

CHEMICAL EQUILIBRIUM

When a reaction takes place in the gas phase or in liquid solutions, the concentrations of reactants and products will change until they appear to be constant - this is called **equilibrium**.

Even though the **[Reactants]** & **[Products]** appear constant, equilibrium is dynamic.

The **rate of the forward reaction is just equal to the rate of the reverse reaction**, resulting in the constant equilibrium concentrations.



$$k_{\text{for}} [A]^2 = k_{\text{rev}} [B][C]$$

$$\frac{k_{\text{for}}}{k_{\text{rev}}} = \frac{[B][C]}{[A]^2} = \text{constant}$$



equilibrium constant $K_{\text{eq}} = \frac{[Y]_{\text{eq}}^y [Z]_{\text{eq}}^z}{[A]_{\text{eq}}^a [B]_{\text{eq}}^b}$

(solids or liquids, enter 1; gases enter the partial pressure, P)

If more products or reactants are added, or the temperature is changed, [Reactants] and [Products] will again change until a new equilibrium is reached.

Le Chatelier's Principle

reaction quotient $Q = \frac{[Y]^y [Z]^z}{[A]^a [B]^b}$

Comparing Q to K will show the "direction" of this change