

## Solubility Equilibrium Problems II

Read p. 485 - 489 of Chemistry 12.

1. Calculate the solubility (in mol/L) for each of the following compounds:

- a) FeS  $K_{sp} = 3.7 \times 10^{-19}$   
 b) Mg(OH)<sub>2</sub>  $K_{sp} = 9.0 \times 10^{-12}$   
 c) Ag<sub>2</sub>S  $K_{sp} = 1.6 \times 10^{-49}$   
 d) AgCN  $K_{sp} = 2.0 \times 10^{-12}$

2. What is the solubility of silver iodide in grams per litre? ( $K_{sp} = 8.3 \times 10^{-17}$ )
3. The  $K_{sp}$  value for BaSO<sub>4</sub> is  $1.5 \times 10^{-9}$ . Calculate the number of moles of this salt that will dissolve in 1000 mL of water.
4. Calculate the mass of CuS that will dissolve in 1.0 litre of water.  $K_{sp} = 4.0 \times 10^{-36}$
5. Calculate the mass of barium carbonate that will dissolve in 100 mL of water. The  $K_{sp}$  of BaCO<sub>3</sub> is  $8.1 \times 10^{-9}$ .
6. Calculate the mass of MnS that will dissolve in 1.0 L of water.  $K_{sp}$  (MnS) =  $4.9 \times 10^{-9}$
7. What volume of water is necessary to dissolve 0.010 mol of silver chloride?  $K_{sp}$  (AgCl) =  $1.7 \times 10^{-10}$

Further textbook questions: p. 486 #1 - 4.

ANSWERS - SOLUBILITY PROBLEMS (CONTINUED)

- 1) a)  $6.1 \times 10^{-10}$  mol/L 4)  $1.9 \times 10^{-17}$  g  
 b)  $1.3 \times 10^{-4}$  mol/L 5)  $1.8 \times 10^{-3}$  g  
 c)  $3.4 \times 10^{-17}$  mol/L  
 d)  $1.4 \times 10^{-6}$  mol/L 6)  $6.1 \times 10^{-3}$  g  
 2)  $2.1 \times 10^{-6}$  g/L 7)  $7.7 \times 10^2$  L  
 3)  $3.9 \times 10^{-5}$  mol

## Solubility Equilibrium Problems I

Refer to p. 484 - 486 of Chemistry 12 (Nelson).

1) Write the dissociation equation and the solubility product ( $K_{sp}$ ) expression for the dissociation of each of the following substances.

- a) PbSO<sub>4</sub> (s) c) Pb(NO<sub>3</sub>)<sub>2</sub> (s) e) Na<sub>2</sub>S (s)  
 b) Mg(OH)<sub>2</sub> (s) d) AlCl<sub>3</sub> (s) f) Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> (s)

2) Write the solubility product expression for the dissociation of each of the following solids in water.

- a) sodium chloride c) silver sulfide e) magnesium sulfite  
 b) calcium carbonate d) aluminum hydroxide f) barium phosphate

3) The solubility of NiS is  $1.0 \times 10^{-12}$  mol/L. Calculate the value of  $K_{sp}$  for this compound.

4) The solubility of calcium hydroxide (Ca(OH)<sub>2</sub>) is 0.02 mol/L. Calculate the solubility product constant for this substance.

5) The solubility of silver sulfide (Ag<sub>2</sub>S) is  $1.3 \times 10^{-6}$  mol/L. Calculate the  $K_{sp}$  value.

6) Experiments show that 0.0059 g of SrCO<sub>3</sub> will dissolve in 1.0 L of water. What is the  $K_{sp}$  for strontium carbonate?

7) The solubility of cobalt (II) sulfide is  $3.8 \times 10^{-3}$  g/L. Calculate the value of  $K_{sp}$ .

*Answers to Calculation Questions:*

- 3)  $1.0 \times 10^{-24}$  6)  $1.6 \times 10^{-9}$   
 4)  $3.2 \times 10^{-5}$  7)  $1.8 \times 10^{-1}$   
 5)  $8.8 \times 10^{-18}$