Acid- Base Titration Calculations

Steps

1. Write a balanced equation
2. Find the number of moles of the known substance
3. Use the balanced equation to find the number of moles of the unknown substance
4. Find the concentration of the unknown substance

Example 1

20 mL of sodium hydroxide solution was titrated with 16 mL of 0.125 molL\(^{-1}\) nitric acid using phenolphthalein indicator.

\[
\text{NaOH} + \text{HNO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}
\]

\[
4c = c = 0.125 \text{ mol L}^{-1}
\]

\[
V = 0.0200 \text{L} \quad V = 0.0160 \text{L}
\]

\[
3n = 0.00200 \text{ mol} \quad 2n = 0.125 \times 0.016
\]

\[
= 0.00200 \text{ mol}
\]

Same due to stoichiometry

Example 2

25 mL of Sodium Hydroxide solution was titrated with 0.173 molL\(^{-1}\) Sulfuric Acid using phenolphthalein indicator. It took 19.1mL of acid for the reaction to reach endpoint. What is the [ ] of NaOH?

\[
2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}
\]

\[
4c = 0.264 \text{ molL}^{-1} \quad c = 0.173 \text{ mol L}^{-1}
\]

\[
V = 0.0250 \text{L} \quad V = 0.0191 \text{L}
\]

\[
3n = 0.00661 \text{ mol} \quad 2n = 0.173 \times 0.0191
\]

\[
= 0.00330 \text{mol}
\]

x2 due to stoichiometry