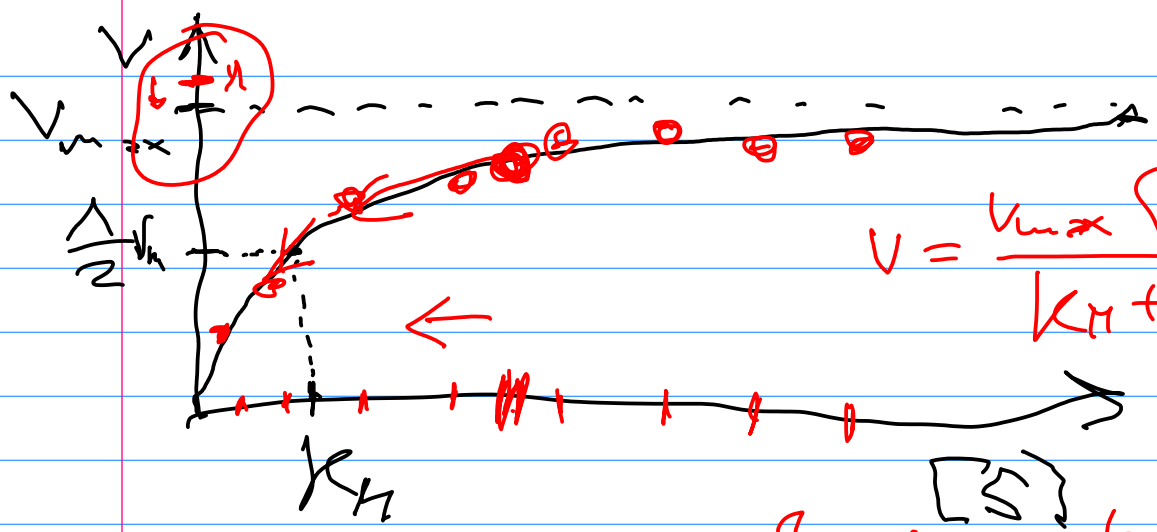


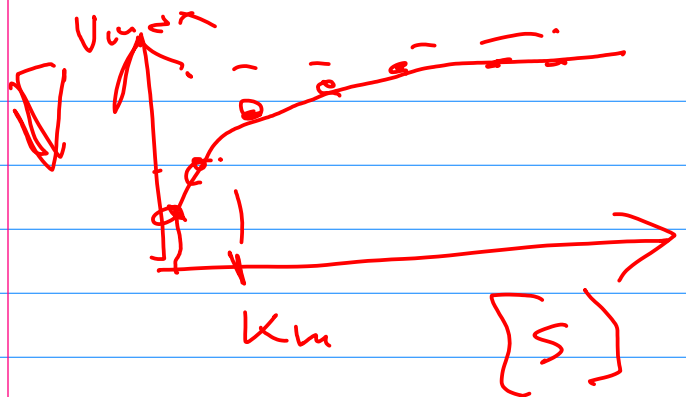
$$V = \frac{V_{max}[S]}{K_M + [S]}$$

[S]	V	$V([S])(V-V)^2$	V_{max}	K_M
			1.	2.5.

Solver

Sum

R

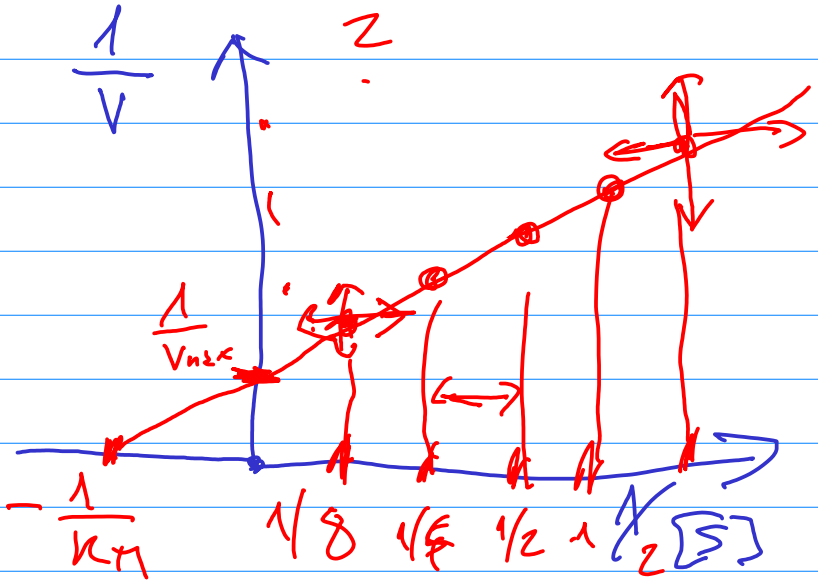


$$V = \frac{V_{max}\,[S]}{K_M + [S]}$$

$$\frac{1}{V} = \frac{K_M + [S]}{V_{max}\,[S]} =$$

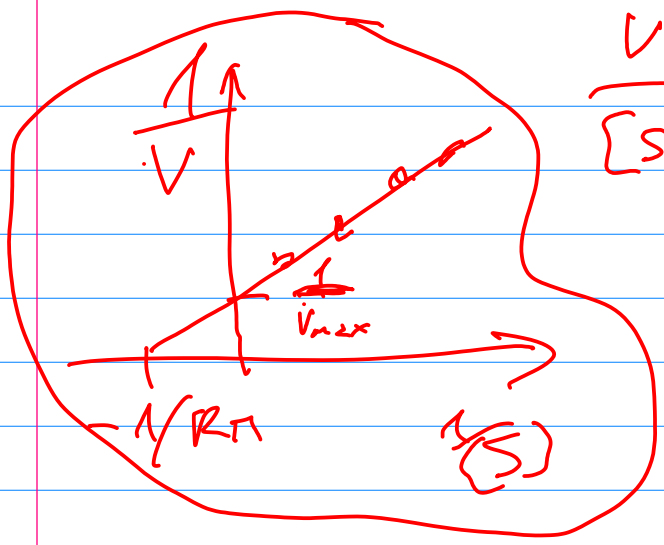
$$\frac{1}{V} = \frac{K_M}{V_{max}}\frac{1}{[S]} + \frac{1}{V_{max}}$$

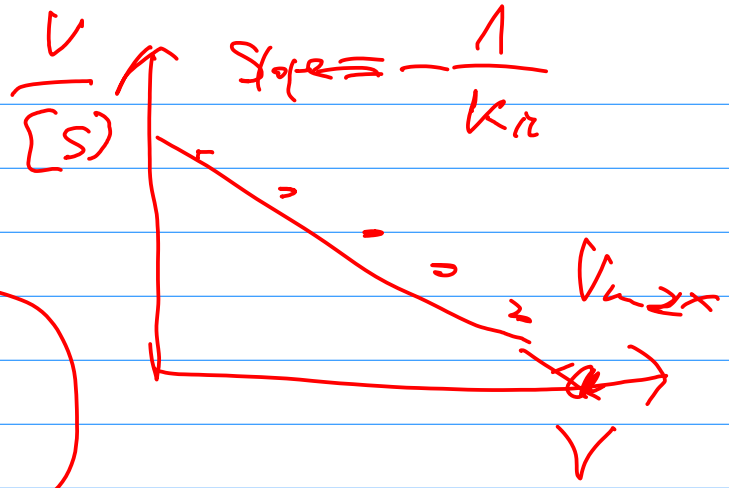
$$\frac{1}{V} = 0 \qquad \frac{K_M}{V_{max}}\frac{1}{[S]} = z$$

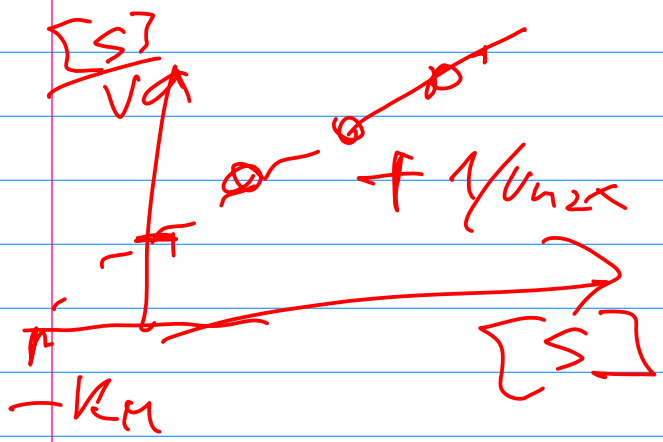


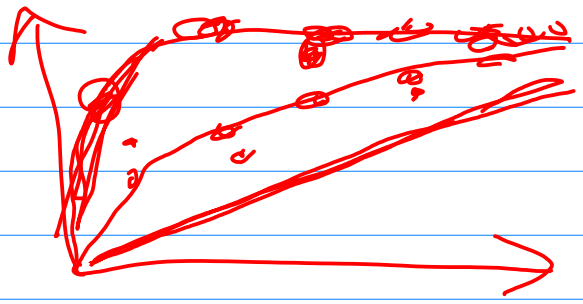
$[S]$ 1, 2, 3, 4, 5 . . . .

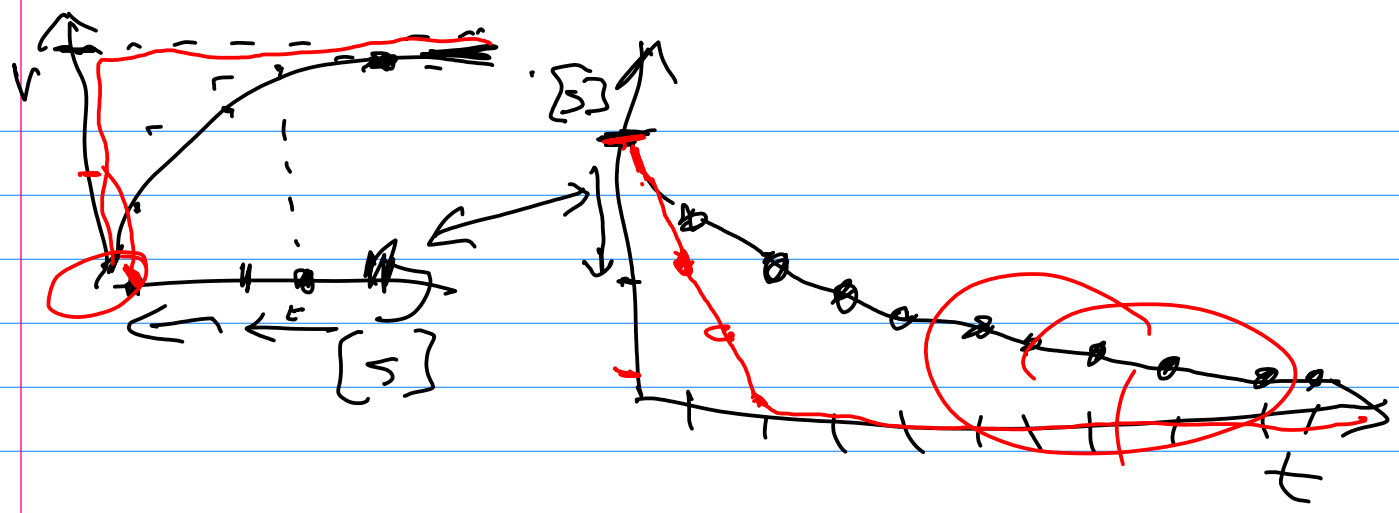
0.5, 1, 2, 4, 8 . . .


V
V_{max}
$1/R_1$
1/[S]


V/[S]
Slope = $-\frac{1}{K_1}$
V_{max}
V


[S]/V
$+1/V_{max}$
[S]
$-K_M$





$$-\frac{d[S]}{dt} = V = \frac{V_{max}[S]}{K_M + [S]}$$

$$d[S] = -\frac{V_{max}[S]}{K_M + [S]}\,dt$$

$[S](t)$

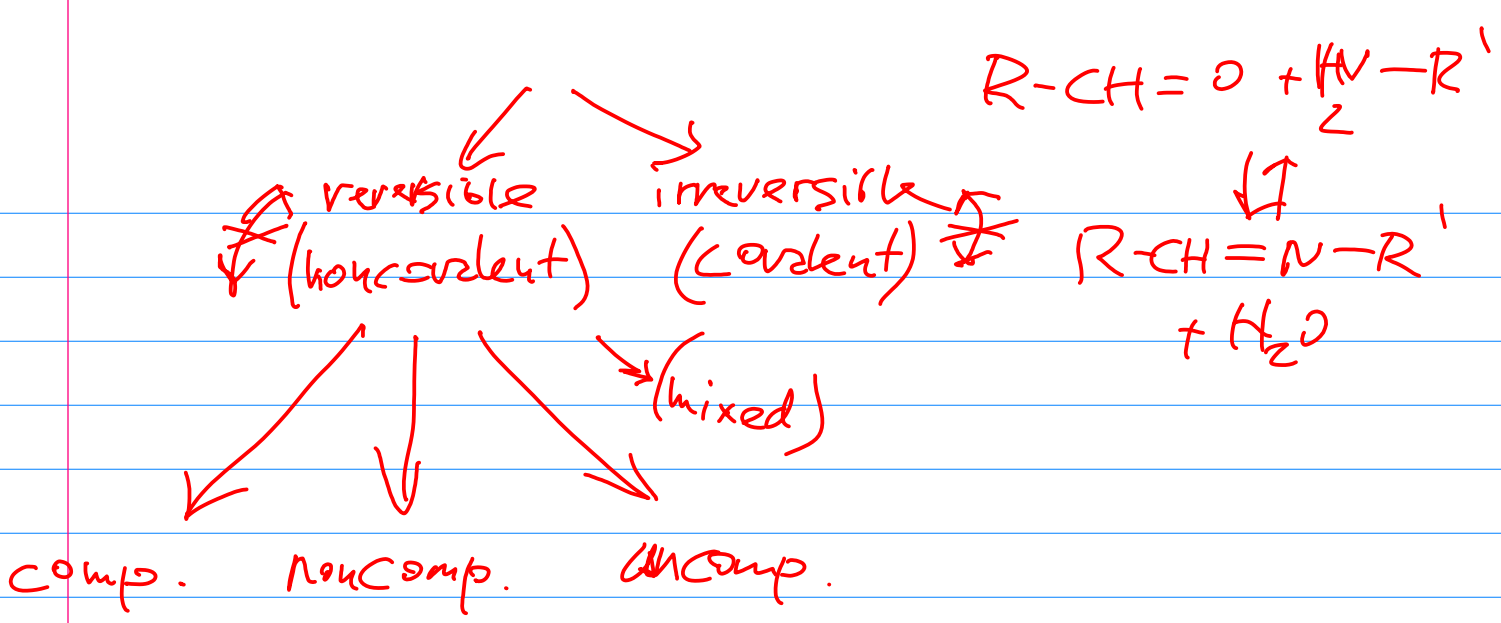
$t([S])$

t	$[S]$
$\vdots$	$\vdots$
t_0	$[S]_0$

$$[S]_0 = -\frac{V_{max}}{K_M + [S]_0}$$

V_{max} K_M

h = time step

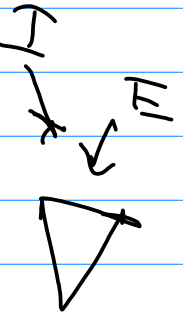


Competitive

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \xrightarrow{k_2} E + P$$

$$+I \quad \downarrow\uparrow \; K_I \; K_i$$

$$EI$$



$$K_i = \frac{[E][I]/1}{[EI]/1}$$

$$K_i = 5\,\mu M$$

$$5 \cdot 10^{-6}$$

mM

$$M_r = 500 \cancel{\text{g/mol}} \cdot 0.01 = 5\,g/l$$

Gl 30g

pM nM pM fM

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \xrightarrow{k_2} E + P$$

$$+ I \uparrow\downarrow$$

$$EI \qquad k_I = \frac{[I][E]}{[EI]}$$

$$c_E = [E] + [ES] + [EI]$$

$$c_E = [E] + [ES] + \frac{[I][E]}{k_I}$$

$$c_E = [ES] + [E]\left(1 + \frac{[I]}{k_I}\right)$$

$$\frac{d[ES]}{dt} = k_1[E][S] - (k_{-1} + k_2)[ES] = 0$$

$$[E] = \frac{c_E - [ES]}{1 + \frac{[I]}{k_I}}$$

$$k_1[S]\frac{c_E - [ES]}{1 + \frac{[I]}{k_I}} = (k_{-1} + k_2)[ES]$$

$$\frac{k_1 c_E[S]}{1 + \frac{[I]}{k_I}} - \frac{k_1[ES][S]}{1 + \frac{[I]}{k_I}} = (k_{-1} + k_2)[ES]$$

$$\frac{k_1 C_E [S]}{1 + \frac{[I]}{K_I}} = \frac{k_1 [ES][S]}{1 + \frac{[I]}{K_I}} + (k_{-1} + k_2)[ES]$$

$$\frac{k_1 C_E [S]}{1 + \frac{[I]}{K_I}} = \left(\frac{k_1 [S]}{1 + \frac{[I]}{K_I}} + k_{-1} + k_2 \right) [ES]$$

$$[ES] = \frac{\frac{k_1 C_E [S]}{1 + [I]/K_I}}{\frac{k_1 [S]}{1 + \frac{[I]}{K_I}} + k_{-1} + k_2}$$

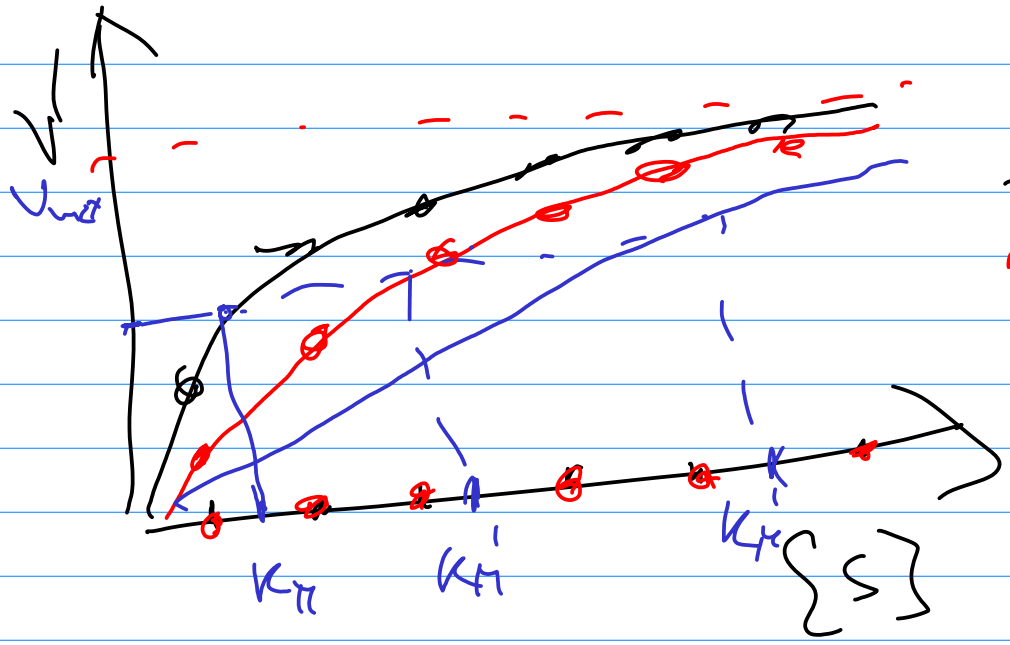
$$V = k_2 [ES] = \frac{k_2 C_E [S] / (1 + [I]/K_I)}{\frac{[S]}{1 + [I]/K_I} + \frac{k_{-1} + k_2}{k_1}}$$

$k_2 C_E = V_{max}$

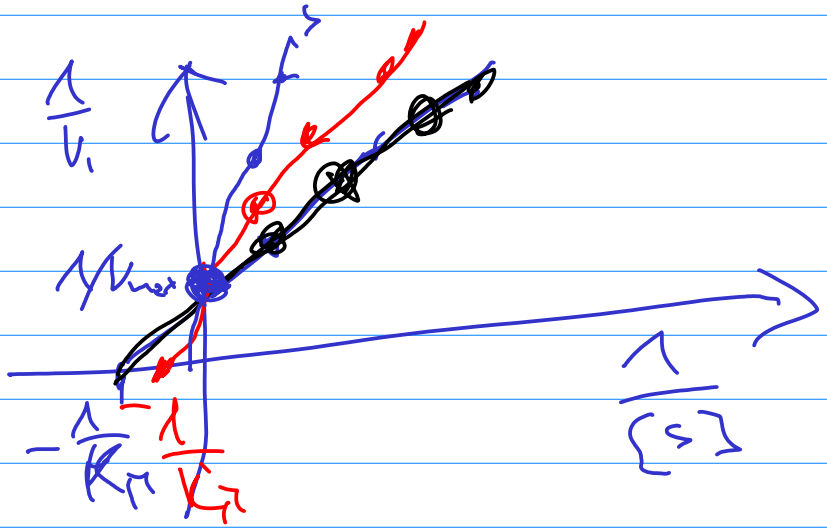
$\frac{k_{-1} + k_2}{k_1} = K_M$

$$V = \frac{V_{max} [S]}{[S] + K_M \left(1 + \frac{[I]}{K_I}\right)}$$

$$K_M' = K_M \left(1 + \frac{[I]}{K_I}\right)$$



$$K_{II} = K_{II}'\left(1 + \frac{[I]}{K_I}\right)$$



Noncomp.

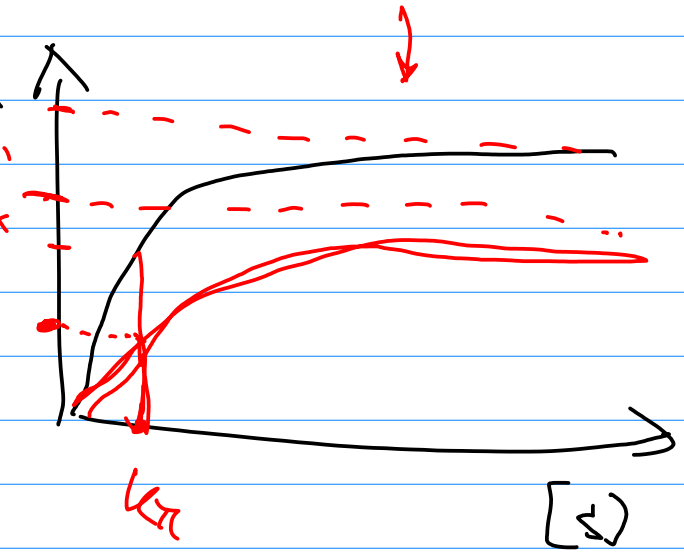
$$E + S \rightleftarrows ES \rightarrow P$$

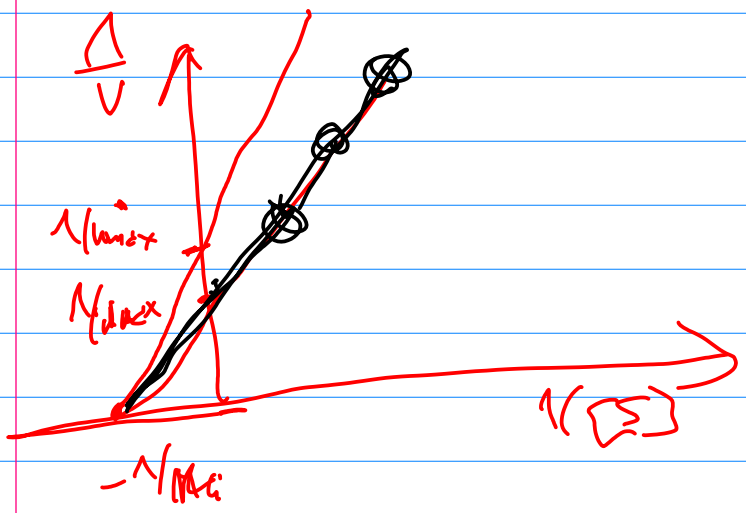
$$+I \updownarrow K_I \qquad +I \updownarrow K_I$$

$$EI + S \rightleftarrows ESI$$

$$K_I = \frac{[E][I]}{[EI]} = \frac{[ES][I]}{[ESI]}$$

$$V = \frac{\frac{V_{max}}{1 + \frac{[I]}{K_I}}[S]}{K_M + [S]}$$





Uncomp.

$$E + S \rightleftarrows ES \rightarrow E + P$$

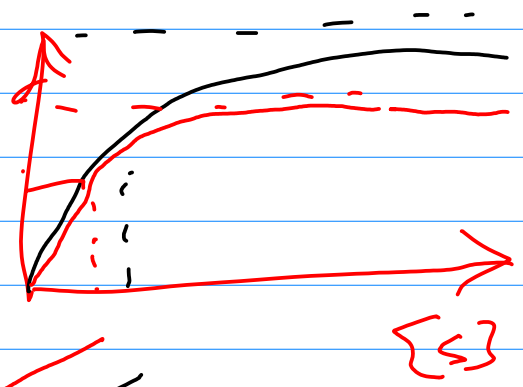
$$+I \updownarrow K_I$$

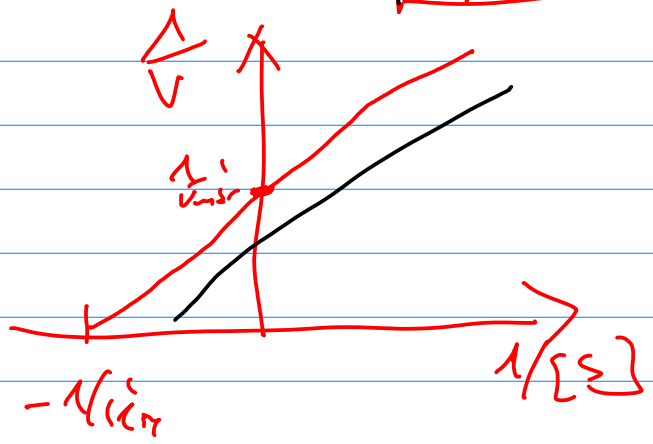
$$ESI$$

$$v = \frac{\frac{V_{max}}{1+\frac{[I]}{K_I}}[S]}{\frac{K_M}{1+\frac{[I]}{K_I}} + [S]} = \frac{V_{max}[S]}{K_M + [S]\left(1+\frac{[I]}{K_I}\right)}$$

$$V_{max}' = \frac{V_{max}}{MB}$$

$$K_M' = \frac{K_M}{MB}$$

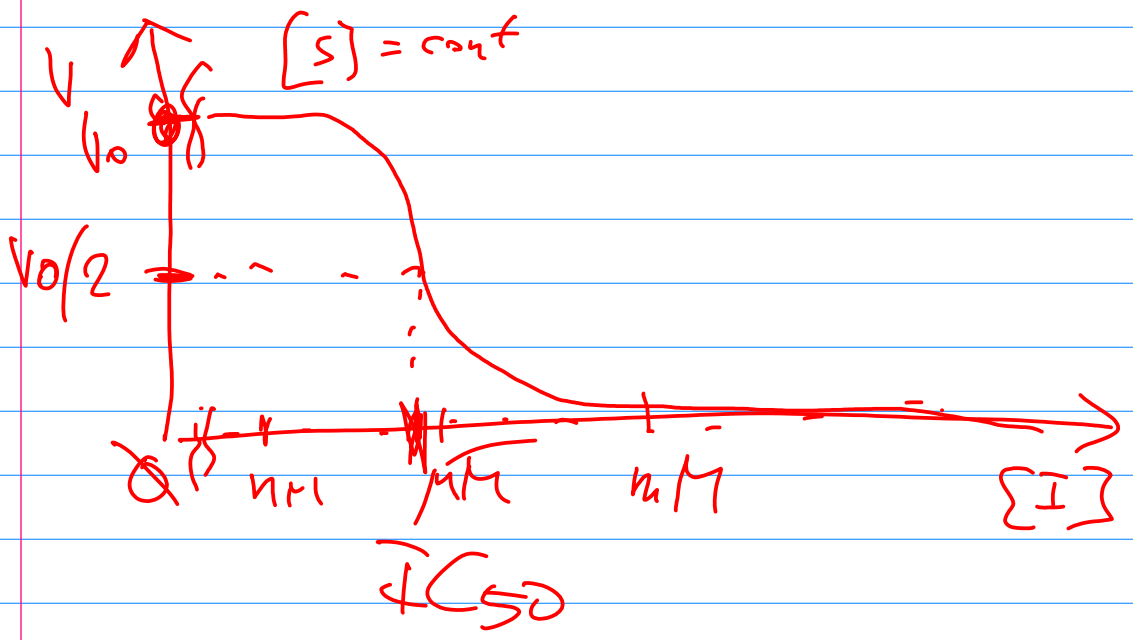




	C	N	U
V_{max}	1	$1/MB$	$1/MB$
K_M	MB	1	$1/MB$

$$MB = \left(1 + \frac{[I]}{K_I}\right)$$

IC_{50} EC_{50} LD_{50}



IC_{50}

× 500 μM

~ 5 μM

0.1 μM

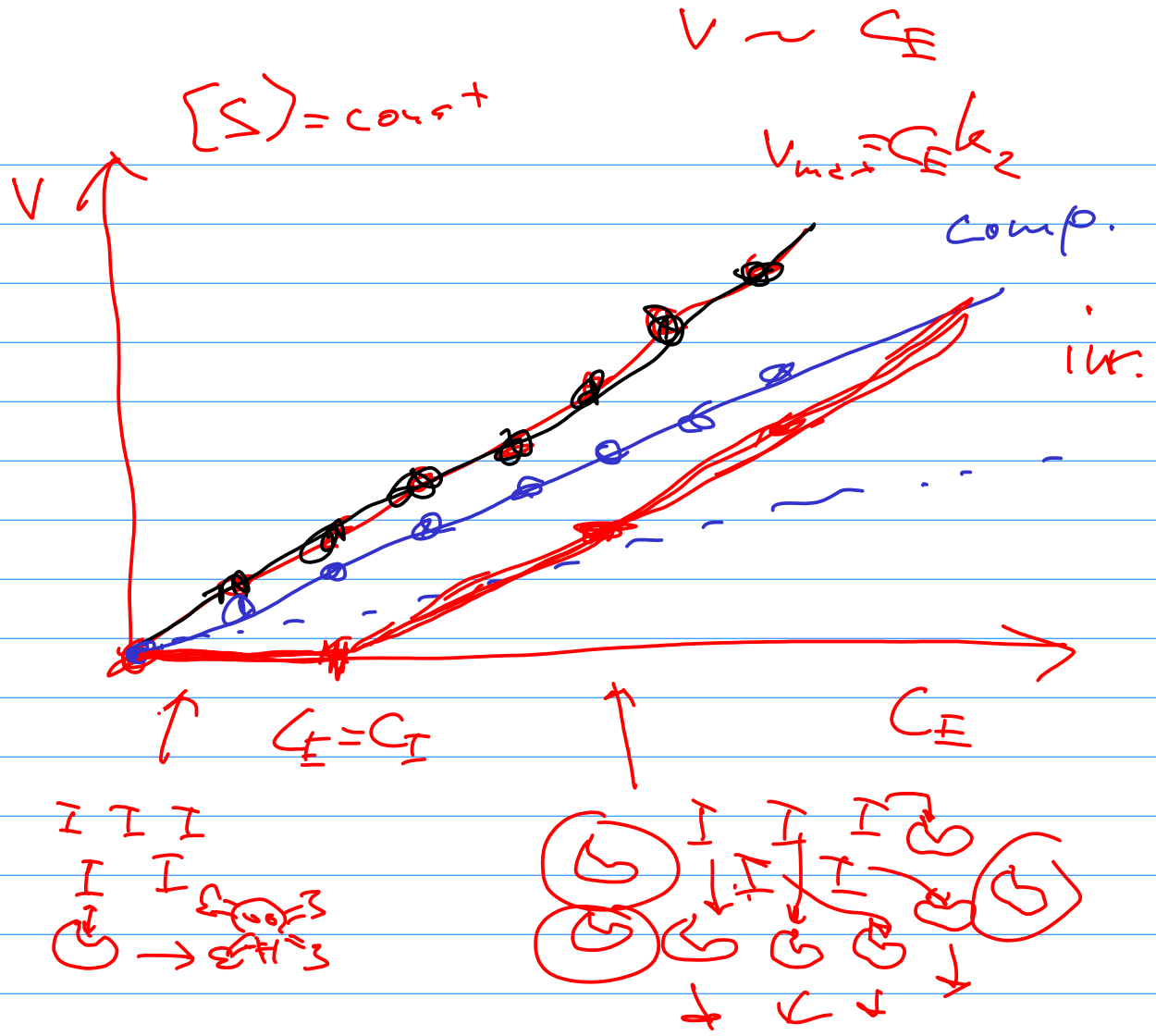
× 500 μM

$K_I = \frac{[I][E]}{[EI]}$

= =

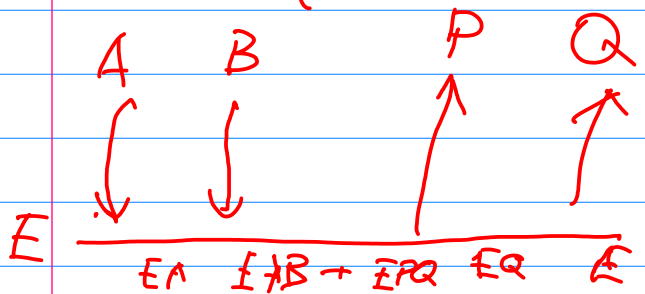
3 μM

0.2 μM

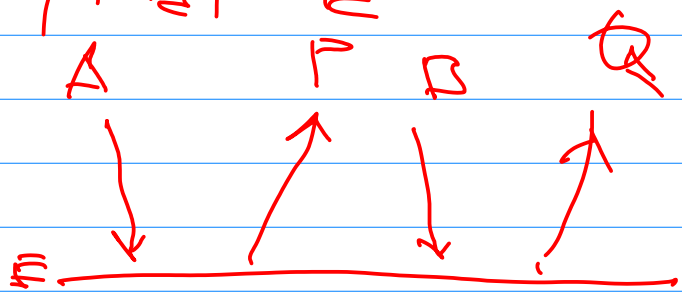

V ~ C_E
[S] = const
$V_{max} = C_E k_2$
V
comp.
inh.
$C_E = C_I$
C_E

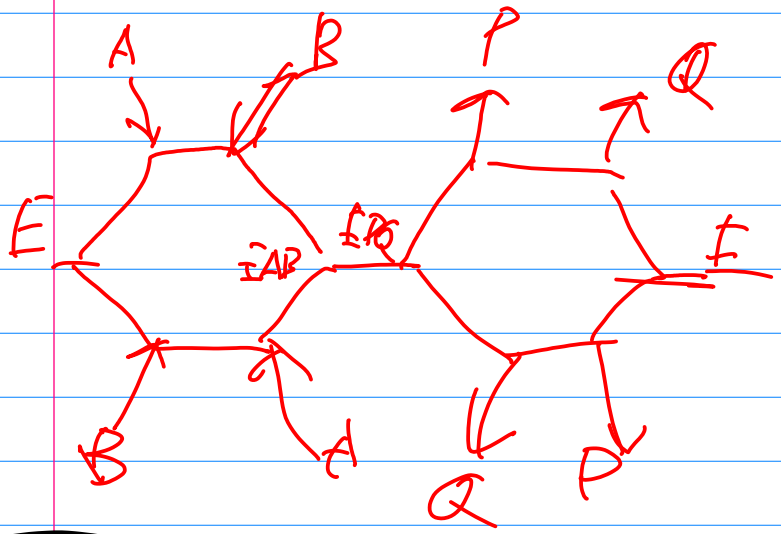
$$E + S \rightleftharpoons ES \rightarrow E + P_1 + P_2$$

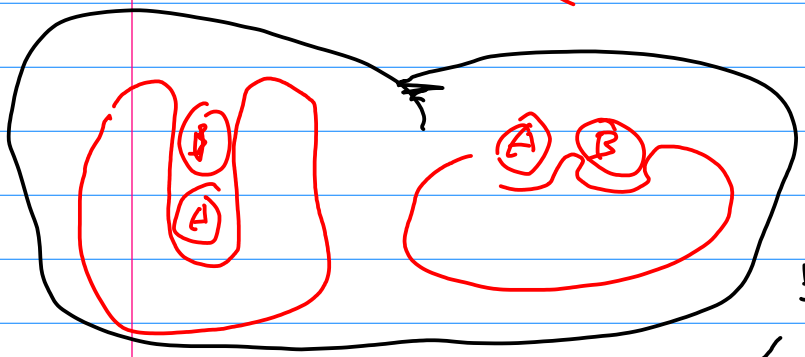
seq.

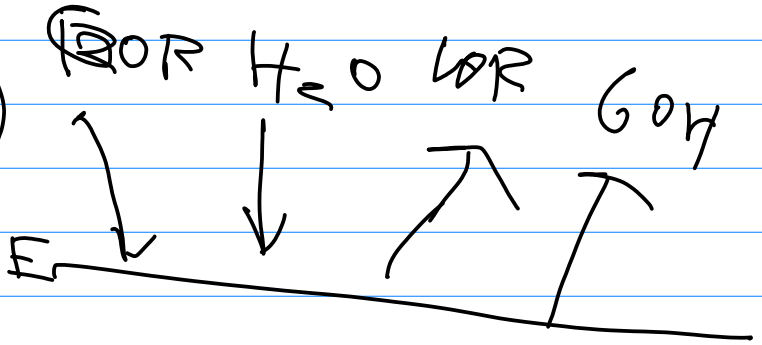


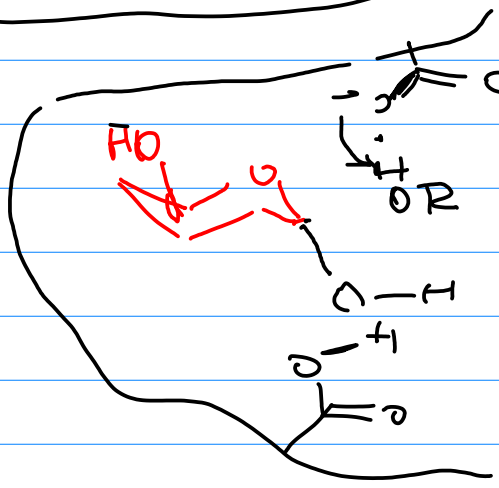
ping pong

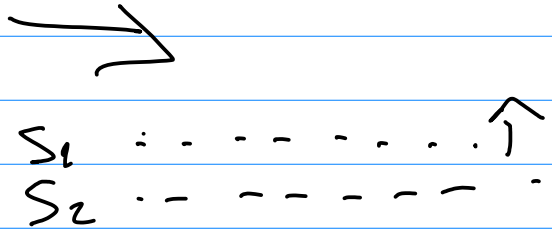


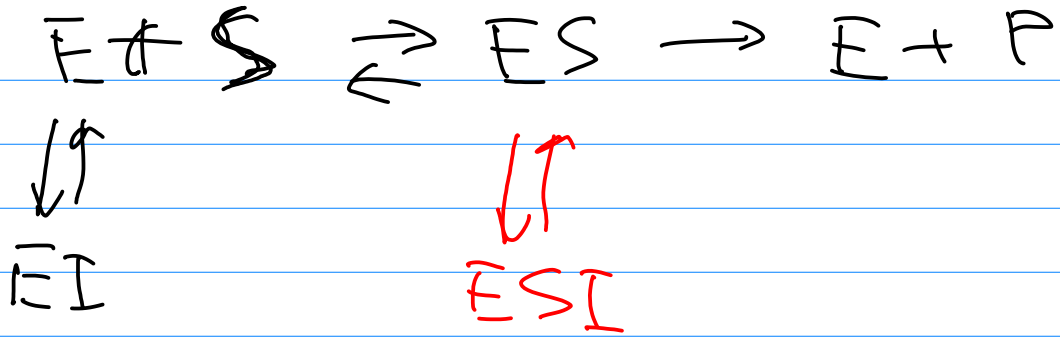


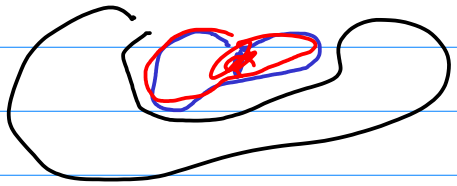


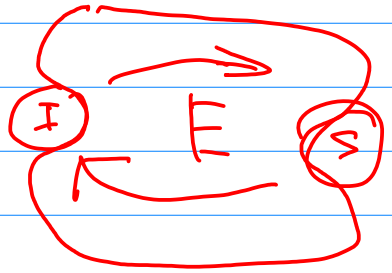


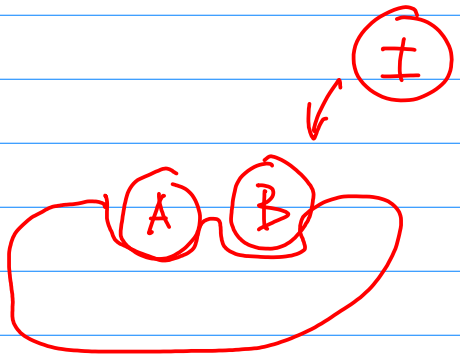




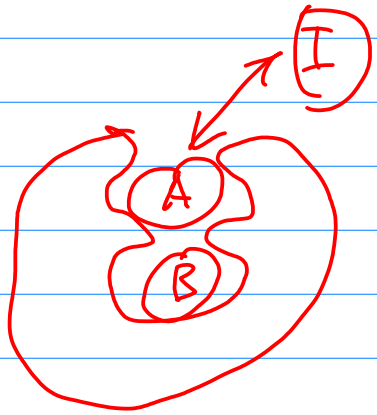








I comp. B
I noncomp. A



I comp. A
I uncomp. B