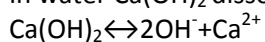


Solid calcium hydroxide, Ca(OH)_2 , is dissolved in water until the pH of the solution is 10.23. What is the concentration of calcium ion $[\text{Ca}^{2+}]$?

Solution:

In water Ca(OH)_2 dissociates according to the equation:



We assume that the pH of the water has been 7, after dissolved Ca(OH)_2 in water the pH increased to 10.23. From this it follows that the concentration of ion OH^- increase by $10^{-3.23} \text{ mol/L}$ or $5.89 \cdot 10^{-4} \text{ mol/L}$

($\Delta\text{pH} = 10.23 - 7 = 3.23$, so $\Delta\text{pH} = \Delta\text{pOH} = 3.23$. Due to the fact that $\text{pOH} = -\lg[\text{OH}^-]$, then $[\text{OH}^-] = 10^{-3.23} \text{ M}$). Because, during the dissociates of Ca(OH)_2 the ions $[\text{Ca}^{2+}]$ form twice less than the ions $[\text{OH}^-]$, the concentration of $[\text{Ca}^{2+}]$ is: $5.89 \cdot 10^{-4} / 2 = 2.945 \cdot 10^{-4} \text{ mol/L}$.

Answer: $[\text{Ca}^{2+}] = 2.945 \cdot 10^{-4} \text{ mol/L}$.