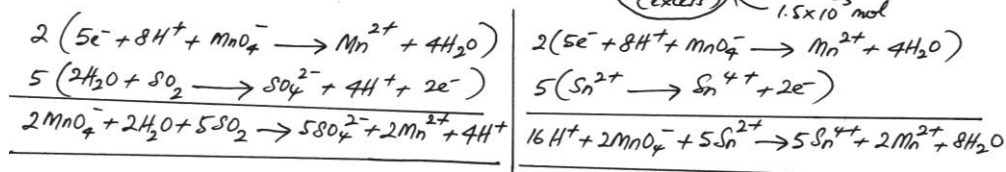
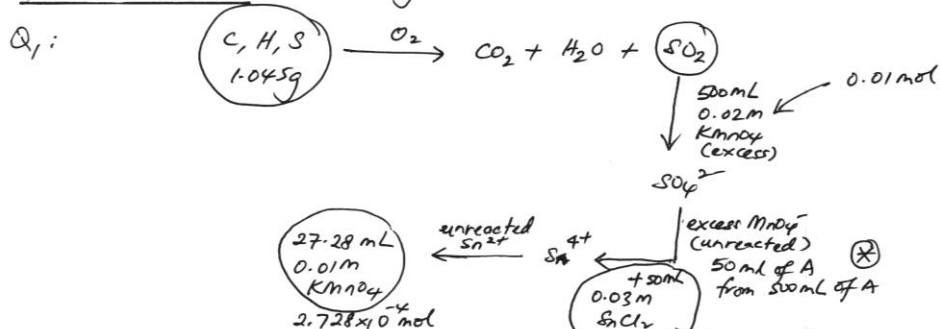


KTT 111 : Model Answers
Sem1 2008/2009 : Q1 : STOICHIOMETRY

Sem I (2008/09) : Stoichiometry



$$n_{\text{Sn}^{2+}}^{\text{(unreacted)}} = \frac{5}{2} \times n_{\text{MnO}_4^-} = \frac{5}{2} \times \left(\frac{27.28 \times 0.01}{1000} \right) = 6.82 \times 10^{-4} \text{ mol}$$

$$n_{\text{Sn}^{2+}}^{\text{(reacted in the unreacted } \text{KMnO}_4)} = (1.5 \times 10^{-3}) - (6.82 \times 10^{-4}) = 8.18 \times 10^{-4} \text{ mol}$$

$$n_{\text{MnO}_4^-}^{\text{(unreacted)}} = \frac{2}{5} \times n_{\text{Sn}^{2+}} = \left(\frac{2}{5} \times 8.18 \times 10^{-4} \right) \text{ mol} = 3.272 \times 10^{-4} \text{ mol (in 50 mL of A)}$$

$$\therefore \text{In 500 mL of A, } n_{\text{MnO}_4^-}^{\text{(unreacted)}} = (3.272 \times 10^{-4}) \times \frac{500}{50} = 3.272 \times 10^{-3}$$

$$n_{\text{MnO}_4^-}^{\text{react with } SO_2} = (0.01 - 3.272 \times 10^{-3}) \text{ mol} = 6.728 \times 10^{-3} \text{ mol}$$

$$n_{SO_2} = \frac{5}{2} \times n_{\text{MnO}_4^-} = \left(\frac{5}{2} \times 6.728 \times 10^{-3} \right) \text{ mol} = 0.01682 \text{ mol}$$

$$n_S = n_{SO_2} = 0.01682 \text{ mol}$$

$$\therefore m_S = (0.01682 \times 32 \text{ g mol}^{-1}) = 0.5382 \text{ g}$$

$$\% S = \frac{0.5382}{1.045} \times 100 = 51.5 \%$$

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