Find Ion Concentration in a Solution of a Soluble Salt (another fixed ion problem) - Question 4

what is the maximum possible concentration of magnesium ion in p.p.m. that can exist in a 1.0 M $K_2C_2O_4$ solution

$$\underset{1.0\ M}{K_2C_2O_4} \longrightarrow 2\,K^{1+} + \underset{1.0\ M}{C_2O_4{}^{2-}}$$

$$MgC_2O_4 \rightleftharpoons Mg^{2+} + \underset{1.0\ M}{C_2O_4{}^{2-}} \qquad Ksp = 8.6 \text{ x } 10^{-5}$$

$$K_{sp} = [Mg^{2+}][C_2O_4{}^{2-}]$$

$$[Mg^{2+}] = \frac{K_{sp}}{[C_2O_4{}^{2-}]^2}$$

$$[Mg^{2+}] = \frac{8.6 \text{ x } 10^{-5}}{1.0}$$

$$[Mg^{2+}] = 8.6 \text{ x } 10^{-5} \text{ M}$$

$$\frac{8.6 \text{ x } 10^{-5} \text{ mol } Mg^{2+} \text{ L}}{1 \text{ L}} \text{ x } \frac{24.31 \text{ g } Mg^{2+}}{1 \text{ mol } Mg^{2+}} \text{ x } \frac{1000 \text{ mg}}{1 \text{ g}} = \frac{2.090 \text{ mg } Mg^{2+}}{1 \text{ L}}$$

$$\therefore [Mg^{2+}] = 2.090 \text{ p.p.m.}$$