Answer on the question #48077, Chemistry, Physical Chemistry

Question:

100 mL 0.2 M Mg(NO3)2 AND 100 mL 0.2M NaF ARE MIXED.WHAT IS THE CONCENTRATION LEFTOF Mg^2+ and F^- IN SOLUION??? PLEASE GIVE DETAIL EXPLANATION
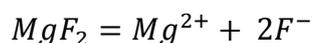
Solution:

Let's consider the following stages:

1) Limit precipitation

   n (Mg^{2+}) = n(F^-)/2 . As one can see, there is an excess of Mg^{2+} ions. Then, after this stage the concentrations of ions are: c (F^-) = 0 mol/L, c (Mg^{2+}) = (0.2*100 – 0.1*100)/200 = 0.5 mol/L

2) Precipitate equilibrium:

$$MgF_2 = Mg^{2+} + 2F^-$$

As we know from the references, the logarithm of solubility product of MgF_2 is -8.2. x is the concentration of F^-. The concentration of Mg^{2+} is $(0.5 + x)$.

$$lg([Mg^{2+}] [F^-]^2) = -8.2$$
$$lg(x + 0.5) (x)^2 = -8.2$$

As x<<0.5:

$$0.5x^2 - 10^{-8.2} = 0$$

$$x = \sqrt{\frac{10^{-8.2}}{0.5}} = 1.12 * 10^{-4}$$

Answer: c $(Mg^{2+}) = 0.5 \ mol/L$, c $(F^-) = 1.12 * 10^{-4} \ mol/L$