

Part 1: Record your data on the number of product molecules formed per minute obtained from the virtual lab.

Product Molecules/minute at:

Amount of Substrate (Lactose)	pH 3	pH 5	pH 7	pH 9	pH 11
0.5 g					
1.0 g					
2.0 g					
4.0 g					
8.0 g					

Part 2: Please answer the following questions in complete sentences.

1. Briefly describe what happens to an enzyme when it catalyzes a reaction. Discuss what is *most likely* to interfere with the enzyme's ability to catalyze a reaction.
2. Feedback mechanisms regulate the rate of enzyme activity, effectively "turning off" an enzyme in a reversible way until more product is needed. Which of the following would be most effective as a feedback mechanism? Explain your answer.
 - a. Reduced concentration of product
 - b. Increased concentration of substrate
 - c. A change in pH
 - d. Temporary binding of a non-substrate molecule in the active site

3. Distinguish between catabolic and anabolic reactions.

4. Distinguish between endergonic and exergonic reactions.

5. How is enzyme activity different from a “lock and key?”

Part 3: Please answer the following questions in complete sentences.

1. A: Discuss the components of the graph you created with the data in the lab. For example, what did the two axes represent? What did the different colored lines represent? At what pH level did the maximum reaction occur?
B: What was the independent variable in the reaction? What was the dependent variable?

2. Describe the relationship between substrate concentration and the initial reaction rate of an enzyme-catalyzed reaction. Is this a linear relationship? What happens to the initial reaction rate as substrate concentration increases?

3. Enzymes function most efficiently at the temperature of a typical cell, which is 37 degrees Celsius. Increases or decreases in temperature can significantly lower the reaction rate. What does this suggest about the importance of temperature-regulating mechanisms in organisms? Explain.

4. Cynthia is lactose intolerant but she is able to take products such as Lactaid, which contains the lactase enzyme, with her meals to aid digestion. Products such as Lactaid can be taken in pill form. Considering the fact that the pill form of the enzyme would have to travel through the Cynthia's stomach, what special consideration would the producer of this product need to be concerned about?
5. A: Why was there no increase in the reaction rate with 8.0 g. of substrate as compared to 4.0 g. of substrate? What would you need to add to see an increase in the reaction rate with 8.0 g. of substrate?
B: Explain why the maximum initial reaction rate cannot be reached at low lactose concentrations.
6. The maximum rate of this reaction is 350 molecules product/minute. Give two examples of changes you could make in the experimental conditions or variables that would increase this reaction rate. Explain why each change you listed will increase the reaction rate.