



Try This!

1. Put 10-20 drops of hydrogen peroxide into a well. Drop in a piece of fresh fruit or vegetable. What happens?
2. Now try a cooked piece of the same fruit or vegetable. Does the hydrogen peroxide react the same way?
3. Try more kinds of fruits and vegetables. Do you notice any differences between the different kinds?



What's Going On?

The raw fruits and vegetables contain an enzyme called *catalase* that breaks up hydrogen peroxide into water and oxygen. This causes the bubbling you see when you put the piece of produce into the hydrogen peroxide. Some kinds of fruits and vegetables have more catalase than others:

- *High in catalase:* sweet potato, kiwi fruit, carrot, red pepper, mushroom, watermelon, pineapple, turnip
- *Low in catalase:* apples, grapes, zucchini

Cooking inactivates enzymes, so the cooked fruits and vegetables don't have active catalase. The chemical reaction that creates bubbles in the hydrogen peroxide doesn't happen.

Enzymes are complex proteins that act as catalysts to speed up reactions. Almost all living things contain catalase to break apart peroxides. Living systems can be damaged by unwanted reactions caused by peroxides, but catalase quickly turns peroxides into harmless water and oxygen.

Catalase is a complex protein, called an ***enzyme***, that acts as a catalyst.

A ***catalyst*** causes or speeds up a reaction without being affected.

Learning Objectives

- The enzyme catalase speeds the breakdown of hydrogen peroxide into water and oxygen.
- Cooking inactivates enzymes.
- Catalysts speed up reactions without being affected.

Materials

- 24-well plate
- Labeled dropping bottle with 3% hydrogen peroxide
- A variety of raw and cooked cut up fruits and vegetables (*Requires advance preparation; see below.*)
- Small cups to hold fruits and vegetables
- Knife and cutting board
- Microwave-safe containers and microwave OR pot, hotplate, and mesh strainer

Advance Preparation:

- 4 kinds of produce high in catalase: sweet potato, kiwi fruit, carrot, red pepper, mushroom, watermelon, pineapple, turnip
- Produce low in catalase: apples, grapes, zucchini

SAFETY: Be careful when boiling the water.

NOTE: All fruit and vegetables should be cut *just* before using.

1. Cut your fruits and vegetables into very small pieces. Make separate piles for each kind.
2. Divide each pile in two and cook half of the cut pieces of each kind separately.
 - Stovetop: Place in a strainer, and cook for a few seconds in boiling water (holding the strainer in the water).
 - Microwave: Place in a microwave-safe dish and cook for 30 seconds.
3. Put the pieces of cooked fruits and vegetables into cups (keeping each kind separate, and keeping the cooked and uncooked pieces separate).

Credits

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