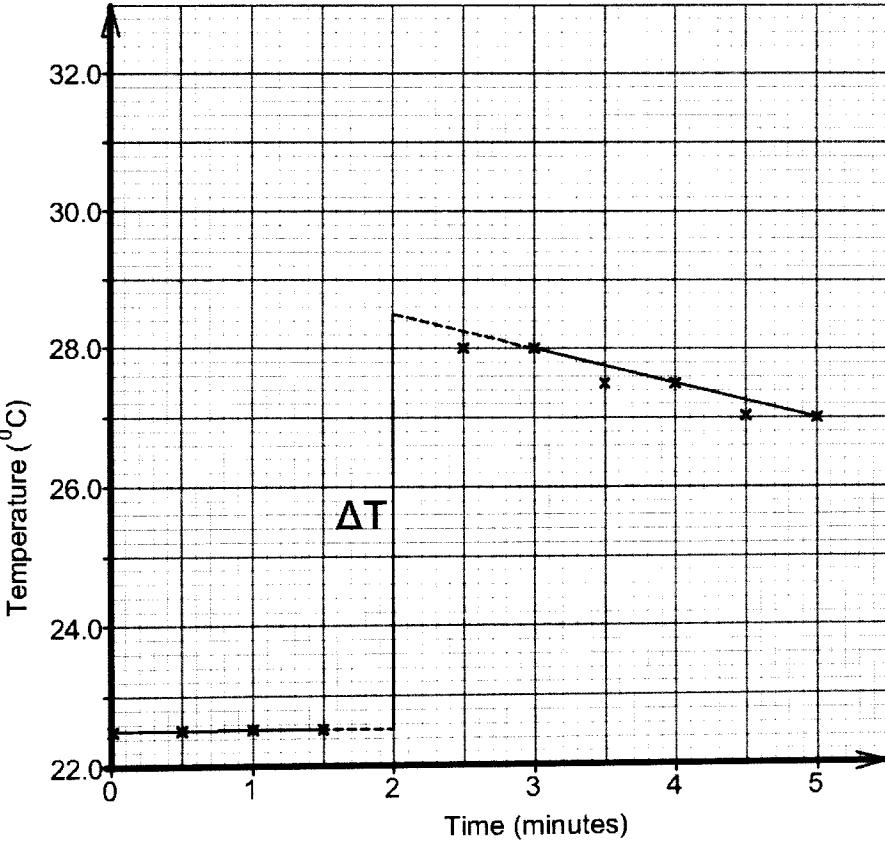


#### 4.7.3 Chemistry Practical Paper 3 (233/3)

1	MS PROCEDURE I										(3marks)															
a)	Table 1																									
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Time (Minutes)</th><th>0</th><th><math>\frac{1}{2}</math></th><th>1</th><th><math>1\frac{1}{2}</math></th><th>2</th><th><math>2\frac{1}{2}</math></th><th>3</th><th><math>3\frac{1}{2}</math></th><th>4</th><th><math>4\frac{1}{2}</math></th><th>5</th></tr> </thead> <tbody> <tr> <td style="text-align: left;">Temperature (°C)</td><td>22.5</td><td>22.5</td><td>22.5</td><td>22.5</td><td>X</td><td>28.0</td><td>28.0</td><td>27.5</td><td>27.5</td><td>27.0</td><td>27.0</td></tr> </tbody> </table>		Time (Minutes)	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	Temperature (°C)	22.5	22.5	22.5	22.5	X	28.0	28.0	27.5	27.5	27.0	27.0
Time (Minutes)	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5															
Temperature (°C)	22.5	22.5	22.5	22.5	X	28.0	28.0	27.5	27.5	27.0	27.0															
	<ul style="list-style-type: none"> <li>• Complete table.....(1 mark)</li> <li>• Use of decimals.....(1/2 mark)</li> <li>• Trend in temperature readings (constant, rise and drop) .....</li> <li>• Accuracy at Time = <math>1\frac{1}{2}</math> minutes being <math>\pm 2^{\circ}\text{C}</math> of the school value.....(1/2 mark)</li> </ul>																									
b)	 <p style="text-align: center;"><math>\Delta T</math></p>																									
	Labelling .....(1/2 mark) Scale .....(1/2 mark) Plots .....(1 mark) Lines (extrapolation).....(1 mark)																									

c)	$\Delta T = (28.5 - 22.5)^\circ\text{C} \checkmark \frac{1}{2}$ $= 6.0^\circ\text{C} \checkmark \frac{1}{2}$ (Showing on the graph $\frac{1}{2}$ mark; Correct $\Delta T$ $\frac{1}{2}$ mark) OR (Correct $\Delta T$ with or without showing on the graph / no working presented 1 mark)	(1 mark)												
d) i)	No. of moles of solid A used = $5.3/106 \checkmark \frac{1}{2}$ $= 0.05 \checkmark \frac{1}{2}$	(1 mark)												
ii)	Molar enthalpy of solution $\left( \frac{-30 \times 4.2 \times 6.0}{0.05} \right) \text{J} \checkmark 1$ $= -15,120 \text{J/mol OR } -15.12 \text{ Kj/mol} \checkmark 1$ Penalise $\frac{1}{2}$ mark for absence of or incorrect units or/and if the negative sign is missing.	(2 marks)												
e) (i)	<b>PROCEDURE II</b> <b>Table 2</b> <table border="1"> <thead> <tr> <th></th> <th>I</th> <th>II</th> </tr> </thead> <tbody> <tr> <td>Final burette reading</td> <td>16.90</td> <td>16.60</td> </tr> <tr> <td>Initial burette reading</td> <td>0.50</td> <td>0.00</td> </tr> <tr> <td>Volume of Solution B used, cm<sup>3</sup></td> <td>16.40</td> <td>16.60</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>• Complete table ..... (1 mark)</li> <li>• Use of decimal places (2 or 1 consistently) ..... (<math>\frac{1}{2}</math> mark)</li> <li>• Accuracy compared to school Value (S.V) ..... (1 mark)</li> <li>• Final Accuracy ..... (<math>\frac{1}{2}</math> mark)</li> </ul> <p>Average volume, V<sub>1</sub>, of solution B used = <math>\frac{16.40 + 16.60}{2}</math>  <math>= 16.50 \text{cm}^3 \checkmark \frac{1}{2}</math></p>		I	II	Final burette reading	16.90	16.60	Initial burette reading	0.50	0.00	Volume of Solution B used, cm <sup>3</sup>	16.40	16.60	(3 $\frac{1}{2}$ marks)
	I	II												
Final burette reading	16.90	16.60												
Initial burette reading	0.50	0.00												
Volume of Solution B used, cm <sup>3</sup>	16.40	16.60												

ii) **Table 3**

	I	II
Final burette reading	33.30	33.30
Initial burette reading	16.90	16.80
Volume of Solution B used, cm <sup>3</sup>	16.40	16.50

- Complete table.....(1 mark)
- Use of decimal places (2 or 1) consistently .....(1/2 mark)
- Accuracy compared to school Value (S.V) .....(1 mark)
- Final accuracy.....(1/2 Mark)

(3½ marks)

$$\text{Average volume, } V_2, \text{ of solution B used} = \frac{16.40 + 16.50}{2} \\ = 16.45 \text{ cm}^3 \checkmark \frac{1}{2}$$

f) (i) **Solution A** contains 0.05 moles in 250cm<sup>3</sup>

$$\text{Concentration} = \frac{\text{Answer d(i)} \times 1000}{250}$$

$$= \frac{0.05 \times 1000}{250} \text{ mol l}^{-1} \checkmark \frac{1}{2}$$

(1 mark)

**OR**

$$\text{Concentration in g/dm}^3 = \frac{1000}{250} \times 5.3 = 21.2 \text{ g/dm}^3$$

$$\text{Molarity of solution A} = \frac{21.2}{106} = 0.2 \text{ M}$$

**OR**

$$\text{Molarity of solution A} = \frac{1000 \times 5.3}{250 \times 106} = 0.2 \text{ M}$$

**OR**

$$\text{Concentration in g/dm}^3 = \frac{1000}{250} \times 5.3 = 21.2 \text{ g/dm}^3$$

$$\text{Molarity of solution A} = \frac{21.2}{106} = 0.2 \text{ M}$$

**OR**

$$\text{Molarity of solution A} = \frac{1000 \times 5.3}{250 \times 106} = 0.2 \text{ M}$$

(ii) Moles of sodium carbonate in  $25\text{cm}^3$  of solution A =  $\frac{\text{Answer f(i)above} \times 25}{1000}$

$$= \frac{25 \times 0.20}{1000} \checkmark \frac{1}{2}$$

**(1 mark)**

$$= 0.005 \checkmark \frac{1}{2}$$

**OR**

$$= \frac{5.3 \times 25}{250 \times 106} = 0.005 \text{ moles}$$

(iii) Moles of hydrochloric acid, solution B = Answer in f(ii)  $\times 2$

$$= 0.005 \times 2 \checkmark \frac{1}{2}$$

**(1 mark)**

$$= 0.01 \checkmark \frac{1}{2}$$

**20 Marks**

	<b>Observations</b>	<b>Inferences</b>
a)	White precipitate Insoluble in excess	Ca <sup>2+</sup> , Mg <sup>2+</sup> or Ba <sup>2+</sup> present Al <sup>3+</sup> , Pb <sup>2+</sup> , Zn <sup>2+</sup> ions absent <b>3 ions for 2 marks;</b> <b>2 ions for 1 mark;</b> <b>1 ion for ½ mark.</b> Penalise ½ mark for each contradictory ion
	(1 mark)	( 2 marks)
b)	<b>Observations</b>	<b>Inferences</b>
	White precipitate	Ba <sup>2+</sup> or Ca <sup>2+</sup> present (Correct inference tied to Ba <sup>2+</sup> / Ca <sup>2+</sup> correctly inferred in 2(a) above)
	(1 mark)	(1 mark)
c)	<b>Observations</b>	<b>Inferences</b>
	No white precipitate	SO <sub>4</sub> <sup>2-</sup> , SO <sub>3</sub> <sup>2-</sup> , CO <sub>3</sub> <sup>2-</sup> absent <b>3 ions for 2 marks;</b> <b>2 ions for 1 mark;</b> <b>1 ion for ½ mark.</b>
	(1 mark)	(2 marks)
	<b>Observations</b>	<b>Inferences</b>
d)	White precipitate which dissolves on heating.	Cl <sup>-</sup> / Br <sup>-</sup> present ( Credit 1 mark for either of the ions given on its own)
	(1 mark)	(1 mark)

**(10 marks)**

3. a) White, needle-like crystals

**OR**

White, feather-like crystals

**OR**

White crystals

(1 mark)

b) (i)	<b>Observations</b> Solid melts and burns with a yellow, smoky flame.	<b>Inferences</b> - Unsaturated organic compound <b>OR</b> - long chain hydrocarbon
	<b>(1 mark)</b>	<b>(1 mark)</b>
(ii)	<b>Observations</b> Substance readily dissolves to form colourless solution.	<b>Inferences</b> - Acidic compound / RCOOH <b>OR</b> - forms a salt
	<b>(1 mark)</b>	<b>(1 mark)</b>
(iii)	<b>Observations</b> - Acidified potassium manganite (VII) solution not decolourised <b>OR</b> - Purple colour of acidified potassium manganite (VII) persists/remains	<b>Inferences</b>  $\equiv C = C \equiv$ (alkene); or $-C \equiv C-$ (alkyne)/present <b>OR</b> $R-OH$ (alcohol) absent
	<b>(1 mark)</b>	<b>(1 mark)</b>
(iv)	<b>Observations</b> Effervescence/bubbles of a colourless gas evolved	<b>Inferences</b> $R-\ddot{C}OOH^+ / H^+$ present <b>OR</b> - Carboxylic/ alkanoic acid present.
	<b>(1 mark)</b>	<b>(1 mark)</b>

**10 Marks**