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Chemistry 203
Pre-Lab Assignment: Chemical Equilibrium Exp 6

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I.D. #: 8010 01141 **Lab Section:** 8

1. A sample is prepared by mixing 5.00mL of 0.200M $Fe(NO_3)_3$ solution with 3.00mL of 2.00×10^{-3}M KSCN and the mixture is made up to 20.00mL with distilled water. Determine the concentration of the complex formed, and that of Fe^{3+} ion left in solution.

equation : $Fe^{3+} + SCN^- \rightleftharpoons FeSCN^{2+}$

$n_o Fe^{3+} = CV = 0.2 \times 5 = 1.00$ mmol
$n_o SCN^- = CV = 2\times10^{-3} \times 3 = 6\times10^{-3}$ mmol } so Fe^{3+} is in excess

since Fe^{3+} is in very large quantity (excess) ; this will push the reaction in a forward direction (as if it is complete) "Le Chatelier Principle"

$\Rightarrow n\ FeSCN^{2+} = n\ SCN^- = 6\times10^{-3}$ mmol

$[FeSCN^{2+}]_2 = \frac{6.00\times10^{-3}\ \text{mmol}}{20\ \text{ml}} = 3.00\times10^{-4}$ mol/l

$[Fe^{3+}]\ left = \frac{n_o - n\ SCN^-}{Vt} = \frac{1.00 - 6\times10^{-3}}{20} = 0.0497$ mol/l

2. 5.00mL of 2.00×10^{-3}M $Fe(NO_3)_3$ are mixed with 2.00mL of 2.00×10^{-3}M KSCN and 3.00mL of distilled water are added. The concentration of $FeSCN^{2+}$ is determined spectrophotometrically and found to be 5.07×10^{-5}M. Determine the equilibrium constant Kc of the above reaction.

$[FeSCN^{2+}] = 5.07\times10^{-5}$ mol/l $\Rightarrow n_{eq}\ FeSCN^{2+} = [\ ]Vt = 5.07\times10^{-5} \times 10$ ml $= 5.07\times10^{-4}$ mmol

$[Fe^{3+}]_{eq} = \frac{n_o\ Fe^{3+} - n_{FeSCN^{2+}}}{Vt} = \frac{2\times10^{-3}\times5 - 5.07\times10^{-4}}{10.00} = 9.50\times10^{-4}$ mol/l

$[SCN^-]_{eq} = \frac{n_o\ SCN^- - n_{FeSCN^{2+}}}{Vt} = \frac{2\times10^{-3}\times2 - 5.07\times10^{-4}}{10} = 3.49\times10^{-4}$ mol/l

$Kc = \frac{[FeSCN^{2+}]}{[Fe^{3+}].[SCN^-]} = \frac{5.07\times10^{-5}}{9.5\times10^{-4}\times3.49\times10^{-4}} = 15.3\times10$

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