

Enzyme Lab: Catalase (A.K.A. "The Liver Lab")



Identify the Problem: How do cells use enzymes to break down poisonous substances in the body?

Background Information (use to answer questions below):

- Hydrogen Peroxide is a clear, odorless liquid that is created during reactions in the cells of the human body. It must be broken down to prevent damage to cell tissue. Hydrogen Peroxide will damage your cells if it is not decomposed.
- Enzyme: A chemical that speeds up the rate of reactions. There are many different types of enzymes in the body. Enzymes are not used up during reactions; one enzyme can be used over and over again.

Example) an enzyme in the body called catalase is responsible for breaking down hydrogen peroxide into water and oxygen. Catalase is found in many cells in the body, including the cells of the liver.

Catalase separates hydrogen peroxide into two substances: water and oxygen.

- Oxygen: a colorless, odorless, gas. It is an oxidizer, which means that it supports combustion or "feeds the fire".

1. Why must hydrogen peroxide be broken down?

2. What is catalase and what does it do?

3. Where can catalase be found in the body? _____

4. What is hydrogen peroxide broken down into?

5. What is significant about oxygen?

Materials: Goggles, 150 ml beaker, beef or chicken liver, graduated cylinder, 20 ml of hydrogen peroxide (3% solution), test tube, candle, splint (wooden coffee stirrers), matches, tray.

Procedure:

1. Spread your materials out on the table. Place the small beaker on your tray or assigned workstation.
2. Place about 10 grams of liver into a test tube. Place the test tube in the beaker.
3. With goggles on, measure 20 ml of hydrogen peroxide and pour it into the test tube.
4. Carefully use a match to light the candle. Leave candle lit.
5. Hold a splint over the flame until the flame lights.
6. Blow out the splint and place it near the bubbles inside the test tube.

Observations:

1. What happened when the hydrogen peroxide was poured into the test tube? _____
2. What happened when you placed the splint near the bubbles in the test tube? _____

Is Catalase Reusable?

What do you think would happen if you added more hydrogen peroxide to the test tube?

After the bubbles have fizzled out, add another 3-5 ml of hydrogen peroxide.

Explain what happens: _____

Conclusions:

1. The chemical equation for this formula is $2 \text{H}_2\text{O}_2 \rightarrow 2 \text{H}_2\text{O} + \text{O}_2$. Write this out in English (as a sentence):

2. Looking at your background information, what do you think is contained in the bubbles that are formed? Explain your reasoning:

3. What two products are formed when hydrogen peroxide breaks down?

4. Why is catalase important in this reaction?

_____.
5. Is catalase reusable? Explain your reasoning: _____
_____.

