

Catalytic Action of Enzymes in Living Materials

Introduction:

- Living cells have a remarkable capacity to perform chemical reactions rapidly and under mild conditions, which under the same conditions would proceed extremely slowly outside the organism.
 - ↳ Ex: sugar exposed to oxygen burns and gives off CO₂, H₂O and heat
 - ↳ This reaction can proceed at room temperature, but it does so at an extremely low rate
 - ↳ However, in your body, this reaction yields the same products and exactly the same amount of energy as if a flame was present (and body temperature is only a few degrees warmer than room temperature).
- All known enzymes are proteins and are referred to as organic catalysts (biocatalysts) that greatly accelerate chemical reactions without themselves being used up in the process.
 - ↳ They do take part in the chemical reaction by combining with the reactant, the substrate, but at the termination of the reaction the enzyme is free to be used again.



Activity:

- The purpose of this activity is to observe the action of enzymes in living tissue and to prepare an enzyme extract for future use.
- In particular, we will be looking at the action of catalase on hydrogen peroxide.
 - ↳ Hydrogen peroxide (H₂O₂) is a highly active chemical that is formed naturally in living organisms and must be removed or broken down in order to prevent destruction of the cell.
 - ↳ Catalase reacts with hydrogen peroxide by breaking it down into harmless water and oxygen:



Procedure:

- 1) Fill three test tubes with approximately 5cm of H₂O₂
- 2) Fill the test tubes according to the following list:
 - a) Test tube 1: An uncooked piece of potato
 - b) Test tube 2: An uncooked ground potato mass
 - c) Test tube 3: A boiled piece of potato
- 3) Record all observations for 7 – 10 minutes, or until the activity in the tube is finished. Clean the test tubes.

Questions:

- 1) How does grinding the living material affect the catalase activity? How can this be explained?

- 2) What effect does boiling the material have on the catalase activity? How can this be explained?

Name: _____

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Date: _____

Observations:

Test Tube 1:

Test Tube 2:

Test Tube 3: