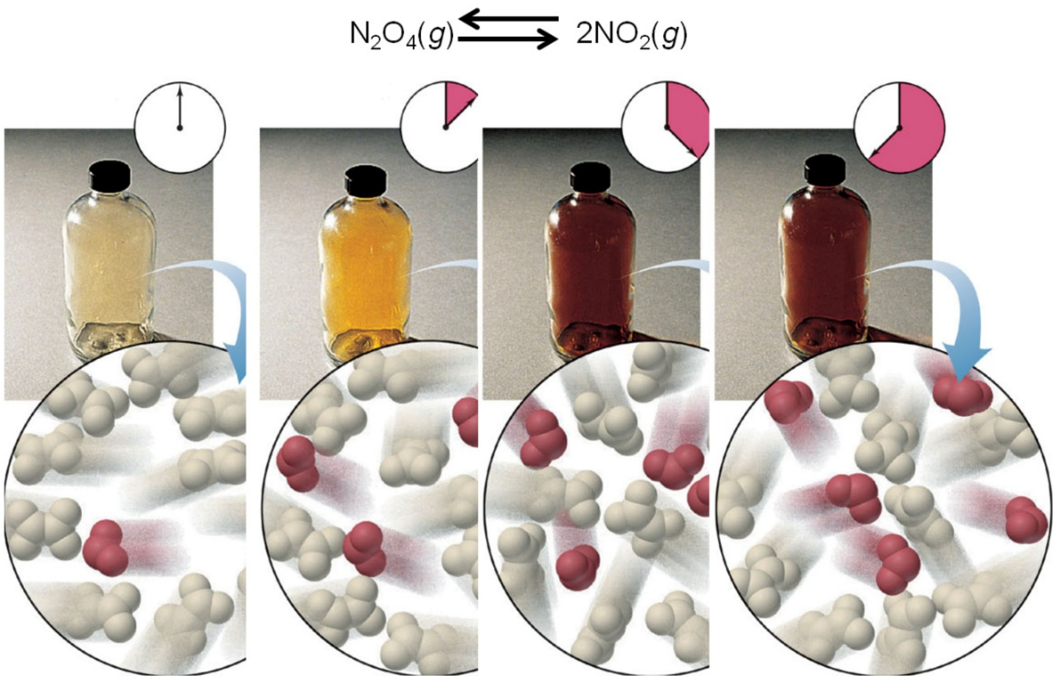
Lesson Overview
The Law of Mass Action

Objective: The student will be able to apply the Law of Mass Action to systems in equilibrium to calculate equilibrium constants.

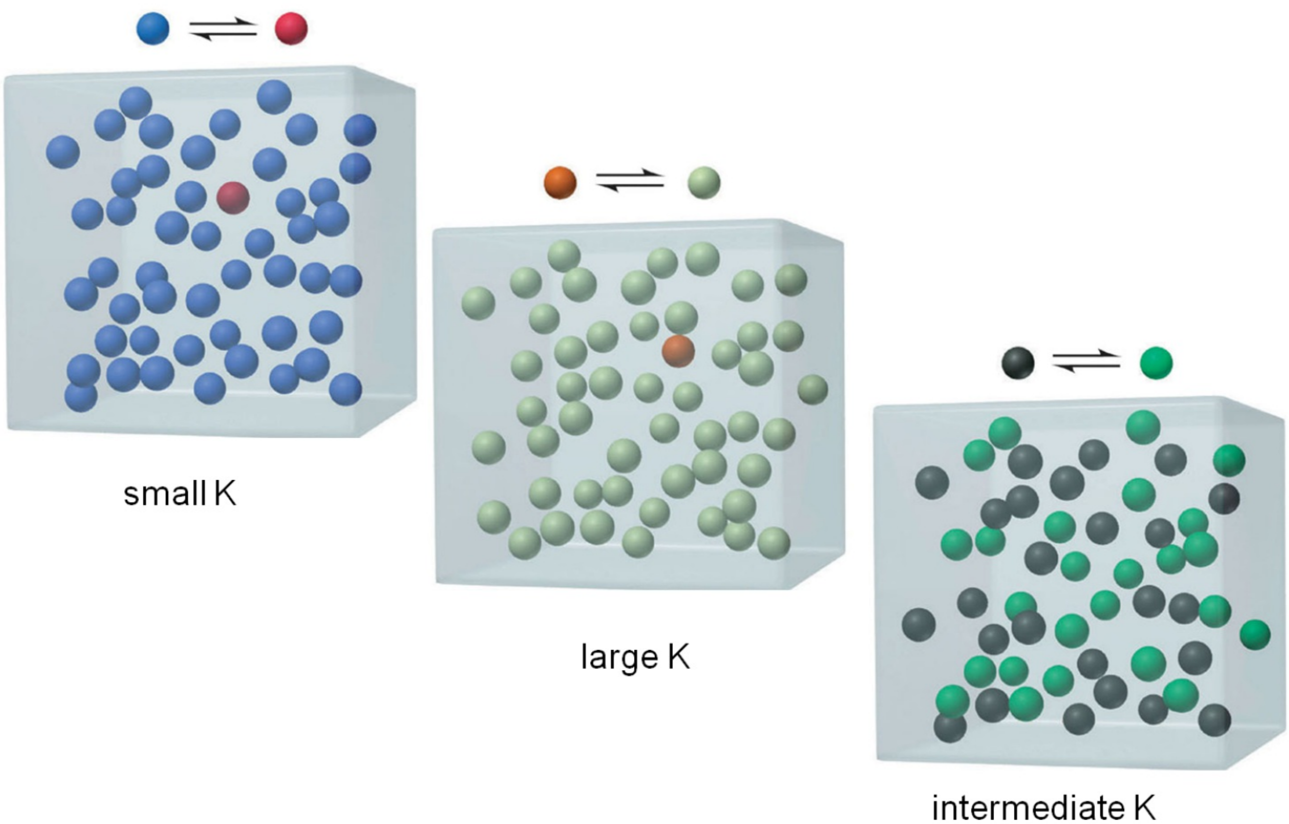
Dynamic state where the forward and reverse reactions occur at the same rate.

Example: $HC_2H_3O_2 \leftrightarrows H^+ + C_2H_3O_2^{-1}$

Does not mean equal amounts.



Significance of the Equilibrium Constant



Discuss values of K_{eq} with respect to 1.

Calculating K_{eq}

For the reaction:
$aA + bB \leftrightarrows cC + dD$

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

<u>Example</u>

$2HI_{(g)} \leftrightarrows H_{2(g)} + I_{2(g)}$

$$Keq = \frac{[H_2][I_2]}{[HI]^2}$$

Do not include (s) or (l). Why?

Law of Mass Action OR
Law of Chemical Equilibrium

The Equilibrium Constant

Molarity (M) ➔ K_c

partial pressure (p_i) ➔ K_P

Using ideal gas equation: $K_P = K_C(RT)^{\Delta n}$

Discuss units of K.

1A

Consider the following reaction: 2 A + 3 B <====> 4C (all gases @35.0°C and 1 atm.)

What is the value of K_C if [A] = 0.350 M, [B] = 1.50 M, and [C] = 4.00 M when the system reaches equilibrium? The reaction vessel is a 5.00 liter container.

1B

Consider the following reaction: 2 A + 3 B <====> 4C (all gases @35.0°C and 1 atm.)

What is the value of K_C if there are 4.00 moles of C, 1.50 moles of B and 0.350 moles of A when the system reaches equilibrium? The reaction vessel is a 5.00 liter container.

1C

Consider the following reaction: A + 3 B <====> 4C (all gases @35.0°C and 1 atm.)

What is the value of K_C if there are 4.00 moles of C, 1.50 moles of B an
0.350 moles of A when the system reaches equilibrium? The reaction vessel is a 5.00 liter container.

2A

Consider the following reaction: 2 A + B <====> C (all gases @35.0°C)

What is the value of K_P if $P_A = 3.50$ atm., $P_B = 1.50$ atm., and $P_C = 8.50$ atm. when the system reaches equilibrium? The reaction vessel is a 10.0 liter container.