

Lab: Liver and Enzymes

Names _____

Period _____

Introduction

During cellular respiration toxic chemicals are often produced as a byproduct. If the cell did not break them down, then they would be poisoned and die. The liver has an enzyme called "Catalase" that breaks down some of these toxins and change them to oxygen and water, so it can be released from the cells. The enzyme in the liver remains intact and active for several days if you keep the liver refrigerated. Enzymes like Catalase allow chemical reactions in our cells to take place at a lower energy level than they would otherwise. However, like all chemical reactions, some heat is given off. We will measure the activity of a liver enzyme, "catalase", as it breaks different chemicals down into oxygen and water, by measuring the temperature of the solution.

Goal

I can explain how enzymes break molecules apart during digestion and cellular respiration, and how the resulting atoms make carbohydrates, proteins, fats, and nucleic acids.

Materials

Thermometer, clock with second hand, graduated cylinder, hydrogen peroxide (3%), ammonia, 1 cm chunks of raw beef liver, 2 test tubes, test tube rack, tweezers, eyedropper or syringe, two different colored pencils or markers

Procedure

Part A

1. Write in your lab book a prediction on what you think will happen when you add liver to hydrogen peroxide.
2. Add 5mL of hydrogen peroxide (H_2O_2) to a test tube.
3. Let the thermometer sit in H_2O_2 to find the starting temperature (record starting temp at 0 min).
4. Remove the thermometer just long enough to add a small piece of liver to the test tube and return the thermometer to the solution quickly.
5. Start timing the reaction immediately.
6. Record the temperature, without removing the thermometer from the test tube, every 30 seconds.
7. Record the data on the data table.

Part B

1. Write in your lab book a prediction on what you think will happen when you add liver to hydrogen peroxide.
2. Add 5mL of ammonia to the second test tube.
3. Let the thermometer sit in the second solution to find the starting temperature (record starting temp at 0 min).
4. Remove the thermometer just long enough to add a small piece of liver to the test tube and return the thermometer to the solution quickly.
5. Start timing the reaction immediately.
6. Record the temperature, without removing the thermometer from the test tube, every 30 seconds.
7. Record the data on the data table.

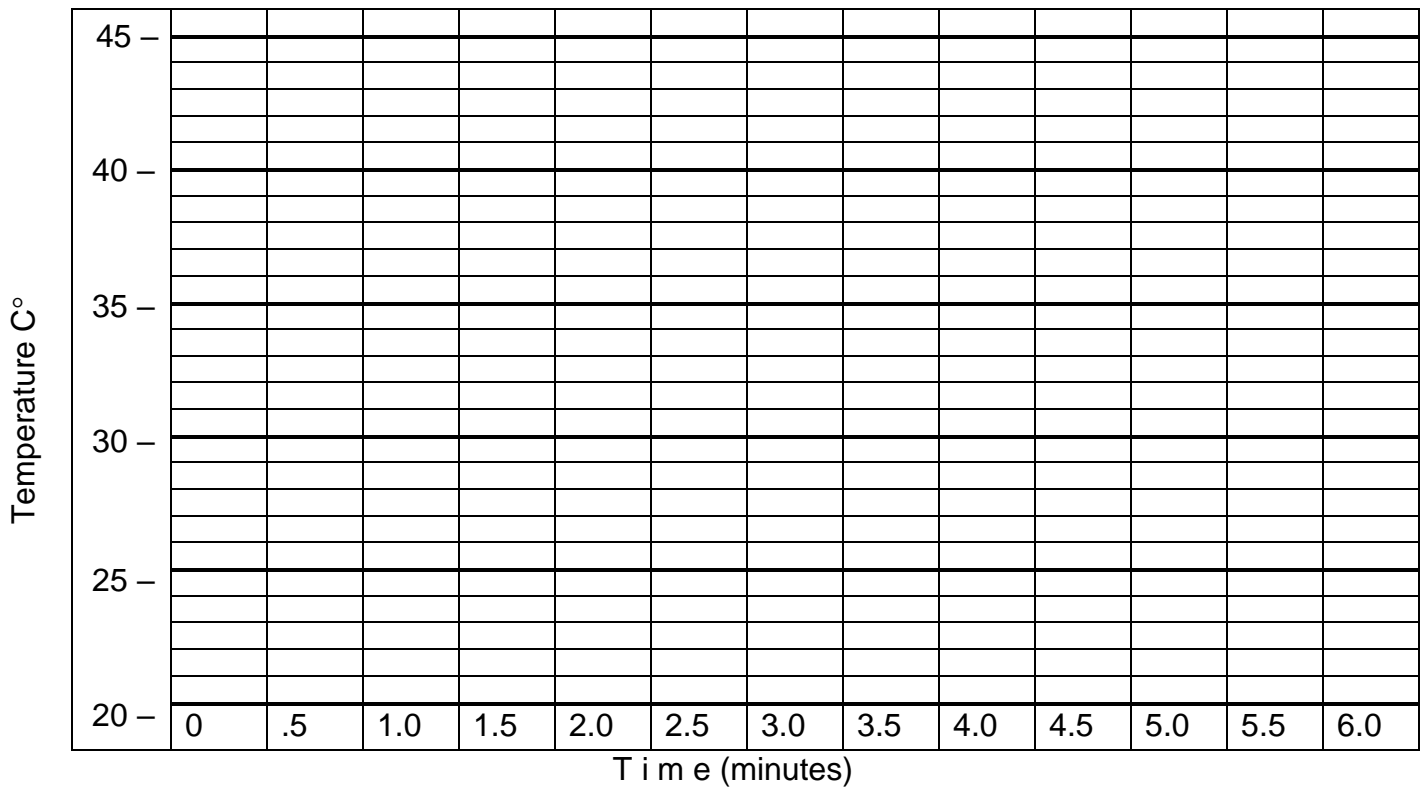
Data

Part A: Hydrogen Peroxide

	Temperature (in C) After Adding Liver											
Trial	Minutes											
	0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	Highest temp
1												

Part B: Ammonia

	Temperature (in C) After Adding Liver											
Trial	Minutes											
	0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	Highest temp
1												



Key
Part A:
Part B:

Analysis

1. Which test tube had a chemical reaction take place? What evidence shows that a chemical reaction took place?
2. The formula for hydrogen peroxide is H_2O_2 . Write the formula for the chemical reaction in the test tube:
3. What part do the liver enzymes play in this reaction?
4. What evidence indicated that oxygen was given off?
5. Assuming the reaction is complete, what is the liquid in the test tube after the reaction?
6. Are enzymes reusable? How do you know?
6. Conclusion: