

4.7.3 Chemistry Practical Paper 3 (233/3)

1.

Table 1

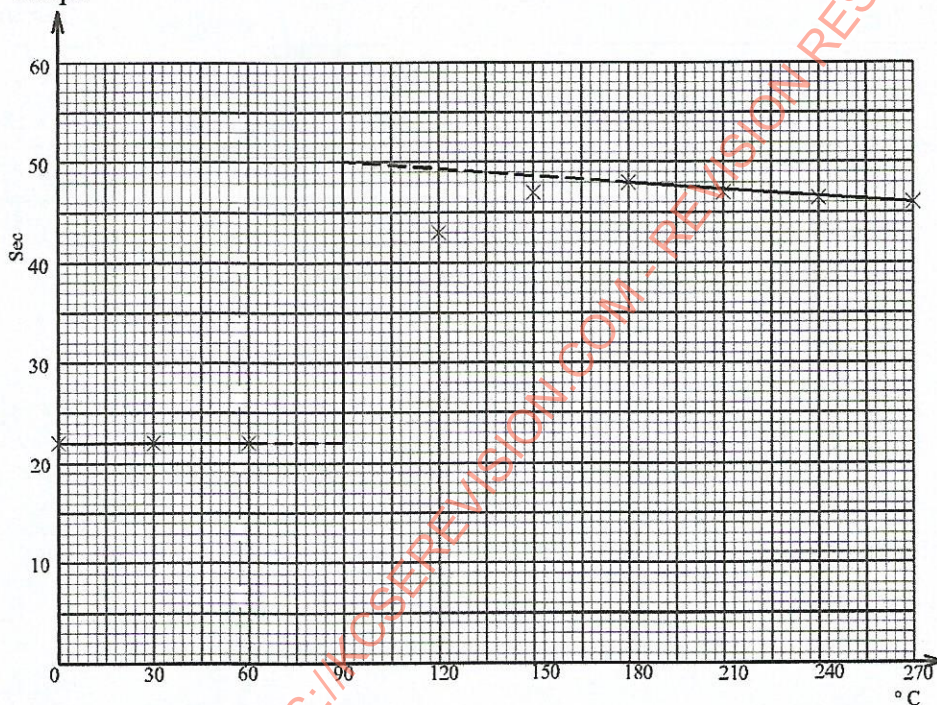
Time, s	0	30	60	90	120	150	180	210	240	270
Temperature, °C	22.0	22.0	22.0	X	43.0	47.5	48.0	47.0	46.5	46.0

(3marks)

- 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)

Graph

a)



(3 marks)

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

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)

$$\text{Moles of magnesium} = \frac{0.30}{24} = 0.0125$$

$$\text{Enthalpy change, } \Delta H = \frac{-5880}{0.0125} \times 1 \text{ J mol}^{-1} \checkmark \frac{1}{2}$$

$$= -470400 \text{ J mol}^{-1} \checkmark \frac{1}{2} \quad \text{OR} \quad -470.4 \text{ kJ mol}^{-1} \checkmark$$

-ve sign must be shown otherwise penalize $\checkmark \frac{1}{2}$

(1 mark)

Table 2

	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)

- Complete table with three titrations----- (1 mark)
- Use of decimals (1 or 2) consistently----- (1 mark)
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.

a)

Average volume of solution C used

$$= \frac{23.50 + 23.50}{2} \text{ cm}^3 \checkmark \frac{1}{2}$$

$$= 23.50 \text{ cm}^3 \checkmark \frac{1}{2}$$

(1 mark)

b)

(i) Moles of sodium carbonate = $\frac{0.15 \times \text{average titre}}{1000}$

$$= \frac{23.50 \times 0.15}{1000} \checkmark \frac{1}{2}$$

$$= 3.525 \times 10^{-3} \checkmark \frac{1}{2}$$

(1 mark)

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

(20 Marks)

2.

	Observations	Inferences
a)	- Colourless liquid condenses the on cooler parts of the test-tube. - Red litmus turned blue - Blue litmus remains blue.	Hydrated compound of ammonium salt (NH_4^+) present
	(2marks)	(1 mark)
b)	Observations	Inferences
(i)	- No effervescence - No white precipitate	CO_3^{2-} and SO_3^{2-} absent Pb^{2+} absent
	(1 mark)	(2 marks)
	Observations	Inferences
(ii)	White precipitate	SO_4^{2-} present
	(½ mark)	(½ mark)
	Observations	Inferences
(iii)	White precipitate which dissolves in excess aqueous sodium hydroxide.	Zn^{2+} or Al^{3+} present
	(1 mark)	(1 mark)
	Observations	Inferences
(iv)	White precipitate insoluble in excess aqueous ammonia	Al^{3+} present
	(1 mark)	(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)
	Observations	Inferences
	(ii) Acidified potassium manganate (VII) decolourised / purple potassium manganate (VII) changes to colourless.	$>C=C< / -C\equiv C-$ / ROH OR Alkene / alkyne or alkanol present
	(1 mark)	(1 mark)
	Observations	Inferences
	(iii) Bromine water decolourized / Yellow or brown colour of bromine turns colourless	$>C=C< / -C\equiv C-$ Alkene OR alkyne present
	(1 mark)	(1 mark)

(9 Marks)