

## ENZYMES at Lew-Port's Biology Place

Directions: Use Google to search for Lew-Port's Biology Place. Click on Lew-Port's biology place site map. Click on enzyme activity. The text is written to help you follow along. Write the missing words on the line.

[http://www.lew-](http://www.lew-port.com/10712041113402793/lib/10712041113402793/animations/Enzyme%20activity.html)

[port.com/10712041113402793/lib/10712041113402793/animations/Enzyme%20activity.html](http://www.lew-port.com/10712041113402793/lib/10712041113402793/animations/Enzyme%20activity.html)

- \_\_\_\_\_ are very important molecules in biology. Enzymes are \_\_\_\_\_ that help speed up chemical reactions in the body. (ANIMATION a)
- Without enzymes, many of the important processes of life could not happen. Enzymes are very \_\_\_\_\_ in their functions. Each enzyme has only \_\_\_\_\_ reaction that it can help. (ANIMATION b)
- Enzymes are \_\_\_\_\_ when they perform their function. This means that the same enzyme molecule can be used over and over again. (ANIMATION b)
- Some enzymes may even be used \_\_\_\_\_ on the same set of small molecules to build a long chain of repeating subunits. (ANIMATION c)
- As with all proteins, the \_\_\_\_\_ of an enzyme is what determines its function. An organism has the ability to make many different enzymes, and each enzyme has one particular \_\_\_\_\_. (ANIMATION d)
- Sometimes, high \_\_\_\_\_ or extreme pH values may affect the shape of an enzyme molecule. This process, called \_\_\_\_\_, will also make the enzyme less effective, possibly even useless. (ANIMATION d)
- We will explore these concepts and examine animations that explain the reasons for the behavior of enzymes.

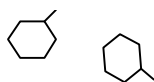
### ANIMATIONS

#### a. To see the difference in a reaction with or without enzymes present.

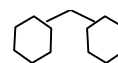


← Enzyme  
for this  
reaction

Simple sugar molecules



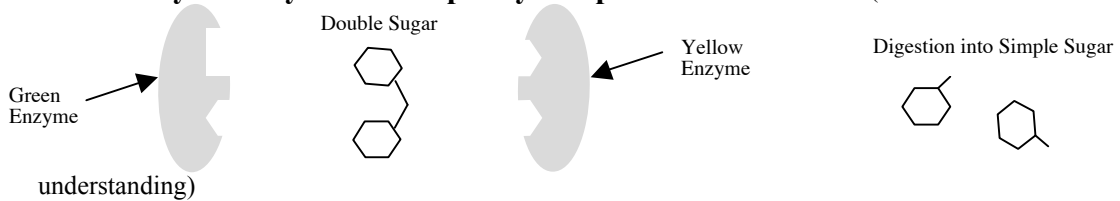
Double sugar molecule



- To understand how enzymes help chemical reactions occur more quickly, we will view a simple \_\_\_\_\_ reaction. Select whether you would like to view the reaction without or with the enzyme present.
- WITHOUT ENZYME: These two simple sugar molecules can combine to form a larger double sugar molecule if they come together at just the right angle.

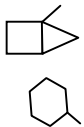
- 3) Even though the molecules have \_\_\_\_\_ often, they have not yet been at the correct angle to form a bond.
- 4) WITH ENZYME: The enzyme shown here is specific for this reaction. Only these simple sugar molecules will fit in, and they are attracted to the enzyme.
- 5) When the simple sugar molecules fit against the enzyme, they are oriented properly to react and make a larger molecule.
- 6) A \_\_\_\_\_ can now form between the small molecules, linking them together.
- 7) The new double sugar molecule leaves the enzyme. The enzyme is \_\_\_\_\_ and can help two more molecules to react.

**b. To see why an enzyme can help only one particular reaction.** (Color code to aid in understanding)

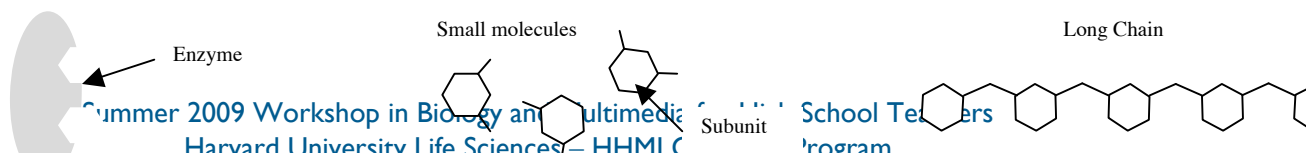


- 1) Enzymes are specific which means each individual enzyme can only be used for one particular reaction.
- 2) In this case, a double sugar molecule needs to be \_\_\_\_\_ (broken apart). There are two different enzymes here, **only one** of which can function for this reaction.
- 3) The double sugar molecule does not fit into the \_\_\_\_\_ enzyme. Therefore the enzyme cannot help the digestion.
- 4) The double sugar molecule **can** fit into the \_\_\_\_\_ enzyme, so it can help the sugar molecule to be digested.
- 5) The digestion has occurred, with the help of the specific enzyme that fits the sugar molecule.
- 6) Here we can see the reaction that might use the green enzyme. A different simple sugar molecule has a different shape, and would not fit the yellow enzyme.
- 7) The two simple sugars can fit into this enzyme, and the enzyme can help them to bond together.
- 8) The \_\_\_\_\_ enzyme helped to form this double sugar molecule. The \_\_\_\_\_ enzyme does not have the specific shape needed to help this reaction.
- 9)

2 Different Simple Sugars

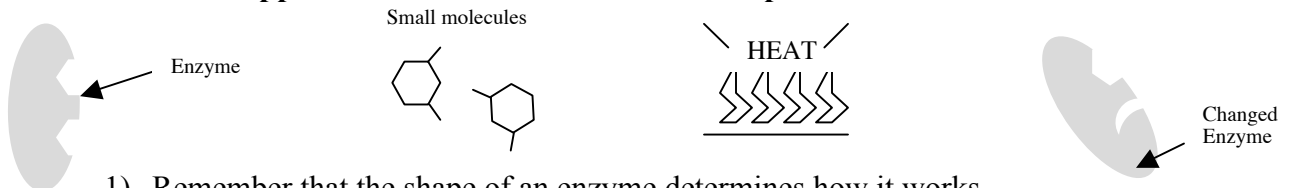


**c. To see how one enzyme can be used repeatedly to form large molecules.**



- 1) Here we will see how a single enzyme may help to \_\_\_\_\_ a group of smaller molecules into a long chain.
- 2) Two of the small molecules (subunits) fit against the enzyme and form a bond.
- 3) The molecules \_\_\_\_\_ along the enzyme and a new subunit can be attached to the first two.
- 4) The process continues forming a chain of repeating subunits.
- 5) This is how long chain (polymer) molecules form. [Examples include \_\_\_\_\_, \_\_\_\_\_ (carbohydrates), and \_\_\_\_\_ (nucleic acids).]
- 6)

**d. To see what happens to an enzyme that is heated or placed in acid.**



- 1) Remember that the shape of an enzyme determines how it works.
- 2) This enzyme has the perfect shape to help these two enzymes combine.
- 3) However, \_\_\_\_\_ or a change in \_\_\_\_\_ can change the shape of an enzyme.
- 4) This process of changing an enzyme's shape is called denaturing. The process cannot be \_\_\_\_\_, so the enzyme will not work anymore.
- 5) The small molecules don't fit the enzyme anymore.
- 6) The small molecules will not react unless more of the proper enzymes are present.

### ENZYMES at Lew Port's Biology Place

Directions: Use the following link to view some helpful animations about enzymes. The text is written to help you follow along. Write the missing words on the line.

<http://www.lewport.wnyric.org/jwanamaker/animations/Enzyme%20activity.html>

8. Enzymes are very important molecules in biology. Enzymes are **proteins** that help speed up chemical reactions in the body. (ANIMATION a)
9. Without enzymes, many of the important processes of life could not happen. Enzymes are very **specific** in their functions. Each enzyme has only one reaction that it can help. (ANIMATION b)
10. Enzymes are not changed when they perform their function. This means that the same enzyme molecule can be used over and over again. (ANIMATION b)
11. Some enzymes may even be used repeatedly on the same set of small molecules to build a long chain of repeating subunits. (ANIMATION c)
12. As with all proteins, the **shape** of an enzyme is what determines its function. An organism has the ability to make many different enzymes, and each enzyme has one particular function. (ANIMATION d)

13. Sometimes, high temperatures or extreme pH values may affect the shape of an enzyme molecule. This process, called denaturing, will also make the enzyme less effective, possibly even useless. (ANIMATION d)
14. We will explore these concepts and examine animations that explain the reasons for the behavior of enzymes.

## ANIMATIONS

### e. To see the difference in a reaction with or without enzymes present.

- 1) To understand how enzymes help chemical reactions occur more quickly, we will view a simple synthesis reaction. Select whether you would like to view the reaction without or with the enzyme present.
- 2) WITHOUT ENZYME: These two simple sugar molecules can combine to form a larger double sugar molecule if they come together at just the right angle.
- 3) Even though the molecules have collided often, they have not yet been at the correct angle to form a bond.
- 4) WITH ENZYME: The enzyme shown here is specific for this reaction. Only these simple sugar molecules will fit in, and they are attracted to the enzyme.
- 5) When the simple sugar molecules fit against the enzyme, they are oriented properly to react and make a larger molecule.
- 6) A bond can now form between the small molecules, linking them together.
- 7) The new double sugar molecule leaves the enzyme. The enzyme is unchanged and can help two more molecules to react.

### f. To see why an enzyme can help only one particular reaction.

- 1) Enzymes are specific which means each individual enzyme can only be used for one particular reaction.
- 2) In this case, a double sugar molecule needs to be digested (broken apart). There are two different enzymes here, **only one** of which can function for this reaction.
- 3) The double sugar molecule does not fit into the green enzyme. Therefore the enzyme cannot help the digestion.

- 4) The double sugar molecule **can** fit into the yellow enzyme, so it can help the sugar molecule to be digested.
- 5) The digestion has occurred, with the help of the specific enzyme that fits the sugar molecule.
- 6) Here we can see the reaction that might use the green enzyme. A different simple sugar molecule has a different shape, and would not fit the yellow enzyme.
- 7) The two simple sugars can fit into this enzyme, and the enzyme can help them to bond together.
- 8) The green enzyme helped to form this double sugar molecule. The yellow enzyme does not have the specific shape needed to help this reaction.
- 9)

**g. To see how one enzyme can be used repeatedly to form large molecules.**

- 1) Here we will see how a single enzyme may help to link a group of smaller molecules into a long chain.
- 2) Two of the small molecules (subunits) fit against the enzyme and form a bond.
- 3) The molecules shift along the enzyme and a new subunit can be attached to the first two.
- 4) The process continues forming a chain of repeating subunits.
- 5) This is how long chain (polymer) molecules form. [Examples include proteins, starches (carbohydrates), and DNA (nucleic acids).]
- 6)

**h. To see what happens to an enzyme that is heated or placed in acid.**

- 1) Remember that the shape of an enzyme determines how it works.
- 2) This enzyme has the perfect shape to help these two enzymes combine.
- 3) However, heat or a change in pH can change the shape of an enzyme.
- 4) This process of changing an enzyme's shape is called denaturing. The process cannot be reversed, so the enzyme will not work anymore.
- 5) The small molecules don't fit the enzyme anymore.

The small molecules will not react unless more of the proper enzymes are present.