**Enzymes** are very important for chemical reactions. There are two general parts for every reaction:

Reactants- the chemicals that participate in a chemical reaction

Products- the substances that are formed as a result of a chemical reaction

C6H12O6 + O2 🡪 CO2 + H2O

**What are enzymes?**

Enzymes are proteins that catalyze the rate of a chemical reaction (speed it up).

- Enzymes speed up reactions by decreasing the amount of activation energy required for a reaction.

- Activation energy is energy that chemicals need to begin a reaction.

**Without enzymes,** typical every day reactions would occur far too slow for us to survive.

* We would not be able to break down toxic wastes in a timely manner.
* We would not be able to metabolize our food fast enough.

**Examples of Enzymes**

* Carbonic anhydrase: found in blood; speeds up the removal of carbon dioxide from our bodies.
* Catalase: found in liver tissue; speeds up the decomposition of hydrogen peroxide in our bodies
* Amylase; found in saliva; speeds up the breakdown of sugar for digestion.

**Enzyme-Substrate Complex: The Lock and Key**

-The substrate of an enzyme is a molecule that attaches to the enzyme’s active site.

-Enzymes and substrates are specific to each other like a lock and key. (For example, the catalase substrate (hydrogen peroxide) would not attach to amylase).

**Enzyme-Substrate Complex**

Once the enzyme-substrate complex is formed, the enzyme changes its shape slightly to create a more secure bond, and then the chemical reaction follows.

After the chemical reaction, the product (former substrate) is released from the enzyme.

The enzyme is free to carry on the same chemical reaction again and again (enzymes can be reused).

**Factors that Affect Enzymes**

-Two factors that affect enzyme productivity are **pH** and **temperature**.

-Enzymes thrive best within certain temperature and pH ranges.

-If the environment is altered, the enzyme activity may decrease.

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