



Raffles Institution
Year 5 H2 Chemistry 2025
Tutorial 1 – Redox Reactions

Answers to Self-Check Questions

- 1** Let the oxidation number of the underlined atoms in the following species be x .
- (a) Note: Ba^{2+} & SO_4^{2-}
 $+2 + x + 4(-2) = 0$
 $x = +6$
- (b) Note: Na^+ & VO_4^{3-}
 $3(+1) + x + 4(-2) = 0$
 $x = +5$
- (c) $x + (-2) = +2$
 $x = +4$
- (d) $2x + 4(-2) = -2$
 $x = +3$
- (e) $2(+1) + 2x = 0$
 $x = -1$
- (f) $2x + 4(-2) = 0$
 $x = +4$
- (g) Note: F is more electronegative than Br.
 $x + (-1) = 0$
 $x = +1$
- (h) Note: F is more electronegative than I.
 $x + 7(-1) = 0$
 $x = +7$
- 2**
- (a) $\overset{-3}{\text{NH}_3}(\text{aq}) + \overset{-1}{\text{HCl}}(\text{aq}) \rightarrow \overset{-3}{\text{NH}_4}\overset{-1}{\text{Cl}}(\text{aq})$
This is not a redox reaction since there is no change in initial and final oxidation states for all elements.
- (b) $\overset{0}{3\text{Mg}}(\text{s}) + \overset{+1}{2\text{NH}_3}(\text{g}) \rightarrow \overset{+2}{\text{Mg}_3}\overset{0}{\text{N}_2}(\text{s}) + \overset{0}{3\text{H}_2}(\text{g})$
This is a redox reaction where the oxidation number of H decreases from +1 in NH_3 to 0 in H_2 , and the oxidation number of Mg increases from 0 in Mg to +2 in Mg_3N_2 .
- 3**
- (a) $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow \text{Na}_2\text{S}_4\text{O}_6 + 2\text{NaI}$
Amount of $\text{Na}_2\text{S}_2\text{O}_3$ required $= 15.0 \times 10^{-3} \times 0.100 = 1.50 \times 10^{-3}$ mol
Amount of I_2 produced $= 1.50 \times 10^{-3} \div 2 = 7.50 \times 10^{-4}$ mol
- (b) $\text{O}_3 + 2\text{KI} + \text{H}_2\text{O} \rightarrow \text{I}_2 + \text{O}_2 + 2\text{KOH}$
Amount of O_3 in the mixture $= 7.50 \times 10^{-4}$ mol
Volume of O_3 in the mixture $= 7.50 \times 10^{-4} \times 22.7 = 0.01703 \text{ dm}^3 = 17.03 \text{ cm}^3$
% of O_3 in the mixture $= \frac{17.03}{500} \times 100\% = 3.41\%$
- 4**
- (a) $\text{NaOH}(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$
Amount of HCl reacted $= 22.50 \times 10^{-3} \times 0.100 = 2.250 \times 10^{-3}$ mol
Amount of NaOH in 25.0 cm^3 of solution $\text{H} = 2.250 \times 10^{-3}$ mol
Amount of NaOH in 100 cm^3 of solution $\text{H} = \frac{2.250 \times 10^{-3}}{25.0} \times 100 = 9.00 \times 10^{-3}$ mol

