

Answer on the question #48495, Chemistry, Other

Question:

What is the molar solubility of PbI_2 in a .10M NaI solution?

PbI_2 $K_{sp} = 7.9 \times 10^{-9}$

Solution:

The molar solubility is the molar concentration of saturated solution of PbI_2 at fixed temperature.



C / mol L ⁻¹	0	0.1
D	+x	+x
[]	x	0.1+x

Solubility product is:

$$K_{sp} = [Pb^{2+}][I^-]^2$$

$$7.9 \times 10^{-9} = x(0.1 + x)$$

As $x \ll 0.1$, then:

$$x = \frac{7.9 \times 10^{-9}}{0.1}$$

$$x = 7.9 \times 10^{-8}$$

Then, equilibrium concentration of Pb^{2+} is $7.9 \times 10^{-8} \text{ mol L}^{-1}$.

$$c(Pb^{2+}) = c(PbI_2) = 7.9 \times 10^{-8} \text{ mol L}^{-1}$$

Answer: $7.9 \times 10^{-8} \text{ mol L}^{-1}$