Chapter 6: Enzymes

**Chemical reactions**

**Reactants –** what you start with

**Products –** what you end with!

**Substrates** – reactants that are acted upon by an enzyme

**Enzyme –** molecules that make chemical reactions faster than they would be on their own (organic catalyst)

- most are proteins, some are RNA

- most are not used up in a reaction – they can be used again and again

-common ending = -ase

**How Enzymes Work**

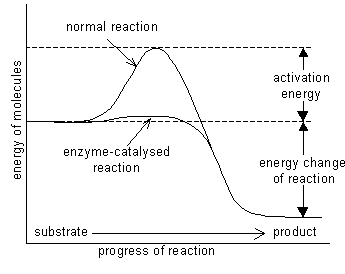
Proteins (polypeptide chains) are folded into a 3D shape and have one or more active sites

**Active sites** = pockets where substrates bind to a protein and the reaction occurs

**Reactions require a release of energy**

**- Endergonic (“energy in”)** – Reactions that require a net input of energy

**- Exergonic (“energy out”)** – Reactions that end with a net release of energy

**Activation energy**

* + The minimum amount of energy needed to get a reaction started
  + Some reactions require a lot of activation energy, others do not

**Mechanisms of Enzyme-Mediated Reactions**

Binding at enzyme active sites may bring on the transition state by 4 mechanisms

* + Helping substrates get together
  + Orienting substrates in positions that favor reaction
  + Inducing a fit between enzyme and substrate (induced-fit model)
  + Shutting out water molecules

**Effects of Temperature, pH, and Salinity**

Raising the temperature boosts reaction rates by increasing a substrate’s energy

* + High temperatures denature enzymes

Each enzyme has an optimum pH range

* + In humans, most enzymes work at a pH of 6 to 8

Salt levels affect the hydrogen bonds that hold enzymes in their three-dimensional shape