

Objective

To investigate the activity of catalase, an enzyme contained within peroxisomes, by observing its ability to break down hydrogen peroxide (H₂O₂)

Background

Peroxisomes are small, membrane-bound organelles found in virtually all eukaryotic cells. They are involved in various metabolic processes, including the breakdown of very long chain fatty acids through beta-oxidation. One of their key roles is in the detoxification of hydrogen peroxide, a byproduct of cellular metabolism, into water and oxygen. This reaction is catalyzed by the enzyme catalase, which is abundantly present in peroxisomes.

Materials

- ☐ Fresh potato (rich source of catalase)
- ☐ 3% Hydrogen peroxide solution
- ☐ Test tubes or small beakers
- ☐ Tweezers or forceps
- ☐ Knife or scalpel
- ☐ Cork Borer
- ☐ Graduated cylinder or pipette
- ☐ Stopwatch or timer
- ☐ Safety goggles and gloves

Procedure

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|--|---|
| Preparation of Materials: | 1. Clean and set up your workspace with all the materials listed above. |
| | 2. Label your test tubes or beakers for identification. |
| Preparation of Potato Samples: | 3. Wash the potato and dry it. |
| | 4. On the chopping board, use the cork borer, scalpel or knife to cut the potato into small, equal-sized pieces (approximately 1 cm ³). |
| Preparation of Hydrogen Peroxide Solutions: | 5. Using the graduated cylinder or pipette, measure and pour 10 ml of 3% hydrogen peroxide into each test tube or beaker. |

Procedure (cont)

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|-----------------------------------|---|
| Conducting the Experiment: | 6. Add a single piece of potato to the first test tube containing hydrogen peroxide. |
| | 7. As soon as the potato is added, start the stopwatch. |
| | 8. Observe the reaction between the potato and hydrogen peroxide for 1 minute. |
| | 9. Look for bubbling or fizzing, indicating the release of oxygen gas. |
| | 10. Record your observations in detail, focusing on the intensity and duration of the bubbling. |
| Repeat the Experiment: | 11. For accuracy and consistency, repeat the experiment with fresh hydrogen peroxide and a new potato piece in the remaining test tubes or beakers |
| Recording Data: | 12. In your lab notebook, create a table to record your observations for each test tube. Note the size of the potato piece, the amount of hydrogen peroxide used, the intensity of the reaction, and any other notable observations in observation table. |
| Clean up | Dispose of the potato pieces and hydrogen peroxide solution in the waste container. Clean and sterilize the test tubes, beakers, and other equipment used. |



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Observation Table

Test Tube	Amount of Hydrogen Peroxide (ml)	Size of Potato Piece (cm3)	Time Observed (S)	Initial reaction	Final Reaction	Notes / Additional Observations**
1	10	1	60	Rapid Bubbling	Slows Down	
2	10	2				
3	10	3				

Conclusion

This experiment should demonstrate the enzymatic activity of catalase present in potatoes, as evidenced by the breakdown of hydrogen peroxide into water and oxygen, observable through the production of bubbles. The intensity and duration of bubbling provide insights into the enzyme's activity under the given conditions.



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