

2.4: Enzymes & Chemical Rxns

Today's Objective:

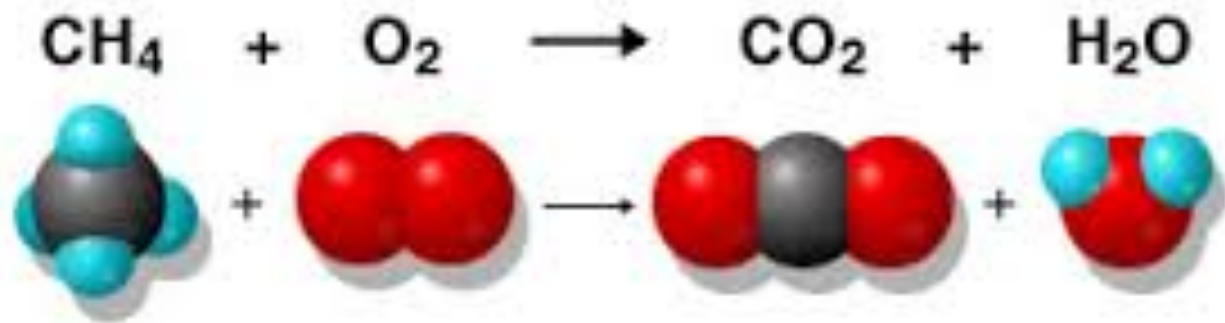
- Identify the type of macromolecule(s) that make up enzymes
- Describe how enzymes function & the importance of enzymes in living organisms
- Given a graph, identify the optimal conditions for a particular enzyme's activity

Enzymes & Chemical Reactions

Chemical Reactions

– REACTANTS (start with) → PRODUCTS (end with)

– Example: $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_{2(\text{gas})} + \text{H}_2\text{O}$



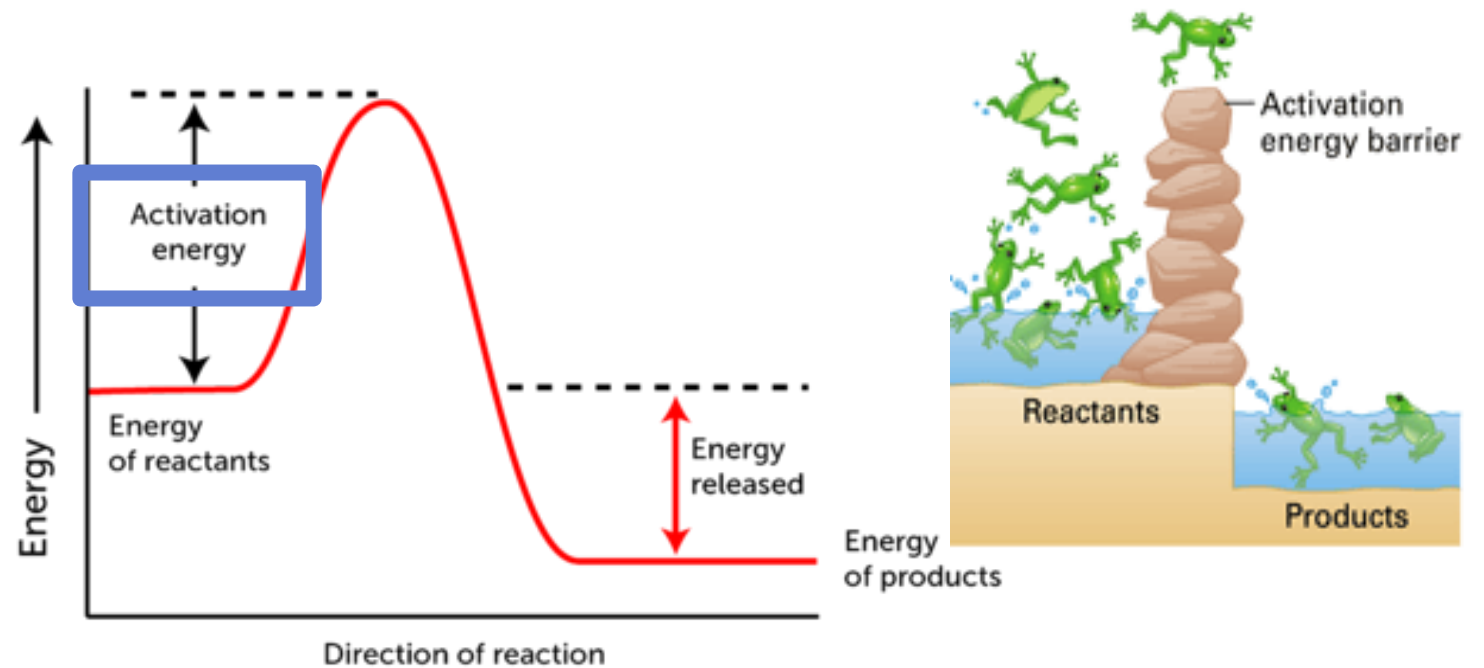
Enzymes & Chemical Reactions

Activation Energy:

- All reactions need **ENERGY** to “GET STARTED”

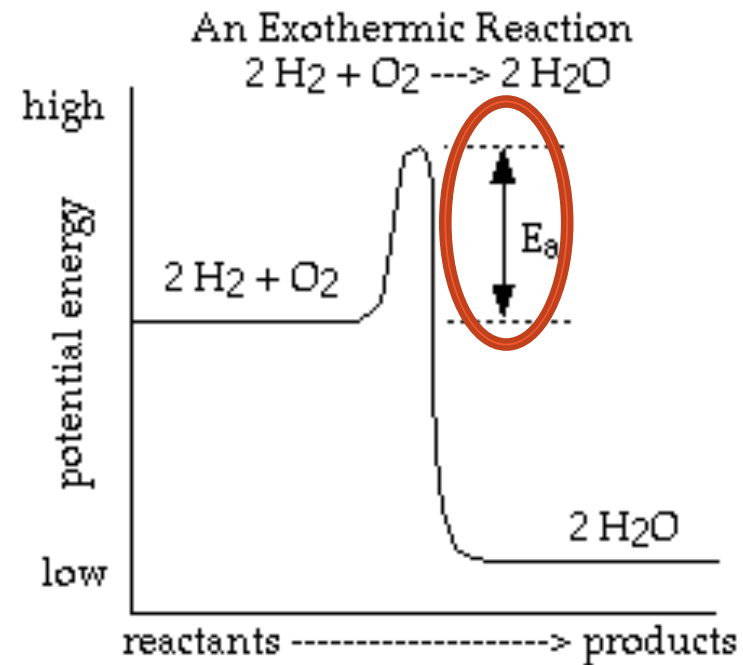
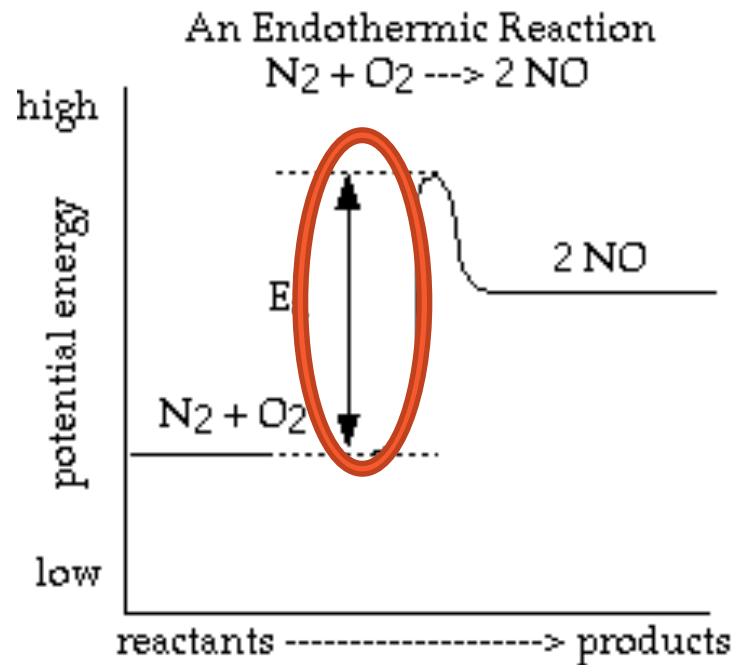
- Definition:

Energy required to start a reaction



Enzymes & Chemical Reactions

- **Different activation energy's needed for different REACTIONS!**



Enzymes & Chemical Reactions

Factors That Speed Up Chemical Reactions

1. High amount of reactants (lots to start with)
2. Higher temperatures (but not too hot!)
3. Neutral pH (not too acidic, not too basic!)

AND...ENZYMES

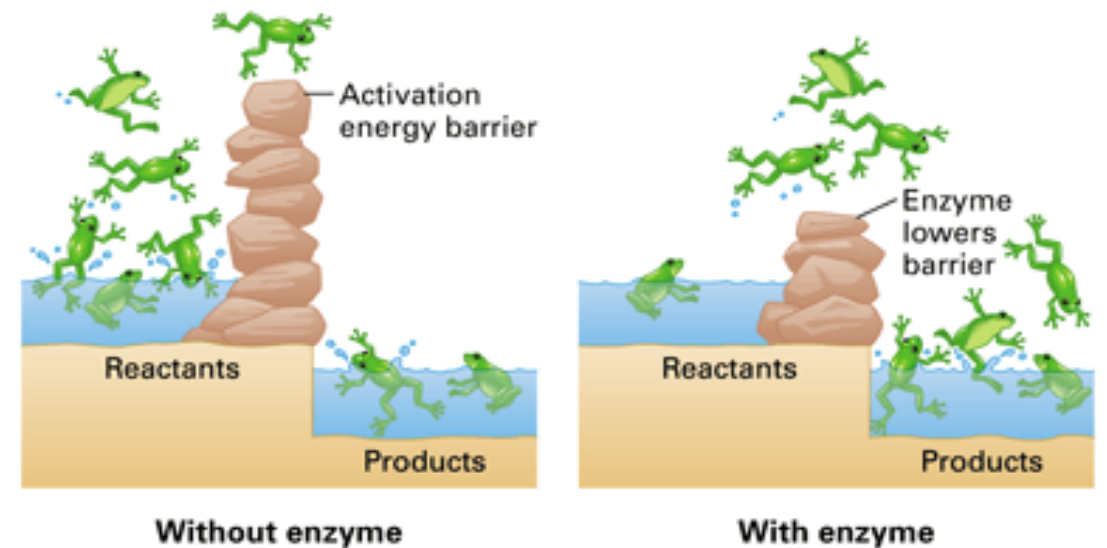


Enzymes & Chemical Reactions

Enzymes in Biological Chemical Reactions

- Most biochemical rxns REQUIRE enzymes
- Why you ask?
 1. Temp too low in cells/body
 2. Low amount of reactants in cells/body

...so we need ENZYMES!



Enzymes & Chemical Reactions

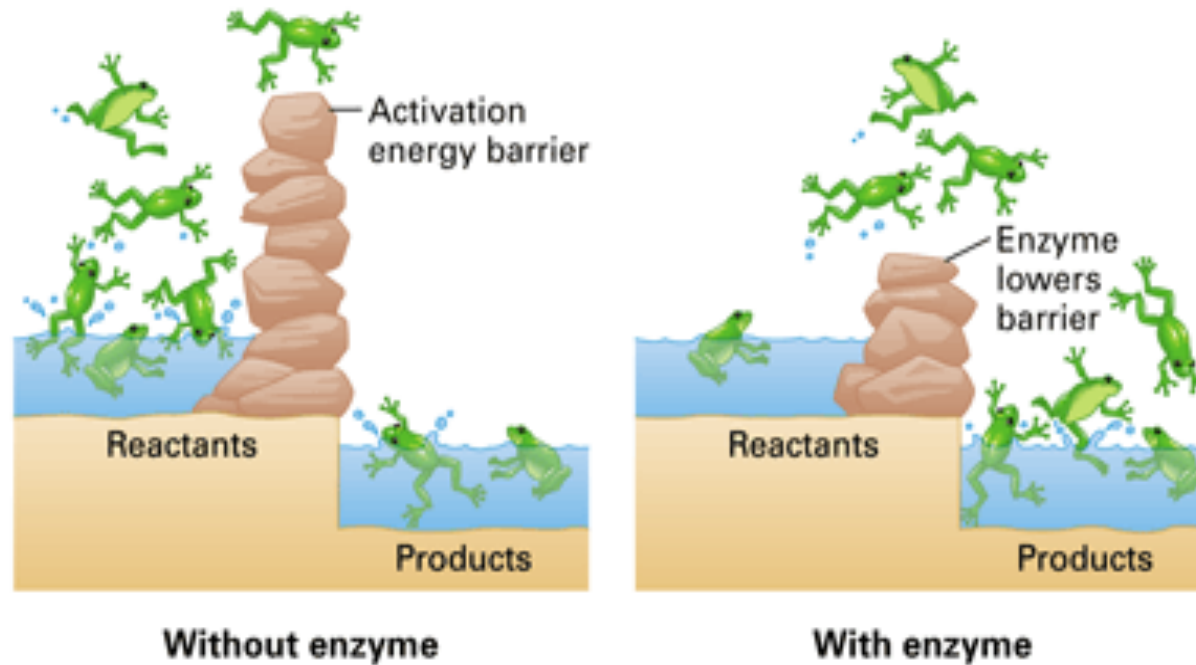
- Enzymes:
 - All enzymes are large proteins
 - Enzymes act as CATALYSTS
- Catalysts:
 - Speed up the rate chemical reactions
 - Decrease amount of activation energy required



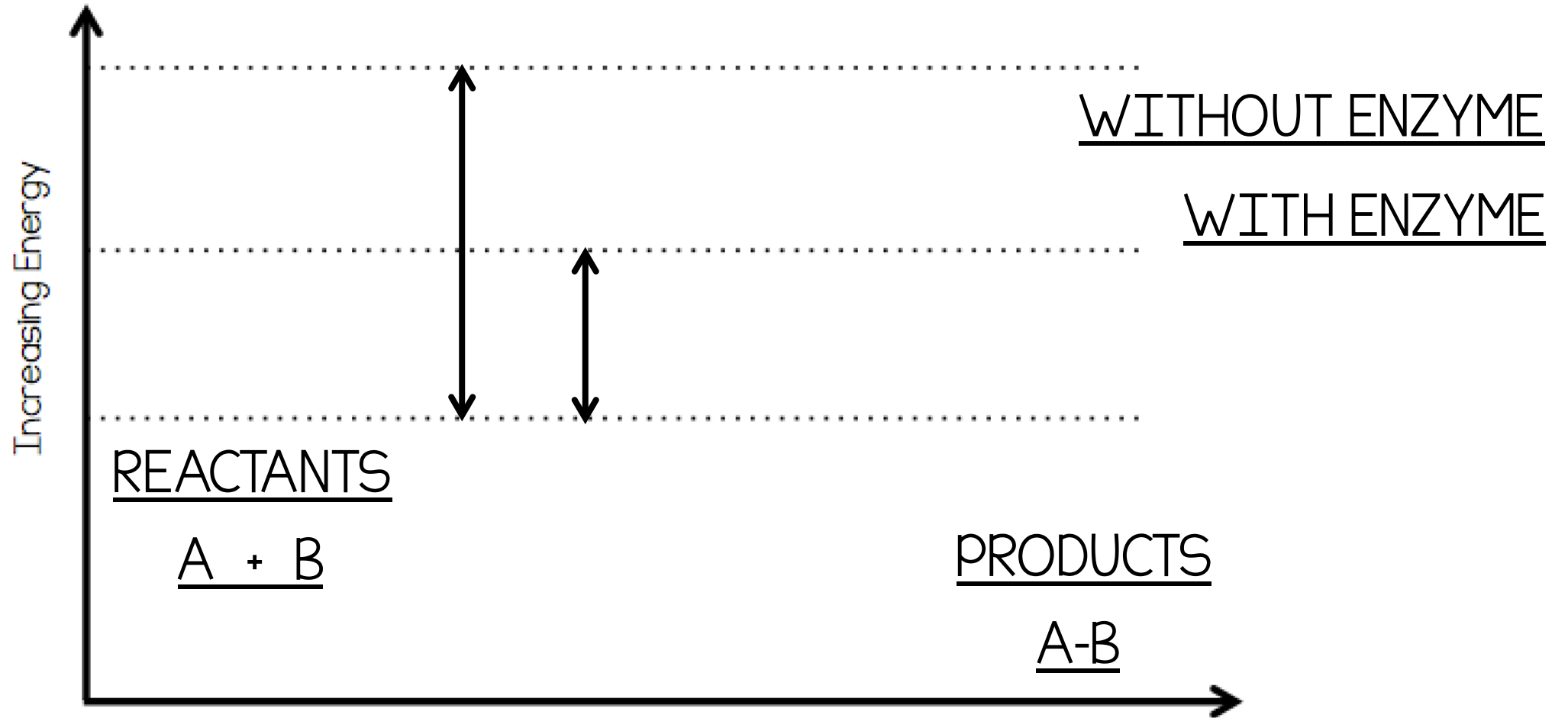
Enzymes lower the activation energy of a reaction!

Enzymes & Chemical Reactions

Enzymes LOWER the ACTIVATION ENERGY of a reaction!



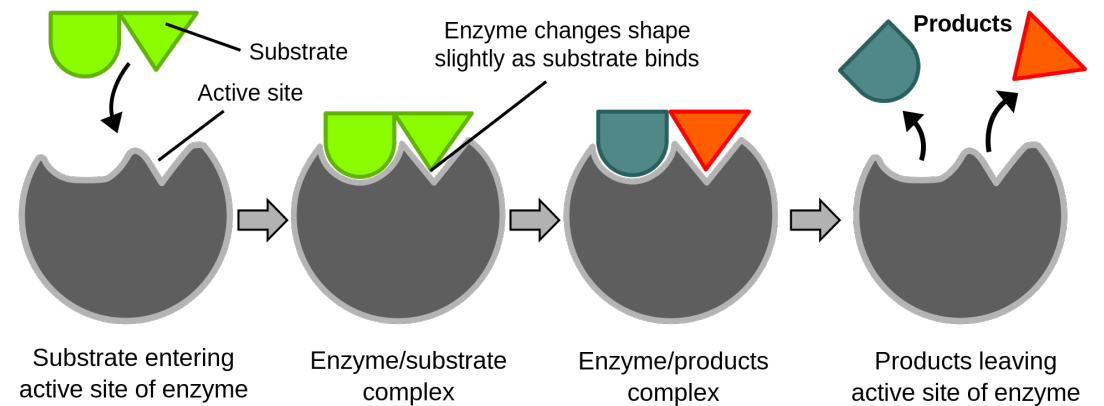
Enzymes & Chemical Reactions



Enzymes & Chemical Reactions

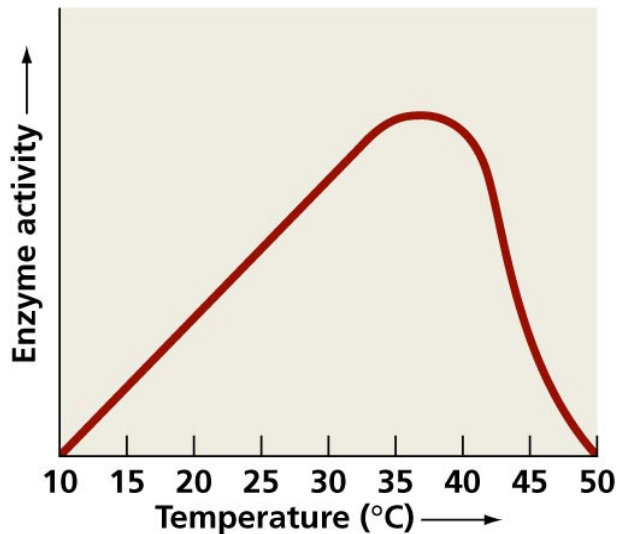
ENZYMES are Like Locks & Keys...Very Specific!

- Each chemical reaction has its own enzyme
(each lock has its own key)



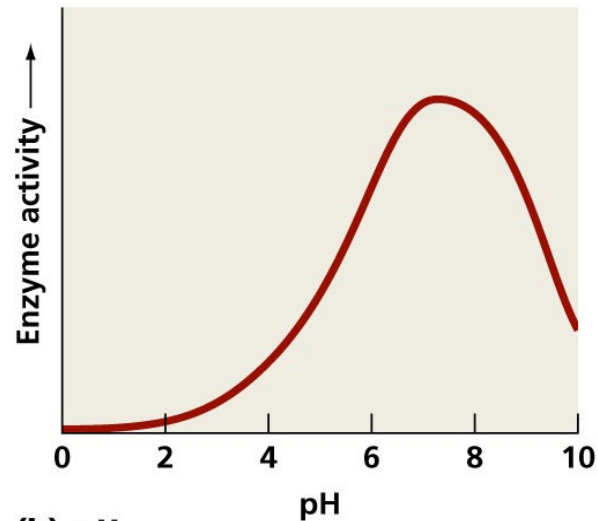
Enzymes & Chemical Reactions

Affect of the Environment on Enzymes



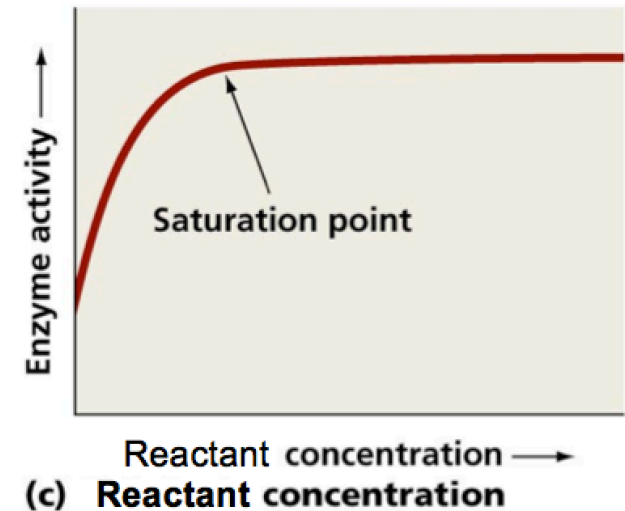
(a) Temperature

Enzymes
have optimal
or “best” temp



(b) pH

Enzymes
have optimal
or “best” pH



(c) Reactant concentration

Enzyme activity
increases with
more reactant

Enzymes & Chemical Reactions

Importance of Enzymes in Living Organisms

- 4,000 biochemical reactions catalyzed by enzymes!
- Regulate cell growth
- Allow movement
- Transport materials
- Make more DNA and then make proteins
- Digest macromolecules
- Build macromolecules
- And more!