Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block \_\_\_\_\_\_\_\_\_

***Catalase Lab***

**Introduction:**

Hydrogen peroxide (H2O2) is produced as a byproduct of metabolism in most living things. Hydrogen peroxide is poisonous to the cells that produce it, so cells need a way to get rid of it. Catalase is an enzyme produced by the cells of most living things to break down hydrogen peroxide into two harmless substances, water and oxygen. See the reaction below:



 Catalase

2H2O2 2H20 + O2

In this lab you will be testing how changing temperature and pH affects the ability of catalase to break down hydrogen peroxide. You will be using **liver** as your source of **catalase.**

**Research Questions:** How does changing temperature affect the functioning of an enzyme?

 How does changing pH affect the functioning of an enzyme?

**Materials:**

4 Test tubes, 4 pieces of cut up liver, 1M HCL, 24 ml of H2O2, Hot water bath, Safety Goggles

**Procedure:**

1. Goggles must be worn at all times for this lab.
2. Label your test tubes, 1 (distilled water), 2 (peroxide), 3 (Boiled), and 4 (HCl).
3. Add 1 piece of liver to each test tube.
4. Add 6 ml of distilled water to test tube 1. Observe and record data.
5. Add 6 ml of peroxide to test tube 2. Observe and record data.
	1. Save test tube #2 and come to my desk before all the bubble go away. Splint test- test for Oxygen.
6. Add 6 ml of distilled water to test tube 3 and place it into a hot water bath for 10 minutes.
7. While you are waiting for the liver to boil, complete the procedure for test tube 4.
8. Being careful not to spill, add 10 drops of HCl (a very corrosive acid) to test tube 4.
9. After adding the acid, add 6 ml of peroxide. Observe and record data.
10. After the liver in test tube 3 has boiled for 10 minutes, remove it from heat. Carefully dump the distilled water into the sink, without dumping out the liver.
11. Add 6 ml of peroxide to test tube 3, and observe the number of bubbles produced for 30 seconds. Record the data in the data table.

**Clean up:** Dump the liquids into the sink, but please place the liver pieces into the garbage. Wash the test tubes out with soap and water.

**Data Table:**

For each test tube, place a check mark in the box for the amount of bubbling you observed.

**Table 1:** Observations of the Catalase Reactions using liver

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test tube #** | **Vigorous Bubbling** | **Moderate Bubbling** | **Little Bubbling** | **No Bubbles Produced** |
| **1.(distilled water & liver)** |  |  |  |  |
| **2. (peroxide& liver)** |  |  |  |  |
| **3.(Peroxide and boiled liver)** |  |  |  |  |
| **4. ( Peroxide, HCl, & liver)** |  |  |  |  |

**Data Analysis:**

1. What did you observe in your experiment that showed the catalase was working?

2. Why did the test tube with distilled water produce no bubbles? What conclusion would you draw if it had produced bubbles?

3. Which of the four test tubes produced the most bubbles? Why do you think this was?

4. Which of the four test tubes (besides distilled water) produced the least bubbles? What was different about these test tubes?

5. How did boiling, or adding acid to liver affect the ability of catalase to breakdown peroxide?

6. What gas is being released in the reaction with catalase and peroxide? How do you know?

**Conclusion:**

1. Restate the hypotheses made for this experiment (rephrase them, don’t cut and paste them)
2. State whether the data supported or did not support the hypotheses for this experiment (make a statement for each hypothesis, since there were two). Cite data in these statements to support the claim you are making (…according to the data test tube #2 bubbled much more vigorously than the other three…)
3. Identify, and explain three things that happened when you were doing your lab that affected your data, and explain how these affected the data.
4. Explain how you would eliminate the sources of error you identified above.