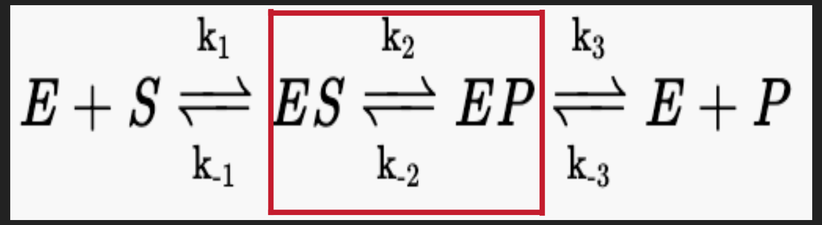
K_2 = RATE DETERMINING STEP



- k_2 = Rate Determining Step
- k_2 = Rate of Catalysis ($k_2 = k_{cat}$)
- We get a build-up of enzyme-substrate complex (sitting there waiting to be used)
- The slowest step is the rate determining step
- The process of converting enzyme-substrate complex into enzyme + product = the rate determining step in Michaelis-Menten Kinetics
- In a Multi-Step Reaction , the slowest step or smallest reaction rate constant determines the overall reaction rate.

TURNOVER NUMBER

- k_{cat} often contains units per second or per minute
- k_{cat} = “turn over” number
- k_{cat} = number of reactions in a given amount of time
  - This number relates to how many substrate molecules are converted to product per unit of time
- $\frac{k_{cat}}{K_M}$ = a measure of enzyme efficiency
  - It is not enough to consider K_M or k_{cat} independently.
  - We must consider both the enzyme rate and the number of substrate molecules needed (concentration) in order to achieve that rate
  - Remember, the calculation for K_M contains the value for k_{cat}

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