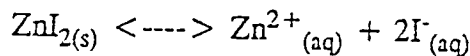


Solubility #4

- When excess Ag_2CO_3 solid is shaken with 1.00 L of 2.00 M K_2CO_3 , it is determined that 6.00×10^{-6} mol Ag_2CO_3 solid dissolves. Calculate the solubility product for silver carbonate.
- Calculate the K_{sp} for SrF_2 if the solubility is 0.122 g/L.
- A saturated solution of calcium hydroxide is found to have $[\text{OH}^-]$ of 2.09×10^{-2} M. Calculate the K_{sp} for $\text{Ca}(\text{OH})_2$.
- The solubility of Ag_2SO_4 is 0.62 g/L at 6°C . What is the K_{sp} at this temperature?
- Describe an analytical method which could be used to determine the K_{sp} of a saturated solution of silver sulphate other than drying the solid from a saturated solution.
- At 20°C the solubility of PbF_2 is 64 mg per 100 mL of solution. Determine the K_{sp} for lead II fluoride. $64 \text{ g/L} \times \frac{1 \text{ mol}}{245.2 \text{ g}} = 2.61 \times 10^{-3} \text{ mol/L}$ $[\text{Pb}^{2+}] = 2.61 \times 10^{-3} \text{ M}$
 $K_{sp} = [\text{Pb}^{2+}][\text{F}^-]^2 = 7.1 \times 10^{-8}$ $[\text{F}^-] = 5.22 \times 10^{-3} \text{ M}$
- The equilibrium in a saturated ZnI_2 solution is given by:



Predict the effect on the solubility of ZnI_2 of adding some:

- solid NaI. Solubility of ZnI_2 will decrease
- solid $\text{Zn}(\text{NO}_3)_2$ decrease
- solid NaOH $\text{Zn}(\text{OH})_2$ is produced; solubility will increase
- concentrated HCl no effect
- solid NH_4NO_3 no effect

#1 $[\text{Ag}^+] = \frac{2(6.00 \times 10^{-6} \text{ mol})}{1.00 \text{ L}} = 1.20 \times 10^{-5} \text{ M}$ $[\text{CO}_3^{2-}] = 2.00 \text{ M} + 6.00 \times 10^{-6} \text{ mol/L} = 2.00 \text{ M}$

$$K_{sp} = [\text{Ag}^+]^2 [\text{CO}_3^{2-}] = 2.88 \times 10^{-10}$$

#2 $0.122 \text{ g/L} \times \frac{1 \text{ mol}}{125.6 \text{ g}} = 9.71 \times 10^{-4} \text{ mol/L}$ $[\text{Sr}^{2+}] = 9.71 \times 10^{-4} \text{ M}$
 $[\text{F}^-] = 2(9.71 \times 10^{-4} \text{ M}) = 1.94 \times 10^{-3} \text{ M}$

$$K_{sp} = [\text{Sr}^{2+}][\text{F}^-]^2 = 3.67 \times 10^{-9}$$

#3 $[\text{OH}^-] = 2.09 \times 10^{-2} \text{ M}$ $[\text{Ca}^{2+}] = \frac{2.09 \times 10^{-2} \text{ M}}{2} = 1.05 \times 10^{-2} \text{ M}$

$$K_{sp} = [\text{Ca}^{2+}][\text{OH}^-]^2 = 4.57 \times 10^{-6}$$

#4 $0.62 \text{ g/L} \times \frac{1 \text{ mol}}{311.9 \text{ g}} = 1.99 \times 10^{-3} \text{ mol/L}$ $[\text{Ag}^+] = 2(1.99 \times 10^{-3} \text{ M}) = 3.98 \times 10^{-3} \text{ M}$
 $[\text{SO}_4^{2-}] = 1.99 \times 10^{-3} \text{ M}$

$$K_{sp} = [\text{Ag}^+]^2 [\text{SO}_4^{2-}] = 3.1 \times 10^{-8}$$

- #5 Titrate a known volume of saturated Ag_2SO_4 solution with standardized NaCl to the stoichiometric point as determined by an indicator. The moles of Cl^- added = moles Ag^+ initially present. Then, $K_{sp} = [\text{Ag}^+]^2 [\text{SO}_4^{2-}]$