General Chemistry w/ Doc M

Today
Friday 2/10 Finish Chp 14

Sunday 2/12 Review session @ 5 - 6:30 in HTTC 108

Monday 2/13 Chp 15 Section 15.1 - 15.7
Last content day for CK 2

Tuesday 2/14 Valentine's day !
Also review session! (Last one before Exam)
5 - 6:30 pm HTTC 108

Wednesday 2/15 Sections 15.8 - 15.10 (CK3)

Thursday 2/16 Expt 5 MM unknown weak acid

Friday 2/17 CK2 Doors open 15 before class

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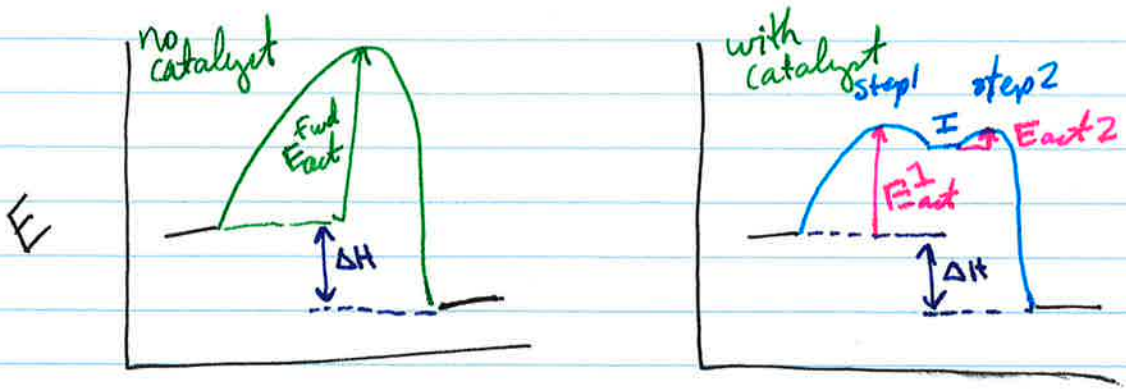
the mechanism, slow step determines rate of reaction.
Also determines when system comes to equilibrium.

	Kinetics	equilibrium
slow step	$A \rightarrow B$	$A \rightleftharpoons B$
	$rate_{fwd} = k_{fwd}[A]^1$	$rate_{fwd} = rate_{rev}$
	$rate_{rev} = k_{rev}[B]^1$	

$A \rightarrow B \qquad \Delta H = -20\ kJ$



Step1 $A + cat \rightarrow I$

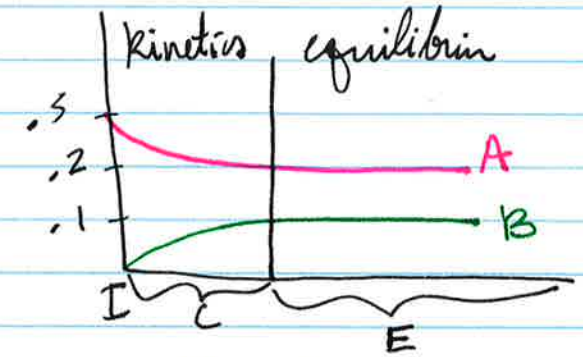
Step2 $I \rightarrow B + cat$

$A \rightarrow B$

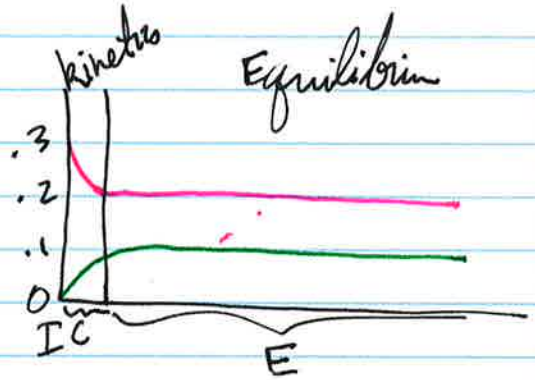
ΔH is not changed

M	A	→	B
I	0.30		0
C	−X		+X
E	0.3−x=.2		x=0.10

$K_C = \frac{0.10}{0.20} = 0.50$



Without catalyst



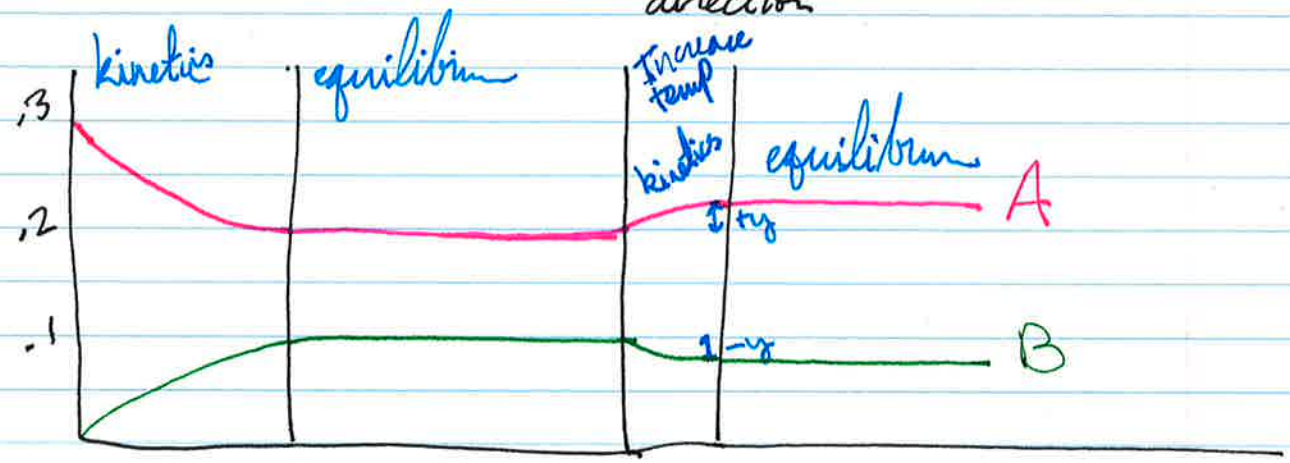
With catalyst

Changes kinetics
Does not change K_C or final distribution

Changing the temp

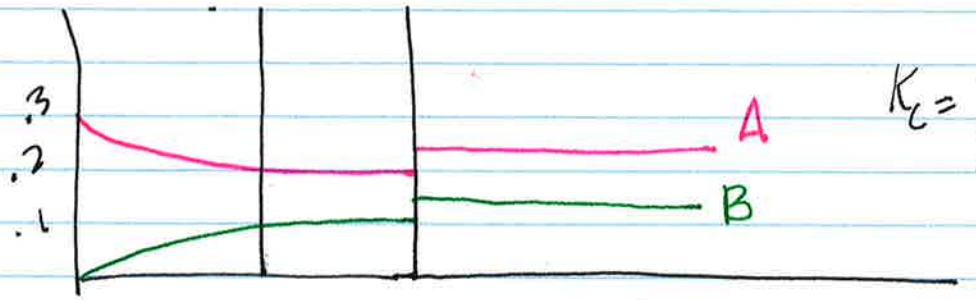
$A \rightarrow B \quad \Delta H = -20\,kJ$

Increasing T: 1) shortens kinetics region
2) drives rxn in endo thermic direction



$K_c = \frac{[B]}{[A]} < 0.50$

Volume Changes by 25%
(now 25% smaller)



$K_c = \frac{[B]}{[A]} = .50$

↑ reaction doesn't shift because $\Delta n_{gas} = 0$

$l_B - l_A = 0$

	k_{fwd}	k_{rev}	$rate_{fwd}$	$rate_{rev}$	K_c	$K_p = K_c(RT)^{\Delta n_g}$
Temp (T ↑)	↑	↑	↑	↑	Exo ↑ Endo ↓	↑ ↓
Vol (P) (vol decrease = pressure increase)	No change	NC	Vol gets smaller [ ] get bigger. rate incr if 1st or 2nd order NC for 0 order		NC	NC
Add whatever is on Left $A \rightarrow B$	NC	NC	If reagent is added first and second order rxns go faster NC for 0 order		NC	NC
Add catalyst	↑	↑	↑	↑	NC	NC

$Br_{2(g)} + Cl_{2(g)} \rightleftharpoons 2BrCl_{(g)}$ $K_c = 0.196$ (100 DK)

$\Delta H < 0$

inc temp: k_{fwd}, k_{rev} ↑ ; K_c + K_p ↓ because it's exothermic
to reach equilibrium, we shift ←.

Add more Br_2: we are no longer at eq
shift → to return to eq.

Increase volume: Reaction may slow down if
it's 1st or 2nd order
k_{fwd}, k_{rev}, k_c, k_p are unchanged

Because $\Delta n_{gas} = 0$, no shift

Catalyst: Figure it out!
See me or Dr. Mattson to
know if you're right :)