# Unit 3 - Equilibrium, Reversible Reactions, and the Equilibrium Constant

**In equilibrium, the rates of the forward reaction and reverse reaction are equal. This is also true for equilibrium phase changes and solution equilibrium.**

**Note that in order for equilibrium to be maintained when a gas is involved, the reaction must be in a closed container.**

**Remember that though rates must be equal, concentrations need not be equal, only CONSTANT ina dynamic equilibrium.**



 **K*eq* >1 K*eq* <1**



**2 N2 + 3 H2 2NH3 Le Chatelier’s Principle**

 **Concentration change**









**Note that pure solids and liquids do not have concentrations, so they are not included in the equilibrium expressions.**

**Types of K*eq***

**K*c* – tells the equilibrium based on Molarities of aqueous of gaseous solutions**

**K*p* – tells the equilibrium based on Pressures of gaseous solutions**

**K*w* – tells the equilibrium of the autoionization of water (1x10-14 at 25oC)**

**K*a* – tells the equilibrium of a weak acid’s ionization in water, called the**

**acid dissociation constant**

**K*b* – tells the equilibrium of a weak base’s ionization in water, called the**

**base dissociation constant**

**K*sp* – tells the equilibrium of a salt’s solubility, called the**

**solubility product constant.**

**(NOTE in these expressions, there is NO denominator)**

