

# Enzymes:

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**Energy-** the capacity to do work

**Potential Energy-** stored energy

**Kinetic Energy-** energy of motion

**First Law of Thermodynamics-** states that energy cannot be created or destroyed, but can be transferred and changed in form

**Second Law of Thermodynamics-** states that disorder, or entropy, in the universe is continuously increasing

**Enzyme-** protein that catalyzes chemical reactions

**Exergonic Reaction-** release energy

**Endergonic Reaction-** gain energy

**Activation Energy-** energy required to break existing bonds and begin reaction

**Substrate-** substance on which the enzyme acts

**Enzyme-Substrate Complex-** enzyme and molecule

**Active Site-** on or in enzyme; region to which enzyme bonds or fits

**Induced Fit-** causes reaction to be more efficient; facilitates break-down

- Enzymes catalyze reactions—speed them up
- Enzymes allow our bodies to be more efficient
- Enzymes are very specific and only work with certain substrates and have a specific function

Types:

- Exergonic—
  - The enzyme releases energy and is said to be a spontaneous reaction
  - The amount of energy is lower at the end than before
- Endergonic—
  - Gain of free energy

## How it works:

- The enzyme lowers the activation energy required to start a reaction
- The process starts when a substrate binds to the active site—this starts the process

## Inhibitors:

- Inhibitors block the substrate from joining into the active site
- Stops the process from occurring
- **Competitive Inhibition**—
  - The inhibitor competes with the normal substrate for binding to the active site of the enzyme
  - The inhibitor is usually similarly shaped to the substrate
  - This time of inhibition does not permanently damage the enzyme however the inhibitor is only attached temporarily
- **Non Competitive Inhibition**—
  - The inhibitor binds with the enzyme at a site OTHER than the active site
  - This inactivates the enzyme and alters its shape not allowing the substrates to bind with the enzyme normally
- **Irreversible Inhibition**—

- The inhibitor attaches at a weird spot and permanently alters the shape of the enzyme making it useless

#### Chapter 6 Review Questions

Q1. You exert tension on a spring and then release it. Explain how these actions relate to work, PE and KE. By exerting tension on the spring, you are inducing work into it. Potential energy is the energy that is stored in an object. As you push down on the spring, it is obtaining P.E. Kinetic energy is energy of motion. It is obtained after releasing the pressure on the spring and allowing it to move.

Q2. What is activation energy? What effect does an enzyme have on activation energy? Activation energy is the kinetic energy required to get a reaction going. An enzyme lowers activation energy.

Q3. Give the function off each of the following – active site, coenzyme and Allosteric site. Active Site: The part of the enzyme's surface into which the substrate is bound and undergoes reaction. Coenzyme: Small organic non-protein molecules that carry chemical groups between enzymes. Allosteric Site: A site other than the protein site where effector molecules are binded.