**Selective or fractional precipitation**

1. A solution contains $1.0 \times 10^{-4}$ M Cu$^+$ and $2.0 \times 10^{-3}$ M Pb$^{2+}$. If a source of iodide is added gradually to this solution, will PbI$_2$ or CuI precipitate first? Show the calculations for the concentration of iodide ion necessary to precipitate each salt.

   \[
   \begin{align*}
   K_{sp} \text{ of PbI}_2 &= 1.4 \times 10^{-8} \\
   K_{sp} \text{ of Cul} &= 5.3 \times 10^{-12}
   \end{align*}
   \]

2. A solution contains 0.10 M each of Zn$^{2+}$ and Pb$^{2+}$. If a source of sulfide is added gradually to this solution, which sulfide salt would precipitate first? Show the calculations for the concentration of sulfide ion necessary to precipitate each salt.

   \[
   \begin{align*}
   K_{sp} \text{ of ZnS} &= 1.1 \times 10^{-21} \\
   K_{sp} \text{ of PbS} &= 2.5 \times 10^{-27}
   \end{align*}
   \]