

# ASSIGNMENT SHEET #10 APQ ANSWERS

## #11



a ii. Molar solubility =  $6.21 \times 10^{-6} \text{ M}$

a iii.  $K_{sp} = 3.86 \times 10^{-11}$

b i.  $Q_{sp} < K_{sp}$ ,  $\therefore$  no precipitate

b ii.  $[\text{Pb}^{+2}] = 2.56 \times 10^{-4} \text{ M}$

b iii. AgCl will precipitate first since it requires a lower  $[\text{Cl}^{-}]$ .

## #27



a ii. Molar solubility =  $1.76 \times 10^{-7} \text{ M}$

a iii.  $K_{sp} = 2.19 \times 10^{-20}$

b i. Molar solubility =  $1.54 \times 10^{-7} \text{ M}$  This is a case where you have a common ion already in solution – since the pH is greater than 7, you must already have some hydroxide ion there. Recall that a common ion will decrease the solubility of a solid in solution (Le Chatelier).

b ii.  $[\text{Zn}^{+2}] = 3.08 \times 10^{-14} \text{ M}$

## #57

a.  $K_{sp} = 7.09 \times 10^{-9}$

b.  $[\text{Mg}^{+2}] = 7.09 \times 10^{-7} \text{ M}$

c.  $Q_{sp} < K_{sp}$ ,  $\therefore$  no precipitate

d. The dissociation reaction must be exothermic. Since solubility decreases with increased temperature, the forward reaction (the dissociation of the solid in water) must be suppressed by a Le Chatelier stress. This would only occur if the forward reaction releases heat.

**#1001**

a.  $K_{sp} = 1.8 \times 10^{-11}$

b. Molar solubility =  $6.7 \times 10^{-6} \text{ M}$

c.  $[\text{Mg}^{+2}] = 1.65 \times 10^{-4} \text{ M}$        $[\text{OH}^{-1}] = 3.30 \times 10^{-4} \text{ M}$

d. Increasing the pH of the solution (the addition of  $\text{OH}^{-1}$ ) will suppress the forward reaction as per a Le Chatelier stress (increasing the  $[\text{OH}^{-1}]$  on the product side of the reaction equation). This will decrease the solubility of the solid. Decreasing the pH of the solution (the addition of acid) will increase the solubility of the solid by decreasing the  $[\text{OH}^{-1}]$  on the product side of the reaction equation (the additional  $\text{H}^{+1}$  will remove  $\text{OH}^{-1}$  in a neutralization reaction). Le Chatelier strikes again!

**#1002**

a. Molar solubility of  $\text{SrSO}_4 = 8.71 \times 10^{-4} \text{ M}$

b. Molar solubility of  $\text{SrF}_2 = 5.82 \times 10^{-4} \text{ M}$

c i.  $\text{SrF}_2$  will precipitate first due to the lower  $[\text{Sr}^{+2}]$  required.

c ii.  $[\text{Sr}^{+2}] = 1.95 \times 10^{-6} \text{ M}$

d. 51 % remaining