

## SPECTROPHOTOMETRIC DETERMINATION OF AN EQUILIBRIUM CONSTANT

### Lab report

Name:

ID #:

TA name:

Lab Section:

Lab Date:

1. Looking at Table 5 (data sheet), how is  $K_c$  related to the initial concentrations ( $[Fe^{3+}]_0$  and  $[SCN^-]_0$ )? Is it what you expected? (Explain briefly) (5 marks)

Looking at Table 5 in the results, it is somewhat evident that  $K_c$  is actually independent of the initial concentrations of the reactants since they are relatively consistent among the five test tubes. Furthermore, the  $K_c$  values are much more relative as opposed to the significant changes in  $K_c$  due to temperature variation which holds true because the equilibrium constant is affected by temperature.

However, looking at the data for any trends, it appears that  $K_c$  drops as the concentration of  $[SCN^-]$  increases, but this should not be true. So, accounting for relative human error and limited machine capabilities, the value only fluctuated minimally from the average which was 204 (M<sup>-1</sup>). Thus the results are not exactly as I had expected, but ignoring the small deviations, the results are based on Le Chatelier's Principle which states that when a chemical system in equilibrium is disturbed there will be a shift in the system to reduce the effect of that disturbance. So, by increasing  $[SCN^-]$  from tube 1 to 5, there should be no change of  $K_c$  since equilibrium will shift to the right of the reaction to increase the concentration of  $[FeSCN^{2+}]$  and balance out.

$$K_c = \frac{[FeSCN^{2+}]_{eq}}{[Fe^{3+}] * [SCN^-]}$$

2. To obtain  $[FeSCN_{2-}]_{eq}$  in tube 5, you made the assumption that 100% of the ions  $SCN^-$  had reacted. Now that you know the value for  $K_c$  (average in table 5), build an ICE diagram to calculate the true percentage of  $SCN^-$  reacted in tube 5. Comment on the validity of the assumption. (Make sure you include the ICE diagram in your answer) (10 marks)

ICE Table

	$[Fe^{3+}]$	$+ [SCN^-]$	$\rightleftharpoons [FeSCN_{2-}]$
Initial	0.180 M	0.000199 M	0 M
Change	-x	-x	+x
Equilibrium	$(0.180 - x)$ M	$(0.000199 - x)$ M	x M

# Equilibrium Constant Lab Report Discussion

**Yan Bai**



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