

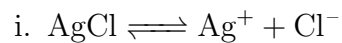
Chapter 15 – Problems 6, 28, 34

Michael Brodskiy

Instructor: Mr. Morgan

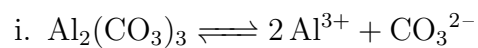
March 25, 2020

6. (a) AgCl



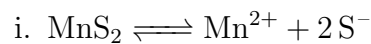
ii. $K_{sp} = [\text{Ag}^+] [\text{Cl}^-]$

(b) $\text{Al}_2(\text{CO}_3)_3$



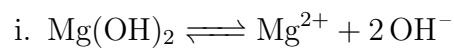
ii. $K_{sp} = [\text{Al}^{3+}]^2 [3 \text{CO}_3^{2-}]^3$

(c) MnS_2



ii. $K_{sp} = [\text{Mn}^{2+}] [2 \text{S}^{2-}]^2$

(d) $\text{Mg}(\text{OH})_2$



ii. $K_{sp} = [\text{Mg}^{2+}] [\text{OH}^-]^2$

28. (a)

$$\begin{aligned} [\text{OH}^-] &= 10^{9.62-14} \\ &= 4.17 \cdot 10^{-5} [\text{M}] \\ [\text{Cd}^{2+}] [\text{OH}^-]^2 &= 2.5 \cdot 10^{-14} \\ [\text{Cd}^{2+}] &= \frac{2.5 \cdot 10^{-14}}{(4.17 \cdot 10^{-5})^2} \\ &= 1.4 \cdot 10^{-5} [\text{M}] \end{aligned} \tag{1}$$

(b)

$$\begin{aligned} .0013 \cdot x^2 &= 2.5 \cdot 10^{-14} \\ x &= 4.4 \cdot 10^{-6} [\text{M}] \\ 14 + \log_{10} (4.4 \cdot 10^{-6}) & \\ \text{pH} &= 8.64 \end{aligned} \tag{2}$$

(c)

$$\begin{aligned}\frac{4.4 \cdot 10^{-6}}{4.17 \cdot 10^{-5}} &= .105 \\ .105 \cdot 100\% &= 10.5\%\end{aligned}\tag{3}$$

34. (a)

$$\begin{aligned}K_{sp}\text{PbSO}_4 &= 1.8 \cdot 10^{-8} \\ [\text{Pb}^{2+}] &= 9 \cdot 10^{-7}[\text{M}] \\ K_{sp}\text{Pb}(\text{OH})_2 &= 2.8 \cdot 10^{-16} \\ [\text{Pb}^{2+}] &= 7 \cdot 10^{-13}[\text{M}] \\ 7 \cdot 10^{-13} &< 9 \cdot 10^{-7} \\ \text{So Pb}(\text{OH})_2 &\text{ precipitates first}\end{aligned}\tag{4}$$

(b)

$$\begin{aligned}[\text{OH}^-]^2 (9 \cdot 10^{-7}) &= 2.8 \cdot 10^{-16} \\ [\text{OH}^-] &= 1.76 \cdot 10^{-5}[\text{M}] \\ 14 + \log_{10} (1.76 \cdot 10^{-5}) & \\ \text{pH} &= 9.25\end{aligned}\tag{5}$$