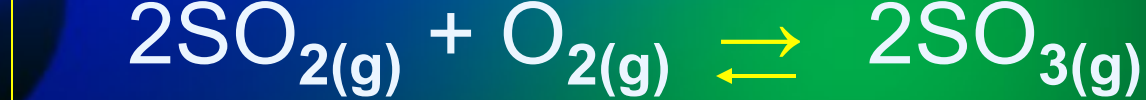
Equilibrium

Terms

- Reversible Reactions -
  - In a reversible reaction, the reactions occur simultaneously in both directions
  - double arrows are used to indicate this



  - In principle, almost all reactions are reversible to some extent

- Equilibrium Constants (K_{eq})
  - Chemists generally express the position of equilibrium in terms of numerical values
  - These values relate to the concentrations of reactants and products at equilibrium

Equilibrium Constants

consider this reaction:

$$aA + bB \rightarrow cC + dD$$

The equilibrium constant (K_{eq}) is the ratio of product concentration to the reactant concentration at equilibrium, with each concentration raised to a power (= the coefficient)

Can you write the equation for K_{eq} ?

HINTS:

- When you see the words 'ratio of' *this* to *that*' , the *THIS* is in the numerator and the *THAT* is in the denominator. THIS/THAT
- Recall the symbol for concentration is [ ]

[ ] means molarity 'M' (mol/L)

$$K_{eq} = \frac{\text{Product}}{\text{Reactants}}$$

$$K_{eq} = \frac{[C]^c \times [D]^d}{[A]^a \times [B]^b}$$

[ ] = molarity = moles per liter

Try this: Write the K_{eq} for this equation:

$$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$$

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Equilibrium Constants

the equilibrium constants provide valuable information, such as whether products or reactants are favored:

$K_{eq} > 1$, products favored at equilibrium

$K_{eq} < 1$, reactants favored at equilibrium