EQUILIBRIUM EXPRESSIONS AND EQUILIBRIUM CONSTANT, K_C

By: Michelle Taepakdee & Craig Dent

EQUILIBRIUM CONSTANT, K_C

Equilibrium Expressions:

General Reaction

$mA + nB \rightarrow pC + qD$

(*Where m, n, p, and q are the number of moles in the equation*)

Ex.) $2Mg + 2HCl \rightarrow 2MgCl + H_2$

Equilibrium Expression

$$K_c = \frac{[C]^p [D]^q}{[A]^m [B]^n}$$

(*Where A, B, C, and D are concentrations of products and reactants, and m, n, p, and q are the number of moles of products and reactants*)

THE UNITS OF K_C

- The units are determined by the calculation of the expression. Each bracket, or concentration, has a unit of mol dm $^{-3}$.

- Ex.) $K_c = \frac{[HI]^2}{[H_2][I_2]}$ Units of K = $\frac{(\text{mol dm}^{-3}) \times (\text{mol dm}^{-3})}{(\text{mol dm}^{-3}) \times (\text{mol dm}^{-3})}$
  - (Notice that because the [HI] is squared ($[HI]^2$), that the mol dm $^{-3}$ is also squared)

AFFECTS OF CHANGES ON THE EQUILIBRIUM CONSTANT, K_C

Changes in Factors	Effect on the Equilibrium Constant, Kc
More products added in equal amounts	Kc decreases (Equilibrium shifts left)
More reactants added in equal mole amounts	Kc increases (Equilibrium shifts right)
Increase in pressure	Kc increases/decreases depending on the mole ratios of reactants to products (Equilibrium shifts right/left)
Decrease in pressure	Kc increases/decreases depending on the mole ratios of reactants to products (Equilibrium shifts right/left)
Increase in temperature (Exothermic)	Kc decreases (Equilibrium shifts left)
Decrease in temperature (Exothermic)	Kc increases (Equilibrium shifts right)
Increase in temperature (Endothermic)	Kc increases (Equilibrium shifts right)
Decrease in temperature (Endothermic)	Kc decreases (Equilibrium shifts left)