Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_

**Virtual Lab: Enzyme-Controlled Reactions – Bio Honors**

***Directions:*** *Type in the following link:*

*****http://www.mhhe.com/biosci/genbio/virtual\_labs/BL\_11/BL\_11.html. This will take you to the McGraw Hill virtual enzyme catalysis lab. Follow the directions given below to navigate the website.*

**Pre-Lab:**

1) On the left side of the screen, you will see the purpose and objectives of the experiment. Record the purpose and objectives IN YOUR OWN WORDS in the space below:

Purpose: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Objectives:

A. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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B. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3) Click the Information button at the bottom of the page. Take a couple minutes to read through some basic information about enzyme action.

4) **Procedure – Part A:** In this portion of the experiment, you will be testing the effects of amount of substrate on the speed of reaction. Add the different amounts of substrate (0.5, 1.0, 2.0, 4.0 and 8.0 grams) to Test Tubes 1-5. In this experiment, you must keep the pH of each test tube at a constant level (pH 7).

5) Click on the computer screen to see the results of the experiment. Create a data table below to record results.

6) 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? Refer to data in your response.

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7) Explain why the maximum initial reaction rate cannot be reached at low substrate concentrations.

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8) **Procedure – Part B:** In this portion of the experiment, you will be testing the effects of pH on the speed of reaction. Change the pH values for test tubes 1-5 to those given below:

Test Tube 1 = pH 3

Test Tube 2 = pH 5

Test Tube 3 = pH 7

Test Tube 4 = pH 9

Test Tube 5 = pH 11

**In this experiment, we will keep the amount of substrate constant. Use an intermediate value (2.0 grams of substrate) for each test tube.**

9) Why are we keeping the substrate constant for this trial?

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10) State a hypothesis for this trial in “If… then…because” format.

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11) Click on the computer screen to see the results of the experiment. Create a data table below to record your results

**12) Create an excel graph of your data**

13) Discuss the results from this trial in the space below. Do the results support or refute your hypothesis? Support with data.

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14) What does your data indicate about the optimum pH level for this enzyme catalyzed reaction?

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15) What happens to enzyme structure when there is a drastic change in pH or temperature?

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16) 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.

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