

Keep Your Apples from Browning



Age
5-12



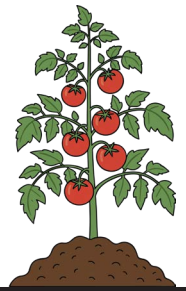
Time
1 hour



Difficulty
easy

About the Experiment

Apples are a tasty and nutritious treat. However, when sliced they can brown quickly, due to the breaking of the apple's cell wall and its exposure to air. This chemical exposure produces brown pigment in the flesh of the apple. The apple slices are still safe to eat, but not very appealing looking and could have an off taste. The good news is there are several natural preservatives that can be used to prevent or delay browning when apples are sliced. But which natural preservatives are most effective, and do any affect their taste? Well, let's find out!



What You Will Need

- Apple slices from four apples (any apple variety will work)
- Water (control)
- 1-2 cups of lemon juice, orange juice, green tea (cold or room temperature) and a vitamin C solution
- 5 clear cups
- Measuring cups
- Paper towels
- Timer



Let's Do This!

1. Fill each cup separately with 1-2 cups of tap water, lemon juice, orange juice, green tea, and a vitamin C solution.
2. Cut each apple into 4-6 slices (ask an adult for assistance with cutting).
3. Place 2-4 apple slices in each cup, making sure they are submerged into the liquids. Soak the slices for 2 minutes. Set aside 2-4 apple slices to see how they react to no solution.
4. Remove the apple slices from the liquids and place them on paper towels, keeping marks on which apples were in which solution. Do not dry them.



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Let's Do This! continued from previous page

5. Observe any browning of the apple slices at 0, 10, 20, 30, and 40 minutes.
6. Mark the results down on a spreadsheet showing the solution (row) and the timeframe (column).
7. You can use a browning scale of 1-5, with 1 being no browning at all, 2 a little browning, 3 some browning, 4 significant browning, and 5 completely brown.



Observations

1. At what time increment did you first start seeing browning on any apple slices? Which solution(s) were they in?
2. Which solution(s) offered the best protection against browning? Which offered the least?
3. Did any solution(s) provide complete protection against browning after 40 minutes?
4. Sample the apples with the least amount of browning. Did any taste different? Did any taste like the liquid they were soaked in?
5. What results surprised you the most, and why?
6. What does this experiment tell you about oxidation and preservation?
7. Do you think natural soaking methods like this are effective in keeping apple slices from browning and still tasting good?

To learn more about ARS's research on apples, click [here](#).

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