

Exp 3 Report

Purpose:

The purpose of this lab is to use the chemical reaction $\text{Fe}^{3+}(\text{aq}) + \text{SCN}^{-}(\text{aq}) \rightleftharpoons \text{FeSCN}^{2+}(\text{aq})$ to determine equilibrium constant of the reaction. Our results will be the absorbance with relation to a set wavelength. Through changing the concentrations we can see how the absorbance will differ.

Procedure:

For this experiment we will prepare 6 varying concentrations of SCN^{-} mixed with HNO_3 and Fe^{3+} . Then after mixing for three minutes we must measure the absorbance at the maximum wavelength. Then we need to plot our information on an excel graph. For part B we need to repeat the procedure with concentrations that do not go to completion. After we will use the slope from part A to calculate $[\text{FeSCN}^{2+}]$ by plugging in absorbance as y. Then we must use ICE charts to calculate K_c and average the K_c values from the 5 trials.

1.) Prepare 6 beakers with varying concentrations.

2.) Stir for 3 minutes and measure maximum absorbance.

3.) Plot data on excel with a trendline.

4.) For Part B repeat with concentrations that do not fully convert.

5. Use slope of data to calculate $[\text{FeSCN}^{2+}]$ from absorbance

6. Use ICE chart to calculate K_c and average them.

Discussion:

The objective of today's lab was to measure absorbance rates of Fe^{3+} with SCN^{-} to find the equilibrium constant of the chemical reaction. To do this we measured the maximum absorbance rate of the mixture at varying concentrations. After we plotted our data on an excel graph and finding the equation of the trendline. We used the trendline to calculate the concentration of the product. Our results yielded that our slope was 3294.3x and our K_c number was averaged to be 194.357. Possibilities for error were in our measurements. This time our measurements were more accurate due to the pipette

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$\lambda_{\max}$ 453.5

Test Tube #	0.200 M $\text{Fe}(\text{NO}_3)_3$ (mL)	0.00200 M KSCN (mL)	0.1 M HNO_3 (mL)	$[\text{Fe}^{3+}]$ after dilution	$[\text{SCN}^-]$ after dilution	$[\text{FeSCN}^{2+}]$ formed	Absorbance
1	5.00	0.00	20.00	.04	0	0	-.008
2	5.00	5.00	15.00	.04	.0004	.0004	1.348
3	5.00	4.00	16.00	.04	.00032	.00032	.988
4	5.00	3.00	17.00	.04	.00024	.00024	.789
5	5.00	2.00	18.00	.04	.00016	.00016	.580
6	5.00	1.00	19.00	.04	.00008	.00008	.276

Part B

Beaker #	0.00200 M $\text{Fe}(\text{NO}_3)_3$ (mL)	0.00200 M KSCN (mL)	0.1 M HNO_3 (mL)	$[\text{Fe}^{3+}]$ after dilution	$[\text{SCN}^-]$ after dilution	Absorbance
1	6.00	0.00	19.00	.00048	.00	.011
2	6.00	2.00	17.00	.00048	.00016	.042
3	6.00	4.00	15.00	.00048	.00032	.069
4	6.00	6.00	13.00	.00048	.00048	.143
5	6.00	8.00	12.00	.00048	.00064	.193
6	6.00	10.00	10.00	.00048	.0008	.210



Initial Concentration (M)	.00048	.00016	0
Change in Concentration (M)	- .0000033	- .0000033	+ x
Equilibrium Concentration (M)	.00048	.00016	.0000033

= 185.3

$$M_1 V_1 = M_2 V_2$$

$$[.2][5] = [25]M_2$$

Trial 1

Initial Concentration (M)			
Change in Concentration (M)			
Equilibrium Concentration (M)			

= -2098

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Trial 3

Initial Concentration (M)	.00048	.00032	0
Change in Concentration (M)	- x	- x	+ x
Equilibrium Concentration(M)	.00048 - x	.00032 - x	2.09×10^{-5}

$$y = 3294.3x$$

$$= 151.45$$

$$= 152.57$$

$$K_{eq} = \frac{[FeSCN^{2+}]}{[Fe][SCN^-]} = \frac{[x]}{[.00048-x][.00032-x]}$$

Trial 4

Initial Concentration (M)			0
Change in Concentration (M)			
Equilibrium Concentration(M)			

$$= 227.13$$

Trial 5

Initial Concentration (M)	.00046	.00062	0
Change in Concentration (M)	- .000047	- .000047	+ .000047
Equilibrium Concentration(M)	.000413	.00056	.000047

$$= 188.5$$

Trial 6

Initial Concentration (M)	.00046	.0007	0
Change in Concentration (M)	- .000064	- .000064	+ .000064
Equilibrium Concentration(M)	.0004	.00064	.000064

$$= 217.66$$

Average: 194.3527

[FeSCN2+]	Abs
0	-0.008
0.0004	1.348
0.00032	0.988
0.00024	0.789
0.00016	0.58
0.00008	0.276

