Announcements

- Turn on the Clicker (the red LED comes on).
- Push “Join” button followed by “20” followed by the “Send” button (switches to flashing green LED if successful).

  – We will finish our discussion of equilibria in general today.

- The remainder of the material for the next exam will cover the special case of equilibria in acid-base systems (Chapters 16 & 17).
- We will get a brief introduction today to help you with the lab you have to plan on buffers.
- A suggested reading and problem assignment will be e-mailed out soon.

Review

- Writing equilibrium constant mass action expressions:
  - $aA + bB \rightleftharpoons cC + dD$
  - $K_{eq} = [C]^c[D]^d/\{[A]^a[B]^b\}$ where all concentrations (or partial pressures are at equilibrium).
  - If not at equilibrium this ratio is called Q, the reaction quotient.
    - $Q > K$ => reaction will run in reverse.
    - $Q < K$ => reaction will run forward.
- $K_{reverse} = K^{-1}$
- $K_P = K_C(RT)^{\Delta n}$
  - R must be in L atm $mol^{-1}K^{-1}$ if partial P's have units of atm.
  - R must be in $Jmol^{-1}K^{-1}$ if partial P's in Pa.

Review

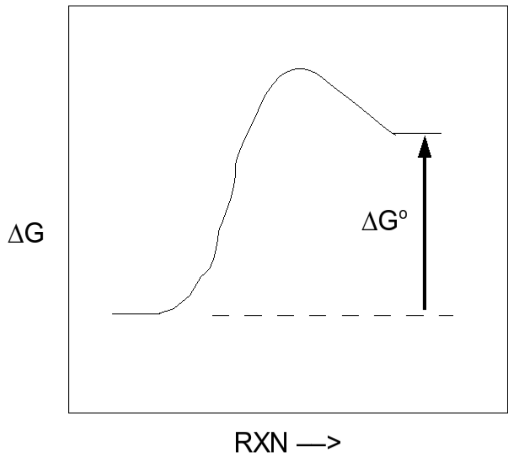
- Finding concentrations after equilibrium is reached.
- Ex: $N_2 + O_2 \longleftrightarrow 2\ NO$

	N_2	O_2	$2\ NO$
i (M)	0.023	0.033	0
Δ	-x	-x	+2x
eq	0.023 -x	0.033 - x	+ 2x

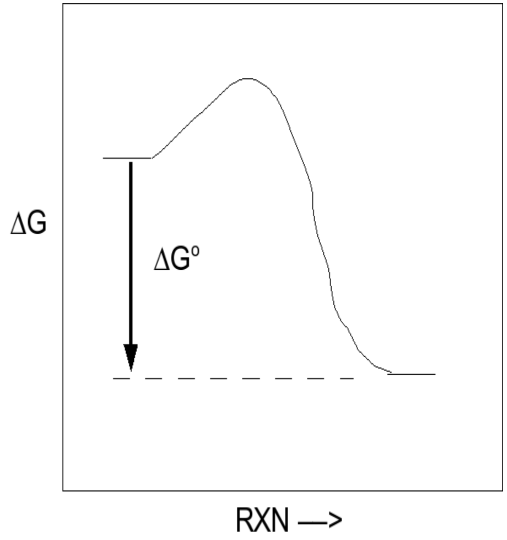
$$K = 1.5 \times 10^{-3} = \frac{(+2x)^2}{(0.023 - x)(0.033 - x)}$$

Tried x << 0.023 => $1.5 \times 10^{-3} \approx (2x)^2/\{(0.023)(0.033)$
solved for $x \approx 5.3 \times 10^{-4}$ => [NO]=2x = 1.1×10^{-3} M

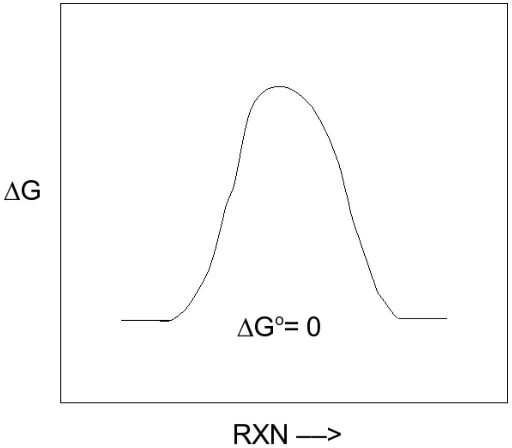
Relation of ΔG^o to K_{eq}



K<1 and reactants are favored at equilibrium.



K > 1 large and products are favored at equilibrium.



K=1 neither products or reactants is favored.