

Name _____ Date _____ Period _____

Biology 2nd 9 Weeks, Weeks 2.6-2.7 Homework 1 (Enzymes)

$2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ is a chemical reaction that needs **activation energy** to start. Think about rolling a boulder up a mountain. You must push the boulder to start the rolling. Activation energy provides the "push" needed to start a chemical reaction.

Catalysts lower the activation energy needed to start chemical reactions. This allows catalysts to speed up the reactions. Proteins that function as biological catalysts are called **enzymes**. Enzymes can be used in synthesis reactions that build molecules and in digestive reactions that break down molecules. Enzymes therefore play a crucial role in the **digestion of food**. It is important to note that enzymes are not used up during a reaction and can therefore be used in additional reactions.

Most enzymes end in **-ase** and the name of the enzymes indicates the reaction it catalyzes. For example, the enzyme **sucrase** breaks down **sucrose** and the enzyme **DNA polymerase** builds **DNA**.

Because of their shapes, enzymes will only catalyze or speed up specific reactions. The lock and key hypothesis offers an explanation of how enzymes work. **Substrates** or **reactants** bind to an enzyme at an **active site** forming an **enzyme-substrate complex**. The substrate must have a complementary shape to bind to the active site of the enzyme. The substrate and enzyme must fit together like a lock and a key. During the reaction, the substrate undergoes a chemical change and a new substance, the **product**, is formed. At the end of the reaction, the product is released from the active site. The active site of the enzyme is then free to bond with other substrates to catalyze more reactions.

Remember that the shape of the enzyme determines what substrate it can bind to. A denatured enzyme can not function properly because its shape has been changed. Changes in temperature and pH can change the shape of an enzyme thus causing the enzyme to lose its function.

1. Enzymes influence chemical reactions in living systems by-
 - a. providing the substrate required for the reaction to occur
 - b. affecting the rate at which reactions occur
 - c. absorbing water released when polymers are formed
 - d. combining with excess hydrogen to form waste

Justification -

2. The enzyme amylases begin the breakdown of carbohydrates into-
- fatty acids
 - polypeptides
 - amino acids
 - simple sugars

Justification -

3. Enzymes belong to the category of biomolecules known as _____.
- carbohydrates
 - protein
 - lipids
 - nucleic acids

Justification -

4. Enzymes are protein catalysts. What is the role of a catalyst?
- Provides extra energy for a reaction
 - Lowers the activation energy of a reaction
 - Allows only irreversible reactions to happen
 - Eliminates the activation energy of a reaction

Justification-

Complete the diagram below using your enzyme foldable.

