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Name

Section

Date

Instructor

25 EXPERIMENT 25

Lab Report

Part A – Preparation of Five Standard $Fe(SCN)^{2+}$ Solutions

Is it necessary to calculate the final $Fe(SCN)^{2+}$ concentration for the solution in each beaker?

Yes

$Fe^{3+} + SCN^- \rightleftharpoons Fe(SCN)^{2+}$ 1:1 ∴ KSCN is limiting reactant ∴ $[Fe(SCN)^{2+}] = [KSCN]$

1) $\frac{0.0015\ M \cdot 0.005\ L}{0.025\ L} = 3.00 \times 10^{-4}$

2) 2.40×10^{-4}

3) 1.80×10^{-4}

4) 1.20×10^{-4}

5) 6.00×10^{-5}

Part B – Absorption Measurements for the Standard Solutions and Preparation of the Beer-Lambert Curve

Should you determine the absorbance of each standard solution from the tab delimited files saved in Step 4? Should your λ_{max} be in the 450–460 nm region of the absorbance spectrum of each standard solution? Why or why not?

Yes – we want to find relationship between concentration and absorbance

Yes – thats a local max with minimal noise.

Part C – Equilibrium Solution Preparation and Absorption Measurements: Finding K_c

Should you determine the absorbance of each equilibrium mixture from the tab delimited files saved in Step 11? Should your λ_{max} be in the 450–460 nm region of the absorbance spectrum of each equilibrium mixture? Why or why not?

Yes - we can use absorbance to find concentration.

Yes - that's a local max with minimal noise.

Prepare an "ICE" table for each equilibrium mixture.

1.)

	Fe^{3+}	SCN^-	$Fe(SCN)^{2+}$
i	7.5×10^{-4}	3×10^{-4}	0
c	$-x$ -4.0×10^{-5}	$-x$ -4.0×10^{-5}	$+x$ $+4.0\times10^{-5}$
e	7.1×10^{-4}	2.6×10^{-4}	4.0×10^{-5}

$0.061 = 2953.3x - 0.057$

$\therefore x = 4.0\times10^{-5}$

2)

	Fe^{3+}	SCN^-	$Fe(SCN)^{2+}$
i	7.5×10^{-5}	4.5×10^{-4}	0
c	$-x$	$-x$	$+x$
e	6.7×10^{-4}	3.7×10^{-4}	8.4×10^{-5}

$0.191 = 2953.3x - 0.057$

$\therefore x = 8.397\times10^{-5}$

3)

	Fe^{3+}	SCN^-	$Fe(SCN)^{2+}$
i	7.5×10^{-4}	6×10^{-4}	0
c	$-x$	$-x$	$+x$
e	6.5×10^{-4}	5.0×10^{-4}	9.9×10^{-5}

$0.235 = 2953.3x - 0.057$

$\therefore x = 9.9\times10^{-5}$

Determine K_c for each of the three equilibrium solutions.

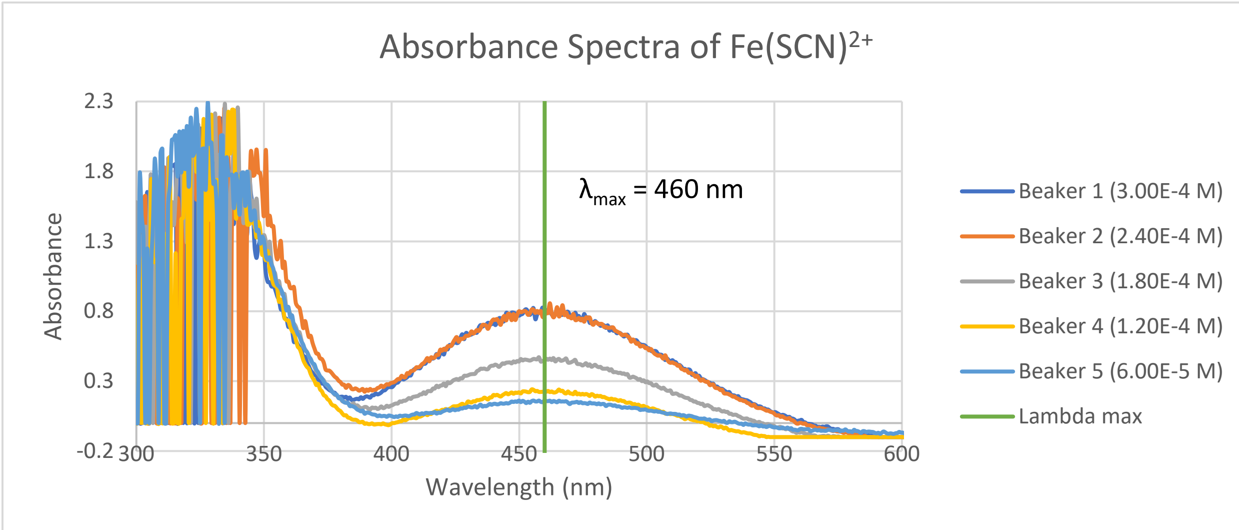
1) $K_c = \frac{4\times10^{-5}}{(2.6\times10^{-4})(7.1\times10^{-4})} = 2.16\times10^{2}$

2) $K_c = \frac{8.4\times10^{-5}}{(3.7\times10^{-4})(6.7\times10^{-4})} = 3.44\times10^{2}$

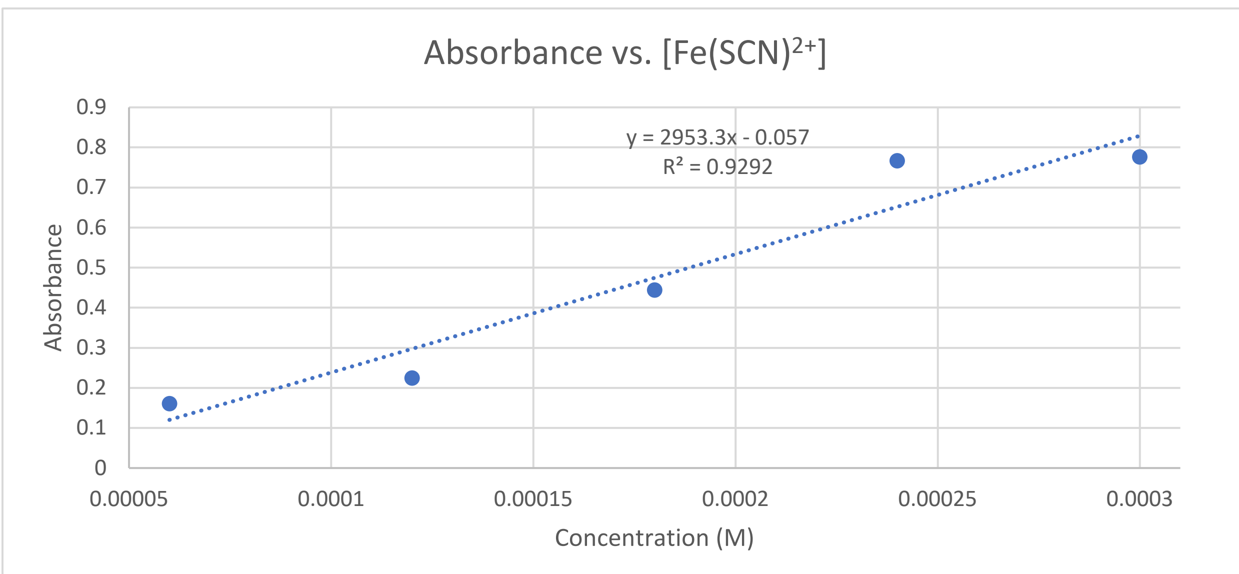
3) $K_c = \frac{9.9\times10^{-5}}{(6.5\times10^{-4})(5.0\times10^{-4})} = 3.03\times10^{2}$

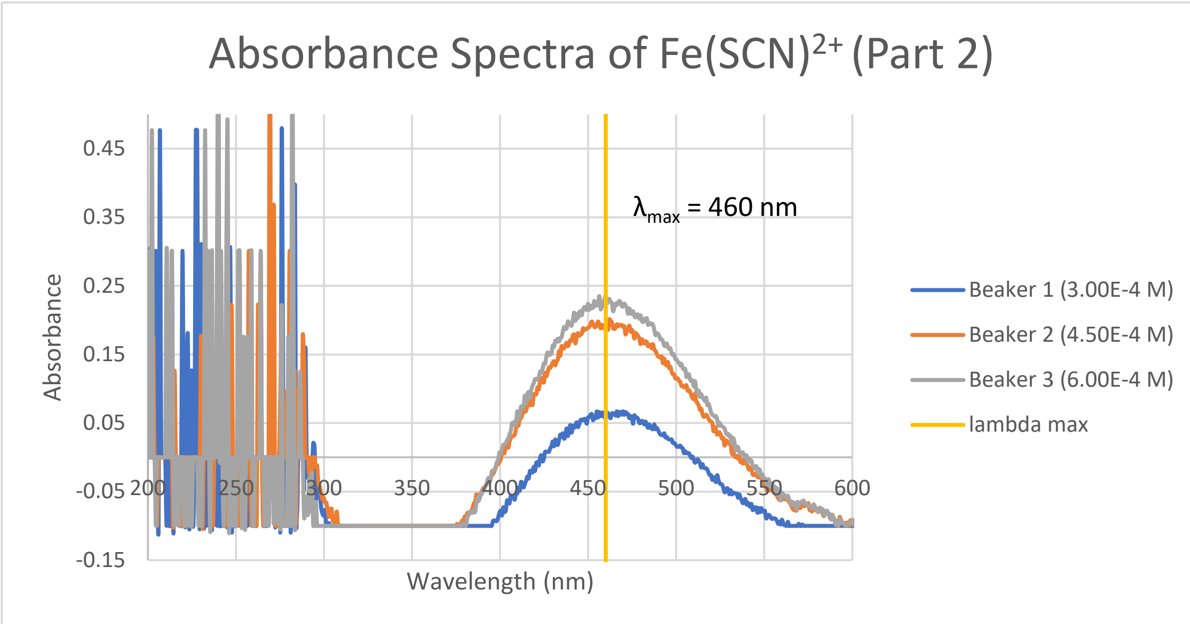
Determine the average K_c value for the equilibrium mixtures.

$K_c = \frac{2.16\times10^{2} + 3.44\times10^{2} + 3.03\times10^{2}}{3} \boxed{= 3.17\times10^{2}}$



Beakers 1 and 2 were observed to have similar absorbances.





Absorbance Spectra of Fe(SCN)2+ (Part 2)
λmax = 460 nm
Absorbance
0.45
0.35
0.25
0.15
0.05
-0.05
-0.15
200
250
300
350
400
450
500
550
600
Wavelength (nm)
Beaker 1 (3.00E-4 M)
Beaker 2 (4.50E-4 M)
Beaker 3 (6.00E-4 M)
lambda max