

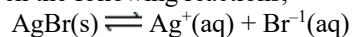
Be sure to show all work, use the correct number of significant figures, circle final answers and use correct units in all problems.

Question #1: 10 points

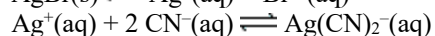
- Write the balanced equation for the equilibrium of copper(II) hydroxide, $\text{Cu}(\text{OH})_2$, in water and the K_{sp} expression. $K_{\text{sp}} = 2.2 \times 10^{-20}$ at 25°C .
- What is the solubility of copper(II) hydroxide at 25°C ?
- What is the solubility of copper(II) hydroxide at 25°C if the initial $[\text{Cu}^{+2}] = 0.010\text{ M}$?
- Will a precipitate form when 10.0 mL of 0.0015 M copper(II) nitrate is mixed with 10. mL of 0.015 M sodium hydroxide?

Question #2: 4 points

Given the following reactions,

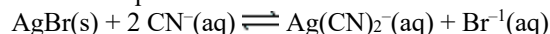


$$K_{\text{sp}} = 5.4 \times 10^{-13}$$



$$K_{\text{f}} = 1.2 \times 10^{21}$$

determine the equilibrium constant for the reaction below.

**Question #3:** 6 points

- A solution of Na_2SO_4 is added dropwise to a solution that is 0.010 M Ba^{2+} and 0.010 M Ag^{+1} . Neglecting volume changes, which salt precipitates first, BaSO_4 ($K_{\text{sp}} = 1.1 \times 10^{-10}$) or Ag_2SO_4 ($K_{\text{sp}} = 1.7 \times 10^{-5}$)?
- What is the concentration of the cation that precipitates first when the second cation begins to precipitate?