

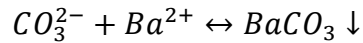
Answer on Question #71703 - Chemistry - Other

Question:

Determine the concentration of CO_3^{2-} that would be required to cause a precipitation to occur in a 3.0×10^{-4} M solution of barium ions. The K_{sp} for $BaCO_3$ is 5.1×10^{-9} .

Solution:

The reaction equation is the following:



The equilibrium constant is the product of the equilibrium concentrations of carbonate anion and barium cation:

$$K_{sp} = [CO_3^{2-}][Ba^{2+}]$$

Thus, if the product is higher than K_{sp} , the precipitation occurs. Let's calculate the concentration of carbonate anion in the equilibrium with $3.0 \cdot 10^{-4}$ M of barium cations:

$$[CO_3^{2-}] = \frac{K_{sp}}{[Ba^{2+}]} = \frac{5.1 \cdot 10^{-9}}{3.0 \cdot 10^{-4}} = 1.7 \cdot 10^{-5} \text{ M}$$

Thus, the concentration of carbonate anion must be higher than $1.7 \cdot 10^{-5}$ M for the precipitation to occur.

Answer: The concentration of CO_3^{2-} is required to be higher than $1.7 \cdot 10^{-5}$ M to cause a precipitation.

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