**Solubility Equilibrium and**

**Ksp.**

**Solubility equilibrium: is achieved when the amounts of ions dissolving (dissociating) are equal to the ions forming crystals (assuming the solution is saturated).**

**Solubility product constant (Ksp): a constant based on the concentrations of the ions involved in the solubility reaction, the coefficients and the subscripts of the chemical equation.**

**Example: reaction of Calcium Fluoride dissolved in water.**

**CaF2 (s) Ca2+ (aq) + 2F- (aq)**

**\*\*Remember H2O is omitted from equilibrium equations because it is a pure liquid.**

**Ksp = [Ca2+][F]2**

**Solubility can be calculated using Ksp.**

**Example:**

**Calculate the solubility of MgF2 at 25 C in moles per liter.**

**1st: Write the balanced solubility equilibrium equation.**

**MgF2 (s) Mg2+(aq) + 2 F- (aq)**

**2nd: Write the Ksp expression = [Mg2+ ] [F]2**

**Ksp value for MgF2 = 7.4 x 10-11 (accepted value that is given or looked up)**

**3rd: Use a variable “x” to represent the moles per liter of Mg2+ along with equilibrium expression and chemical equation to solve for the concentration of Mg2+ ions.**

**Since: Ksp = [Mg2+][F-]2**

**(x) (2x2)**

**MgF2 (s) Mg2+(aq) + 2 F- (aq)**

**7.4 x 10-11 = (x)(2x)2**

**X = [Mg2+] = 2.6 x 10-4 M**

**Note the number 2 appears twice in the expression (x) (2x)2. This is because it is the subscript of MgF2 and the coefficient of 2F-.**