

- ▶ 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}

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

- ▶ Enzyme Efficiency = Fast Conversion , and With a Small Amount of Substrate
- ▶ Speed and Concentration need to reach $\frac{V_{max}}{2}$
- ▶ $\frac{k_{cat}}{K_M}$ = number we can use to compare efficiencies.
- ▶ IF k_{cat} == Large , Enzyme Efficiency == High ; MORE substrate is being catalyzed by an enzyme to product per unit of time
- ▶ IF k_{cat} == Small , Enzyme Efficiency == Low ; LESS substrate is being catalyzed by an enzyme to product per unit of time
- ▶ IF K_M == Small , Enzyme Efficiency == High
- ▶ IF K_M == Large , Enzyme Efficiency == Low