EQUATIONS

$$Equation\,1: \frac{1}{V_o} = \frac{K_m}{V_{max} * [S]} + \frac{1}{V_{max}}$$

$$Equation\,2: E + S \underset{\mathrm{k_{-1}}}{\overset{\mathrm{k_1}}{\rightleftharpoons}} ES \xrightarrow{\mathrm{k_2}} E + P$$

$$Equation\,3: K_m = \frac{k_{-1} + k_2}{k_1}$$

MICHAELIS-MENTEN STEADY STATE DERIVATION

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \underset{k_{-2}}{\overset{k_2}{\rightleftharpoons}} EP \underset{k_{-3}}{\overset{k_3}{\rightleftharpoons}} E + P \tag{8.17}$$

Assuming Transformation of ES to EP is Rate Limiting:

aka: k_1, k_{-1} , and $k_3 >> k_2$

k_{cat} = rate constant of rate-determining step (substrate to product)

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \xrightarrow{k_{cat}} E + P \tag{8.18}$$

$$\therefore\ Velocity = k_{cat} * [ES] \tag{8.19}$$

When $k_{cat} << k_{-1}$,

Equalibrium Dissociation Constant :

$$K_S = \frac{k_{-1}}{k_1} = \frac{[E] * [S]}{[ES]}$$