# How do temperature and shape change the work of an enzyme?

Name _____ Date _____

## MATERIALS

*You supply everything. Tick each item as you gather it.*

- ☐ Fresh 3 percent hydrogen peroxide from a drugstore, about 400 mL
- ☐ A raw potato (it holds the enzyme catalase)
- ☐ 4 tall narrow glasses, a ruler in millimeters, and a timer
- ☐ A pot of hot water and a bowl of ice water
- ☐ A fork for crushing and a knife for cutting (an adult may cut)
- ☐ Safety glasses or sunglasses

## SAFETY

Wear eye protection. Hydrogen peroxide at 3 percent is a mild irritant. If it gets on your skin or in your eyes, rinse with water. Do not drink it. Use only 3 percent, never stronger. An adult should handle the boiling water. Work on a tray that can catch foam.

## PROCEDURE

1. Cut four 1 cm cubes of raw potato. Leave one at room temperature. Put one in ice water for 10 minutes. Boil one for 5 minutes, then let it cool for 10 minutes. Crush one thoroughly with a fork.
2. Pour 50 mL of hydrogen peroxide into a glass. Drop in the room-temperature cube and start the timer.
3. After 60 seconds, measure the height of the foam above the liquid in millimeters.
4. Rinse the glass. Repeat with the chilled cube, the boiled cube and the crushed potato, using fresh peroxide each time. Make 3 trials of each condition, with new cubes.
5. Compute the mean foam height for each condition.

## RECORD YOUR DATA

| Condition | Trial 1 (mm) | Trial 2 (mm) | Trial 3 (mm) | Mean (mm) |
|---|---|---|---|---|
| Raw, room temperature | | | | |
| Raw, chilled | | | | |
| Boiled, cooled | | | | |
| Raw, crushed | | | | |

## LAB REPORT

Write a report that states what you expected for each condition before you started, gives your table, shows how you computed one mean, and explains each result using what you know about enzymes. Your explanation must say what happens to the shape of an enzyme when it is boiled and why that stops it from working.

*Report the numbers you actually got, even when they disagree with the lesson. Write on the lines, or type your report on the website and send it to a teacher there.*

**Question and hypothesis** *State the question in your own words, what you expect to happen, and why you expect it.*

**Method** *What you changed, what you measured, what you kept the same, and how many trials you ran.*

**Observations** *Describe what you saw, including anything unexpected. Your data tables are added to the report automatically.*

**Calculations** *Show each calculation step by step, with units.*

**Claim and reasoning** *Answer the question using your numbers, then explain why, using the biology from the unit.*

**Limits and next step** *What could have affected your results, and one change you would make next time.*