FLINN SCIENTIFIC

Name_____

Data Tables

Reference Solutions

Temperature		
Sample	**[$FeSCN^{2+}$]**	**Absorbance**
Reference solution #1		
Reference solution #2		
Reference solution #3		
Reference solution #4		
Reference solution #5		

Test Solutions

Temperature			
Sample	**[Fe^{3+}]***	**[SCN^-]***	**Absorbance**
Test solution #6			
Test solution #7			
Test solution #8			
Test solution #9			
Test solution #10			

*These are the concentrations of ions in solution immediately after mixing and before any reaction has occurred. See the *Pre-Lab Questions* for calculations.

Results Table

Sample	$[FeSCN^{2+}]_{eq}$	$[Fe^{3+}]_{eq}$	$[SCN^-]_{eq}$	K_{eq}
Test Solution #6				
Test Solution #7				
Test Solution #8				
Test Solution #9				
Test Solution #10				
Average value				
Average deviation				

Post-Lab Calculations and Analysis

(Use a separate sheet of paper to answer the following questions.)

1. Plot molar concentration of $FeSCN^{2+}$ versus absorbance as shown in Figure 1, and draw the best-fitting straight line through the data points. Include the origin (zero absorbance for zero concentration) as a valid point.

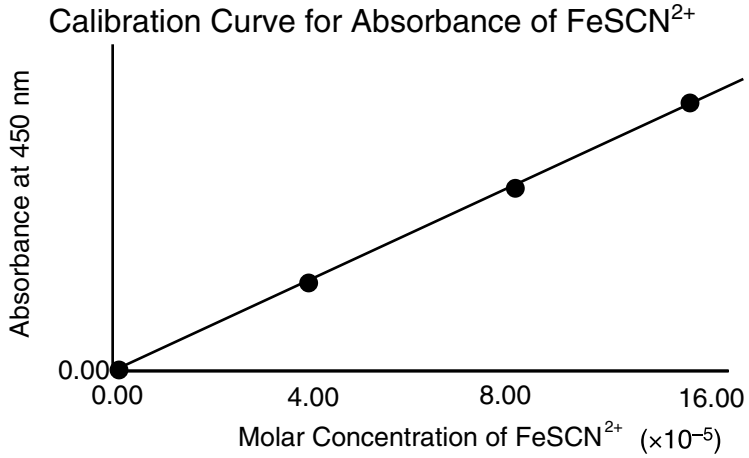

Figure 1. Sample Graph of Absorbance versus Concentration of $FeSCN^{2+}$

2. The unknown concentration of $FeSCN^{2+}$ ions in each test solution can be determined from the graph. Find the absorbance value of the test solution, read across to the best-fit, straight-line curve, and then down to the x-axis to find the concentration.

3. Record the $FeSCN^{2+}$ concentration for each test solution in the Results Table.

4. Calculate the equilibrium concentration of Fe^{3+} ions in each test solution #6–10: subtract the equilibrium concentration of $FeSCN^{2+}$ ions from the initial concentration of Fe^{3+} ions (see the Test Solutions Data Table). Enter the results in the Results Table.

$$[Fe^{3+}]_{eq} = [Fe^{3+}]_{initial} - [FeSCN^{2+}]_{eq}$$

5. Calculate the equilibrium concentration of SCN^- ions in each test solution #6–10: subtract the equilibrium concentration of $FeSCN^{2+}$ ions from the initial concentration of SCN^- ions (see the Test Solutions Data Table). Enter the results in the Results Table.

$$[SCN^-]_{eq} = [SCN^-]_{initial} - [FeSCN^{2+}]_{eq}$$

6. Use Equation 4 in the *Background* section to calculate the value of the equilibrium constant K_{eq} for each test solution #6–10. Enter the results in the Results Table.

7. Calculate the *mean* (average value) of the equilibrium constant for the five test solutions.

8. Calculate the *average deviation* for K_{eq}: Find the absolute value of the difference between each individual value of the equilibrium constant and the mean. The average of these differences for solutions #6–10 is equal to the average deviation.

9. The average deviation describes the precision of the results. Does the precision indicate that the equilibrium constant is indeed a "constant" for this reaction? Explain.

10. Describe the possible sources of error in this experiment and their likely effect on the results.