



ENZYME TIME! WEBQUEST AND VIDEO GAME

Prior Knowledge: In this lesson you will discover how enzymes help our bodies to break down or build up a specific substrate and catalyze chemical reactions. You will learn how pH, temperature, and concentration affect the rate of chemical reactions in our bodies, and will experiment using graphs and interactive games to learn and check your understanding of enzymes. Before beginning, use the Learning Scale below to rate your knowledge of enzymes. Place a check in the Before Lesson box. Re-rate yourself in the After Lesson box after the lesson.

Rating Before Lesson	Learning Scale	Rating After Lesson
	4 I can teach others about how enzymes are specified proteins that catalyze chemical reactions and how they can be denatured by non-optimal conditions.	
	3 I can explain how enzymes are specified proteins that catalyze chemical reactions and how they can be denatured by non-optimal conditions.	
	2 I can describe how enzymes affect chemical reactions and how they can become denatured.	
	1 I can identify the significance of enzymes in chemical reactions.	
	0 I do not understand enzymes or how they can become denatured.	

Task 1: Introduction to Enzymes

Discover how enzymes function. Click on the following link to watch the “Enzymes and Pac-Man” video by the Amoeba Sisters. As you watch, answer the questions below.

<http://tinyurl.com/jkv9clr>

1. What is the name of the site where the substrate binds to the enzyme? _____

2. What is a substrate? _____

3. What is induced fit? _____

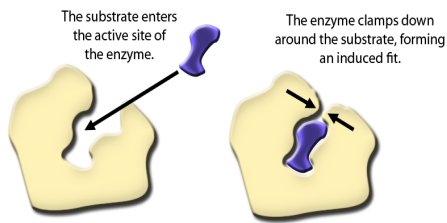
4. How do enzymes change the speed of a chemical reaction? _____

5. What two factors can denature enzymes? _____

6. How is an enzyme's shape affected when it becomes denatured? _____

7. Why do lactose intolerant people get sick from drinking milk? _____





Task 2: Enzymatic Virtual Lab Game

Click on the link the below to play the “Enzymatic” virtual lab video game from the BioMan Biology website. Click “Start a New Game” to begin. Read the screens and follow the directions to complete the game. As you complete the game, answer the following questions on the handout.

<http://tinyurl.com/mbstogk>

Part A: What Are Enzymes? - Click on “What Are Enzymes” tab.

1. Enzymes are _____ that speed up or _____ chemical reactions.
2. Enzymes are important because all living things must do many _____ in order to survive.
3. The chemical reactions done by living organisms are known as _____
4. In biology, the two most important types of reactions are _____ and _____
5. _____ is a type of chemical reaction that involves the _____ of polymers into _____
6. _____ is a reaction that involves _____ large molecules by joining together building blocks called _____
7. Dehydration synthesis happens in your cells when you need to build large molecules such as _____, _____, or _____

Part B: Specificity of Enzymes - Click on the “Specificity” tab.

8. Each enzyme has a unique _____ that makes an _____
9. Each active site can only fit a specific _____
10. When a substrate(s) enters the active site, the enzyme helps a specific _____ to occur. The end result of a chemical reaction is the _____ or _____
11. What is the name of the part of the enzyme where the substrate binds and causes a chemical reaction to occur?

12. We say that enzymes are specific. What does this mean? _____



Part C: Experimenting With Enzymes – Click on “Experiments” tab.

13. What three factors affect an enzyme’s capability to catalyze chemical reactions? _____

14. Use the slider to adjust the temperature to a low (not the lowest) setting. What do you notice about the rate of reaction when the temperature is low? _____
15. Use the slider to adjust the temperature to a medium setting. Describe the rate of enzyme activity. _____

16. Use the slide to adjust the temperature to the high setting. What happened to your enzyme? _____
17. What does becoming “denatured” mean? _____
18. What is the temperature that an enzyme works best at is called? _____
19. What is the optimal temperature of this enzyme? _____
20. The _____ is used to tell how acidic or basic a solution is.
21. Temperature damage can denature an enzyme permanently. Does extreme pH changes permanently denature an enzyme? Explain. _____
22. What is the optimal pH range of the stomach enzyme pepsin? _____
23. Substrate _____ refers to the relative amount of substrate in a solution.
24. What does a high substrate concentrate mean? _____
25. What does a lower substrate concentration mean? _____
26. What is your hypothesis that you typed about substrate concentration and enzyme activity? _____
27. Why is there more enzyme activity at a higher substrate concentration than a lower substrate concentration? _____
28. Which factors can cause an enzyme to denature? _____

Part D: Build an Enzyme!



29. In the box to the right, draw the enzyme and substrate you will be experimenting with.
30. What is the optimal temperature of your enzyme? _____ What is the optimal pH? _____
31. What is the enzymes optimal substrate concentration? _____
32. Observe your machine; describe what did you see. _____
33. Go to the main menu and click on the “Quiz!” tab to take the quiz. What score did you receive? _____



BONUS!
 Play a Fun Pac-Man Game by clicking on this link: <http://tinyurl.com/8ylcjyk>