1. A solution is made with NaI and NaCl such that it is 0.01 M in both I\(^-\) and Cl\(^-\). To 1 L of this solution 0.01 moles Cu(NO\(_3\))\(_2\) are added (you can ignore any volume change). The NaI, NaCl, and Cu(NO\(_3\))\(_2\) are completely soluble (as is NaNO\(_3\) but you already knew that). The \(K_{sp}\) for CuI is 1.3 \(\times\) \(10^{-12}\) and for CuCl is 1.0 \(\times\) \(10^{-6}\).

After the solution has reached equilibrium what are the concentrations of the following?

\([Cu^+]\)

\([I^-]\)

\([Cl^-]\)

Are there any solid precipitates? If so how many grams of each.

2. The \(K_{sp}\) of PbCl\(_2\) is 1.7 \(\times\) \(10^{-5}\). How many grams of PbCl\(_2\) will dissolve in 100 mL of a 0.1 M NaCl solution?

3. Will CaF\(_2\) be more soluble in acid or base?

4. Consider the following reactions

\[ \text{AgCN(s)} \rightarrow \text{Ag}^+(aq) + \text{CN}^- (aq) \quad K_{sp} = 1.2 \times 10^{-16} \]

\[ \text{AgCl(s)} \rightarrow \text{Ag}^+(aq) + \text{Cl}^- (aq) \quad K_{sp} = 1.8 \times 10^{-10} \]

\[ \text{HCN (aq)} \rightarrow \text{H}^+ (aq) + \text{CN}^- (aq) \]

You a saturated solution of AgCN, what will the effect of each of the following (nothing, more AgCN dissolves, some AgCN precipitates)

A. Adding NaCl
B. Adding HCl
C. Adding HNO\(_3\)
D. Adding KCN
E. Adding KNO\(_3\)
5. A blast from the past

\[ \text{AgBr} (s) \leftrightarrow \text{Ag}^+ (aq) + \text{Br}^- (aq) \]
\[ \text{Ag}^+ (aq) + 2\text{S}_2\text{O}_3^{2-} (aq) \leftrightarrow \text{Ag(S}_2\text{O}_3)_2^{2-} (aq) \]
\[ \text{S}_2\text{O}_3^{2-} (aq) + \text{H}_2\text{O}^+ (aq) \leftrightarrow \text{HS}_2\text{O}_3^- (aq) + \text{H}_2\text{O} (l) \]

What is the effect of each of these on the solubility of AgBr(s)

1. Adding the soluble salt Kbr
2. Adding the soluble salt Na,\text{S}_2\text{O}_3
3. Adding HCl
4. Adding solid AgBr