

**SERIES 9 EXAMS**

233/3

**CHEMISTRY**

**PAPER 3**

**PRACTICAAL**

**MARKING SCHEME**

**TABLE 1**

Experiment number	I	II	III
Final burette reading (cm <sup>3</sup> )	13.0	25.9	38.7
Initial burette reading (cm <sup>3</sup> )	0.0	13.0	25.9
Volume of solution B used (cm <sup>3</sup> )	13.0	12.9	12.8

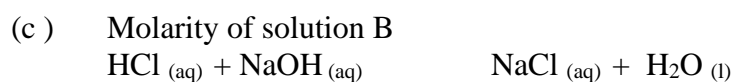
Complete table	1
Decimal place	1
Accuracy ( tied to school value	1
Arithmetic ( correct)	1

(a) Average volume of solution B used  

$$\frac{13.0 + 12.9 + 12.8}{3} \sqrt{\frac{1}{2}} = 12.9\text{cm}^3 \sqrt{\frac{1}{2}}$$

(b) Molarity of solution A  

$$\text{Molarity} = \frac{\text{mass}}{\text{RMM}} \div \text{litre} = \frac{4.0}{40} = 0.1\text{M} \sqrt{\frac{1}{2}}$$



Mole ratio 1 : 1

$$\begin{aligned} \text{Moles of NaOH} &= 0.1 \times \frac{25}{1000} \sqrt{\frac{1}{2}} \\ &= 0.0025 \text{ moles} \sqrt{\frac{1}{2}} \end{aligned}$$

Moles of HCl = moles of NaOH = 0.0025 moles

$$\begin{aligned} \text{Molarity of HCl} &= \frac{0.0025 \times 1,000}{12.9} \sqrt{\frac{1}{2}} \\ &= 0.19379\text{M} \sqrt{\frac{1}{2}} \end{aligned}$$

**TABLE 2**

Experiment number	I	II	III
Final burette reading (cm <sup>3</sup> )	5.0	10.0	15.0
Initial burette reading (cm <sup>3</sup> )	0.0	5.0	10.0
Volume of solution B used (cm <sup>3</sup> )	5.0	5.0	5.0

Complete table	1
Accuracy ( tied to school value )	1
Decimal place	1
Arithmetic	1

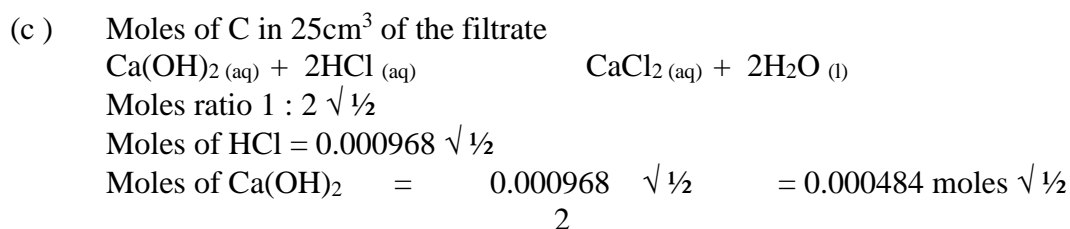
(a) Average volume of solution B used  

$$\frac{5.0 + 5.0 + 5.0}{3} \sqrt{\frac{1}{2}} = 5.0 \text{cm}^3 \sqrt{\frac{1}{2}}$$

(b) Moles of solution B used  

$$\text{Moles} = \frac{M \times V}{1000}$$

$$= \frac{0.19379 \times 5.0 \sqrt{\frac{1}{2}}}{1000} = 0.0096895 \sqrt{\frac{1}{2}} \text{ moles}$$



(d) Moles in 100cm<sup>3</sup>  

0.000484 moles	5.0cm <sup>3</sup>
?	100cm <sup>3</sup>

$$\frac{0.00484 \times 100 \sqrt{\frac{1}{2}}}{5} = 0.00968 \text{ moles } \sqrt{\frac{1}{2}}$$

(e) R.F.M Ca(OH)<sub>2</sub> = 40 + 32 + 2 = 74  
 Moles in 100cm<sup>3</sup> = 0.00968  
 1 mole                      74g  
 0.00968 moles            ?  

$$\frac{0.00968 \times 74 \sqrt{\frac{1}{2}}}{1} = 0.71632 \text{g } \sqrt{\frac{1}{2}}$$

$$0.71632 \times 1 \text{ g/cm}^3 \sqrt{\frac{1}{2}} \quad 0.71632 \text{ cm}^3 \sqrt{\frac{1}{2}}$$
 Solubility = 0.71632g / 100g of water

	Observation	Inference
2 (a)	- Colourless liquid formed on cooler part of the test-tube $\checkmark$ $\frac{1}{2}$ - White residue or solid is left $\checkmark$ $\frac{1}{2}$ ( 1 mark )	Hydrated salt $\checkmark$ 1 ( 1 mark) NB: Reject Tiny droplets or moisture or vapour or water condensed or colourless liquid condensed.
(b)	Colourless filtrate $\checkmark$ $\frac{1}{2}$ White residue $\checkmark$ $\frac{1}{2}$ ( 1 mark)	Compound is sparingly soluble $\checkmark$ 1 NB: Accept absence of coloured ions ( 1 mark)
(c)	Solution turns pink from colourless $\checkmark$ $\frac{1}{2}$ ( 1 mark)	$\text{OH}^-$ , $\text{HCO}_3^-$ or $\text{CO}_3^{2-}$ present All 3- 1 mark Only 2 – $\frac{1}{2}$ mark Only 1 – 0 mark NB: Accept basic for $\frac{1}{2}$ mark
(d)	No effervescence $\checkmark$ $\frac{1}{2}$ ( 1 mark)	$\text{OH}^-$ present or $\text{CO}_3^{2-}$ or $\text{HCO}_3^-$ absent ( 1 mark)
(e)	White precipitate $\checkmark$ 1 ( 1 mark)	$\text{Ca}^{2+}$ or $\text{Ba}^{2+}$ ions present Accept $\text{Ca}^{2+}$ only $\frac{1}{2}$ $\text{Ba}^{2+}$ only $\frac{1}{2}$ ( 1 mark)
(f)	No white precipitate $\checkmark$ 1 ( 1 mark)	$\text{Ba}^{2+}$ or $\text{Ca}^{2+}$ ions present ( 1 mark)
3(a)	Colourless gas $\checkmark$ $\frac{1}{2}$ ; turns red litmus paper to blue $\checkmark$ $\frac{1}{2}$ ( 1 mark)	Basic gas or ammonium ions present $\checkmark$ 1 ( 1 mark)
(b)	Pale green precipitate $\checkmark$ $\frac{1}{2}$ ; Insoluble in excess $\checkmark$ $\frac{1}{2}$ ( 1 mark)	$\text{Fe}^{2+}$ present $\checkmark$ 1 ( 1 mark)
(c)	Pale green precipitate $\checkmark$ $\frac{1}{2}$ Insoluble in excess $\checkmark$ $\frac{1}{2}$ ( 1 mark)	$\text{Fe}^{2+}$ present $\checkmark$ 1 ( 1 mark)
(d)	Pale green solution. Turns to brown orange $\checkmark$	$\text{Fe}^{2+}$ confirmed $\checkmark$
(e)	White precipitate $\checkmark$ 1 ( 1 mark)	$\text{SO}_4^{2-}$ present $\checkmark$ 1 ( 1 mark)

