KTT 111 : Model Answers
Sem2 2008/2009 : Q1 : STOICHIOMETRY

Sem 2 (2008/09) : Stoichiometry

Q_2 (a) $2(MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O)$

$5(H_2C_2O_4 \longrightarrow 2CO_2 + 2H^+ + 2e^-)$

$2MnO_4^- + 6H^+ + 5H_2C_2O_4 \longrightarrow 10CO_2 + 8H_2O + 2Mn^{2+}$

0.2585 g

Assume molarity of $MnO_4^- = M$

$n_{H_2C_2O_4} = \frac{5}{2} \times n_{MnO_4^-}$

$\left(\frac{0.2585\,g}{90\,g\,mol^{-1}}\right) = \frac{5}{2} \times \left(\frac{22.35 \times M}{1000}\right)$

$\therefore M = 0.0515\ mol\,dm^{-3}$

Molarity of the $KMnO_4$ solution $= 0.0515\ mol\,dm^{-3}$ //

Q_2 (6) – see text (types of bonding)

Q_3 (c) (i) $5\,pm = 5 \times 10^{-10}\,cm$ //
$= 5 \times 10^{-3}\,nm$ //

(ii) $8.5\,cm^3 = 8.5 \times 10^{-6}\,m^3$ //
$= 8.5 \times 10^{3}\,mm^3$ //

(iii) $65.2\,mg = 65.2 \times 10^{-3}\,g$
$= 6.52 \times 10^{-2}\,g$ //
$= 6.52 \times 10^{-2} \times 10^{+12}\,pg$
$= 6.52 \times 10^{10}\,pg$ //

$[1\,Å = 100\,pm = 0.1\,nm = 10^{-10}\,m]$
$1\,pm = 10^{-10}\,cm = 10^{-8}\,m = 10^{-3}\,n$
$(1\,cm = 10^{-2}\,m)^3$
$1\,cm^3 = 10^{-6}\,m^3$
$(1\,cm = 10\,mm)^3$
$1\,cm^3 = 10^{3}\,mm^3$
$1\,mg = 10^{-3}\,g$
$1\,pg = 10^{-12}\,g$
$1\,g = 10^{12}\,pg$

Q_3 (d) $35.7\,mL,\ 12.0\,M\ HCl \xrightarrow{\text{diluted to}} 250.0\,mL$

$(M_1V_1)_{\text{before dilution}} = (M_2V_2)_{\text{after dilution}}$

$(12.0 \times 35.7) = M_2(250.0)$

$\therefore M_2 = 1.7136\ mol\,dm^{-3}$ //

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