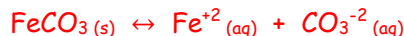


Solubility Constant Product Calculations Practice

Part 1

- 1.) A solution in equilibrium with a precipitate of FeCO_3 contains $5.0 \times 10^{-6} \text{ M Fe}^{+2}$ and $6.0 \times 10^{-6} \text{ M CO}_3^{-2}$.

Calculate K_{sp} for FeCO_3 .



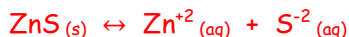
Answer - $K_{sp} = (\text{Fe}^{+2})(\text{CO}_3^{-2})$

$$K_{sp} = (5.0 \times 10^{-6})(6.0 \times 10^{-6})$$

$$K_{sp} = 3.0 \times 10^{-11}$$

- 2.) What is the concentration of Zn^{+2} ions in a saturated solution made by shaking $\text{ZnS}(s)$ with water?

Answer -



$$K_{sp} = (\text{Zn}^{+2})(\text{S}^{-2})$$

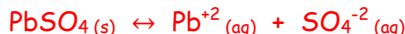
$$2.0 \times 10^{-25} = (x)(x)$$

$$x = 4.4721 \times 10^{-13}$$

$$[\text{Zn}^{+2}] = 4.5 \times 10^{-13}$$

- 3.) How many grams of $\text{PbSO}_4(s)$ will dissolve in 5.0 L of water?

Answer -



$$K_{sp} = (\text{Pb}^{+2})(\text{SO}_4^{-2})$$

$$1.8 \times 10^{-8} = (x)(x)$$

$$x = 1.3416 \times 10^{-4}$$

$$\frac{1.3416 \times 10^{-4} \text{ mol}}{1 \text{ L}} \times \frac{303.26 \text{ g}}{1 \text{ mol}} \times 5.0 \text{ L} =$$

$$\text{PbSO}_4 = 0.203426 \text{ g}$$

$$[\text{PbSO}_4] = 0.20 \text{ g}$$

- 4.) How many grams of BaCrO_4 are present in 10.0 L of a saturated solution of BaCrO_4 .

Answer -



$$K_{sp} = (\text{Ba}^{+2})(\text{CrO}_4^{-2})$$

$$1.2 \times 10^{-10} = (x)(x)$$

$$x = 1.095445 \times 10^{-5}$$

$$\frac{1.095445 \times 10^{-5} \text{ mol}}{1 \text{ L}} \times \frac{253.3 \text{ g}}{1 \text{ mol}} \times 10.0 \text{ L} =$$

$$\text{BaCrO}_4 = 0.277476 \text{ g}$$

$$[\text{BaCrO}_4] = 0.278 \text{ g}$$

- 5.) An experiment shows that a maximum of 7.35 g of silver acetate can dissolve in 1.00 L of water at 25°C.

What is K_{sp} for silver acetate?



Answer - $7.35 \text{ g} \times \frac{1 \text{ mol}}{166.92 \text{ g}} \times \frac{1}{1.0 \text{ L}}$

$$[\text{AgCH}_3\text{COO}^{-}] = 0.044033 \text{ M}$$

$$1:1:1 \text{ ratio}$$

$$K_{sp} = (0.044033)(0.044033)$$

$$K_{sp} = 0.00193891$$

$$K_{sp} = 1.94 \times 10^{-3}$$

- 6.) Calculate the molar solubility of Ag_2CrO_4 .

Answer -



1:2:1 ratio

$$K_{sp} = (\text{Ag}^{+})^2(\text{CrO}_4^{-2})$$

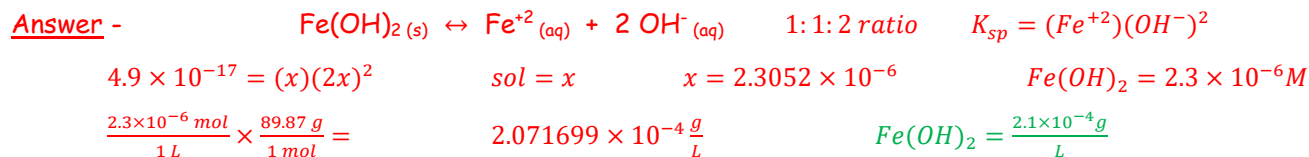
$$1.1 \times 10^{-12} = (2x)^2(x)$$

$$\text{sol} = x$$

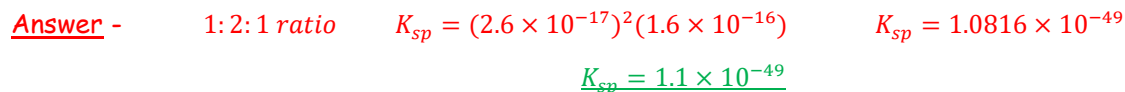
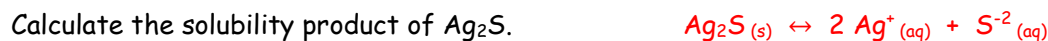
$$x = 6.50296 \times 10^{-5}$$

$$\text{Ag}_2\text{CrO}_4 = 6.5 \times 10^{-5} \text{ M}$$

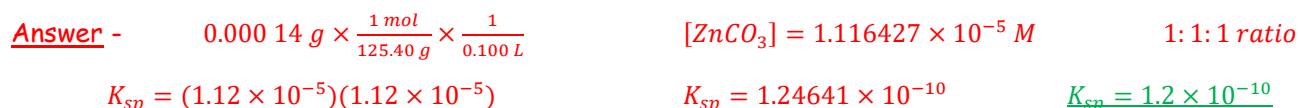
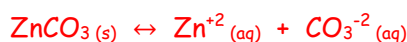
7.) Calculate the solubility of $\text{Fe}(\text{OH})_2$ in grams per litre.



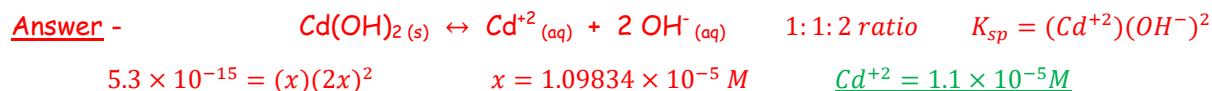
8.) A solution in equilibrium with a precipitate of Ag_2S contained $1.6 \times 10^{-16} \text{ M S}^{-2}$ and $2.6 \times 10^{-17} \text{ M Ag}^+$.



9.) A small piece of the mineral smithsonite, ZnCO_3 , with a mass of 0.000 14 g just dissolves in 100.0 mL of water. Calculate K_{sp} for ZnCO_3 .



10.) What is the concentration of Cd^{2+} ions in saturated $\text{Cd}(\text{OH})_2$? $K_{sp} = 5.3 \times 10^{-15}$ for $\text{Cd}(\text{OH})_2$.



11.) What mass of Pb^{2+} is present in 5.0 L of saturated $\text{Pb}(\text{IO}_3)_2$ (aq)?

