

**K<sub>sp</sub> Problems Worksheet**

1. Calculate the  $K_{sp}$  for each of the salts whose solubility is listed below.
  - a)  $\text{CaSO}_4 = 5.0 \times 10^{-3} \text{ mol/L}$
  - b)  $\text{MgF}_2 = 2.7 \times 10^{-3} \text{ mol/L}$
  - c)  $\text{AgC}_2\text{H}_3\text{O}_2 = 1.02 \text{ g/100 mL}$
  - d)  $\text{SrF}_2 = 12.2 \text{ mg/100 mL}$
2. Calculate
  - a) the solubility in moles/L of each of three salts and
  - b) the concentration of the cations in mg/mL in each of the saturated solutions.
    - i)  $\text{AgCN } K_{sp} = 2.0 \times 10^{-12}$
    - ii)  $\text{BaSO}_4 K_{sp} = 1.5 \times 10^{-9}$
    - iii)  $\text{FeS } K_{sp} = 3.7 \times 10^{-19}$
    - iv)  $\text{Mg(OH)}_2 K_{sp} = 9.0 \times 10^{-12}$
    - v)  $\text{Ag}_2\text{S } K_{sp} = 1.6 \times 10^{-49}$
    - vi)  $\text{CaF}_2 K_{sp} = 4.9 \times 10^{-11}$
3. Consider these slightly soluble salts:
  - i)  $\text{PbS } K_{sp} = 8.4 \times 10^{-28}$
  - ii)  $\text{PbSO}_4 K_{sp} = 1.8 \times 10^{-8}$
  - iii)  $\text{Pb(IO}_3)_2 K_{sp} = 2.6 \times 10^{-13}$
  - a) Which is the most soluble?
  - b) Calculate the solubility in moles/L for  $\text{PbSO}_4$ .
  - c) How many grams of  $\text{PbSO}_4$  dissolve in 1 L of solution?
  - d) How can you decrease the concentration of  $\text{Pb}^{2+}(\text{aq})$  in a saturated solution of  $\text{PbSO}_4$  solution?
  - e) What is the concentration in moles/L of  $\text{PbS}$  in a saturated solution of the salt?
4. For each of these substances, calculate the milligrams of metallic ion that can remain at equilibrium in a solution having a  $[\text{OH}^-] = 1.0 \times 10^{-4} \text{ mol/L}$ .
  - a)  $\text{Cu(OH)}_2 K_{sp} = 1.6 \times 10^{-9}$
  - b)  $\text{Fe(OH)}_3 K_{sp} = 6.0 \times 10^{-38}$
  - c)  $\text{Mg(OH)}_2 K_{sp} = 6.0 \times 10^{-12}$