

PRE-LAB DISCUSSION

A State of equilibrium is affected by concentration and temperature, if gases are involved, by pressure. If a system at equilibrium is subjected to a change in one or more of these factors, a stress is applied on the equilibrium system. According to Le Chatelier's principle, when a stress is applied on a system at equilibrium, it responds in such a way that minimizes the stress by shifting the direction of the reaction. Equilibrium will be reestablished at a different point that is, with different concentrations of reactants and products.

PURPOSE

To study equilibrium system and their responses to stress as described by Le Chatelier's principle.

EQUIPMENT

beaker	graduated cylinder	test tubes
test tube rack	dropper pipette	

MATERIALS

0.1M FeCl ₃ solution	0.1M KSCN solution	0.1M KCl solution
0.1M K ₂ CrO ₄ solution	0.1M K ₂ Cr ₂ O ₇ solution	1M HCl and 1M NaOH solution

PROCEDURE

1. Number four test tubes 1 through 4 and stand the tubes in a test tube rack.
2. Measure out 5mL of 0.1M FeCl₃ and pour it into a beaker. Add 5mL of 0.1M KSCN to the same beaker. Dilute the contents of the beaker with distilled water until the solution has a light reddish-orange color. Divide the solution equally among the four numbered test tubes. Set test tube 1 at one end of the rack to be used for color comparison.
3. Using a dropper pipette, add 0.1M FeCl₃ drop by drop to the solution in the test tube 2 until a color change occurs. Record your observation.
4. Repeat step 3, but instead of FeCl₃ add the following solutions drop by drop to test tube indicated. Rinse the pipette after each use. Test tube 3, 0.1M KSCN; Test tube 4, 0.1M KCl

5. Discard the solutions. Wash and rinse them.
6. Number four test tubes from 5 to 8. Stand the test tubes in the rack.
7. Measure out 10mL of 0.1M K_2CrO_4 . Pour 5mL each into test tube 5 and 6. Measure 10mL 0.1M $K_2Cr_2O_7$. Divide this equally to the test tubes 7 and 8.
8. Using a dropper pipette, add 1M HCl drop by drop to the test tube 5 until the color changes. Record your observation.
9. Repeat step 8 with test tube 6. As soon as the color changes, rinse the pipette and use it to add 1M NaOH drop by drop to the solution until the color changes again. Record your observations for this step.
10. Using a dropper pipette, add 1M NaOH drop by drop to test tube 7 until the color changes. Record your observation.
11. Repeat step 10 with test tube 8. As soon as the color changes, rinse the pipette and use it to add 1M HCl to the solution until the color changes again. Record your observation.

OBSERVATION AND DATA

	Color
Test tube 2
Test tube 3
Test tube 4
Color Changes	
Test tube 5
Test tube 6
Test tube 7
Test tube 8

CONCLUSIONS AND QUESTIONS

1. Write the equilibrium reactions for the reversible reactions that take place in this reaction.
2. Using the Le Chatelier's principle, explain how the addition of $FeCl_3$ to the solution in test tube 2 (step 3) and similar explanations for step 4.
3. Using the equilibrium equation for the reaction and Le Chatelier's principle, explain the color changes.