Enzyme Kinetics and Plots

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \underset{k_{-2}}{\overset{k_2}{\rightleftharpoons}} E + P$$

Filled Sites and Turnover Number

Define fraction of filled sites on enzyme as $f \equiv [S]/([S] + K_M)$ (Just accept this!)

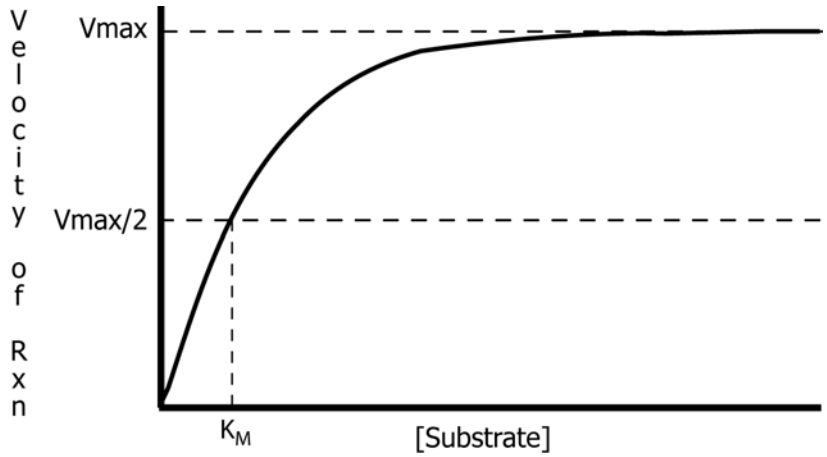
Define $k_{cat} \equiv k_2 = V_{max}/[E]_T$ = "turnover number" also...
k_{cat} = # of substrate molecules that go to product / # of enzyme molecules
$1/k_{cat}$ = time for one reaction to occur

Measure of Catalytic Efficiency = k_{cat}/K_M

Limit of Catalytic Efficiency ≡ fastest the reaction can possibly happen = k_1
Two assumptions:
1) $k_{cat} >> k_{-1}$
2) reaction is limited by diffusion only; therefore, $k_{max} \approx 10^8 - 10^9$ mol/sec

Michaelis-Menten Plot

$$V_0 = \frac{V_{max}[S]}{K_M + [S]}$$



Lineweaver Burke Plot

$$\frac{1}{V_0} = \frac{K_M}{V_{max}} \bullet \frac{1}{[S]} + \frac{1}{V_{max}}$$