

Answer on Question #43057 - Chemistry - Other

Question:

The K_{sp} value for lead sulfide, PbS, is $1.0 \cdot 10^{-28}$. What is the concentration of Pb^{2+} in a saturated solution of lead sulfide?

- a) $1.0 \cdot 10^{-56}$
- b) $1.0 \cdot 10^{-14}$
- c) $3.3 \cdot 10^{-29}$
- d) $0.5 \cdot 10^{-14}$

Answer:

Lead sulfide dissociation equation is $PbS \leftrightarrow Pb^{2+} + S^{2-}$. Thus, solubility product constant expression for PbS is $K_{sp} = [Pb^{2+}][S^{2-}]$. As is clear from the dissociation equation, $[Pb^{2+}] = [S^{2-}]$. The solubility product constant expression for PbS may be written as $K_{sp} = [Pb^{2+}]^2$, whence

$$[Pb^{2+}] = \sqrt{K_{sp}} = \sqrt{1.0 \cdot 10^{-28}} = 1.0 \cdot 10^{-14}$$

Correct answer is **b) $1.0 \cdot 10^{-14}$**