Names: _____ Class: _____ Date: _____

Biology
Mr. Croft

Investigating Enzymatic Reaction Rates

Part I: The Effect of Temperature on Enzymatic Reaction Rates

Construct a line graph from the following data:

Temperature (°C)	Reaction Rate (%)		
	Chymotrypsin	Carbonic Anhydrase	Lysozyme
0	0	17	12
20	0	48	40
40	1	17	98
60	5	0	35
80	13	0	0
100	33	0	0

1. What can you conclude about the affect of temperature on Lysozyme's activity?

2. Which enzyme has the greatest activity at the highest temperature? Which enzyme is the most active at the lowest temperature?

3. What is the optimal temperature for each enzyme?

4. What is occurring to Lysozyme between 40-80 °C?

5. Calculate the increase in the reaction rate/°C of:
   a. Chymotrypsin between 80-100 °C

   b. Carbonic anhydrase between 0-20 °C

   c. Lysozyme between 20-40 °C

6. Thermal geological features, such as the geysers and hot pools of Yellowstone National Park, are often brilliantly colored by bacteria that live in the water.
   a. What special trait must the enzymes of these bacteria have?

   b. What can you infer about the conditions of different colored pools?

Part II: The Effect of pH on Enzymatic Reaction Rates

Construct a line graph from the following data:

pH	Reaction Rate (%)		
	Chymotrypsin	Carbonic Anhydrase	Lysozyme
3	0	45	30
4	0	91	84
5	1	100	100
6	13	91	84
7	69	45	30
8	93	8	4
9	28	1	0

7. Which enzyme displays the greatest activity at highest pH? Which enzyme was most active at the lowest pH?

8. What is the optimal pH for each enzyme?

9. What is occurring to Lysozyme between pH 5 and pH 9?

10. Carbonic anhydrase, which is found in red blood cells, helps to regulate the transporting and expelling of carbon dioxide. Respiration produces carbon dioxide and tends to lower the body's pH. Why is it important for carbonic anhydrase to have the optimal pH that it does?