

## **Sample Lab Report: Factors which Affect the Activity of the Enzyme Catalase**

### **Purpose:**

#### **Must include:**

- **background information about concepts involved in the lab,**
- **statement of purpose of the lab**
- **identification of independent and dependent variables.**

**A hypothesis is often not necessary or appropriate.**

Enzymes are proteins that speed up chemical reactions in cells. They break down molecules called substrates. Each enzyme has only one substrate that it breaks down. Enzymes are produced in the cells of the body and affect the rate of almost all the chemical reactions which take place in living organisms. The rate of enzyme activity is influenced by temperature, pH, and the presence of inhibitors.

Catalase is an enzyme which is produced by every cell to break down hydrogen peroxide. Hydrogen peroxide is a waste product of cellular activity that is poisonous to cells. Catalase speeds up the decomposition of hydrogen peroxide into harmless water and oxygen gas.

The purpose of this lab was to determine whether an inhibitor affects the rate of activity for the enzyme catalase. Since catalase speeds up the production of oxygen gas, the rate of enzyme activity can be measured as the height of the column of oxygen gas bubbles produced in a test tube. If copper sulfate inhibits the action of catalase, then it will slow down the reaction between the catalase enzyme in chicken liver and hydrogen peroxide. The independent variable in this lab is the addition of copper sulfate to one test tube and the dependent variable is the amount of oxygen gas produced (measured as the height of gas bubbles).

### **Procedure:**

#### **Must include:**

- **Step by step procedure**
- **Procedure for setting up a control**
- **Identification of the control**

1. Take 2 disposable test tubes and mark them both 1.5 cm from the bottom.
2. Label the tubes respectively with the numbers 1 and 2.
3. Fill both tubes with hydrogen peroxide up to the mark.
4. Add 10 drops of water to test tube 1. (This will serve as the control.)
4. Add 10 drops of copper sulfate to tube 2.
5. Add small, equal-sized pieces of liver to each tube.
6. After 1 minute, record the height of the oxygen bubbles in each tube.

**Results:****Must include:**

- **Data table with title**
- **Units for any quantitative data**
- **Graph with title for data if appropriate**
- **Description of qualitative data**

**Results depicted in data table do NOT need to be restated in sentences.**

**A Comparison of the Activity of Catalase With and Without Copper Sulfate**

|                                 | <b>Tube 1 (control)</b> | <b>Tube 2 (Copper sulfate added)</b> |
|---------------------------------|-------------------------|--------------------------------------|
| <b>Height of oxygen bubbles</b> | 5 cm                    | 1 cm                                 |

The data indicated that more oxygen was present in the control tube. The tube with copper sulfate had many fewer oxygen gas bubbles.

**Conclusion/Discussion:****Must Include:**

- **Relationship of results to initial purpose of the lab**
- **Conclusions which can be drawn from the lab**
- **Discussion of validity of results (how could lab procedure be improved?)**

**Must be written in the third person (do not use the words “I,” “we,” “our,” etc.)**

The results indicate that copper sulfate does inhibit catalase activity. The tube that contained hydrogen peroxide, liver, and water without the presence of the inhibitor (copper sulfate) produced 5 cm of oxygen gas bubbles after one minute. The second tube (which contained hydrogen peroxide, liver, and the inhibitor) only formed 1 cm of bubbles after one minute. Since there were fewer bubbles in tube 2, the hydrogen peroxide was broken down more slowly when the inhibitor was used. This indicates that the use of an inhibitor slows down enzyme activity and therefore slows the rate of decomposition of hydrogen peroxide.

The validity of the results in this lab could be improved by conducting more trials of the experiment. Typically, in order to form a conclusion from a lab, an experimenter needs to average the results of at least three trials. It would also be important to ensure that the temperature of the two tubes is identical since temperature also affects enzyme activity. When this lab was completed, the size of the liver pieces was similar, but not exactly the same. If the pieces of liver were weighed and the same mass was used in each tube, that would ensure the concentration of catalase was the same in experimental and control tubes.