Today Feb 5 - Sections 14.5-14.7

Wednesday Feb 7 - chap. 14

Thursday Feb 8 - lab (prepare for quiz - download data set)

	$2BrCl(g)$	$\rightleftharpoons$	$Br_2(g)$	+	$Cl_2(g)$
M					
I	0.2		0		0
C	$-2x$		$+x$		$+x$
E	0.0162		.0919		.0919

$K_c^{500K} = \frac{[Br_2][Cl_2]}{[BrCl]^2} = ?$

$K_c^{500K} = \frac{(0.0919)(0.0919)}{(0.0162)^2}$

$K_c^{500K} = 32.0$

$0.200 - 2x = 0.0162$

$x = .0919$

$P(atm)$	$N_2(g)$	+	$3H_2(g)$	$\rightleftharpoons$	$2NH_3(g)$
I	0		0		0.500 atm
C	$+x$		$+3x$		$-2x$
E	~~0.096~~ .2346		$3(.2346) = 0.7038$ ~~0.288~~		0.0308 atm

$K_p^{400K} = \cancel{44.4} = \frac{P_{NH_3}^2}{P_{N_2} \cdot P_{H_2}^3}$

$= \frac{(0.0308)^2}{(0.2346)(0.7038)^3}$

$K_p = 0.0116$

$0.500 - 2x = 0.0308$

$x = \cancel{0.096}\ .2346$

$PV_x = n_x RT$

$P = \frac{n_x}{V_x} RT$

$P = [x]RT$

$K_p = \frac{[NH_3]^2 R^2 T^2}{[N_2]RT[H_2]^3 R^3 T^3}$

$K_p = K_c (RT)^{-2}$

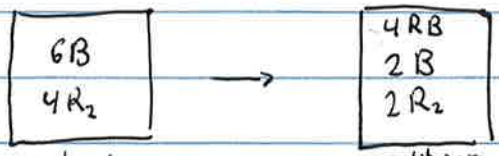
in general... $K_p = K_c (RT)^{\Delta n_g}$ or $K_c = K_p (RT)^{-\Delta n_g}$

$\Delta n_g = \cancel{\text{reactant}} - \cancel{\text{product}}$ (right − left)

$\Delta n_g = 2 - 4$

$\Delta n_g = -2$

$K_c = K_p$ when $\Delta n_g = 0$

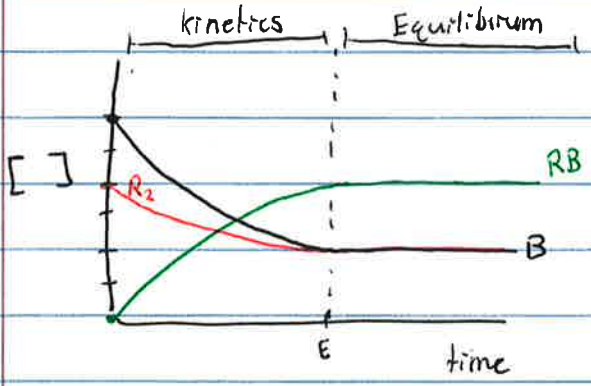


M	2B	+ R_2	→ 2RB
I	6	4	0
C	-2x	-x	+2x
E	2	2	4

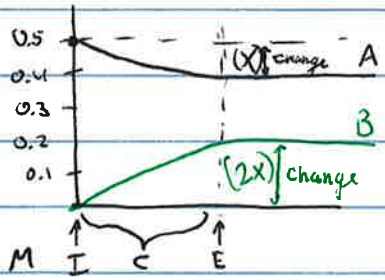
$K_c = \frac{[RB]^2}{[B]^2[R_2]}$

$K_c = \frac{(4)^2}{(2)^2(2)} = 2.0$

$x = 2$



A ⟶ 2B



M	A	→ 2B
I	0.5	0
C	-x	+2x
E	0.4	0.2

$x = 0.1$

$K_c = \frac{[B]^2}{[A]}$

$K_c = \frac{(0.2)^2}{0.4}$

$K_c = 0.1$

M	$2NO_2(g)$	⇌	$N_2O_4(g)$
I	0.0800		0
C	-2x		+x
E	0.0124		0.0338

$K_c = \frac{[N_2O_4]}{[NO_2]^2} = 216 = \frac{x}{(0.0800-2x)^2}$

$216 \times (0.0800-2x)^2 = x$

$216(0.0800^2 - 2 \cdot 0.0800x + 4x^2) = x$

$1.3824 - 69.12x + 864x^2 = x$

$\underbrace{1.3824}_{c} \underbrace{- 70.12x}_{b} + \underbrace{864x^2}_{a}$

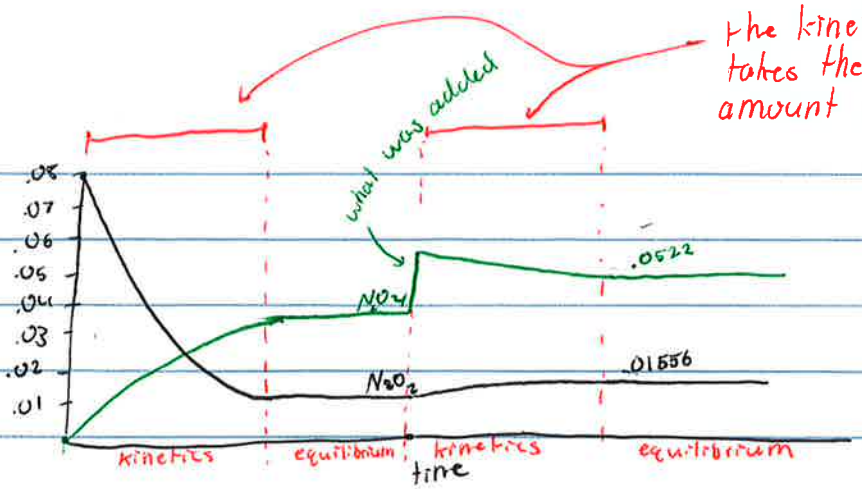
*check using equilibrium concentrations

$K_c = \frac{0.0338}{(0.0124)^2} = 220$ ✓

you will not have to do a quadratic on the test :)

$x = 0.0338, \quad 0.0474$

* if both roots are positive, choose smaller one
* if one root is positive and one is negative, choose the positive one



* Add some N_2O_4 0.0200 mol/L

	$2NO_2(g)$	$\rightleftharpoons$	N_2O_4
I	0.0124		0.0638
C	+2x		-x
E	0.0124+2x		0.0538-x

$$Q_c = \frac{[N_2O_4]_I}{[NO_2]_I^2} = \frac{0.0538}{(0.0124)^2}$$

$$= 350$$

Le Chatelier's principle: if $Q_c > K_c$ shift left; if $Q_c < K_c$ shift right

$$K_c = \frac{[N_2O_4]}{[NO_2]^2} = 216$$ will be the same as long as temperature does not change

$x = .00168$

	$2NO_2(g)$	$\rightleftharpoons$	$N_2O_4(g)$	$K_c = 216$
I	0.10		0.70	
C	$\pm 2x$		$\mp x$	use Q_c to determine + or -
E	0.10-2x		0.70+x	

$$Q_c = \frac{0.70}{(0.10)^2} = 70$$

$Q_c < K_c$, sh. ft right

change in volume

Suppose... we decrease vol by 2x

	$2NO_2(g)$	$\rightleftharpoons$	$N_2O_4(g)$
original concentrations → E	0.0124		.0338

vol decreases by 2x (10L → 5L for example)

I	0.0248		.0676
C	-2x		+x
E			

use Q_c $Q_c = \frac{.0676}{(0.0248)^2} = 110$ $Q_c < K_c$

shift right