TOPIC
Chemistry – Section III – Question 4

QUESTION
The solubility product for silver chloride (AgCl) is 1.7×10^{-10}. The solubility of AgCl in 0.001 normal hydrochloric acid (HCl) in mol/lit most nearly is
   (A) 1.7×10^{-10}
   (B) 0.85×10^{-10}
   (C) 1.7×10^{-7}
   (D) 1.3×10^{-5}

HINT
Remember the common ion effect.

SOLUTION
The solubility product is given by
$$[Ag] [Cl] = 1.7 \times 10^{-10}$$
where [Ag] and [Cl] are the concentrations of silver ion and chloride ion in moles/lit. Suppose X moles/lit of AgCl dissolve. Then [Ag] = X.
Assuming the hydrochloric acid is completely dissociated, the concentration of chloride would be X + 0.001.
Thus
$$X(X+0.001) = 1.7 \times 10^{-10}$$
$$X = 1.7 \times 10^{-7} \text{ mol/lit.}$$

ANSWER
(C)

CONTRIBUTOR
 Scott Campbell