

AP Biology
Chapter 6: Metabolism: Energy and Enzymes
Enzyme Lab

Name: _____
Date: _____
Period: _____

Enzyme Virtual Lab

Objective: Today you will learn about enzymes and their role in chemical reactions.

Experiment #1- Background on Enzymes

Go to the website: http://www.phschool.com/science/biology_place/labbench/lab2/intro.html

Read the page and then click on "Next"

1. What is the function of an enzyme?
2. What is a substrate?
3. What happens to the enzyme and the substrate during a chemical reaction?
4. What does it mean that enzymes are "specific"?
5. What does catalase do? Use the terms substrate and product in your response.
6. How can you tell that catalase has been added to hydrogen peroxide?
7. Why is the active site specific for only one type of substrate?
8. Draw a schematic model of an enzyme.
9. What happens when a substrate with a different shape from the active site tries to enter the active site?
10. What happens with the enzyme of the shape enters the active site?

11. What are 2 important influences on enzymatic activity? What happens when these factors are significantly altered?
12. Provide 2 examples of enzymes and the pH of the environment in which it works.
13. Describe the effect of temperature on enzyme function.

Experiment #2

In this experiment, you will determine the effects of substrate concentration and pH on the initial rate of enzyme-catalyzed reaction.

Click on:

http://www.glencoe.com/sites/common_assets/advanced_placement/mader10e/virtual_labs_2K8/labs/BL_02/index.html

14. What is the difference in people who suffer from lactose intolerance when compared with “normal individuals”?
15. Read the objective and procedures. Click the monitor and watch the video about enzyme action. Summarize the video.
16. Conduct the experiment based on the directions specified under procedures. Adjust the pH in each test tube to the following:
 - Test tube 1- adjust the pH to 3
 - Test tube 2- adjust the pH to 5
 - Test tube 3- leave the pH at 7
 - Test tube 4- adjust the pH to 9
 - Test tube 5- adjust the pH to 11.
17. Add 0.5 g of substrate in each of the 5 test tubes.
18. Why was 0.5g of substrate added to all of the tubes instead of varying amounts of substrate?

19. What is the independent variable in this experiment?

20. What is the dependent variable in this experiment?

21. Record the data in the data table below. Title the table appropriately.

22. Repeat the experiment using the following amounts of lactose:

- a. 1.0g Lactose
- b. 2.0g Lactose
- c. 4.0g Lactose
- d. 8.0g Lactose

Table 1: _____

Amount of Substrate	pH3	pH5	pH7	pH9	pH11
0.5g					
1.0g					
2.0g					
4.0g					
8.0g					

23. Graph the data on graph paper.

24. What does your data indicate about the optimum substrate concentration for this lactase catalyzed reaction?

25. What does your data indicate about the optimum pH level for this lactase-catalyzed reaction?

26. People with lactose intolerance are able to take products such as Lactaid that contain the lactase enzyme with their meals. These products can be taken in pill form. Considering the fact that the pill form of the enzyme would have to travel through a person's stomach, what special consideration would the producer of this product need to be concerned about?

27. Explain why the maximum initial reaction rate cannot be reached at low lactose concentrations.

28. Describe the relationship between substrate concentration and the number of glucose and galactose molecules formed during the first minute.

29. Describe the relationship between pH and the number of glucose and galactose molecules formed during the first minute.