1. Use the chemical AgCl to describe solubility, molar solubility and solubility product.

2. Write balanced equations and solubility product expressions for the following compounds:
   a. CuBr
   b. ZnC₂O₄
   c. Ag₂CrO₄
   d. Hg₂Cl₂
   e. AuCl₃
   f. Mn₃(PO₄)₃

3. Silver Chloride has a larger Ksp than silver carbonate (Ksp = 1.6x10⁻¹⁰ and 8.1x10⁻¹² respectively). Does this mean that AgCl also has a larger molar solubility than Ag₂CO₃? Explain.

4. Calculate the concentration of ions in the following saturated solutions:
   a. [I⁻] in AgI solutions with [Ag⁺] = 9.1x10⁻⁹
   b. [Al³⁺] in Al(OH)₃ solution with [OH⁻] = 2.9 x10⁻⁹

5. From the solubility data given, calculate the solubility product for the following compounds:
   a. SrF₂ 7.3x10⁻² g/L
   b. Ag₃PO₄ 6.7x10⁻³ g/L

6. The molar solubility of MnCO₃ is 4.2x10⁻⁶ M. What is Ksp for this compound?

7. If 20.0 mL of 0.10 M Ba(NO₃)₂ are added to 50.0 mL of 0.10 M Na₂CO₃, will BaCO₃ precipitate? Supply explanation / calculations to support answer.

8. A volume of 75 mL of 0.060 M NaF is mixed with 25 mL of 0.15 M Sr(NO₃)₂. Calculate the concentrations in the final solution of NO₃⁻, Na⁺, Sr²⁺, and F⁻. (Ksp for SrF₂ = 20.x10⁻¹⁰)
9. Calculate the K_{sp} for each of the salts whose solubility is listed below.
   a. CaSO_4 = 5.0 \times 10^{-3} \text{ mol/L} 
   c. AgC_2H_3O_2 = 1.02 \text{ g/100 mL}
   b. MgF_2 = 2.7 \times 10^{-3} \text{ mol/L} 
   d. SrF_2 = 12.2 \text{ mg/100 mL}

10. 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. AgCN K_{sp} = 2.0 \times 10^{-12}
       ii. BaSO_4 K_{sp} = 1.5 \times 10^{-9}
       iii. FeS K_{sp} = 3.7 \times 10^{-19}
       iv. Mg(OH)_2 K_{sp} = 9.0 \times 10^{-12}
       v. Ag_2S K_{sp} = 1.6 \times 10^{-49}
       vi. CaF_2 K_{sp} = 4.9 \times 10^{-11}

11. Consider these slightly soluble salts:
    a. PbS K_{sp} = 8.4 \times 10^{-28}
    b. PbSO_4 K_{sp} = 1.8 \times 10^{-8}
    c. Pb(IO_3)_2 K_{sp} = 2.6 \times 10^{-13}
       i. Which is the most soluble?
       ii. Calculate the solubility in moles/L for PbSO_4.
       iii. How many grams of PbSO_4 dissolve in 1 L of solution?
       iv. How can you decrease the concentration of Pb^{2+}(aq) in a saturated solution of PbSO_4 solution?
       v. What is the concentration in moles/L of PbS in a saturated solution of the salt?

12. For each of these substances, calculate the milligrams of metallic ion that can remain at equilibrium in a solution having a \([OH^-]\) = 1.0 \times 10^{-4} \text{ mol/L}.
    a. Cu(OH)_2 K_{sp} = 1.6 \times 10^{-9}
    b. Fe(OH)_3 K_{sp} = 6.0 \times 10^{-38}
    c. Mg(OH)_2 K_{sp} = 6.0 \times 10^{-12}