

Answers to 3.2 Paper 1

- 1 Blue colour disappears, brown (orange) solution forms.
White precipitate formed.
- 2 Brown to yellow / yellow to colourless/brown to colourless.

$$3 \quad V(\text{S}_2\text{O}_3^{2-}) = \frac{24.55 + 24.65 + 24.6}{3} \\ = 24.60 \text{ mL}$$

$$n(\text{S}_2\text{O}_3^{2-}) = 0.102 \text{ mol L}^{-1} \times 0.02460 \text{ L} \\ = 2.51 \times 10^{-3} \text{ mol}$$

$$\frac{n(\text{Cu}^{2+})}{n(\text{I}_2)} \times \frac{n(\text{I}_2)}{n(\text{S}_2\text{O}_3^{2-})} = \frac{2}{1} \times \frac{1}{2}$$

$$n(\text{Cu}^{2+}) = n(\text{S}_2\text{O}_3^{2-})$$

$$n(\text{Cu}^{2+}) = 2.51 \times 10^{-3} \text{ mol}$$

$$n(\text{Cu}^{2+}) \text{ in original sample (250 mL)} \\ = 2.51 \times 10^{-3} \text{ mol} \times 10 \\ = 2.51 \times 10^{-2} \text{ mol}$$

$$m(\text{Cu}^{2+}) = 2.51 \times 10^{-2} \text{ mol} \times 63.5 \text{ g mol}^{-1} \\ = 1.59 \text{ g}$$

$$\% \text{ Cu} = \frac{1.59 \text{ g}}{2.15 \text{ g}} \times 100\% \\ = 74.0 \%$$

A = correct calculation of $n(\text{Cu}^{2+})$ or $c(\text{Cu}^{2+})$ of solution analysed, M = correct mass of copper,
E = correct % composition plus all units correct and final answer to 3 sig fig