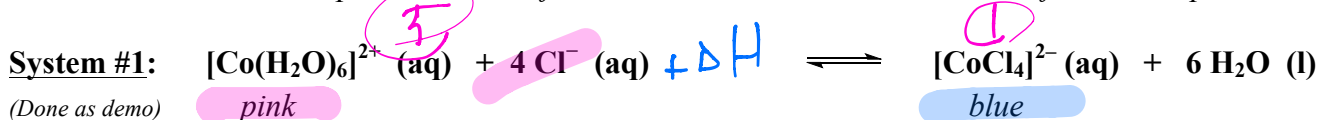


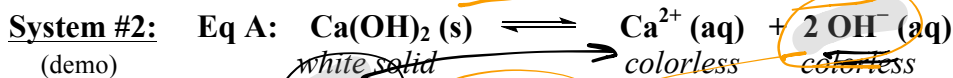
Purpose: To do four equilibrium reactions and observe how the equilibrium position shifts due to added "stress" on the system. You will see Le Châtelier's Principle in action.

Write-up: Fill in all charts and answer the post lab questions.

KEY PHRASES for Explanations: "Shifted... to consume added..." or "shifted ... to replenish depleted..."



	Color? ppt forms? ppt gone?	Equilibrium position shifted to the...	Explanation for shift in equilibrium position
a) Put a dropper-full of 0.1 M $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_2$ into a small tt	Pink		$K_q = \frac{[\text{CoCl}_4]^{2-}}{[\text{Co}(\text{H}_2\text{O})_6]^{2+} [\text{Cl}^-]^4}$ $Q = \frac{[\text{CoCl}_4]^{2-}}{[\text{Co}(\text{H}_2\text{O})_6]^{2+} [\text{Cl}^-]^4} > K$
b) Add drops of 12 M HCl until a color change occurs. $\rightarrow \text{H}^+ + \text{Cl}^-$	Blue	Right	Consume added Cl^- $Q < K$
c) Add drops of water until a color change occurs.	Pink	Left	Diluted solution - \downarrow all $[\]$ Shifts to more mols of (aq) $Q > K$
d) Observe the specified test tube at room temp.	Purple		
e) Observe the test tube after heating.	Blue	Right	$K_{eq} \uparrow$ Endothermic - $T \uparrow$ favors endothermic direction
f) Observe the test tube after cooling.	Pink	Left	$K_{eq} \downarrow$ $T \downarrow$ favor exothermic direction



	Color? ppt forms? ppt gone?	Equilibrium position shifted to the..	Explanation for shift (s) in equilibrium position
a) Put a dropper-full of saturated solution of $\text{Ca}(\text{OH})_2$ in a small tt.	Colorless No ppt		
b) Add drops of 1 M NaOH(aq) until a change is observed. $\rightarrow \text{Na}^+ + \text{OH}^-$	Eq A: White ppt	Eq A: Left	Eq A: Consume added OH^- (product) $Q > K$
c) Add drops of 3 M HNO_3 (aq) until a change is observed. (Stopper test tube and shake.) $\rightarrow \text{H}^+ + \text{NO}_3^-$	Eq B: can't see change	Eq B: Right	Eq B: Added reactant (H^+) $Q < K$ Consume added H^+
	Eq A: ppt gone	Eq A: Right	This shift in Eq. B causes OH^- to be depleted. Eq A: $Q < K$ Replenish depleted OH^- (product)