

Name: _____ Period: _____

Enzymes and Their Functions – Enzymes – PreAP Option 1

What are Enzymes?

Enzymes are compounds that assist chemical reactions by increasing the rate at which they occur. For example, the food that you eat is broken down by digestive enzymes into tiny pieces that are small enough to travel through your blood stream and enter cells. Enzymes are proteins that are found in all living organisms. Without enzymes, most chemical reactions within cells would occur so slowly that cells would not be able to work properly. Enzymes function as catalysts. **Catalysts** accelerate the rate of a chemical reaction without being destroyed or changed. They can be reused for the same chemical reaction over and over, just like a key can be reused to open a door many times. Enzymes are generally named after the substrate affected, and their names usually end in **-ase**. For example, enzymes that break down proteins are called proteases. While lipases break down lipids, carbohydrases break down carbohydrates. The compounds that enzymes act upon are known as **substrates**. The substrate can bind to a specific place in the enzyme called the **active site**. By temporarily binding to the substrate, an enzyme can lower the energy needed for a reaction to occur, thus making this reaction faster. The energy required for a chemical reaction to occur is known as the **activation energy**. Once the reaction between an enzyme and a substrate is complete, the substrate is changed to a **product** while the enzyme remains unchanged. The rate of the reaction between an enzyme and a substrate can be affected by different factors. Some of the factors that can affect enzyme activity are temperature, pH, concentration of the enzyme and concentration of the substrate. In living organisms, enzymes work best at certain temperatures and pH values depending on the type of enzyme.

1. What are enzymes?
2. How are enzymes named?
3. How do enzymes work?
4. An example of an enzyme:

Match the following words with their definitions.

_____ Product

_____ Active site

_____ Enzymes

_____ Substrate

_____ Activation energy

a. Amount of energy required for a chemical reaction to occur.

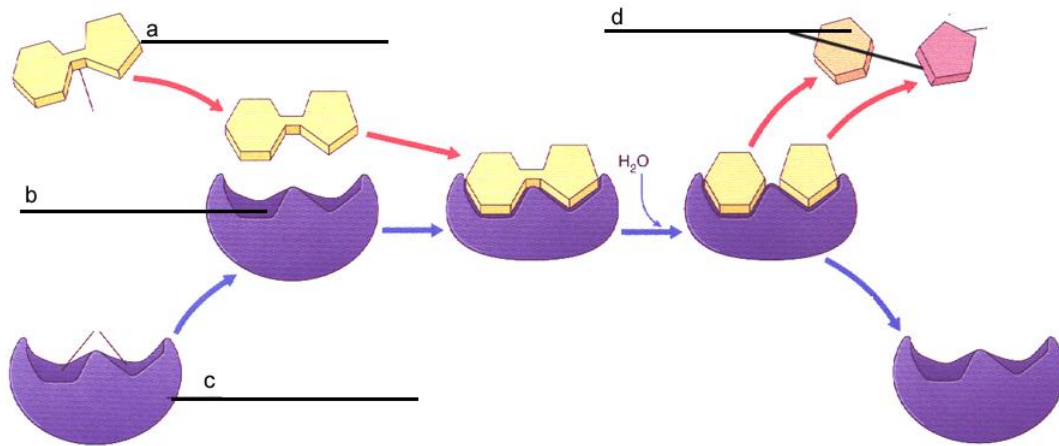
b. Substance that enzymes act upon.

c. Regions on the surface of enzymes that fit the substrate.

d. Substance formed from the substrate at the end of a chemical reaction with an enzyme.

e. Proteins that speed up chemical reactions.

1. Label the diagram



2. Answer true or false to the following statements:

- _____ Enzymes interact with a specific substrate.
- _____ Enzymes change shape after a reaction occurs.
- _____ Enzymes speed up reactions.
- _____ One enzyme can be used for many different types of chemical reactions.
- _____ Enzyme reactions can be slowed or halted using inhibitors.

3. Circle the correct effect.

- Raising the temperature slightly should [increase | decrease | not change] the rate of reaction
- Boiling temperature will [increase | decrease | not change] the rate of reaction.
- Changing the pH toward the optimal pH will [increase | decrease | not change] the rate of reaction.
- Introducing a competitive inhibitor will [increase | decrease | not change] the rate of reaction.

4. Place a check mark next to the things that are expected to INCREASE the rate of an enzymatic reaction

- _____ Add more enzyme
- _____ Add more substrate
- _____ Adjust pH to optimal level
- _____ Add a non competitive inhibitor
- _____ Freezing