

## Precipitates

$$\textcircled{1} \quad [\text{Ag}^+] = \frac{0.0015 \text{ mol}}{0.05 \text{ L}} = 0.03 \text{ M}$$

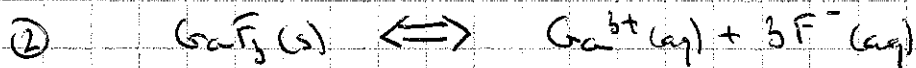
$$[\text{C}_2\text{H}_3\text{O}_2^-] = \frac{0.0015 \text{ mol}}{0.05 \text{ L}} = 0.03 \text{ M}$$

$$Q = [\text{Ag}^+][\text{C}_2\text{H}_3\text{O}_2^-]$$

$$= (0.03)(0.03)$$

$$Q = 9 \times 10^{-4}$$

Since  $Q < K_{sp}$ , no precipitate forms.



$$0.01 \text{ g GaF}_3 \times \frac{1 \text{ mol}}{126.7 \text{ g}} = 7.89 \times 10^{-5} \text{ mol GaF}_3$$

$$[\text{Ga}^{3+}] = \frac{7.89 \times 10^{-5} \text{ mol}}{0.1 \text{ L}} = 7.89 \times 10^{-4} \text{ M}$$

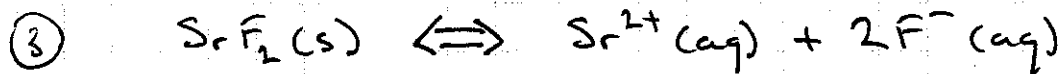
$$[\text{F}^-] = \frac{3(7.89 \times 10^{-5})}{0.1} = 2.37 \times 10^{-3} \text{ M}$$

$$Q = [\text{Ga}^{3+}][\text{F}^-]^3$$

$$= (7.89 \times 10^{-4})(2.37 \times 10^{-3})^3$$

$$Q = 1.05 \times 10^{-12}$$

Since  $Q < K_{sp}$ , no precipitate forms.



$$\frac{0.957 \text{ mol}}{1000 \text{ L}} = 9.57 \times 10^{-4} \text{ mol/L} \quad \text{SrF}_2 = x$$

$$[\text{Sr}^{2+}] = x = 9.57 \times 10^{-4} \text{ mol/L}$$

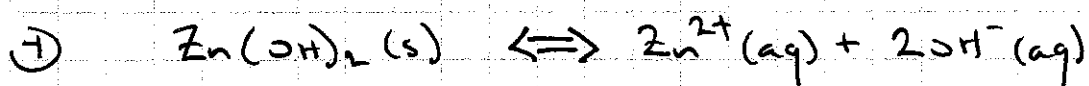
$$[\text{F}^{-}] = 2x = 2(9.57 \times 10^{-4}) = 1.914 \times 10^{-3} \text{ mol/L}$$

$$Q = [\text{Sr}^{2+}][\text{F}^{-}]^2$$

$$= (9.57 \times 10^{-4})(1.914 \times 10^{-3})^2$$

$$Q = 3.51 \times 10^{-9}$$

Since  $Q > K_{sp}$ , a precipitate forms.



$$\frac{0.0001 \text{ mol}}{50 \text{ L}} = 2 \times 10^{-6} \text{ mol/L} \quad \text{Zn(OH)}_2 = x$$

$$[\text{Zn}^{2+}] = x = 2 \times 10^{-6} \text{ mol/L}$$

$$[\text{OH}^{-}] = 2x = 2(2 \times 10^{-6}) = 4 \times 10^{-6} \text{ mol/L}$$

$$Q = [\text{Zn}^{2+}][\text{OH}^{-}]^2$$

$$= (2 \times 10^{-6})(4 \times 10^{-6})^2$$

$$Q = 3.2 \times 10^{-17}$$

Since  $Q < K_{sp}$ , no precipitate forms.

$$\textcircled{5} \quad \frac{0.03 \text{ mol}}{0.075 \text{ L}} = 0.4 \text{ mol/L} \quad \text{KClO}_4 = x$$

$$[\text{K}^+] = x = 0.4 \text{ mol/L}$$

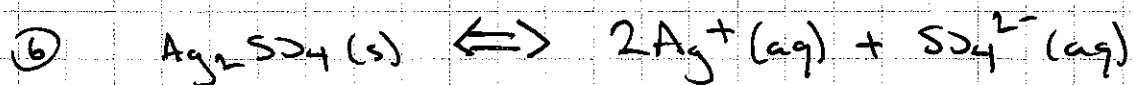
$$[\text{ClO}_4^-] = x = 0.4 \text{ mol/L}$$

$$Q = [\text{K}^+][\text{ClO}_4^-]$$

$$= (0.4)(0.4)$$

$$Q = 0.16$$

Since  $Q > K_{sp}$ , a precipitate forms.



$$1.4 \text{ g} \times \frac{1 \text{ mol}}{311.9 \text{ g}} = 0.0045 \text{ mol Ag}_2\text{SO}_4$$

$$[\text{Ag}_2\text{SO}_4] = \frac{0.0045 \text{ mol}}{0.1 \text{ L}} = 0.045 \text{ mol/L} = x$$

$$[\text{Ag}^+] = 2x = 2(0.045) = 0.090 \text{ mol/L}$$

$$[\text{SO}_4^{2-}] = x = 0.045 \text{ mol/L}$$

$$Q = [\text{Ag}^+]^2 [\text{SO}_4^{2-}]$$

$$= (0.090)^2 (0.045)$$

$$Q = 3.62 \times 10^{-4}$$

Since  $Q > K_{sp}$ , a precipitate forms.

