

Name _____	Lab Partner _____
TA Name _____	Section _____ Date _____

### Determination of an Equilibrium Constant Worksheet

As you work through the steps in the lab procedures, record your experimental values and the results on this worksheet.

**Table A:** Calibration Curve of  $\text{FeSCN}^{2+}$  Solutions

Solution #	Volume of 0.100 M $\text{Fe}^{3+}$ (mL)	Volume of $6.00 \times 10^{-4}$ M $\text{SCN}^{-}$ (mL)	Volume of water (mL)	Total Volume (mL)	$[\text{FeSCN}^{2+}]$ (M)	Absorbance at ~470 nm
Blank	1.00	0.00	7.00	8.00	_____	_____
1A	1.00	1.00	6.00	8.00		
2A	1.00	2.00	5.00	8.00		
3A	1.00	3.00	4.00	8.00		
4A	1.00	4.00	3.00	8.00		
Equation of Trendline _____					R <sup>2</sup> Value _____	

1. What is the initial concentration of  $\text{SCN}^{-}$  in Solution 1A? Show your work; remember to account for dilution. Pay attention to significant figures.

2. Given your result from Question 1, what is the concentration of  $\text{FeSCN}^{2+}$  in Solution 1A? Enter this concentration in your data table.

3. How does the intensity of the color of the solutions and the absorbance vary with the concentration of the  $\text{FeSCN}^{2+}$  solution?

**Table B:** Measuring  $[\text{FeSCN}^{2+}]$  in Equilibrium Mixtures

Solution #	Volume of 0.002 M $\text{Fe}^{3+}$ (mL)	Volume of 0.002 M $\text{SCN}^{-}$ (mL)	Volume of water (mL)	Total Volume (mL)	Initial $[\text{Fe}^{3+}]$ (M)	Initial $[\text{SCN}^{-}]$ (M)	Abs at ~470 nm	Calculated Equilibrium $[\text{FeSCN}^{2+}]$ (M)
1B	2.00	4.00	2.00	8.00				
2B	3.00	4.00	1.00	8.00				
3B	4.00	4.00	0.00	8.00				
4B	4.00	3.00	1.00	8.00				
5B	4.00	2.00	2.00	8.00				

4. Calculate the initial concentration of  $\text{Fe}^{3+}$  in Solution 1B. Show your work; remember to account for dilution. Enter the concentration in your data table.

5. Calculate the initial concentration of  $\text{SCN}^{-}$  in Solution 1B. Show your work; remember to account for dilution. Enter the concentration in your data table.

6. Using your calibration curve from Part A and your absorbance data from Part B, what is the equilibrium concentration of  $\text{FeSCN}^{2+}$  in Solution 1B? Show your work.

7. Construct a reaction table for Solution 1B.

	$\text{Fe}^{3+}(\text{aq})$	+	$\text{SCN}^{-}(\text{aq})$	$\rightarrow$	$\text{FeSCN}^{2+}(\text{aq})$
initial					
change( $\Delta$ )					
equilibrium					

8. From the equilibrium concentrations in the reaction table for Solution 1B, calculate the equilibrium constant for the reaction.