**ENZYMES**

**What are enzymes?**

**The living cell is a miniature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ where MILLIONS of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Metabolism:**

Metabolic Pathway:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pathways release energy.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pathway consume energy.

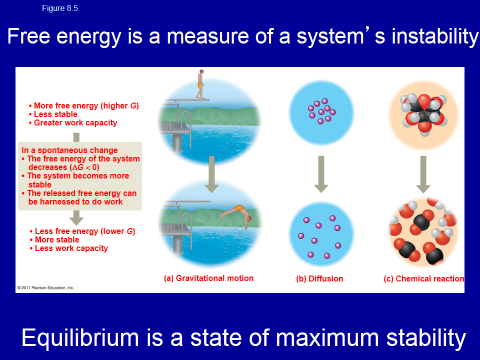
**Bioenergetics:**

Laws of Thermodynamics (a review):

* + 1st law – Energy cannot be created or destroyed it only be transferred or transformed
  + 2nd law – Every energy transfer increases the entropy of the universe

**Energy flows INTO and ecosystem as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and exists as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

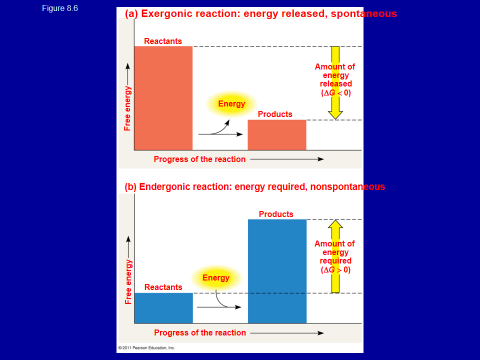
* The free-energy change of a reaction tells us whether or not the reaction occurs spontaneously.

** Free energy =**

**Endergonic Reactions and Exergonic Reactions:**

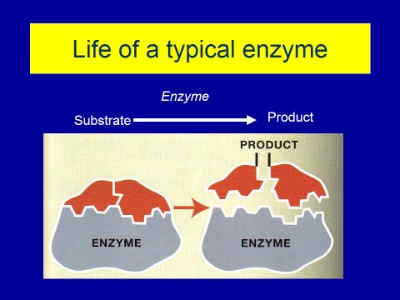
***Exergonic:***

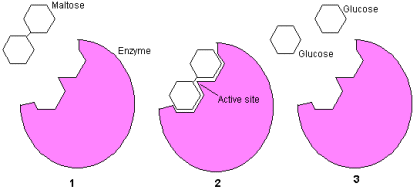
***Endergonic:***

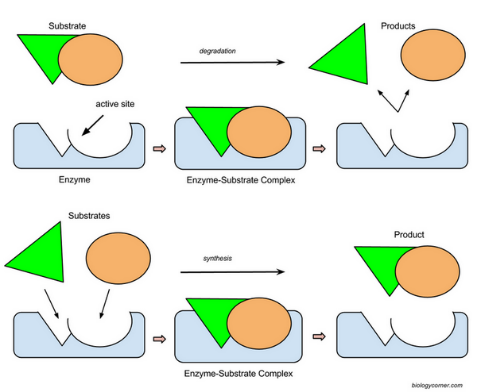


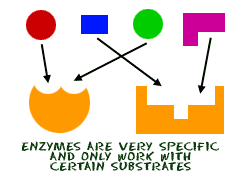
**Energy Coupling Reactions**

In the cell, the energy from the exergonic reaction of ATP hydrolysis can be used to drive an endergonic reaction. It’s driven by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Why do we need enzymes?**

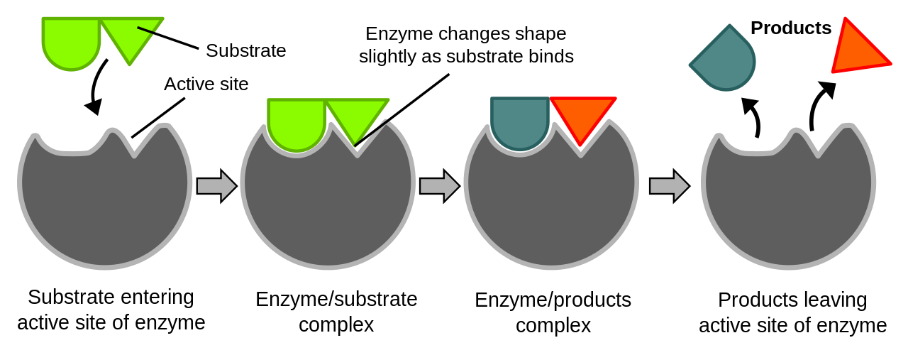
* What do enzymes do to the activation energy of a reaction? They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

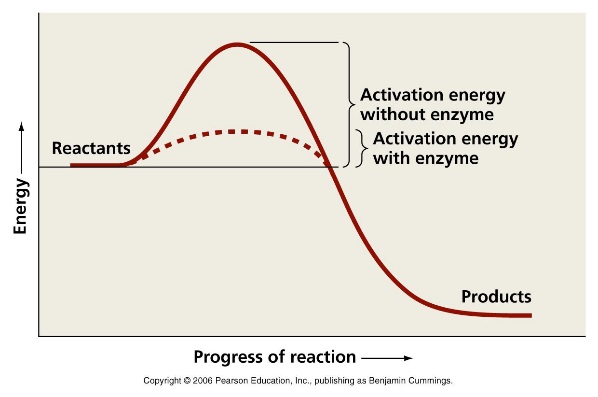
**What are the parts/players in an enzymatic reaction?**



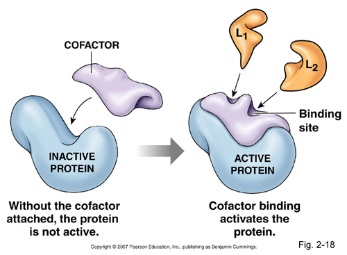
**Enzymes are SPECIFIC**

**Induced Fit Model**



**Activation Energy**

**DIFFERENT FACTORS CAN INFLUENCE AN ENZYMATIC REACTION**

1. **Cofactors**

examples: Vitamin C

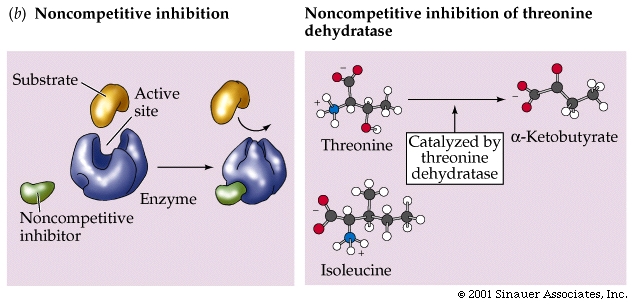
Folic Acid

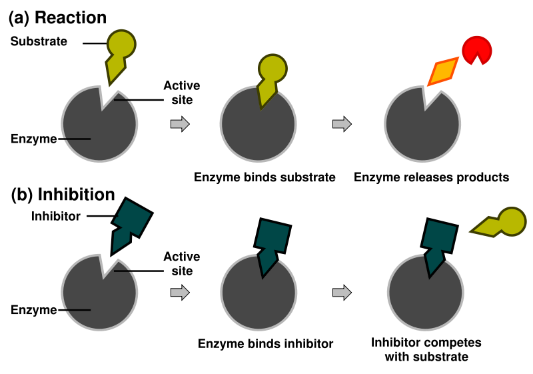
Vitamin D

**ENZYME INHIBITORS**

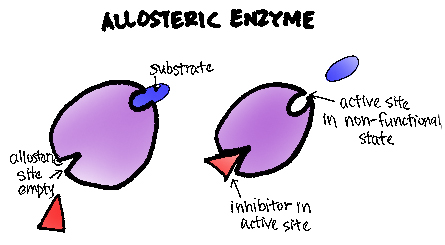
Two types: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Competitive Inhibitors Non-competitive Inhibitors**

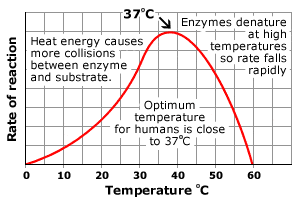




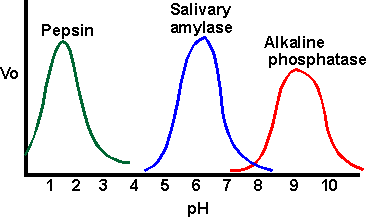
**Allosteric Regulation – (Non-competitive inhibition)**

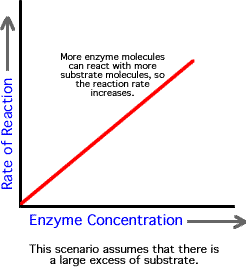


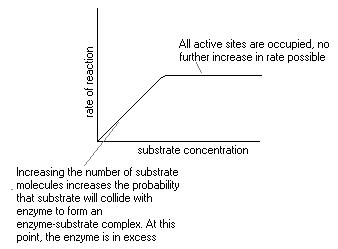
* **FEEDBACK INHIBITION!!!** (why is it important?)



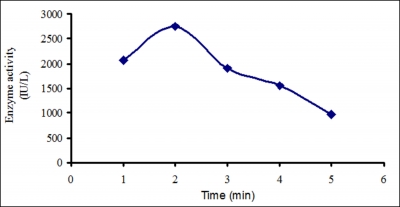
1. **Temperature**



1. **pH**
2. **Substrate/Enzyme Concentrations**



1. **Time**

****