

## Solubility Product Problems

1. One liter of water is able to dissolve  $2.15 \times 10^{-3}$  mol of  $\text{PbF}_2$ . What is the  $K_{sp}$  for  $\text{PbF}_2$ ?
2. The molar solubility of  $\text{CoCO}_3$  in a 0.10 M  $\text{Na}_2\text{CO}_3$  solution is  $1.0 \times 10^{-9}$  mol/L. What is  $K_{sp}$  for  $\text{CoCO}_3$ ?
3. The molar solubility of  $\text{PbF}_2$  in a 0.10 M  $\text{Pb}(\text{NO}_3)_2$  solution is  $3.1 \times 10^{-4}$  mol/L. Calculate  $K_{sp}$  for  $\text{PbF}_2$ .
4. What is the molar solubility of  $\text{AgBr}$  in water?
5. What is the molar solubility of  $\text{Ag}_2\text{CO}_3$  in water?
6. What is the molar solubility of  $\text{AgI}$  in 0.20 M  $\text{NaI}$  solution?
7. What is the molar solubility of  $\text{Fe}(\text{OH})_3$  in a solution with a hydroxide ion concentration of 0.050 M?  $K_{sp} = 1.6 \times 10^{-39}$
8. Will a precipitate of  $\text{CaSO}_4$  form in a solution if the  $\text{Ca}^{2+}$  concentration is 0.0025 M and the  $\text{SO}_4^{2-}$  concentration is 0.030 M? For  $\text{CaSO}_4$ ,  $K_{sp} = 2.4 \times 10^{-5}$ .
9. Will a precipitate form in a solution containing  $3.4 \times 10^{-4}$  M  $\text{CrO}_4^{2-}$  and  $4.8 \times 10^{-5}$  M  $\text{Ag}^+$ ? (Use literature value for  $K_{sp}$ )
10. Will a precipitate of  $\text{PbSO}_4$  form if 100 mL of  $1.0 \times 10^{-3}$  M  $\text{Pb}(\text{NO}_3)_2$  solution is added to 100 mL of  $2.0 \times 10^{-3}$  M  $\text{MgSO}_4$  solution?  $K_{sp} = 6.3 \times 10^{-7}$

## Solubility Practice Questions - Answers

1.

$$K_{sp} = 3.98 \times 10^{-8}$$

2.

$$K_{sp} = 1 \times 10^{-10}$$

3.

$$K_{sp} = 3.86 \times 10^{-8}$$

4.

$$\text{Molar solubility} = 7.07 \times 10^{-7}$$

5.

$$\text{Molar solubility is } 1.3 \times 10^{-4}$$

6.

$$\text{Molar solubility is } 4.15 \times 10^{-16}$$

7.

$$\text{Molar solubility is } 1.28 \times 10^{-35}$$

8.

$$\text{Trial } K_{sp} = 7.5 \times 10^{-5}$$

$$K_{sp} = 2.4 \times 10^{-5}$$

Trial  $K_{sp} > K_{sp}$

Precipitate will form

9.

$$\text{Trial } K_{sp} = 7.83 \times 10^{-13}$$

Trial  $K_{sp} < K_{sp}$

No precipitate will form

10.

$$\text{Trial } K_{sp} = 5 \times 10^{-7}$$

Trial  $K_{sp} < K_{sp}$

No precipitate will form