

## S4 Chemistry Quiz

1. 25.0 cm<sup>3</sup> of 0.20 M sulphuric acid is completely neutralized by 15.5 cm<sup>3</sup> of sodium hydroxide solution. What is the resultant concentration of sodium hydroxide solution?
2. 25.0 cm<sup>3</sup> of ammonia solution was titrated with 0.05 M hydrochloric acid. The following table shows the results of titration.

	Titration 1	Titration 2	Titration 3	Titration 4
Final reading (cm <sup>3</sup> )	2.70	3.60	11.10	9.80
Initial reading (cm <sup>3</sup> )	37.70	35.70	43.30	42.00

What is the molarity of ammonia solution?

## Suggested Answer

- $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) \longrightarrow \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$   
Number of moles of  $\text{H}_2\text{SO}_4$  used =  $0.20 \times 0.025 = 0.005$   
From the equation, mole ratio of  $\text{H}_2\text{SO}_4 : \text{NaOH} = 1 : 2$ .  
 $\therefore$  number of moles of  $\text{NaOH} = 0.005 \times 2 = 0.01$   
Concentration of  $\text{NaOH} = 0.01 / 0.015 = 0.667 \text{ M}$
- Volume of  $\text{HCl}$  used =  $[(35.70 - 3.60) + (43.30 - 11.10) + (42.00 - 9.80)] / 3$   
 $= 32.17 \text{ cm}^3$   
 $\text{NH}_3(\text{aq}) + \text{HCl}(\text{aq}) \longrightarrow \text{NH}_4\text{Cl}(\text{aq})$   
Number of moles of  $\text{HCl}$  used = number of moles of  $\text{NH}_3$  reacted  
 $= 0.05 \times 0.03217$   
 $= 1.61 \times 10^{-3}$   
Molarity of  $\text{NH}_3 = 1.61 \times 10^{-3} / 0.025$   
 $= 0.0643 \text{ M}$