

What stops fruit from turning brown?

Grace Chrapkowski

Notre Dame School

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Acknowledgements:

I would like to thank my mom for getting all my Ingredients for my experiment.

Purpose and Hypothesis:

Purpose:

To see what stops apples from browning that are edible

Hypothesis:

I think that lemon juice will work the best because it is most well known for stopping the browning in apples but I think that some things might be just as good as a lemon.

Why do apple slices start to turn brown when exposed to air? Well This experiment will help people understand better. This experiment will also explain how to keep fruit fresh and non-brown by showing and explaining what kinds of fruit or other things help prevent that.

Why does fruit turn brown when exposed to air? The apple has an oxidation reaction which is formally called enzymic browning. Enzymic browning is enzyme phenolase found in cells of apples and when exposed to air which causes the reaction. Certain cells in the apple react to oxygen (polyphenol) which is why it turns brown and it also uses defense against ultraviolet radiation or aggression .Fruit turns brown so fast because of the level of PPO (polyphenol oxidase). The higher the level is, then the faster the fruit will turn brown. It is different for all kinds of apples because they all have different amounts of PPO.

Now what stops fruit from turning brown? The thing that stops fruit from browning is the chemical reaction between the PPO and citric acid in like lemons. People usually say that lemons work, but what else?

There are oranges, pineapples, tangerines, grapefruits, and cider vinegar.

Another question is,“Why does food that contains a lot of citric acid help prevent browning in fruits?” The higher the acidity the more it prohibits

the PPO which then creates a chemical reaction and which then stops the browning process.

## Materials:

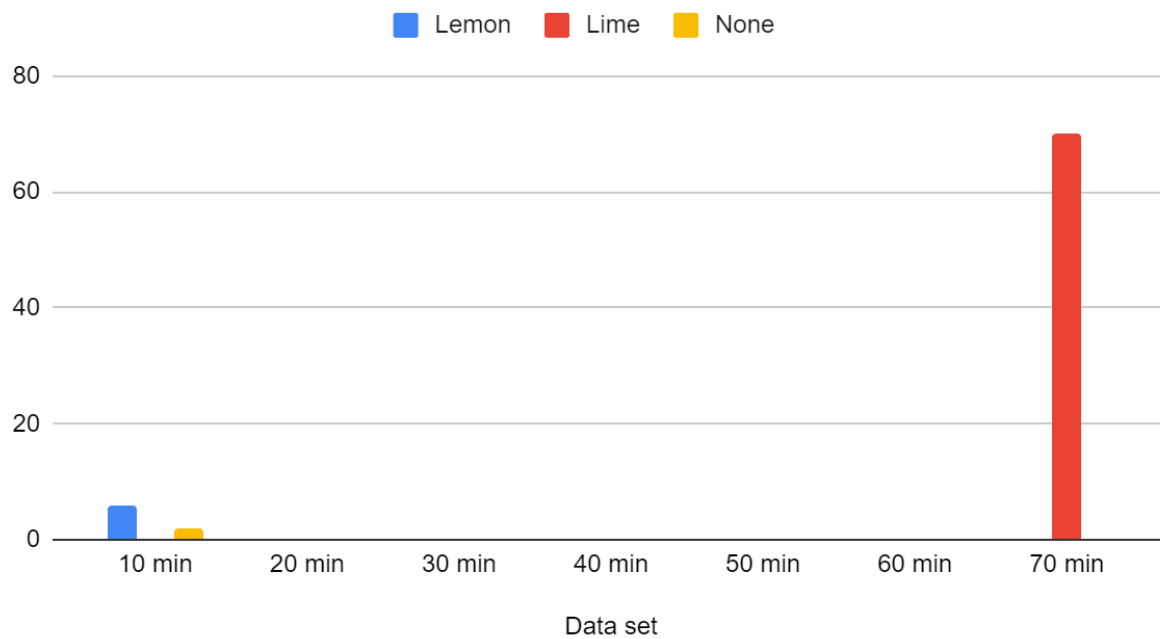
- 2 Lemons
- 2 Limes
- 10 apples
- 2 timers / stopwatch
- Knife

Procedure:

1. Get all of the materials (Listed on pg 5)
2. Cut lemons in half and squeeze juice in a small bowl - about  $\frac{1}{2}$  cup.
3. Then cut each apple into six pieces and place each apple in a small bowl.
4. Immediately sprinkle 1 tablespoon of lemon juice on five of the apples because once apples are cut the air immediately touches it and starts the browning process.
5. Set aside one apple with no juice on it as a control.
6. Then put the apples each in a ziploc bag and zip it shut.
7. Once you have them in a bag start your timer / stopwatch
8. Watch the bag with no lemon juice and stop the timer when you start to see brown on these apples and record the time of the control.
9. Then watch the bags with lemon juice and when that starts to turn brown stop your timer and record the time it took for each apple to start to brown.
10. Then once you have both the times compare them to see how long the lemon juice slows down the browning process



## Lemon, Lime and None



## Results:

Time until the browning process began:

1st Test:

- Nothing- took about 2 minutes until the browning process started
- Lemon- took about 6 minutes until the browning process started
- Lime- took about 15 min until the browning process started

2nd Test:

- Nothing- took about 5- 10 minutes until the browning process started
- Lemon- took about 10 minutes until the browning process started
- Lime- took about 70 minutes until the browning process started

3rd Test:

- Nothing- took about 5 minutes until the browning process started
- Lemon- took about 10 minutes until the browning process started
- Lime- took about 60 minutes until the browning process started

How much acidic juice I used:

- Lemon juice- I used about 2  $\frac{3}{4}$  teaspoons
- Lime juice- I used about  $\frac{1}{2}$  teaspoon

Taste:

- Nothing-  
Plain, Usual Taste
- Lemon juice-

Sweet, Tasty, Flavorful

- Lime-  
Very Sour / Sweet, Tarte

#### Conclusion:

In conclusion it turns out that Lemon juice and Lime juice work on stopping the browning process in apples. I thought that Lemon juice was the only thing that worked and kept it looking good for a while. Lime juice actually works better than Lemon juice. The Lime juice keeps the apples looking good for a very long time. Although the Lime juice works better it is very bitter and would fit someone who likes sour or very sweet tasting things.

## Works Cited:

Lohner, S. (2019, April 11). *Fruits Gone Bad? Discover Enzymatic Browning.*

scientificamerican.com.

Retrieved November 6, 2020, from <https://www.scientificamerican.com/article/fruits-gone-bad-discover-enzymatic-browning/>

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Matte, M. (n.d.). *Does Fruit Lose Nutrients in Oxidation?* livestrong.com. Retrieved November

5,

2020, from <https://www.livestrong.com/article/547675-does-fruit-lose-nutrients-in-oxidation/>

Springer Nature America, INC (Trans.). (2007, July 30). *Why do apple slices turn brown after being*

*cut?* scientificamerican.com. Retrieved November 10, 2020, from

<https://www.scientificamerican.com/article/experts-why-cut-apples-turn-brown/>

#:~:text=When%20an%20apple%20is%20cut,to%20brown%2Dcolored%20secondary%20products.

The home of BBC science focus magazine. (n.d.). *Why do apples turn brown so fast?*

sciencefocus.com.

Retrieved November 10, 2020, from [https://www.sciencefocus.com/nature/](https://www.sciencefocus.com/nature/why-do-apples-turn-brown-so-fast/)

[why-do-apples-turn-brown-so-fast/](https://www.sciencefocus.com/nature/why-do-apples-turn-brown-so-fast/)