

LESSON
122

LAB

How Pushy Le Châtelier's Principle

Name _____

Date _____ Period _____

Purpose

To explore what happens to a reversible reaction at equilibrium when the conditions are changed..

Materials Used in Demo

- 5 large test tubes (~50 mL) with ~40 mL 0.0001 M FeSCN²⁺ (aq) in each
- 250 mL beaker with water warming on a hot plate (about 60 °C)
- dropper bottle with 0.10 M Fe(NO₃)₃ (aq)
- 250 mL beaker with crushed ice
- dropper bottle with 0.10 M KSCN (aq)

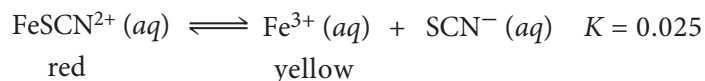
Part I: Demonstration

- I. In the table, record your observations of color changes for each step of the demonstration.

Procedure	Test tube	Solution color
1. Add approx. ~40 mL of 0.0001 M FeSCN ²⁺ (aq) to 5 small test tubes.		
2. Test tube #1 is a control for comparison with the other tubes.	#1	
3. Add drops of 0.1 M Fe ³⁺ (aq) to test tube #2 until color changes.	#2	
4. Add drops of 0.1 M SCN ⁻ (aq) to test tube #3 until color changes.	#3	
5. Place tube #4 in a hot-water bath until color changes.	#4	
6. Place test tube #5 in an ice-water bath until color changes.	#5	

Part 2: Changing Concentration

A solution of FeSCN²⁺ (aq) is an equilibrium mixture described by the chemical equation given below.



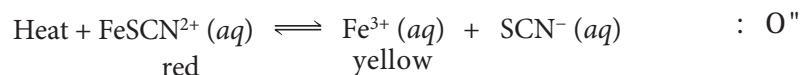
- I. Use the chemical equation to explain why the solution in test tube #1 is orange.

2. The color changes after addition of $\text{Fe}^{3+} (aq)$ in step 2. What does this indicate about the amounts of $\text{FeSCN}^{2+} (aq)$, $\text{Fe}^{3+} (aq)$, and $\text{SCN}^{-} (aq)$ in the equilibrium mixture?

3. The color changes after addition of $\text{SCN}^{-} (aq)$ in step 3. What does this indicate about the amounts of $\text{FeSCN}^{2+} (aq)$, $\text{Fe}^{3+} (aq)$, and $\text{SCN}^{-} (aq)$ in the equilibrium mixture?

Part 2: Changing Temperature

The dissociation of $\text{FeSCN}^{2+} (aq)$ is endothermic. This means that heat is transferred to the solution in the forward process.



1. The color changes when the temperature of the equilibrium mixture is changed in step 4. Explain what happens and why?

2. The color changes when the temperature of the equilibrium mixture is changed in step 5. Explain what happens and why.

3. **Making Sense** Le Châtelier's principle indicates that the equilibrium mixture changes when it is disturbed to reduce the stress.
 - a. What happens to the concentration of starting material upon addition of one of the products?

 - b. What happens to the concentration of starting material for an endothermic process when heat is transferred to the equilibrium mixture?