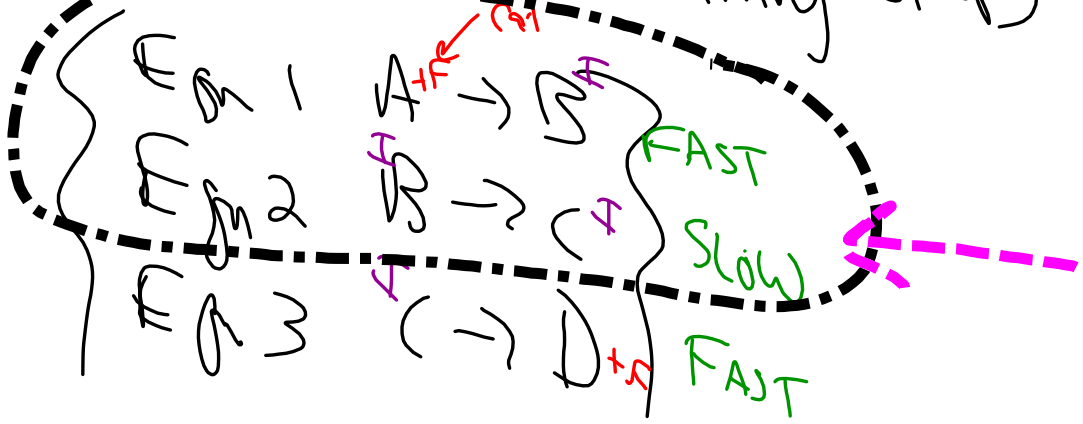
Reaction Mechanisms

Must include all eqns up to AND INCLUDING the slow step (Rate determining step)



Feb 6-7:49 AM

$A \rightarrow B$ FAST

$B \rightarrow C$ SLOW

$A \rightarrow C$

$\text{Rate}(B) = k_1[A]$

$\text{Rate}(C) = k_2[B]$

$\text{Rate}(C) = k_2[B]$

$\text{Rate}(C) = k_2[k_1[A]]$

$\text{Rate}(C) = k[A]$

Feb 6-7:55 AM

FAST ① $NO + NO \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} N_2O_2$

SLOW ② $N_2O_2 + Br_2 \xrightarrow{k_2} 2NOBr$

$NO + NO + Br_2 \rightarrow 2NOBr$

Rate $(N_2O_2) = k_1[NO][NO]$

$= k_1[NO]^2$

Rate $(NOBr) = k_2[N_2O_2][Br_2]$

Eqn #1

Rate $(NOBr) = k_2[N_2O_2][Br_2]$

Rate $(NOBr) = k_2[k_1[NO]^2][Br_2]$

Rate $(NOBr) = k[NO]^2[Br_2]$

Feb 6-8:00 AM

14-1 ⑬ $2NO + O_2 \rightarrow 2NO_2$

Rate $= k[O_2][NO]^2$

~~①~~ Rate $= k[NO][O_2]$

~~②~~ $NO + O_2 \rightarrow \cancel{NO_3}$

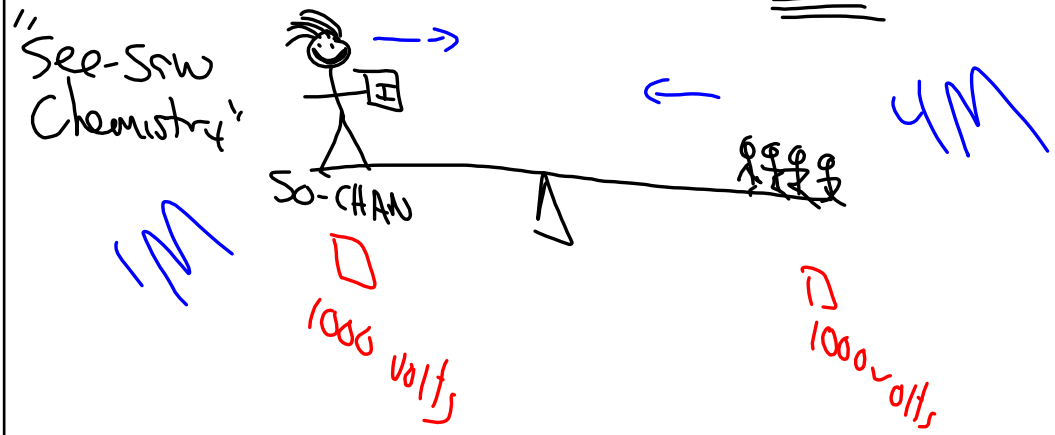
$\cancel{NO_3} + O_2 \rightarrow NO_2 + O_3$

Rate $= k[NO][O_2]^2$

Feb 6-8:18 AM

Chap 15 Reaction Equilibrium

RATE forward Rxn = RATE reverse Rxn



Feb 6-8:23 AM

Reactants → Products.

MASS ACTION Expression ⇒ $K_{eq} = \frac{[Prod]^{coeff}}{[React]^{coeff.}}$ → K_c

$$aA + bB \rightarrow cC + dD$$

$$K_c = \frac{[C]^c[D]^d}{[A]^a[B]^b}$$

Feb 6-8:44 AM

$A \rightarrow B$ $\quad Rate_f = K_f[A]$ (forward)

$B \Rightarrow A$ $\quad Rate_r = K_r[B]$ (Reverse)

Rates Must be equal

$K_f[A] = K_r[B]$

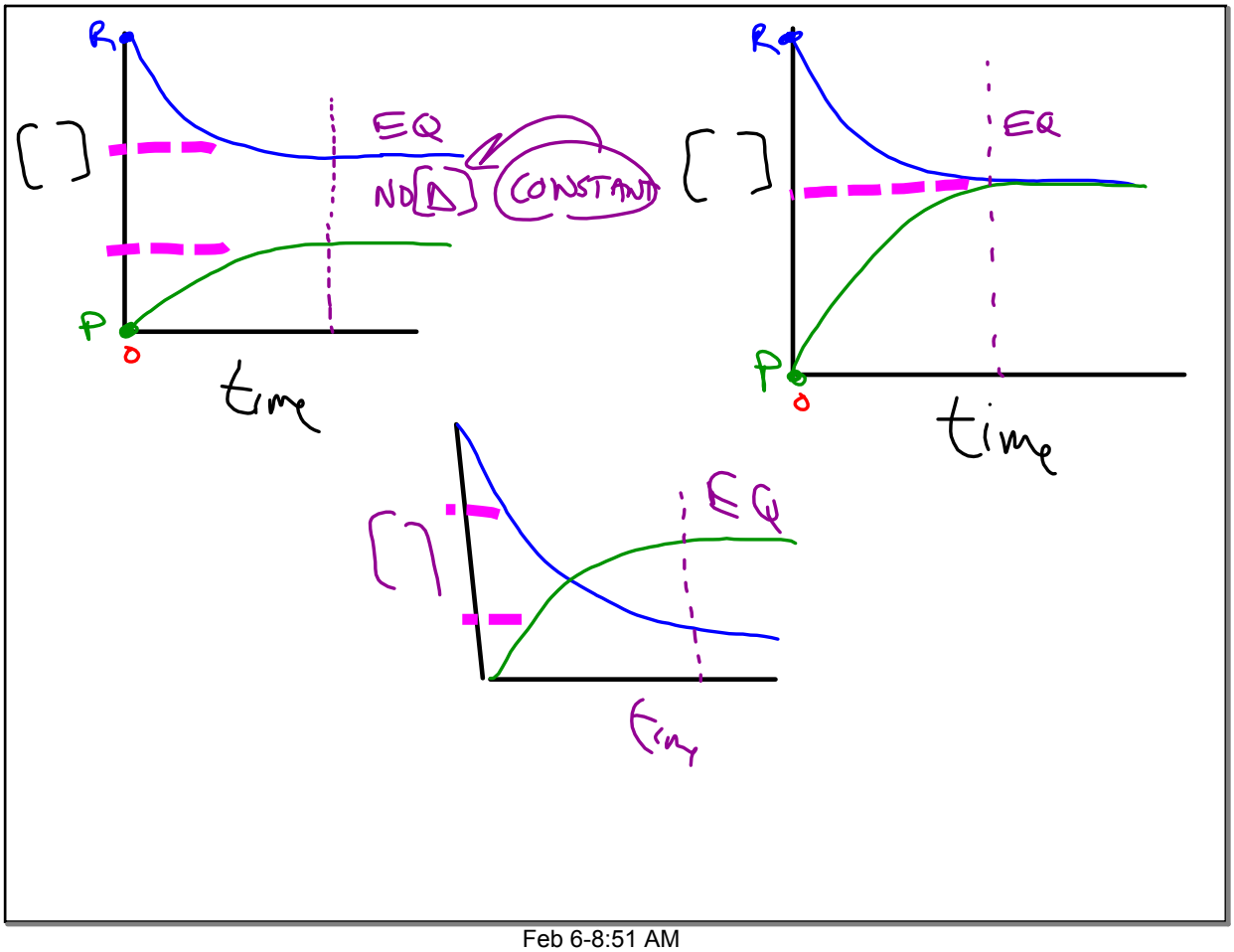
$K_{eq} = \frac{K_f}{K_r} = \frac{[B]}{[A]}$ $\frac{Prod}{react}$

Feb 6-8:47 AM

$K_f = \frac{1}{K_r}$

$K_f * K_r = 1$

Feb 6-8:49 AM



Feb 6-8:51 AM

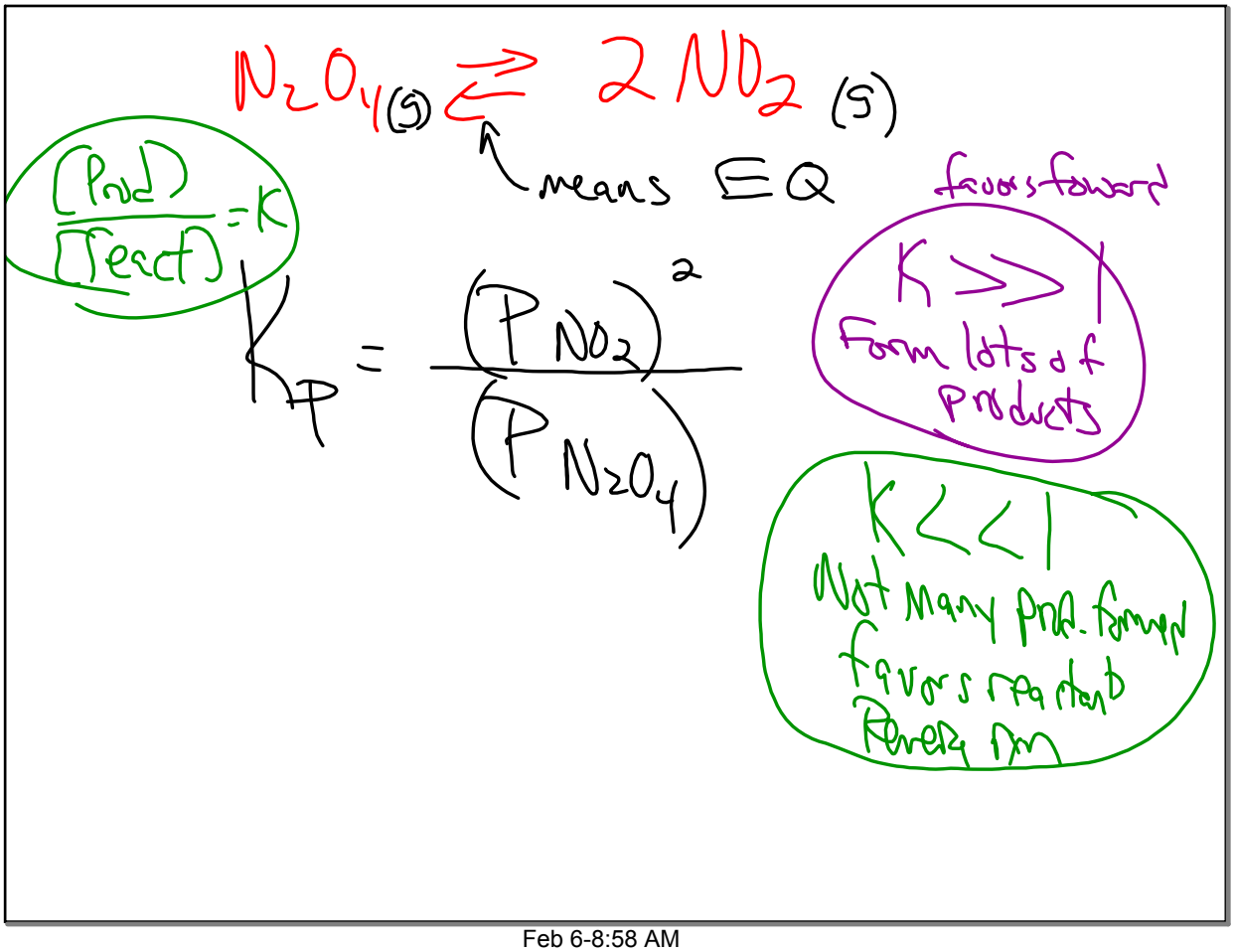
K_c = Concentration eq. aqueous solns (aq)

K_p = Pressure of a gas equilibrium (g)

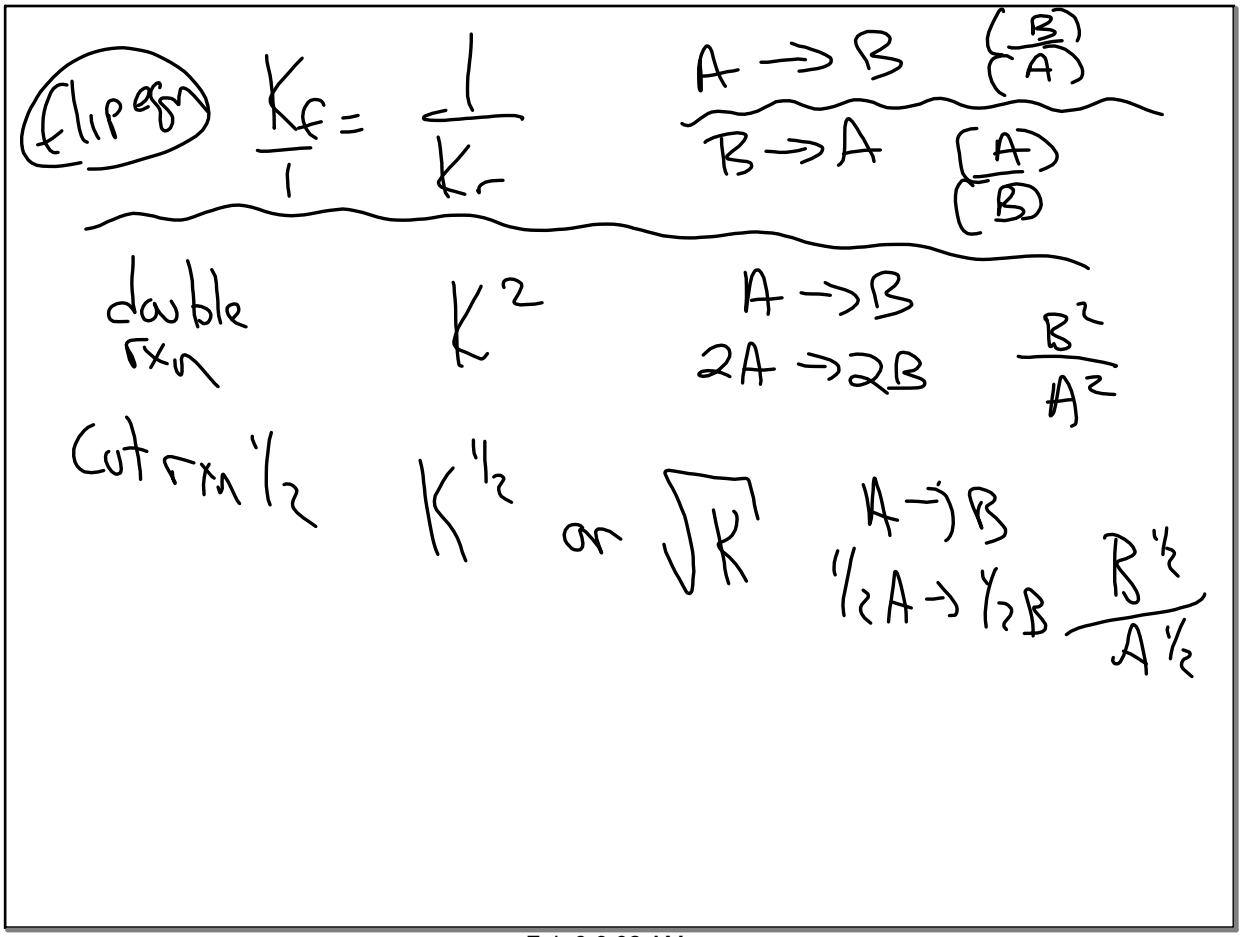
IGNORE (Replace with "1")

any Pure (S) or (l)

Feb 6-8:55 AM



Feb 6-8:58 AM



Feb 6-9:02 AM

$CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$

$K = \frac{[CO_2](1)}{(1)}$ $\quad K_p = \frac{P_{CO_2}}{1}$

Feb 6-9:05 AM

$PV = nRT$

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

$P = MRT$

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

Δn = change in # moles from react to product. only (g) and (g) IGNORE pure (s) and (l)

Feb 6-9:07 AM

$2SO_{3(g)} \rightarrow 2SO_{2(g)} + O_{2(g)}$

$K_c = 4.07 \times 10^{-3}$ at 1000 K

K_p

$K_p = K_c (RT)^{\Delta n}$ $\quad P - R = (3-2)$

$= (4.07 \times 10^{-3}) \left[(0.08206)(1000) \right]^1$

Feb 6-9:11 AM

14 / 68

15 / 16 + 22

Feb 6-9:14 AM