

- 4 EVALUATE** The answer has the proper number of significant figures and is close to an estimated value of 7.0×10^{-7} calculated as $\sqrt{49 \times 10^{-14}}$.

PRACTICE

Answers in Appendix E

1. Calculate the solubility of cadmium sulfide, CdS, in mol/L, given the K_{sp} value listed in **Table 3**.
2. Determine the concentration of strontium ions in a saturated solution of strontium sulfate, SrSO₄, if the K_{sp} for SrSO₄ is 3.2×10^{-7} .

extension

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 **Keyword:** HC6EQUX

Precipitation Calculations

In an earlier example, BaCO₃ served as the source of both Ba²⁺ and CO₃²⁻ ions. Because each mole of BaCO₃ yields one mole of Ba²⁺ ions and one mole of CO₃²⁻ ions, the concentrations of the two ions were equal. However, the equilibrium condition does not require that the two ion concentrations be equal. Equilibrium will still be established so that the ion product [Ba²⁺][CO₃²⁻] does not exceed the value of K_{sp} for the system.

Similarly, if the ion product [Ca²⁺][F⁻]² is less than the value of K_{sp} at a particular temperature, the solution is unsaturated. If the ion product is greater than the value for K_{sp} , CaF₂ precipitates. This precipitation reduces the concentrations of Ca²⁺ and F⁻ ions until equilibrium is established.

Suppose that unequal quantities of BaCl₂ and Na₂CO₃ are dissolved in water and that the solutions are mixed. If the ion product [Ba²⁺][CO₃²⁻] exceeds the K_{sp} of BaCO₃, a precipitate of BaCO₃ forms. Precipitation continues until the ion concentrations decrease to the point at which [Ba²⁺][CO₃²⁻] equals the K_{sp} .

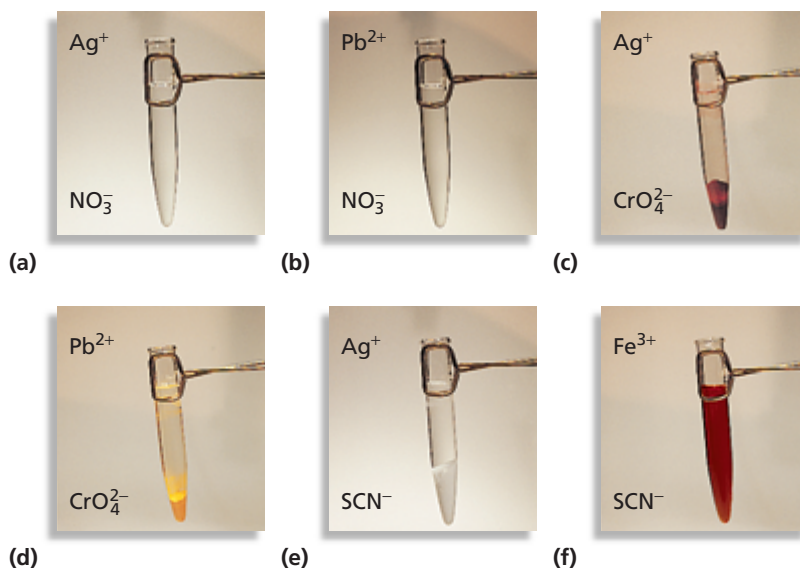


FIGURE 13 Nitrate salts of Ag⁺ (a) and Pb²⁺ (b) are soluble. When chromate ions, CrO₄²⁻, combine with Ag⁺ (c) or Pb²⁺ (d), an insoluble salt forms. Thiocyanate ions, SCN⁻, can form an insoluble salt with Ag⁺ (e) or a soluble salt with Fe³⁺ (f).