24. Mysterious Catalase

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Problem

• An enzyme called catalase influences on the rate of decomposition of hydrogen peroxide. Make tests to identify catalase-positive and catalase-negative organisms and materials.
outline

• Theory
  - enzymes
  - catalysts

• Testing
• conclusions
Catalase

• Catalase is a common enzyme found in nearly all living organisms exposed to oxygen. It catalyzes the decomposition of hydrogen peroxide to water and oxygen.
Enzymes

• Enzymes are biological catalysts
Catalysts

• $H_2O_2 + \text{catalase} = H_2 + O_2$

• This reaction is catabolic
Hydrogen Peroxide → reactant

Catalase → enzyme

H₂ → O₂

Catalase
Ways of measuring oxygen

• Dishwashing liquid (measuring the height of the bubbles)
• Balloon (measuring how much it expands)
• Watching for bubbles
Testing

• Measure out 1cm of material pulp in to the bottom of a test tube
• Measure out 5mL of Hydrogen Peroxide into a syringe
• Add the hydrogen peroxide into the test tube
• Quickly place a finger of a latex glove over the top of the test tube and seal with tape
• Wait for 5 minutes and record how much the balloon inflates
• Compare results between materials
Materials used:

- Apple
- Onion
- potato
Denature

What causes enzymes to denature?

• High temperature
• High or low pH
High temperature
## Conclusion

<table>
<thead>
<tr>
<th>Material</th>
<th>Oxygen produced?</th>
<th>Catalase positive?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cooked potato</td>
<td>no</td>
<td>Denatured catalase so no</td>
</tr>
<tr>
<td>apples</td>
<td>Verry little</td>
<td>Very little</td>
</tr>
<tr>
<td>Onion</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>