

**Ksp Problems Worksheet #3 (2011)**

Threshold Saturation Ion Concentration before ppt formation begins

1. What is the maximum concentration of strontium ion ( $\text{Sr}^{2+}$ ) that can be present in a 0.012 M  $\text{K}_2\text{CO}_3$  solution without observing a precipitate of  $\text{SrCO}_3$ ?
2. What is the maximum concentration of chloride ion ( $\text{Cl}^-$ ) that can be present in a 0.10 M  $\text{AgNO}_3$  solution without observing a precipitate of  $\text{AgCl}$ ?
3. Solid  $\text{AgNO}_3$  is added to a solution containing 0.0003 M  $\text{KCl}$  and 0.02 M  $\text{NaBr}$ .
  - (a) What molarity of dissolved  $\text{Ag}^{1+}$  is required to start the precipitation of the  $\text{AgBr}$ ?
  - (b) What molarity of dissolved  $\text{Ag}^{1+}$  is required to start the precipitation of the  $\text{AgCl}$ ?
  - (c) Which compound,  $\text{AgBr}$  or  $\text{AgCl}$ , will precipitate first upon slow addition of  $\text{AgNO}_3$ ? Explain your reasoning.

4. If solid NaCl is added slowly to a beaker containing 0.120 M AgNO<sub>3</sub> and 0.150 M Pb(NO<sub>3</sub>)<sub>2</sub>, which will precipitate first, AgCl<sub>(s)</sub> or PbCl<sub>2(s)</sub>? Show calculations to support your answer.
5. An aqueous solution of Ca(NO<sub>3</sub>)<sub>2</sub> is added slowly to 1.0 Liter of a well-stirred solution containing 0.020 mole F<sup>1-</sup> and 0.10 mole SO<sub>4</sub><sup>2-</sup> at 25°C. (You may assume that the added Ca(NO<sub>3</sub>)<sub>2</sub> solution does not affect the total volume of the system.)
- (a) Which salt precipitates first? Explain your reasoning.
- (b) What is the concentration of Ca<sup>2+</sup> in the solution when the first precipitate begins to form?