ENZYME EFFICIENCY

- 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.

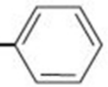
- IF k_{cat} == Large , Enzyme Efficiency == High ; MORE substrate is being catalyzed by an enzyme to product per unit of time
- IF k_{cat} == Small , Enzyme Efficiency == Low ; LESS substrate is being catalyzed by an enzyme to product per unit of time

- IF K_M == Small , Enzyme Efficiency == High
- IF K_M == Large , Enzyme Efficiency == Low

ENZYME EFFICIENCY : $\frac{k_{cat}}{K_M}$

- $\frac{k_{cat}}{K_M}$ = number we can use to compare enzyme effectiveness with different substrates
- Chymotrypsin , which has many different substrates , and is responsible for cleaving peptide bonds , is said to prefer hydrophobic residues based on its efficiency calculations

TABLE 8.6 Preferences of chymotrypsin in the hydrolysis of several *N*-acetyl amino acid methyl esters, as measured by k_{cat}/K_M

Amino Acid in Ester	Amino Acid Side Chain	k_{cat}/K_M [(mol/L)$^{-1}$s^{-1}]
Glycine	—H	1.3×10^{-1}
Norvaline	—$CH_2CH_2CH_3$	3.6×10^{2}
Norleucine	—$CH_2CH_2CH_2CH_3$	3.0×10^{3}
Phenylalanine	—CH_2— 	1.0×10^{5}

- Most Efficient = Phenylalanine