

Predicting Precipitation

Example One

Will a precipitate form when 0.080 L of 1.0×10^{-2} M NaF is mixed with 0.010 L of 2.0×10^{-2} M $\text{Ca}(\text{NO}_3)_2$? The K_{sp} for CaF_2 is 3.9×10^{-11}

Example Two

Will a precipitate form for a solution containing 2.0×10^{-3} M $\text{Pb}(\text{NO}_3)_2$ and 4.0×10^{-5} M Na_2SO_4 ?

The K_{sp} for PbSO_4 is 6.3×10^{-7} .

Example Three

Will a precipitate form when 0.040 L of 2.0×10^{-2} M NaF is mixed with 0.010 L of 3.0×10^{-2} M $\text{Ca}(\text{NO}_3)_2$? The K_{sp} for CaF_2 is 3.9×10^{-11}

Example Four

A solution contains $2.0 \times 10^{-2} \text{ M Ag}^+$ and $4.0 \times 10^{-2} \text{ M Pb}^{2+}$. By adding Cl^- to the solution, the precipitation of both AgCl ($K_{\text{sp}} = 1.8 \times 10^{-10}$) and PbCl_2 ($K_{\text{sp}} = 1.7 \times 10^{-5}$) will occur. What concentration of Cl^- is needed to begin precipitation of each salt? Does AgCl or PbCl_2 precipitate first?

Example Five

What pH is required to start precipitation of Ca(OH)_2 from a 0.800 M solution of CaCl_2 ?

The K_{sp} of $\text{Ca(OH)}_2 = 7.9 \times 10^{-6}$.

Example Six

A buffer containing ammonia and ammonium ions is used to prepare a 0.500 M solution of CaCl_2 . If the buffer becomes too basic, calcium hydroxide, Ca(OH)_2 will precipitate out of solution. What ratio of $\text{NH}_3/\text{NH}_4^+$ will start precipitation of Ca(OH)_2 from the CaCl_2 solution?

K_{sp} of $\text{Ca(OH)}_2 = 7.9 \times 10^{-6}$ and

K_{b} of $\text{NH}_3 = 1.8 \times 10^{-5}$