

Names: _____

Class: _____

Date: _____
Biology - Mr. Croft

Enzyme Lab

50 Points

The compound hydrogen peroxide, H₂O₂, is a by-product of metabolic reactions in most living things. However, hydrogen peroxide is damaging to delicate molecules inside cells. As a result, nearly all organisms contain the enzyme peroxidase, which breaks down H₂O₂ as it is formed. Potatoes are one source of peroxidase. Peroxidase speeds up the breakdown of hydrogen peroxide into water and gaseous oxygen. This reaction can be detected by observing the oxygen bubbles generated.

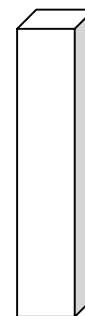


I. Problem: What is the effect of temperature and pH on the rate of enzyme reaction rates?

II. Hypothesis:

III. Materials:

- | | | |
|----------------------|-------------------|------------------|
| 1. Potatoes | 6. Test Tubes | 11. Vinegar |
| 2. Hydrogen Peroxide | 7. Test Tube Rack | 12. Drain Opener |
| 3. Kitchen Knife | 8. Hot Plate | 13. Water |
| 4. Ruler | 9. Glove | 14. Ice |
| 5. Beakers | 10. Pipettes | 15. Dish Soap |



IV. Procedure:

1. Cut five pieces of potato - 1 cm X 1 cm X 4 cm (see picture). Be sure that each piece will fit into a test tube.
2. Place each potato into one of the five solutions (cold, warm, control, acid, base) on the front lab bench.
3. Pull out potatoes after 10 minutes and place on paper towel.
4. Place potatoes into test tubes.
5. Add 1 mL of the H₂O₂/soap mixture to Tube #1.
6. Invert tube once with gloved hand.
7. Immediately measure the height of the bubbles with a metric ruler.
8. Repeat #5-7 for the remaining test tubes.

V. Results:

Temperature	Amount of Bubbles (cm)	pH	Amount of Bubbles (cm)
Ice Water		Acid (Vinegar)	
Room Temperature		Neutral (Water)	
Warm Water		Base (Drain Opener)	

Construct a bar graph of the data from the lab.

VI. Conclusion (Summary of Experiment, Analysis of Data, Discussion of Error)

VII. Questions (Explain **all** answers):

1. How might freezing food affect the enzyme activity of organisms that cause food to decay?
2. Explain why enzymes are needed to control chemical reactions in cells.
3. What factors did you need to control in your tests (controlled variables)?
4. If you've ever used hydrogen peroxide as an antiseptic to treat a cut or scrape, you know that it foams as soon as it touches an open wound. How can you account for this observation?
5. Most enzymes in the human body work best at 37 °C. Imagine scientists have discovered an enzyme in the body that works best at 39 °C. What processes or functions might this enzyme be involved in?
6. The enzyme involved in controlling the synthesis of the dark pigment in Siamese cats is very sensitive to temperature. Explain why the ears, nose, paws, and tip of the tail of Siamese cats are black.