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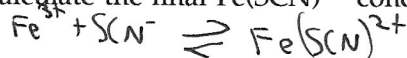
EXPERIMENT 25

## Lab Report

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

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

Yes



1:1

$\therefore$  KSCN is limiting

reactant  $\{ [\text{Fe}(\text{SCN})^{2+}] = [\text{KSCN}]$

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

$$2) 2.40 \times 10^{-4}$$

$$3) 1.50 \times 10^{-4}$$

$$4) 1.20 \times 10^{-4}$$

$$5) 6.00 \times 10^{-5}$$

### 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  $\lambda_{\text{max}}$  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 – that's 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  $\lambda_{\text{max}}$  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.)

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

$0.061 = 2953.3x - 0.057$   
 $\therefore x = 4.0 \times 10^{-5}$

2.)

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

$$0.191 = 2953.3x - 0.057$$

$$\therefore x = 8.997 \times 10^{-5}$$

3.)

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

$0.235 = 2953.3x - 0.057$   
 $\therefore x = 9.9 \times 10^{-5}$

Determine  $K_c$  for each of the three equilibrium solutions.

$$1) K_c = \frac{4 \times 10^{-5}}{(2.6 \times 10^{-4})(7.1 \times 10^{-4})} = 2.16 \times 10^2$$

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$$2) K_c = \frac{8.4 \times 10^{-5}}{(3.7 \times 10^{-4})(6.7 \times 10^{-4})} = 3.44 \times 10^2$$

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$$3) K_c = \frac{9.9 \times 10^{-5}}{(6.5 \times 10^{-4})(5.0 \times 10^{-4})} = 3.03 \times 10^2$$

Determine the average  $K_c$  value for the equilibrium mixtures.

$$K_c = \frac{2.16 \times 10^2 + 3.44 \times 10^2 + 3.03 \times 10^2}{3} = 3.17 \times 10^2$$