Titration Calculations

(1) $25.0cm^3$ of $0.100 mol\,dm^{-3}$ NaOH solution required $23.5cm^3$ of dilute hydrochloric acid for neutralisation. Calculate the concentration of the hydrochloric acid.

$$NaOH + HCl \longrightarrow NaCl + H_2O$$

(2) $25.0cm^3$ of sodium hydroxide solution of unknown concentration was titrated with dilute sulphuric acid of concentration $0.050 mol\,dm^{-3}$. $20.0cm^3$ of the acid was required to neutralise the alkali. Find the concentration of the sodium hydroxide in $mol\,dm^{-3}$.

$$2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$$

③ $25.0 cm^3$ of $0.100 mol dm^{-3}$ sodium hydrogencarbonate solution was titrated with dilute sulphuric acid of unknown concentration. $17.6 cm^3$ of the acid was required to neutralise the sodium hydrogencarbonate. Find the concentration of sulphuric acid in gdm^{-3}.

$$2 NaHCO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O + 2CO_2$$

④ $2.10g$ of sodium hydrogencarbonate was dissolved in water and the solution made up to $250 cm^3$. $25.0 cm^3$ of this solution was pipetted into a conical flask and some methyl orange indicator added. This solution was neutralised by $25.9 cm^3$ of dilute hydrochloric acid added from a burette. Calculate the concentration of the acid in ~~mol~~ gdm^{-3}

$$NaHCO_3 + HCl \longrightarrow NaCl + CO_2 + H_2O$$