

2. In calculating  $[\text{FeSCN}^{2+}]$  in each test tube, some assumptions must be made. It is impossible to make up a set of test tubes of standard concentration of  $\text{FeSCN}^{2+}$  to compare against, since the equilibrium reaction will always come into play, and the position of the equilibrium will shift on dilution of the mixture. For these reasons, no calibration graphs can be drawn, so you will have to assume that the absorbance measured is proportional to the  $[\text{FeSCN}^{2+}]$ .

In obtaining a standard concentration for comparison of results, you must assume that in test tube A, in which  $0.200\text{M Fe}^{3+}$  is mixed with  $0.002\text{M SCN}^-$ , there is so much excess  $\text{Fe}^{3+}$  that essentially all the  $\text{SCN}^-$  will be used up. You can therefore state that the initial  $[\text{SCN}^-]$  will be equal to the equilibrium  $[\text{FeSCN}^{2+}]$  in test tube A. This test tube therefore becomes the standard for comparison of the absorbances measured in the experiment.

Calculate the equilibrium  $[\text{FeSCN}^{2+}]$  in each tube from the following equation:

$$[\text{FeSCN}^{2+}] (\text{test tube } x) = [\text{FeSCN}^{2+}] (\text{test tube } A) \times \frac{\text{Absorbance (test tube } x)}{\text{Absorbance (test tube } A)}$$

Note that the assumption that all the  $\text{SCN}^-$  will be used up in test tube A implies that the equilibrium  $[\text{SCN}^-] = 0$ . This will give no meaningful results for any quantitative relationships in that test tube, but it does enable you to get meaningful results in the remaining four.

3. For test tubes B to E, calculate the equilibrium  $[\text{Fe}^{3+}]$  and equilibrium  $[\text{SCN}^-]$  by subtracting the equilibrium  $[\text{FeSCN}^{2+}]$  from the initial  $[\text{Fe}^{3+}]$  and initial  $[\text{SCN}^-]$  respectively. (Mole ratio in equation = 1:1:1.)

4. Find the equilibrium constant for the system