CHAPTER 16		BLM 16.3.3A
ANSWER KEY	Investigation 16.C: Using Experimental Data to Determine an Equilibrium Constant Answer Key	

Answer to Prediction Question

$$K_c = \frac{[Fe(SCN)^{2+}(aq)]}{[Fe^{3+}(aq)][SCN^{-}(aq)]}$$

Answers to Analysis Questions

1. As the volume of $SCN^{-}(aq)$ in the vials increases, the colour intensity of the $Fe(SCN)^{2+}(aq)$ should increase because the equilibrium is being shifted to the right.

$$Fe^{3+}(aq) + SCN^{-}(aq) \leftrightarrow Fe(SCN)^{2+}(aq)$$

2. Values of K_c will vary greatly from one group to another; the range is typically from 100 to 800. If a spectrophotometer or a colourimeter is used, the precision should be much improved. Differences in values will largely be due to the subjectivity of the visual colour assessment and error associated with using the depth of solution to measure concentration.

3. **(a)** The equilibrium concentration of the product would be half the concentration of the product in the actual reaction. This is because in the supposed reaction, each mol of $SCN^{-}(aq)$ forms half a mole of product.

(b) The value of K_c will be larger. The $[SCN^{-}(aq)]$ at equilibrium will be reduced and the equilibrium expression is different.

$$K_c = \frac{[Fe(SCN)^{2+}(aq)]}{[Fe^{3+}(aq)][SCN^{-}(aq)]^2}$$

Answer to Conclusion Question

4. The conclusion should state that *within experimental error*, the ratio of equilibrium concentrations

$$\frac{[Fe(SCN)^{2+}(aq)]}{[Fe^{3+}(aq)][SCN^{-}(aq)]}$$

is constant. There will almost certainly be large variations in the calculated value for K_c, even in the same group, and you should discuss the experimental errors that are present.