1 mark)</p>
<p>(iv) $Mg + 2HCl \rightarrow MgCl_2 + H_2$</p> <p>Reaction ratio is Mg : HCl = 1 : 2</p> <p>Moles of magnesium = 0.0125</p> <p>Moles of hydrochloric acid = $2 \times 0.0125 \checkmark_{1/2}$</p> $= 0.025 \checkmark_{1/2}$	<p>(1 mark)</p>
<p>(v) Total number of moles of hydrochloric acid in 50 cm^3 of solution B</p> $= \text{Answer in b(iii)} + \text{answer in b(iv)}$ $= 0.0705 + 0.025 \checkmark_{1/2}$ $= 0.0955 \checkmark_{1/2}$	<p>(1 mark)</p>
<p>c) Concentration of hydrochloric acid in moles per litre of solution B</p> $= \frac{\text{Answer in b(v)} \times 1000}{50}$ $= \frac{0.0955 \times 1000}{50} \text{ Moles per litre} \checkmark_{1/2}$ $= 1.91 \text{ mol dm}^{-3} \checkmark_{1/2}$	<p>(1 mark)</p>

(20 Marks)

2.

a)	Observations - Colourless liquid condenses the on cooler parts of the test-tube. - Red litmus turned blue - Blue litmus remains blue. (2marks)	Inferences Hydrated compound of ammonium salt (NH_4^+) present (1 mark)
b)	Observations	Inferences
(i)	- No effervescence - No white precipitate (1 mark)	CO_3^{2-} and SO_3^{2-} absent Pb^{2+} absent (2 marks)
	Observations	Inferences
(ii)	White precipitate (½ mark)	SO_4^{2-} present (½ mark)
	Observations	Inferences
(iii)	White precipitate which dissolves in excess aqueous sodium hydroxide. (1 mark)	Zn^{2+} or Al^{3+} present (1 mark)
	Observations	Inferences
(iv)	White precipitate insoluble in excess aqueous ammonia (1 mark)	Al^{3+} present (1 mark)

(11 marks)

3.

a)	Observations	Inferences
	Burns with a yellow smoky/sooty flame	- Unsaturated organic compound OR - long-chain organic compound
	(1 mark)	(1 mark)
b)	Observations	Inferences
	Dissolves forming a colourless solution.	Polar compound
	(1 mark)	(1 mark)
(i)	pH = 2 (accept pH value from 1 to 3) Reject pH range	Acidic compound probably carboxylic acid
	(½ mark)	(½ mark)
(ii)	Observations	Inferences
	Acidified potassium manganate (VII) decolourised / purple potassium manganate (VII) changes to colourless.	$\text{>C=C<} / \text{-C}\equiv\text{C-} / \text{ROH}$ OR Alkene / alkyne or alkanol present
	(1 mark)	(1 mark)
(iii)	Observations	Inferences
	Bromine water decolourized / Yellow or brown colour of bromine turns colourless	$\text{>C=C<} / \text{-C}\equiv\text{C-}$ Alkene OR alkyne present
	(1 mark)	(1 mark)

(9 Marks)