Work Sheet 8+
CH302 Spring 2008

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 $Cu(NO_3)$ are added (you can ignore any volume change). The NaI, NaCl, and $Cu(NO_3)$ are completely soluble (as is $NaNO_3$ but you already knew that). The K_{SP} for CuI is 1.3×10^{-12} and for CuCl is 1.0×10^{-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 1.7×10^{-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

$AgCN(s) \rightarrow Ag^+(aq) + CN^-(aq) \qquad K_{sp} = 1.2 \times 10^{-16}$

$AgCl(s) \rightarrow Ag^+(aq) + Cl^-(aq) \qquad K_{sp} = 1.8 \times 10^{-10}$

$HCN(aq) \rightarrow H^+(aq) + CN^-(aq)$

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

A. Adding NaCl
B. Adding HCl
C. Adding HNO_3
D. Adding KCN
E. Adding KNO_3

5. A blast from the past

$$AgBr(s) \Leftrightarrow Ag^{+}(aq) + Br^{-}(aq)$$
$$Ag^{+}(aq) + 2S_2O_3^{2-}(aq) \Leftrightarrow Ag(S_2O_3)_2^{3-}(aq)$$
$$S_2O_3^{2-}(aq) + H_3O^{+}(aq) \Leftrightarrow HS_2O_3^{-}(aq) + H_2O(l)$$

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 $Na_2S_2O_3$
3. Adding HCl
4. Adding solid AgBr