K_M AS AN APPROXIMATION FOR ENZYME AFFINITY

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

- IF ($k_2 > k_1$) { K_M == Large ; Affinity == Low }
- IF ($k_2 < k_1$) { K_M == Small ; Affinity == High }

MICHAELIS CONSTANT : K_M

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

$$k_1 * [E] * [S] = (\ k_{-1} * [ES]\ ) + (\ k_{cat} * [ES]\ )$$

Formation of ES Complex = Dissociation of ES Complex + Breakdown to E+P

- This ratio of rate constants is known as the Michaelis Constant (K_M) ;

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

- k_{cat} is another name for k_2
- When k_{cat} is small:
  - We essentially remove it from the equation. $K_M = \dfrac{k_{-1}}{k_1}$
  - @ maximum turnover
    - [ES] is high as it as it "builds up"
- Comparing k_1 and k_{-1} = likelihood substrate is bound to the enzyme , aka affinity
  - IF ($k_1 > k_{-1}$) { K_M == Small ; Reaction Prefers to be in Eyzme-Substrate Complex –> Then Eventual Formation of Product }
  - IF ($k_1 < k_{-1}$) { K_M == Large ; Reaction Prefers to be Separated into Enzyme + Substrate }