

***CHEMISTRY  
FORM THREE  
PAPER 3 (233/3)  
END TERM 2  
EXAMINATIONS  
JULY/AUGUST 2025  
MARKING SCHEME***

You are provided with: solid A sodium carbonate

0.25M HCl solutions B

You are required to determine the mass of solid A

- **Procedure**

Place solid A in 250ml volumetric flask then add about 100ml distilled water. Shake the mixture for solid A to dissolve

Add distilled water to the mark shake the mixture and label it as solution A.

pipette 25ml of solution A into clean conical flask then add 3 drops of methyl orange indicator and titrate with solution B from burette

Repeat Procedure two more times to fill table below

✓ = 1mk  
✓ = 1/2mk

|                           | I    | II   | III  |
|---------------------------|------|------|------|
| Final burette readings    | 37.1 | 37.0 | 37.0 |
| Initial burette readings  | 0.0  | 0.0  | 0.0  |
| Volume of solution B used | 37.1 | 37.0 | 37.0 |

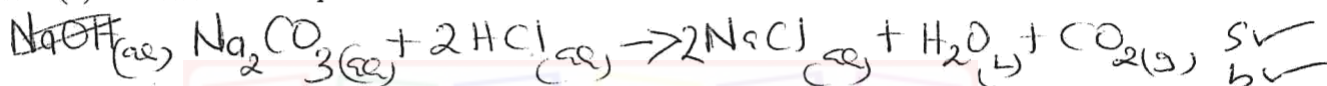
i. Calculate average volume of solution B used

$$\frac{37.1 + 37.0 + 37.0}{3} = 37.0 \text{ cm}^3$$

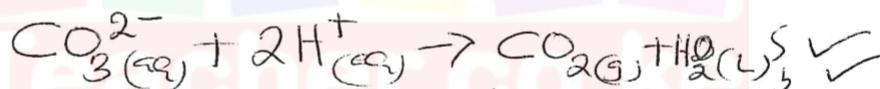
ii. Calculate number of moles of B used

$$\frac{37 \times 0.25}{1000} = 0.00925 \text{ moles}$$

iii. Write the: (a) stoichiometric equation for reaction between A and B



(b) Ionic equation



iv. Calculate moles of sodium carbonate solution A used in titration

$$\text{Moles ratio } 1:2 = \frac{0.00925}{2} = 0.004625$$

v. Moles of solution A in 250ml of solution A

$$0.004625 \Rightarrow 25 \text{ cc} \quad \left| \quad \frac{0.004625 \times 250}{25} = 0.04625 \text{ moles} \right.$$

vi. Calculate the molarity in moles per litre of solution A

$$\frac{0.04625 \times 1000}{250} = 0.185 \text{ M}$$

vii. Calculate the mass of sodium carbonate in 1L of solution A

(Na=23, C=12, O=16)

$$\begin{aligned} \text{Molarity is } \text{mol/L} &= \frac{\text{g/L}}{\text{RFM}} \\ \text{g/L} &= 0.185 \times (23 \times 2 + 12 + 16 \times 3) \\ &= 19.61 \text{ g} \end{aligned}$$