

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## ENZYME WEB QUEST

This web quest was designed to help you understand the purpose, and function of enzymes. Use the following websites provided to answer the questions below.

### Part 1: Introduction

[http://www.phschool.com/science/biology\\_place/labbench/lab2/intro.html](http://www.phschool.com/science/biology_place/labbench/lab2/intro.html)

1. \_\_\_\_\_ catalyze reactions by lowering the \_\_\_\_\_ necessary for a reaction to occur.

### Key Concepts

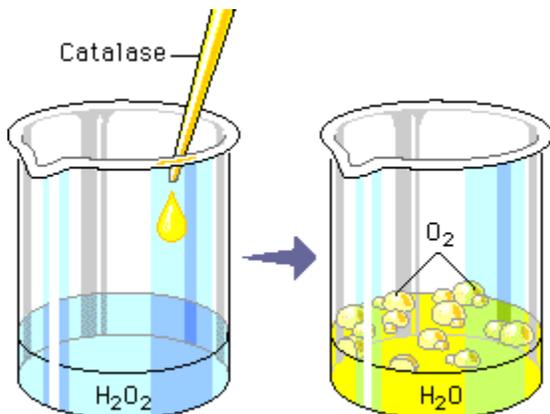
2. \_\_\_\_\_ catalyze reactions by lowering the \_\_\_\_\_ necessary for a reaction to occur. The molecule that an enzyme acts on is called the \_\_\_\_\_. In an enzyme-mediated reaction, \_\_\_\_\_ molecules are changed, and \_\_\_\_\_ is formed. The \_\_\_\_\_ molecule is \_\_\_\_\_ after the reaction, and it can continue

3. Each \_\_\_\_\_ is \_\_\_\_\_ for the \_\_\_\_\_ it will catalyze. In this laboratory,

Enzyme = catalase, found in your liver

Substrate = hydrogen peroxide ( $H_2O_2$ )

Products = water and oxygen



4. DRAW THE REACTION THAT TOOK PLACE ON THE LEFT IN THE SPACE BELOW. LABEL THE SIDE OF REACTANTS, AND THE SIDE OF THE PRODUCTS THAT ARE PRODUCED. CIRCLE THE NAME OF THE ENZYME THAT IS FACILITATING THE REACTION.

### **Concept 1: Enzyme Structure**

5. Enzymes are globular \_\_\_\_\_. Their folded conformation creates an area known as the \_\_\_\_\_ . The nature and arrangement of \_\_\_\_\_ in the \_\_\_\_\_ make it specific \_\_\_\_\_ .
6. DRAW A MODEL OF AN ENZYME, ACTIVE SITE, AND SUBSTRATE BELOW:

### **Concept 2 Binding Specificity**

7. Even when different \_\_\_\_\_ molecules are present, only those that have the \_\_\_\_\_ to the \_\_\_\_\_ are able to bind with the enzyme's \_\_\_\_\_ .

### **Concept 3: Induced Fit**

8. When an enzyme binds to the appropriate \_\_\_\_\_, subtle changes in the \_\_\_\_\_ occur. This alteration of the \_\_\_\_\_ is known as an \_\_\_\_\_. Induced fit enhances catalysis, as the enzyme converts \_\_\_\_\_ to \_\_\_\_\_ .
9. Observe the INDUCED FIT ANIMATION and describe what happens below:
10. Release of the \_\_\_\_\_ restores the enzyme to its \_\_\_\_\_ form. The enzyme can \_\_\_\_\_, as long as \_\_\_\_\_ .

#### **Concept 4: Some Factors That Affect Enzyme Action**

11. The conformation of an enzyme is maintained by interactions between the various \_\_\_\_\_ that compose it, and this conformation is sensitive to \_\_\_\_\_. Two important influences are \_\_\_\_\_ and \_\_\_\_\_. When an enzyme's \_\_\_\_\_ is significantly altered because of \_\_\_\_\_ or \_\_\_\_\_ variation, the enzyme may no longer \_\_\_\_\_. An enzyme is said to be \_\_\_\_\_ when it loses its functional shape.

#### **Concept 5: pH and Enzyme Function**

12. Each enzyme functions best within a \_\_\_\_\_. For example, the enzyme \_\_\_\_\_, which works in your stomach, functions best in a strongly \_\_\_\_\_ environment. Lipase, an enzyme found in your \_\_\_\_\_, works best in a \_\_\_\_\_ environment.

13. When the pH changes, the active site \_\_\_\_\_ and affects \_\_\_\_\_. What happens to catalysis when an enzyme is subjected to a pH far from its optimum range?

14. WATCH THE ANIMATION AND DESCRIBE WHAT YOU SEE BELOW:

15. In the presence of either excess \_\_\_\_\_ or excess \_\_\_\_\_, the \_\_\_\_\_ is altered. The \_\_\_\_\_ is \_\_\_\_\_ and the enzyme cannot \_\_\_\_\_.

#### **Concept 6: Temperature and Enzyme Function**

16. Chemical reactions speed up as \_\_\_\_\_ is increased, so, in general, \_\_\_\_\_ will \_\_\_\_\_ at higher temperatures. However, each enzyme has a temperature \_\_\_\_\_, and beyond this point the enzyme's \_\_\_\_\_ is lost. \_\_\_\_\_ temperatures will \_\_\_\_\_ most enzymes.

**Part 2: Go the following website for this section**

**[http://glencoe.mcgraw-hill.com/sites/dl/free/0078695104/383930/BL\\_11.html](http://glencoe.mcgraw-hill.com/sites/dl/free/0078695104/383930/BL_11.html)**

17. What are the two **variables** you will be experimenting with on this site?
  
  
  
  
  
  
  
  
  
  
18. If you click on the "Information" button, it is stated that "enzymes are **organic catalysts**." What does this mean?
  
  
  
  
  
  
  
  
  
  
19. What kind of mechanism is the enzyme-substrate complex often compared to?
  
  
  
  
  
  
  
  
  
  
20. First, add the same amount of substrate to every test tube and keep the pH constant. Click the computer monitor to see the data. What is your dependent variable? In other words, what is it that you are measuring?
  
  
  
  
  
  
  
  
  
  
21. What was the number of molecules of product formed per minutes when you added the same amount of substrate to each test tube?
  
  
  
  
  
  
  
  
  
  
22. Hit Reset. Now, add the amount of substrate laid out in front of each test tube. What happens to the number of molecules of product formed per minute when you increase the amount of substrate? What does this tell you about the reaction rate?
  
  
  
  
  
  
  
  
  
  
23. Hit Reset. First, change the levels of the pH too: **3, 5, 7, 9, and 11**. Then Add the **SAME** amount of substrate to **ALL** the test tubes. What happens when you increase the pH? What happens when you decrease the pH? Does the enzyme suffer more from an acidic solution or a basic solution?