February 26th

*Office hours: Today + Tomorrow until 4pm

Temp., Vol., K_c, [ ]

↳ Le Chatelier #1: adding or removing gases (g)

M A(g) ⇌ B(g) $K_c = 3.0$

E 1.0 3.0

Add A

I 2.0 3.0 $Q_c = \frac{3.0}{2.0} = 1.5 < K_c$

C *If you add some A, shift R, if you

E add some B, shift L

↳ Le Chatelier #2: volume changes

$PV = nRT$ Vol ↓ P↑

→ volume decreases, shift to the fewer moles of gas

MA ⇌ 2B

E 2.0 4.0 $K_c = \frac{4.0^2}{2} = 8.0$

*volume ↓ by 50%

I 4.0 8.0 $Q_c = \frac{8.0^2}{4.0} = 16.0$

C +x -2x

E $K_c = 8.0$

everything speeds up!

↑T, ↑ all rate constants

↳ Le Chatelier #3: Temperature

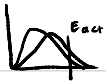
↑temperature, favors the uphill (endothermic rxn)

$K_c^{325} = 1.20$ $K_c^{375} = 0.70$

$K_c^{325} = \frac{[A]}{[B]} < 1.20$ $K_c^{375} = \frac{[B]}{[A]} > 0.7$

* In exothermic rxns K_c ↓ as T↑

* In endothermic rxns K_c ↑ as T↑



*ONLY temperature can Δ K_c

Worksheet chapter 16.3 #6

HOBr + OCl^- ⇌ OBr^- + HOCl

↳ $K_a = 2.0 \times 10^{-9}$ ↳ $K_a = 3.5 \times 10^{-8}$

weak acids

HOBr + H_2O ⇌ H_3O^+ + OBr^- K_a^{HOBr}

↳ template!

$HOBr + H_2O \rightleftharpoons H_3O^+ + OBr^-$ $K_a^{HOBr} = 2.0 \times 10$

$OCl^- + H_3O^+ \rightleftharpoons H_2O + HOCl$ $K = \frac{1}{K_a^{HOCl}} = 2.9 \times 10^7$

$K = 2.0 \times 10^{-9} * 2.9 \times 10^7$

$= 0.057$

↳ 0.057 < 1 (means more stuff on L)

$2H_2O$ ⇌ $H_3O^+ + OH^-$ $K_w = 1 \times 10^{-14}$

#2 what is the pH of a 6.7×10^{-3} M HI soln?

$HI + H_2O \xrightarrow{100\%} H_3O^+ + I^-$

↳ $-\log(6.7 \times 10^{-3}) = 2.174 = pH$

What is the concentration if 10.0 mL of this acid is diluted to 100. 0mL?

$M_o V_c = M_d V_d$ $[HI] = 6.7 \times 10^{-4}$

$6.7 \times 10^{-3} * 10.0 = 100.0 * M_d$ ↳ $pH = 3.174$

*ONLY SO^{-2} * OH^-

warm-up #1 predict the acid-base properties, if any, of these compounds

NaOCl Sa Wa n So WB

H_2SO_3 Wa

RbBr

NaCN

HF

ClO_3

LiClO4

NH_4NO_3

$NH_4(CH_3)_2$

CsOH

$NaHSO_3$

What is the pH of a 0.441 M $HC_2H_3O_2$ soln? $K_a = 1.8 \times 10^{-5}$

	$HC_2H_3O_2$	+ H_2O ⇌	$C_2H_3O_2^-$	+ H_3O^+
M				
I	0.441M		0	0
C	−x		+x	+x
E	0.441−x		x	x

*passes 400 rule?

$\frac{x^2}{0.441} = 1.8 \times 10^{-5} \rightarrow x = 0.002817 \rightarrow -\log(0.002817)$

↳ pH = 2.55

% dissociation = 100% * $\frac{x}{0.441}$

↳ 100% * $\frac{0.002817}{0.441} = 0.64\%$

What is the pH of a 0.0441M $HC_2H_3O_2$ soln?

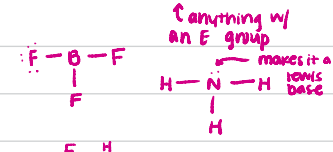
↳ $\frac{x^2}{0.0441} = 1.8 \times 10^{-5}$ ↳ $x = 0.00089096$

↳ pH = 3.05

↳ 100% * $\frac{0.00089096}{0.0441} = 2.0\%$

*Lewis Acids + Bases:

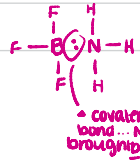
↑ anything w/ an E group



← makes it a lewis base

*any metal cation = a lewis acid

↳ $Na^+ :\ddot{O}-H$ (H below O)



↳ covalent bond... Nitrogen brought both e-