Date: Period:

Enzyme Lab

Introduction: Hydrogen peroxide (H_2O_2) is a waste product that is formed by cells during metabolic reactions. Because hydrogen peroxide is poisonous, cells must break it down or they will die. The enzyme that breaks hydrogen peroxide into water and oxygen is called **catalase**.

Hydrogen Peroxide (H_2O_2) $\xrightarrow{\text{catalase}}$ Water (H_2O) + Oxygen (O_2)

This enzyme is found in many organisms including the livers of animals and in yeast.

Purpose: To determine how pH, concentration, and temperature affect catalase's ability to break down hydrogen peroxide.

Hypothesis: Write a hypothesis for EACH of the variables listed in the purpose.

Procedure: You will be visiting 3 stations (concentration, pH, and temperature). The materials and procedures will be at each station. Follow the procedures for each and record all data in the tables below.

Table 1. The effects of pH on the catalase enzyme.

	Time (seconds)				
pН	Trial 1	Trial 2	Trial 3	Average of 3 trials	
2	52 sec	50 sec	20 sec		
7	13 sec	30 sec	30 sec		
14	Did not rise	Did not rise	Did not rise		
Just Water	Did not rise				

Table 2. The effects of concentration on the catalase enyzyme.
Time (seconds)

	lime (seconds)				
Concentration	Trial 1	Trial 2	Trial 3	Average of 3 trials	
$25\% H_2O_2$	Did not rise	40 sec	24 sec		
50% H ₂ O ₂	64 sec	73 sec	9 sec		
100% H ₂ O ₂	25 sec	33 sec	8 sec		
Just Water	Did not rise				

Table 3. The effect of temperature on the catalase enzyme.

	Time (seconds)				
Temperature	Trial 1	Trial 2	Trial 3	Average of 3 trials	
Ice	15 sec	6 sec	10 sec		
Room Temperature	10 sec	30 sec	31 sec		
Hot	3 sec	4 sec	3 sec		
Just Water	Did not rise				

WLHS/Biology

Conclusion:

- 1. Draw a graph for EACH table. To do this you need to answer the following questions for EACH variable:
 - a. What is the dependent variable (what is measured)? What axis will it go on?
 - b. What are the independent variables? What was controlled? What axis will it go on?
 - c. Are the graphs going to be line or bar graphs?
- 2. Which pH is best for catalase enzyme activity? How do you know?
- 3. Which H_2O_2 concentration is best for catalase enzyme activity? How do you know?
- 4. Which temperature is best for catalase enzyme activity? How do you know?
- 5. Why does the enzyme not work as well in the other pHs, concentrations, and temperatures?
- 6. Why was H_2O used as a control?
- 7. Where did the catalase come from?