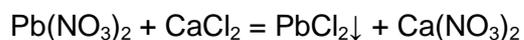


Question #57947, Chemistry, Other

Will a precipitate form when 20.0 mL of $\text{Pb}(\text{NO}_3)_2$ with a concentration of 2.50×10^{-4} mol/L is mixed with 45.0 mL of CaCl_2 with a concentration of 1.25×10^{-3} mol/L?

Answer:

The expected precipitate is:



The precipitate will form when the concentration of PbCl_2 will exceed the K_{sp} .

K_{sp} for PbCl_2 is 1.7×10^{-5}

$$K_{\text{sp}} = [\text{Pb}^{2+}][\text{Cl}^-]^2$$

For $\text{Pb}(\text{NO}_3)_2$: $0.00025 \cdot 20.0 = C_2 \cdot 1000$ ml

$$C_2(\text{Pb}(\text{NO}_3)_2) = 0.000005 \text{ M}$$

For CaCl_2 : $0.00125 \cdot 45.0 = C_2 \cdot 1000$ ml

$$C_2(\text{CaCl}_2) = 0.000056 \text{ M}$$

$$Q = 0.000005 \cdot 0.000056^2 = 1.57 \cdot 10^{-14}$$

As long as the obtained value is less than K_{sp} for PbCl_2 , the precipitate will not form.