General Chemistry II with Dr. Mattson

Today Feb 3 — Sect 14.1 - 14.3

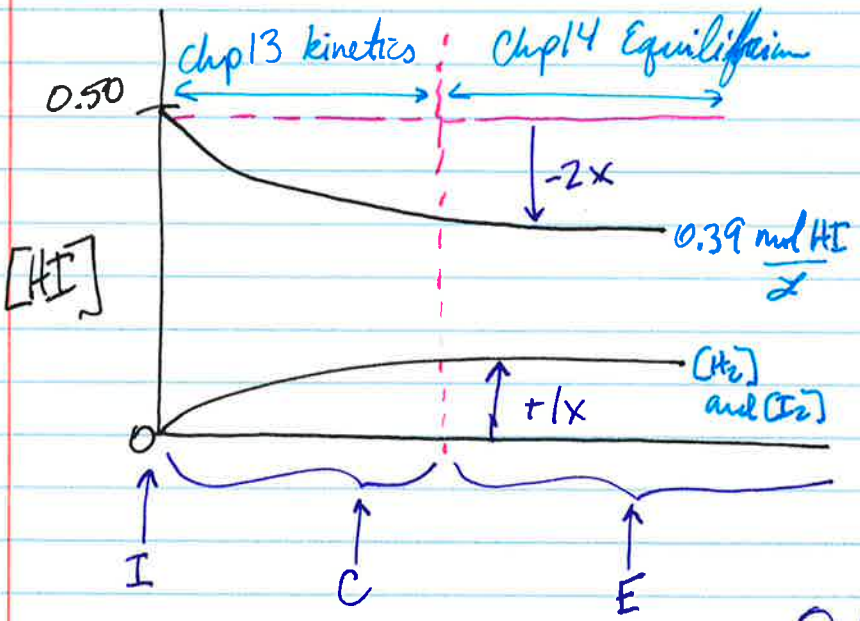
Sunday 2/5 — Review session w/ Monika HTTC 108 5–6:30 pm

Monday 2/6 — Sect. 14.4-14.5

Tuesday 2/7 — Review session HTTC 108 5–6:30 pm

Wednesday 2/8 — Sect 14.6-14.8

Friday 2/10 — Hmwk Quiz (Sect 13.9-14.5)



at 700 K

	$2HI_{(g)}$	$\rightleftharpoons$	$H_{2(g)}$	+	$I_{2(g)}$
M					
I	0.50		0		0
C	-2x		x		x
E	.39		x		x

$0.50 + (-2x) = 0.39$

$x = 0.055$ mol/L

kinetics → Equilibrium ⇌

$$K_c = \frac{[H_2]^1[I_2]^1}{[HI]^2} \qquad \frac{[\text{products}]^x}{[\text{reactants}]^y}$$

coefficients in

K_c ↓ concentration

↓ Equilibrium constant

$$= \frac{0.055 \times 0.055}{0.39^2} = 0.020$$

$P_{(atm)}$	$2HI \rightleftharpoons H_2 + I_2$
I	
C	
E	

$$K_p = \frac{P_{H_2} * P_{I_2}}{(P_{HI})^2}$$

$PV = nRT$

$P_a = \frac{n}{V} RT$

$P_a = [A]RT$

$$K_p = \frac{[H_2]RT\,[I_2]RT}{[HI]^2 R^2T^2} \Rightarrow K_c$$

$K_p = K_c$ if $\Delta n_{gas} = 0$

$F_{2(g)} \rightleftharpoons 2F_{(g)}$

$$K_p = \frac{(P_F)^2}{P_{F_2}} = \frac{[F]^2R^2T^2}{[F_2]RT}$$

$$= RTK_c$$

In general

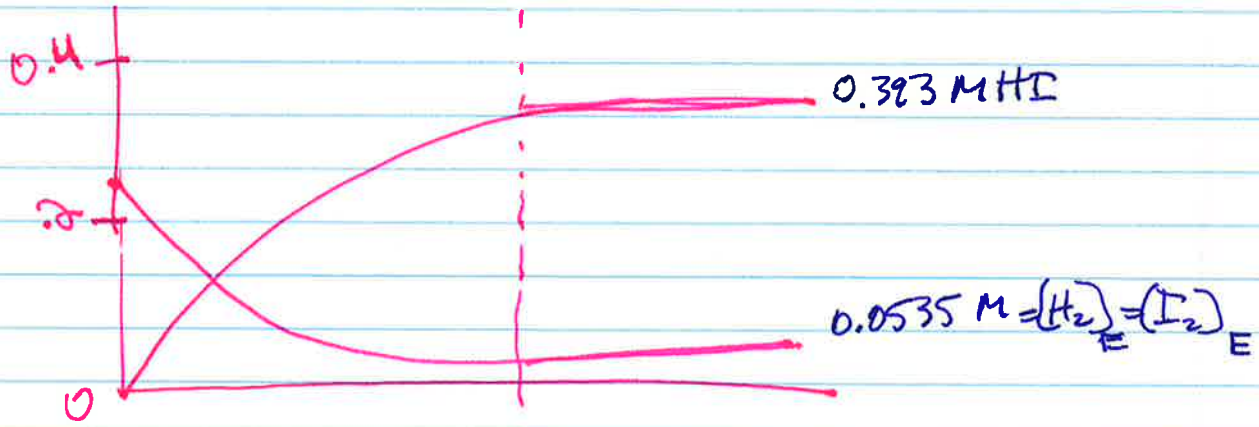
$$K_p = K_c (RT)^{\Delta n_{gas}}$$

Δn_{gas} ← $n_{right} - n_{left}$

at 700 K

	$H_{2(g)}$	+ $I_{2(s)}$	→	2 HI
I	0.25	0.25		0
C	−x	−x		+2x
E	0.25 − x = 0.0535 M	0.25 − x = 0.0535 M		2x = 0.393 M

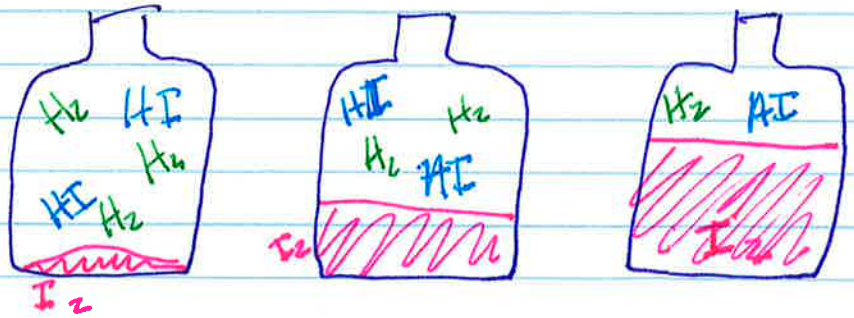
$$K_c = \frac{[HI]^2}{[H_2][I_2]} = \frac{0.393^2}{0.0535 \times 0.0535} = 50.3$$



at 300 K

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

(I_2 solid at 300 K)



[HI] is the same in all 3 tanks

When writing K_p and K_c expressions don't added solids or gases. (aren't involved in reaction)

At 700 K → What is $[HI]_E$ and $[H_2]_E$

	$2HI_{(g)}$	$\rightleftharpoons H_{2(g)}$	$+ I_{2(s)}$
I	0.84	0	0
C	$-2x$	x	x
E	$0.84-2x$	x	x

$$K_c^{700} = 0.020 = \frac{[H_2][I_2]}{[HI]^2} = \frac{x^2}{(0.84-2x)^2}$$

$$0.020 = \left(\frac{x}{0.84-2x}\right)^2$$

$$0.1414 = \sqrt{0.020} = \frac{x}{0.84-2x}$$

$$0.1414(0.84-2x) = x$$
$$0.1188 - 0.2828x = x$$
$$0.1188 = 1.2828x$$
$$0.0926 = x$$

$$[HI] = 0.84-2x = 0.84-2(0.0926) = .655\ M$$

$$[H_2] = x = 0.0926\ M$$

Check: $K_c^{700} = \frac{0.0926 \times 0.0926}{0.655^2} = 0.20$