

Lab: Investigating Chemical Equilibrium

Name:

Block:

For Students:	For Teacher:
Lab performed:	Pre-lab completion: <input type="checkbox"/> Yes <input type="checkbox"/> No
Lab due:	Lab Submitted: <input type="checkbox"/> On Time <input type="checkbox"/> Late

A state of equilibrium is established when _____ and _____ are equal.

Why is a system at equilibrium considered to be “dynamic”?

Any change to the conditions at equilibrium, such as concentration, pressure or temperature is said to produce a _____ on the equilibrium.

Part I: Equilibrium Involving Bromcresol GreenReaction:Procedure:

Colour observation of 50 mL of water + 10 drops of bromcresol green:			
<u>Reagent Added</u>	<u>Colour Change and # of drops required</u>	<u>Direction of Equilibrium shift</u>	<u>Stress</u>
HCl (H ⁺)			
More HCl (H ⁺)			
NaOH (OH ⁻)			
More NaOH (OH ⁻)			

Part II: Equilibrium Involving Thiocyanatoiron (III) Ion

Reaction:

Procedure:

Colour observation of 1 mL 0.2M FeCl₃ + 1 mL 0.2M KSCN:			
<u>Reagent Added</u>	<u>Colour Observation</u>	<u>Direction of Equilibrium shift</u>	<u>Stress (which ion in the original equil'm changed concentration)</u>
Test tube B: KSCN (K ⁺ + SCN ⁻)			
Test tube C: FeCl ₃ (Fe ³⁺ + Cl ⁻)			
Test tube D: KCl (K ⁺ + Cl ⁻)			
Test tube E: NaOH (Na ⁺ + OH ⁻)			

Part III: Equilibrium Involving Cobalt (II) Complexes

Reaction:

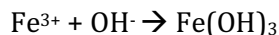
Procedure:

Beaker #1: Colour observation of $\text{CoCl}_2 + \text{HCl} =$ Colour observation with the addition of water =		Beaker #2: Colour observation of $\text{CoCl}_2 + 10 \text{ mL water} =$	
<u>Reagent Added</u>	<u>Colour Observation</u>	<u>Direction of Equilibrium shift</u>	<u>Stress</u>
Heat			
Cooled			

Discussion Questions:

1. In Part I, how would increasing the molarity of the NaOH solution from 0.01M to 0.1M affect the number of drops required for the observed colour changes? Explain your answer.

2. Consider the following reaction. Note the arrow.



For Part II, explain the results obtained when NaOH was introduced into the iron ((III) thiocyanate ion equilibrium system.

3. If the cobalt (II) ion complex were refrigerated from Part III, what would you predict as the colour of the refrigerated solution? Explain your answer.
4. Consider the equilibrium from Part III.
 - a. Is the forward reaction exothermic or endothermic? Explain your answer using evidence from your lab results.
 - b. Write a thermochemical equation including the term "heat" as either a reactant or product.

Conclusion:

- State the effect on the position of an equilibrium if a change is made in the concentration of a reactant or product.
- State the effect on the position of an equilibrium if a change is made in the temperature.