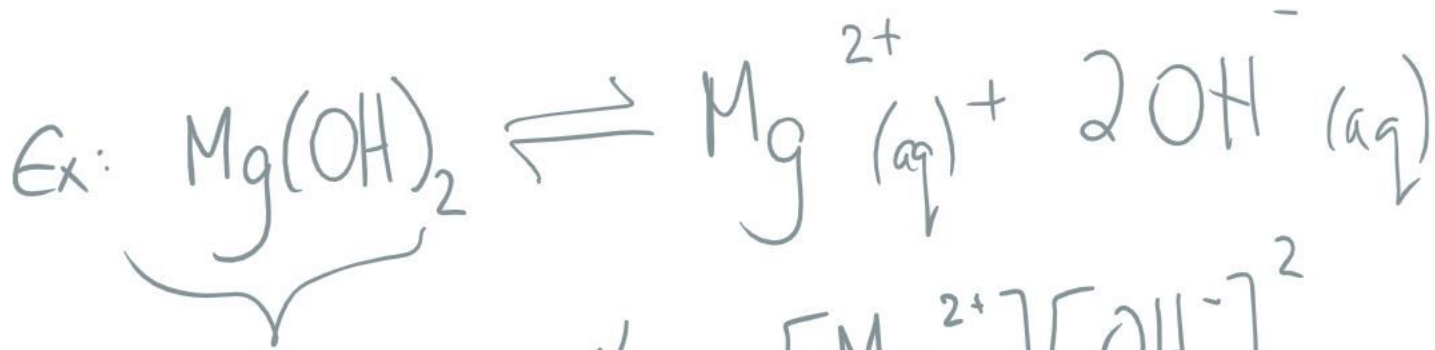




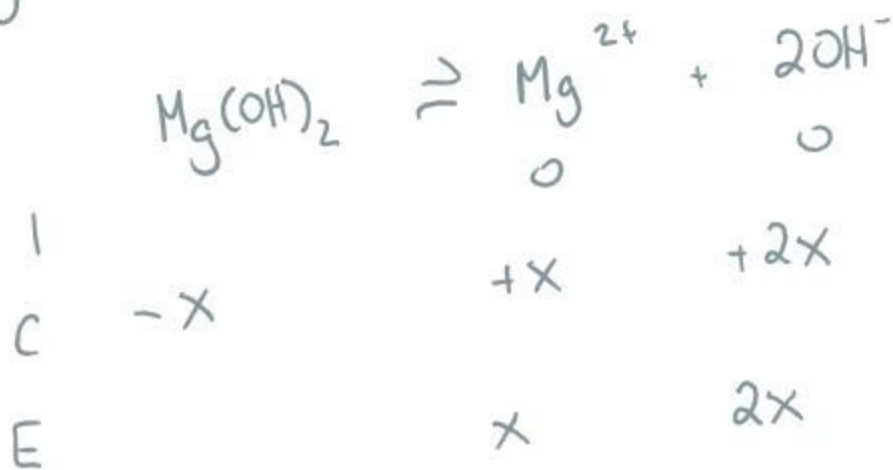
technically
insoluble by
solubility rules

$$K_{sp} = [\text{Mg}^{2+}][\text{OH}^{-}]^2$$

also equilibrium
constant

constant

Given that $K_{sp} = 5.6 \times 10^{-12}$, what is molar solubility of $Mg(OH)_2$ in water?



$$K_{sp} = [Mg^{2+}][OH^-]^2 = (x)(2x)^2 = 5.6 \times 10^{-12}$$

$$4x^3 = 5.6 \times 10^{-12}$$

$$x = \sqrt[3]{\frac{5.6 \times 10^{-12}}{4}} = 1.1 \times 10^{-4} M = [Mg^{2+}]$$

$$\frac{1.1 \times 10^{-4} \text{ mol}}{1 L} \cdot \frac{1 \text{ mol } Mg(OH)_2}{1 \text{ mol } Mg^{2+}}$$

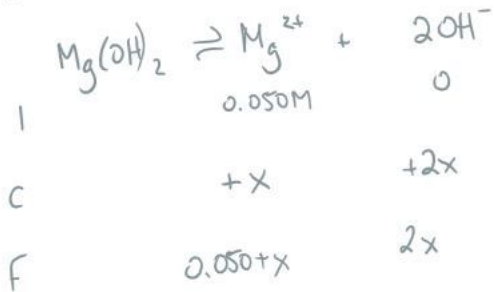
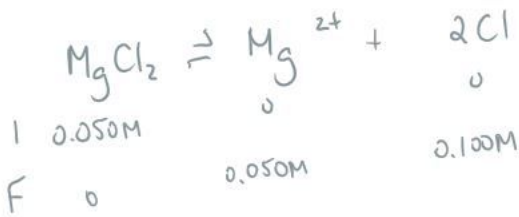
Molar Solubility

$= 1.1 \times 10^{-4} M \text{ of } Mg(OH)_2$

If MgCl_2 was added to a soln @ equilibrium of $\text{Mg}(\text{OH})_2$ then less $\text{Mg}(\text{OH})_2$ would dissolve becuz rxn would shift to the left.

• As we increase the amount of common ion in solution, the solubility decreases

Ex: Calc. molar solubility of $\text{Mg}(\text{OH})_2$ in soln of 0.050 M MgCl_2 . (K_{sp} of $\text{Mg}(\text{OH})_2 = 5.6 \times 10^{-12}$)



ignore x approx.

$$K_{sp} = [\text{Mg}^{2+}][\text{OH}^-]^2 = (0.050)(2x)^2 = 5.6 \times 10^{-12}$$

$$(0.050)(4x^2) = 5.6 \times 10^{-12}$$

$$x = 5.3 \times 10^{-6} \text{ M} = [\text{Mg}^{2+}] \text{ for } \text{Mg}(\text{OH})_2 = \text{solubility of } \text{Mg}(\text{OH})_2$$

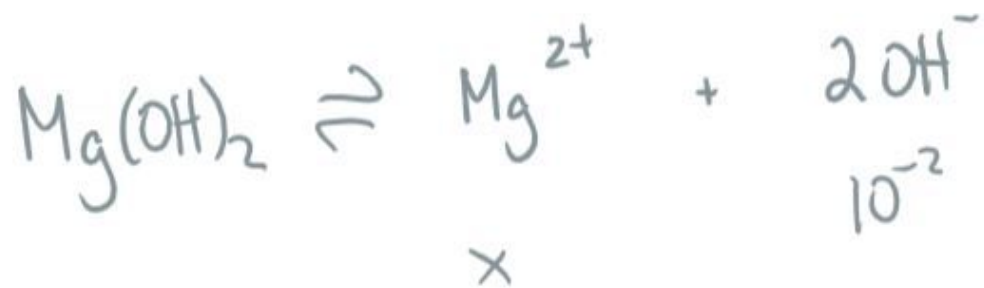
Compare this, common ion solubility = $5.3 \times 10^{-6} \text{ M}$

+ previous

$\text{Mg}(\text{OH})_2$ solubility = $1.1 \times 10^{-4} \text{ M}$

Sometimes OH^- can be the common ion
↳ affects the pH and the $[\text{OH}^-]$

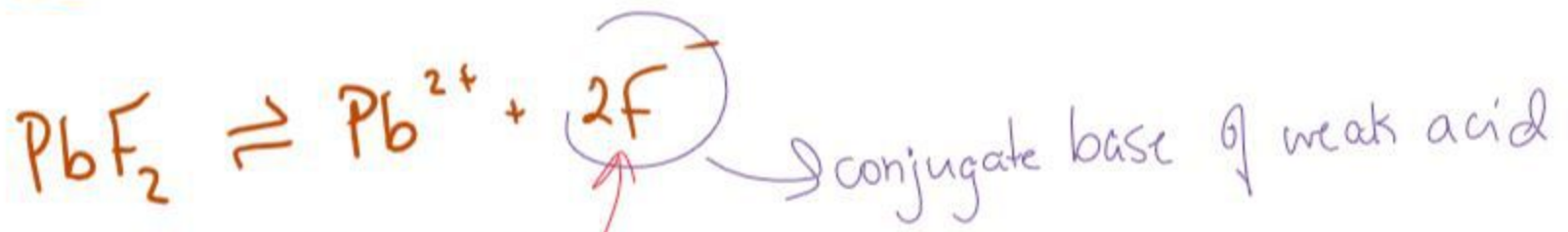
Ex: What is solubility of $\text{Mg}(\text{OH})_2$ in a solution buffered @ $\text{pH} = 12$? ($K_{sp} = 5.6 \times 10^{-12}$)



$$K_{sp} = [\text{Mg}^{2+}][\text{OH}^-]^2 = x(10^{-2})^2 = 5.6 \times 10^{-12}$$

$$\boxed{x = 5.6 \times 10^{-8} \text{ M}} = [\text{Mg}^{2+}] = \text{solubility of } \text{Mg}(\text{OH})_2$$

- pH can affect solubility
- If a substance has a basic anion, it'll be more soluble in an acidic soln.



if $\text{F}^- \uparrow$, the solubility of PbF_2 decreases
↳ Le Chatelier