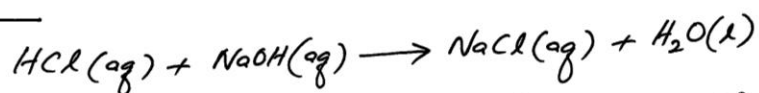


STOICHIOMETRY : BACK TITRATION

Back TitrationExample 4 :

An antacid tablet weighing 0.8017g and containing CaCO_3 plus starch and sweeteners was added to 50.00mL of 0.3115 M HCl in a flask. After the reaction was complete, the excess HCl in the flask required 29.17mL of 0.1350 M NaOH for titration to the equivalence point. Calculate the percentage (by mass) of CaCO_3 in the tablet.

Solution :

$$n_{\text{NaOH}} = \frac{MV}{1000} = \frac{(0.1350\text{M})(29.17)}{1000} = 3.94 \times 10^{-3} \text{ mol}$$

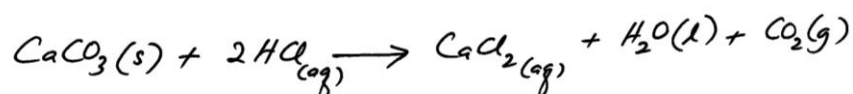
$$n_{\text{HCl}} = n_{\text{NaOH}} = 3.94 \times 10^{-3} \text{ mol}$$

(titrated)

$$n(\text{HCl}_{\text{total}}) = \frac{(50.00\text{mL})(0.3115\text{M})}{1000} = 0.01558 \text{ mol}$$

$$\therefore n(\text{HCl}_{\text{reacted with CaCO}_3}) = (0.01558) - (3.94 \times 10^{-3}) \text{ mol}$$

$$= 0.01164 \text{ mol}$$



$$\frac{n_{\text{CaCO}_3}}{n_{\text{HCl}}} = \frac{1}{2} \Rightarrow n_{\text{CaCO}_3} = \frac{1}{2} \times n_{\text{HCl}}$$

$$\left(\frac{m_{\text{CaCO}_3}}{100.087} \right) = \frac{1}{2} (0.01164)$$

$$\therefore m_{\text{CaCO}_3} = \frac{(0.01164)(100.087)}{2}$$

$$= 0.5825\text{g}$$

$$\% \text{ CaCO}_3 = \left(\frac{0.5825}{0.8017} \times 100 \right) = 72.66 \text{ (Ans)}$$