

K_{sp} Problems - Set I

1. Write an equilibrium reaction representing each of the following saturated solutions:

(a) barium fluoride \rightleftharpoons

(b) magnesium hydroxide \rightleftharpoons

2. Write the solubility product expression (K_{sp}) for the ionic compound A_xB_y .

3. What is meant by term molar solubility (s)?

4. Calculate the concentration of ions in the following saturated solutions:

(a) $[I^-]$ in AgI with $[Ag^+] = 9.1 \times 10^{-9}$. The K_{sp} of AgI is 8.3×10^{-17} . ($[I^-] = 9.1 \times 10^{-9}$ M)

(b) $[Al^{3+}]$ in $Al(OH)_3$ with $[OH^-] = 2.9 \times 10^{-9}$ M. (answer $[Al^{3+}] = 9.7 \times 10^{-10}$ M)

5. The molar solubility of $Zn(OH)_2$ is 1.67×10^{-5} , what is its K_{sp} value? Start by writing an equilibrium equation that represents a saturated solution of zinc hydroxide. (1.86×10^{-14})

6. If a saturated solution of zinc hydroxide has $[OH^-] = 0.02$ M, what is the concentration of the zinc ion? (4.65×10^{-11} M)

7. The molar solubility of calcium carbonate ($CaCO_3$) in pure water is 6.9×10^{-5} M. What is the K_{sp} ? (4.8×10^{-9})

8. If $[Pb^{2+}] = 0.0012M$ in a saturated solution of lead(II) iodide, calculate the K_{sp} . (6.9×10^{-9})
9. Given that the K_{sp} of silver chloride ($AgCl$) is 1.7×10^{-10} , calculate its molar solubility in pure water. ($1.3 \times 10^{-5}M$)
10. Lead(II) chloride ($PbCl_2$), with a K_{sp} of 1.6×10^{-5} , is among the more soluble of the salts considered "insoluble". What is its molar solubility in pure water? ($0.016M$)
11. The molar solubility (s) of silver sulfide, Ag_2S , is 1.14×10^{-17} mol/L. What is the K_{sp} of Ag_2S ? (5.9×10^{-51})
12. 100 liters of saturated cadmium sulfide, CdS , is evaporated to dryness. How many grams of solid CdS can be recovered upon evaporation? The K_{sp} of CdS is 8.0×10^{-28} . (4.09×10^{-10} g)
13. The solubility of an ionic compound M_2X_3 (molar mass = 288g) is 3.6×10^{-17} g/L. What is the K_{sp} for the compound?
(3.29×10^{-93})