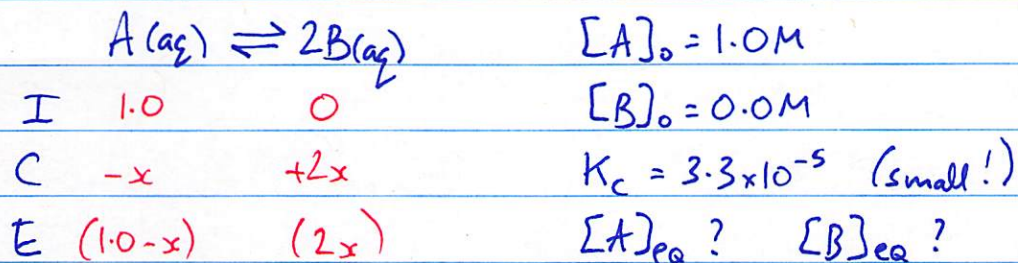


3/20/2019

Last time...



$$K_c = 3.3 \times 10^{-5} = \frac{[B]^2}{[A]_{eq}} = \frac{(2x)^2}{(1.0-x)} \quad \text{Quadratic?}$$

... because $K_c \ll 1$, we know that x will be small
then we can assume $(1.0-x) \approx 1.0$

$$\text{then: } 3.3 \times 10^{-5} \approx \frac{(2x)^2}{1.0} \approx 4x^2$$

$$x = \sqrt{\frac{3.3 \times 10^{-5}}{4}} = 2.87 \times 10^{-3}$$

$$[A]_{eq} = 1.0 - x = 1.0 - 0.00287 = 1.0M$$

1dp 4dp 1dp

$$[B]_{eq} = 2x = 2 \times 2.87 \times 10^{-3} = 5.74 \times 10^{-3}M$$

2sf. 2sf.

Rule of thumb: 5% rule

- check that we less than 5% dissociation

$$\left(\frac{x}{\text{init conc}} \times 100 < 5\% \quad \checkmark \right)$$

$$\frac{2.87 \times 10^{-3}}{1.0} \times 100 = 0.287\% \quad \checkmark$$

Le Châtelier's Principle

"When we stress a dynamic eq^m, it shifts to remove the stress"

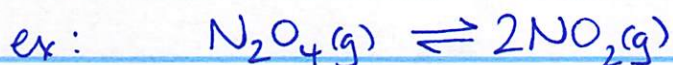
Homeostasis: too hot? Sweat (cools us down)

STRESS ~ RELIEF

too cold? Shiver (warms us up)

etc.

Stresses: conc }
 pressure } raise/lower
 temp }
Relief: counteract stress

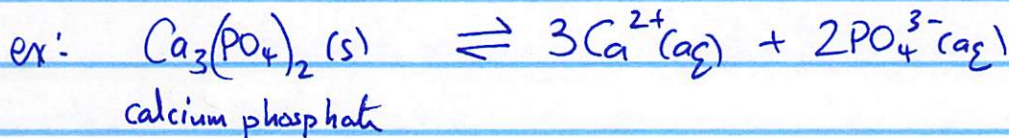


- add $NO_2(g)$ (Stress)

Relief: $[NO_2] \downarrow$ Shift to LHS

- add $N_2O_4(g)$ (Stress)

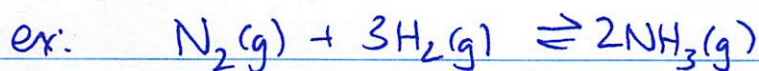
Relief: $[N_2O_4] \downarrow$, Shift to RHS



if we lower Ca^{2+} conc, ... need to increase Ca^{2+} conc, ... shift to RHS!
(stress) (relief)
(osteoporosis)

Pressure changes: Boyle's law: $p \propto 1/v$

$V \downarrow, P \uparrow // V \uparrow, P \downarrow$



Stress: decreasing V ($P \uparrow$)

Relief: need to decrease P ($P \downarrow$)

\Rightarrow shift to RHS, fewer molecules

of gas, lowering of pressure!

more molecules

- more they hit walls

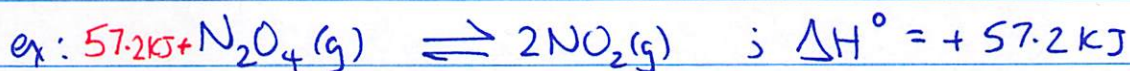
- more pressure!

Temp. changes

$\Delta H < 0$ (-ve), exothermic, heat is lost by rxn: $A \rightleftharpoons B + \text{heat}$

$\Delta H > 0$, (+ve), endothermic, heat is gained by rxn: $\text{heat} + A \rightleftharpoons B$

If we raise T , we must have added heat } stresses
" lower T , " ————— " removed heat }



endothermic

increase T (stress)

\rightarrow adding heat

relief is to

remove heat

\rightarrow So, we must shift
to RHS

So, we make more NO_2 @ eqm! less N_2O_4 !

Affects K_c (or K_p) ... in this case, $K \uparrow$ as $T \uparrow$

- other stresses (conc, pressure) do not change K

exothermic rxns

as $T \uparrow, K \downarrow$

Ch 16 Acids + Bases

Acids: taste sour
turn litmus **RED**

Bases: taste bitter
turn litmus **BLUE**
feel slippery

Definitions

1880s Arrhenius: Acids: form H^+ ions in aq. solⁿ
Bases: form OH^- " " " "

