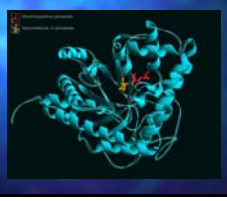
Enzymes



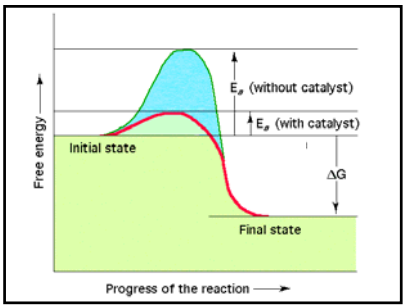
Activation Energy

- Enzymes Δ how a rxn proceeds
  - ↓ activation NRG
    Makes it go faster

Active Sites

Enzymes

- Typically very large proteins
- Are very specific – reacts with 1 or only a few types of molecules (substrates)



Active Sites

- Enzymes use weak bonds to hold the molecule in place

Enzymes

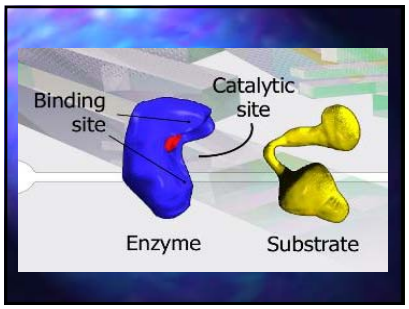
- Biological catalysts
  - Allows rxns to "go" at certain conditions
  - Can process millions of molecules each sec.

Active Sites

- Twisted protein structure gives the enzyme places for bonding.
- Sites are pockets or "clefts" on the enzyme surface

Active Sites

- Binding site: The area that holds the substrate in place
- Catalytic site: where the rxn actually occurs



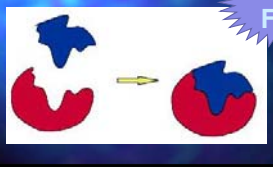
Enzyme-Substrate Rxn

3. Enzyme-product complex is formed

Characteristics of Enzyme Active Sites

- Lock & Key Model

Exact Fit!



Enzyme-Substrate Rxn

1. Enzyme + Substrate → E-S Complex

Enzyme-Substrate Rxn

4. Product is made & the enzyme is ready for another substrate

Characteristics of Enzyme Active Sites

- Induced Fit Model
  - 1958 by Daniel Koshland
  - Enzyme is flexible
  - Enzyme changes to fit the substrate

Enzyme-Substrate Rxn

2. Transition State

(an intermediate molecule is formed)

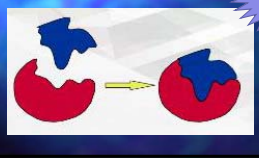
Characteristics of Enzyme Active Sites

- Lock & Key Model
  - 1890 by Emil Fisher
  - Only a substrate with the proper shape can fit with the enzyme.

Characteristics of Enzyme Active Sites

- Induced Fit Model

Forms to Fit!

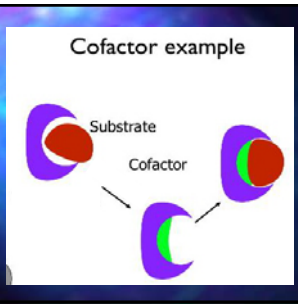


Cofactors & Coenzymes

- Some enzymes require a 2nd molecule to help out

Enzyme Regulation

- Temperature, pH & cofactors help to regulate enzymes
- pH changes & increasing temp always affect rxn rates



Enzyme Regulation

- Examples of optimum pH

Enzyme	Source	Optimum pH
Pepsin	Gastric mucus	1.5
Sucrase	Intestine	6.2
Catalase	Liver	7.3
Alkaline phosphatase	Bone	9.5

Cofactors & Coenzymes

- Vitamins are often converted to coenzymes
  - Examples: B_1, B_2, Folic Acid

Questions? Comments?