February 14th ♥

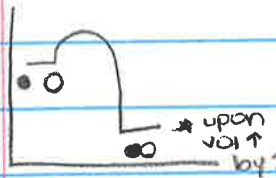
2 mol gas → $K_c = \frac{[A][B]}{[AB]}$ ← 1 mol gas

Given $A + B \rightleftharpoons AB$

1. calculate K_c^{325} and K_c^{350} ✓
2. Is the reaction exo- or endothermic? → exothermic
3. If volume is incr. @ constant temp., will shift occur? Will [AB] ↑ or ↓
4. Is $K_C = K_p$? NO
5. What happens if more B is added?
   ↳ not @ equilibrium, Shift R

	Equilib at 325°C	Equilib at 350°C
A	3	5
B	1	3
AB	4	2

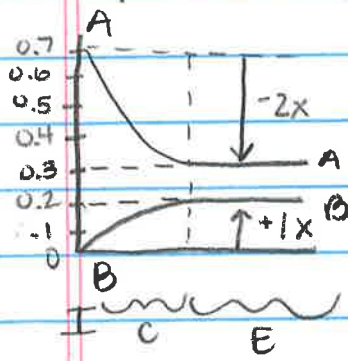
$K_c = \frac{4}{3 \cdot 1} = 1.33$ $K_c = \frac{2}{5 \cdot 3} = 0.133$



	$A + B \rightleftharpoons AB$			
M				
E	3	1	4	$K_c = 1.33$ ↓
I	1.5	0.5	2.0	$Q_c = 2.7$
C	+x	+x	−x	
E				

} shift to the LEFT ↳ [AB] ↓

$K_p = K_c(RT)^{\Delta n_{gas}}$



	$2A \rightleftharpoons B$	
M		
I	0.7	0.0
C	−0.4(2x)	+0.2(x)
E	0.3	0.2

$K_c = \frac{(B)}{(A)^2} = \frac{0.2}{0.3^2} = 2.22$

I C E

$A_2 \rightleftharpoons 2A$ $K_c = \frac{[A]^2}{[A_2]} = 0.0100$

$Cl_2 \rightleftharpoons 2Cl$

$2A \rightleftharpoons A_2$ $K_c = \frac{[A_2]}{[A]^2} = 100.00$

$A \rightleftharpoons \frac{1}{2}A^2$ $K_c = \frac{[A_2]^{1/2}}{[A]} = 10.0$ ← square root of it

$\frac{1}{2}A_2 \rightleftharpoons A$ $K_c = \frac{[A]}{[A_2]^{1/2}} = 0.10$

Adding Equilibria Expressions

February 4th

$A \rightleftarrows B \quad K_c = \frac{[B]}{[A]} = 4.00$

$B \rightleftarrows C \quad K_c = \frac{[C]}{[B]} = 0.50$

$A \rightleftarrows C \quad K_c = K_{c_1} * K_{c_2} = \frac{[B]}{[A]} \frac{[C]}{[B]} = \frac{[C]}{[A]} = 4.00 * 0.50 = \boxed{2.00}$

Given: $Na_2O \rightleftarrows 2Na + \frac{1}{2}O_2 \quad K_c = 2.0 \times 10^{-25}$

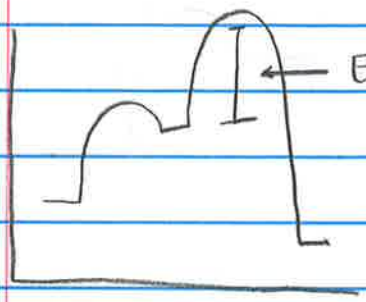
$Na_2O_2 \rightleftarrows 2Na + O_2 \quad K_c = 5.0 \times 10^{-29}$

→ what is K_c for: $Na_2O + \frac{1}{2}O_2 \rightleftarrows Na_2O_2$?

$Na_2O \rightleftarrows 2Na + \frac{1}{2}O_2 \quad K_c = 2.0 \times 10^{-25}$

$2Na + O_2 \rightleftarrows Na_2O_2 \quad K_c = 2.0 \times 10^{28}$

$Na_2O + \frac{1}{2}O_2 \rightleftarrows Na_2O_2 \quad K_c = 4000$



$E_{act}^{\#2} > E_{act}^{\#1}$

Step 1: $HTar + Cat \rightleftharpoons Int$ FAST

$K_c = \frac{[Int]}{[HTar][Cat]}$

$[Int] = K_c[HTar][Cat]$

2nd step SLOW — Step 2: $Int + H_2O_2 \rightarrow CO_2$ (green) $+ Cat + Products$ — SLOW STEP

$HTar + H_2O_2 \rightarrow CO_2 + products$

$rate = k[Int]^1[H_2O_2]^1$

$rate = k K_c [HTar][Cat][H_2O_2]$

$k K_c$ lumped together

$= k'[HTar]^1[Cat]^1[H_2O_2]^1$

Mechanism:

- Step 1. $NO + O_2 \rightleftharpoons NO_3$ fast → $K_c[NO][O_2] = [NO_3]$, $K_c = \frac{[NO_3]}{[NO][O_2]}$
- Step 2. $NO_3 + NO \rightarrow 2NO_2$ slow

overall $2NO + O_2 \rightarrow 2NO_2$

- $rate = k[NO_3][NO]$
- $= k K_c [NO]^2 [O_2]$