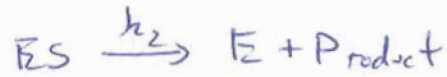
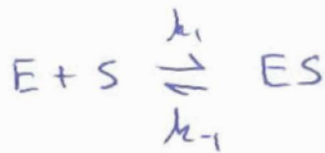
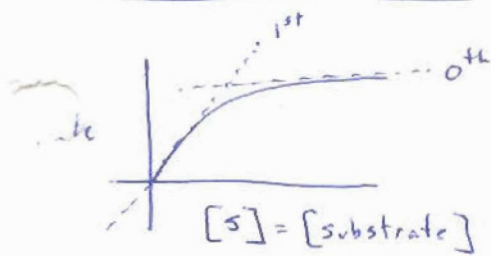


Michaelis - Menten Kinetics - Saturation Kinetics



$$\boxed{\text{rate} = k_2 [ES]}$$

$$k_1 [E][S] = k_{-1} [ES] + k_2 [ES] \quad \text{SSA}$$

$$k_1 ([E]_0 - [ES])[S] = k_{-1} [ES] + k_2 [ES]$$

$$[ES] = \frac{k_1 [E]_0 [S]}{k_{-1} + k_2 + k_1 [S]}$$

$$\text{rate} = \frac{k_1 k_2 [E]_0 [S]}{k_{-1} + k_2 + k_1 [S]}$$

divide the numerator and denominator by k_1

$$\text{rate} = \frac{k_2 [E]_0 [S]}{\frac{k_{-1} + k_2}{k_1} + [S]} \quad \rightarrow \quad \underset{\text{velocity}}{V} = \frac{k_2 [E]_0 [S]}{K_m + [S]}$$

note as $[S] \uparrow$ V approaches $\frac{k_2 [E]_0}{K_m} = \text{constant}$ 0th order

as $[S] \downarrow$ V approaches $\frac{k_2 [E]_0 [S]}{K_m}$ 1st order