

Equilibrium and Le Châtelier's Principle Worksheet

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

Table A: Observations for the Equilibrium: $\text{Fe}^{3+} + \text{SCN}^- \rightleftharpoons \text{FeSCN}^{2+}$

Well #	Stress Applied	Observations Upon Applying Stress
1	None; control for comparison	
2	Add 0.10 M $\text{Fe}(\text{NO}_3)_3$	
3	Add 0.05 M NaSCN	
4	Add 1.0 M AgNO_3	
5	Add 1.0 M NaNO_3	

Question 1: When $\text{Fe}(\text{NO}_3)_3$ was added to the system,

- Which ion in the equilibrium system caused the “stress”?
- Which way did the equilibrium shift?
- What happened to the concentration of SCN^- ?
- What happened to the concentration of FeSCN^{2+} ?

Question 2: When NaSCN was added to the system,

- Which ion in the equilibrium system caused the “stress”?

- b. Which way did the equilibrium shift?
- c. What happened to the concentration of Fe^{3+} ?
- d. What happened to the concentration of FeSCN^{2+} ?

Question 3: When AgNO_3 was added to the system, it caused the precipitation of solid AgSCN .

- a. Which ion in the equilibrium had its concentration changed by addition of AgNO_3 ?
- b. Did the concentration of that ion increase or decrease?
- c. When AgNO_3 was added, which way did the equilibrium shift?

Question 4: When you added NaNO_3 , did anything happen? Can you explain this result?

Table B: Observations for the Equilibrium: $\text{CoCl}_4^{2-} + 6 \text{H}_2\text{O} \rightleftharpoons \text{Co}(\text{H}_2\text{O})_6^{2+} + 4 \text{Cl}^-$

Exp't	Stress Applied	Observations Upon Applying Stress
Well 1A	Add 12 M HCl	
Well 1B	Add water	
Well 2A	Add 12 M HCl	
Well 2B	Add 1.0 M AgNO_3	
Beaker 1	Heat Solution	
Beaker 2	Cool Solution	

Question 5: Adding HCl has the effect of adding Cl^- ions to the system. When Cl^- was added to the system,

- a. Which way did the equilibrium shift?
- b. What happened to the concentration of CoCl_4^{2-} ?
- c. What happened to the concentration of $\text{Co}(\text{H}_2\text{O})_6^{2+}$?

Question 6: When water was added to the system,

- a. Which way did the equilibrium shift?
- b. What happened to the concentration of CoCl_4^{2-} ?
- c. What happened to the concentration of $\text{Co}(\text{H}_2\text{O})_6^{2+}$?

Question 7: When you added AgNO_3 , it caused the precipitation of solid AgCl .

- a. Which ion in the equilibrium had its concentration changed by addition of AgNO_3 ?
- b. Did the concentration of that ion increase or decrease?
- c. When AgNO_3 was added, which way did the equilibrium shift?

Question 8: State a general rule concerning a system at equilibrium when more of one of the components is added.

