FLINN SCIENTIFIC

Name_____

Restoring Balance

Data Table

Color of control solution $Co(H_2O)_6^{2+}$ (Test Tube A)	
Color of reference solution $CoCl_4^{2-}$ (Test Tube B)	
Amount of H_2O required to obtain "transition" color (step 6)	
Transition color (step 6)	
Effect of H_2O addition (step 7)	
Effect of $CaCl_2$ addition (step 8)	
Effect of $AgNO_3$ addition (step 9)	
Color of solution after heating (step 10)	
Color of solution after cooling (step 11)	

Post-Lab Questions

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

1. Write the chemical equation for the complex-ion equilibrium that results when excess chloride ion is added to an aqueous solution of cobalt chloride. Note the observed color of each complex ion underneath its chemical formula.
2. What is the likely composition of the solution (relative amounts of the two different complex ion forms) when the intermediate or transition color is observed in step 6? How does this observation provide visual proof of the idea that not all reactions "go to completion"? Explain.
3. Use LeChâtelier's Principle to explain the color changes observed upon addition of water and calcium chloride to an equilibrium mixture of the two complex ions in this reaction (steps 7 and 8).
4. What was the effect of adding $AgNO_3$ on the position of equilibrium for these two complex ions? Is this effect consistent with LeChâtelier's Principle? Explain.
5. How was the composition of the solution affected when the solution was heated (step 10)? When the solution was cooled (step 11)?
6. Based on the observed effect of temperature on the position of equilibrium, is the forward reaction for the equation in Question # 1 endothermic or exothermic? Explain, using LeChâtelier's Principle.