

# Hot Liver Lab

**Background:** Chemical changes differ from physical changes in many ways. However, one difference is that *energy is often given off during a chemical change*. Chemical changes could be sped up by the use of a catalyst. Enzymes are biological catalysts that speed up chemical reactions. The energy that is given off in a chemical reaction may be in different forms, but one form that is easily measured is heat.

Living organisms contain an enzyme called catalase. The purpose of the enzyme is to chemically change peroxides, which are toxic, into oxygen and water, which are non-toxic. Peroxides are produced as by-products of fatty acid metabolism.

In this lab you will witness an enzyme in action. At the same time you will measure the heat produced by the chemical reaction that is taking place.

**Pre Lab Questions:**

1. In this experiment, what is the role of the enzyme specifically? Where is the enzyme found?
2. What evidence will you witness that a chemical change has occurred?
3. What will happen to the hydrogen peroxide in this experiment?

**Procedure:**

1. -Add 5 ml of hydrogen peroxide ( $H_2O_2$ ) to a clean test tube.
2. -Take the initial temperature of the  $H_2O_2$  using a Celsius scale thermometer, before adding the liver.
3. Record the initial temperature of the  $H_2O_2$  on the data table.
4. -Carefully remove the thermometer from the test tube.
5. Add a piece of liver to the test tube. If the liver sticks to the side of the test tube, use a pencil to push it down into the liquid.
6. -Replace the thermometer and begin to record the temperature of the liver and hydrogen peroxide every half-minute for six minutes.
7. -Repeat the experiment a second time. Use new hydrogen peroxide and a new piece of liver, and a clean test tube for each trial.
8. -Average each column and make a line graph. (Hint: You will graph temperature vs. time)

**Data:**

Temperature after adding liver													
Time (min)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Trial 1 Temp.(°C)													
Trial 2 Temp.(°C)													
Total Temp.(°C)													
Avg. Temp.(°C)													

**Post Lab Questions:** (Answer in complete sentences)

1. Create a line graph using your "graphing rules".
2. Is there any evidence that energy was being released when the liver was added to the hydrogen peroxide? Explain.
3. Does the evidence indicate that a physical or a chemical change has taken place? Explain.
4. What was the highest temperature change recorded in you experiment?
5. At what time was the highest temperature change taking place?
6. Are the changes in temperature for each half-minute exactly the same during each trial? Why or why not?
7. During the experiment, what was hydrogen peroxide converted into? What did you witness during the experiment to show that oxygen was given off? Explain.
8. What caused the reaction that you witnessed in this lab?

\*CLASS SET\*