

APPLES

'HOW TO PREVENT BROWNING OF APPLE SLICES'

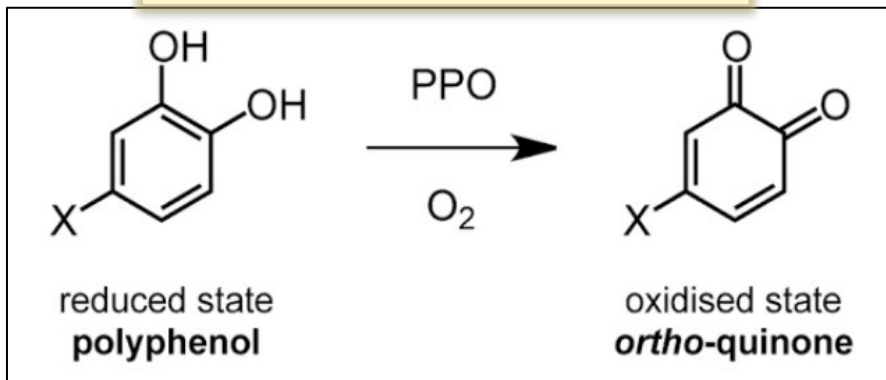
5TH IYNT 2017

INDONESIAN TEAM

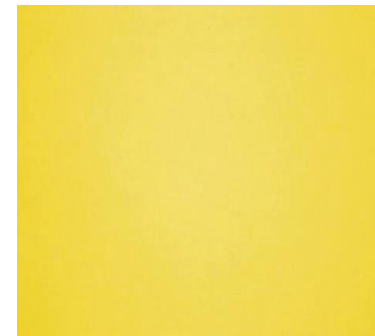
WHY DO APPLE SLICES TURN BROWN?

→ OXIDIZING = become **combined chemically** with oxygen

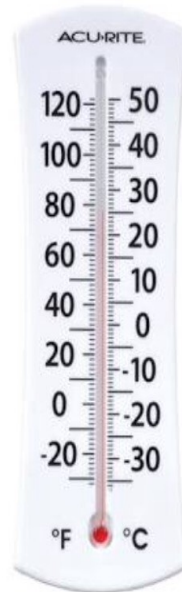
POLYPHENOL OXIDASE



(changes the phenols into different chemicals)



CAUSES TO FASTER OXIDATION



Types of



- **more or stronger Polyphenol oxidase in them.**

THE EXPERIMENT (1)

- Find out : Which liquid can mostly prevent apples from browning
- Materials :
 1. Apple
 2. Liquids
 3. Knife
 4. Plates
 5. Toothpicks
 6. Small containers

LIQUIDS

Isotonic drink

1



Carbonated drink / Soda

3



Lemon

2



4



Salt water



5



Sugar water

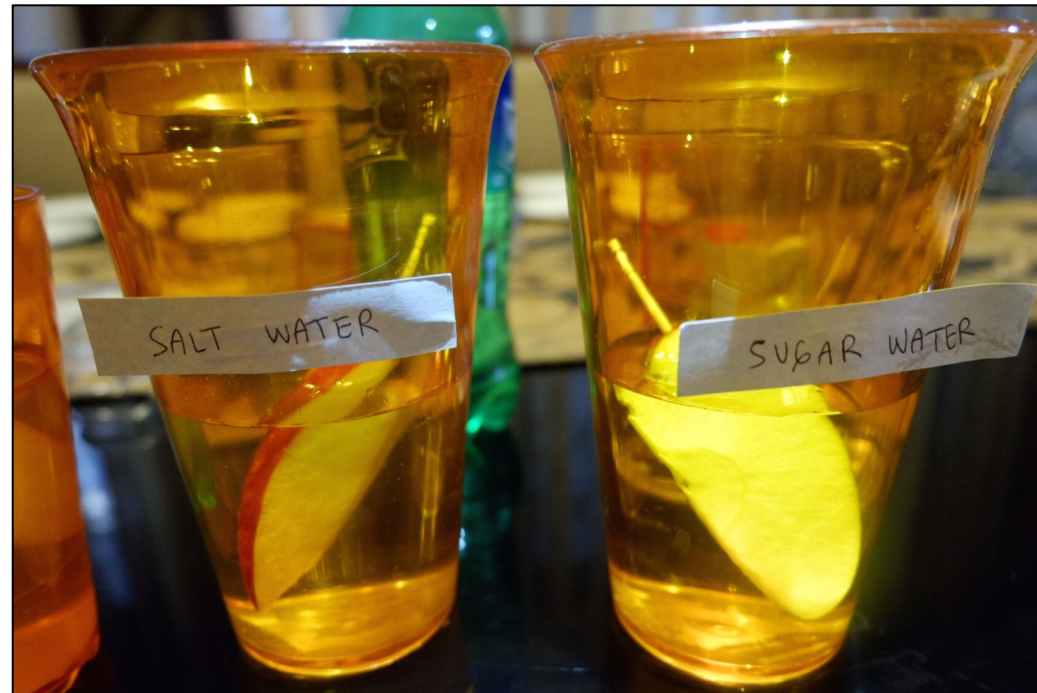


PROCEDURE

1. Slice the apple
2. Fill each container with the liquids
3. Stick a toothpick into each slices of apple
4. Soak the apple slices in the liquids for 1 minute
5. Take the apple slices out
6. Place it on the plates
7. Observe what happens to each slices of apple

Washington apple





NO SOLUTION

Browns

0 hour



2 hours



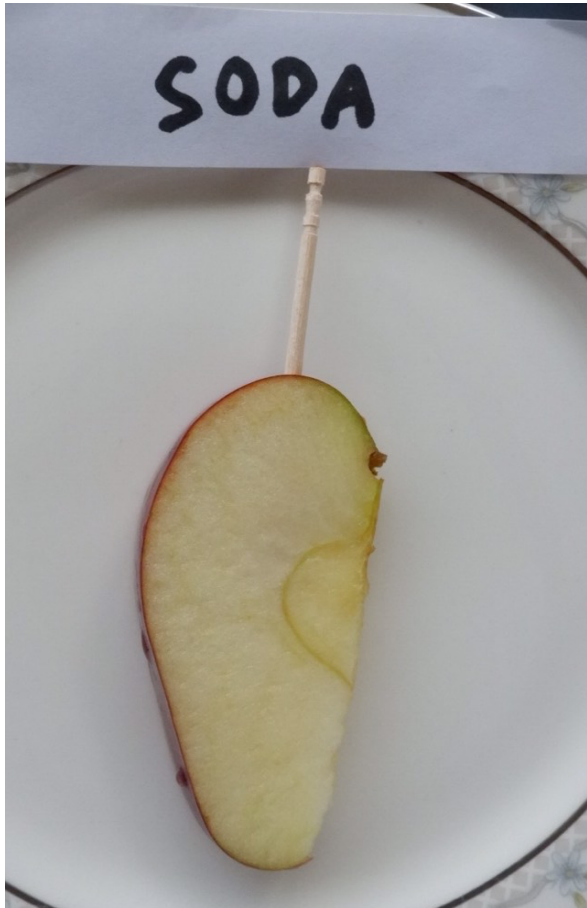
4 hours



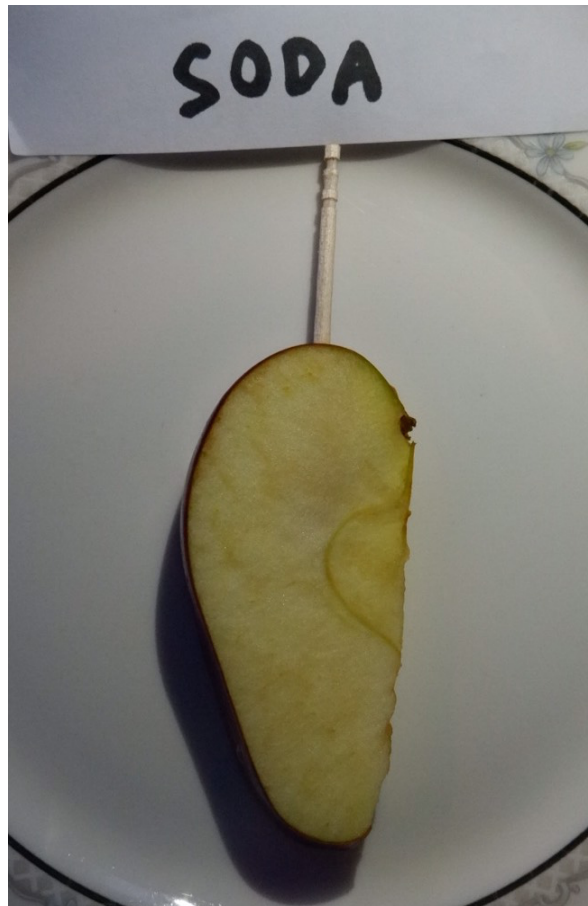
SODA

Slightly browning

0 hour



2 hours



4 hours



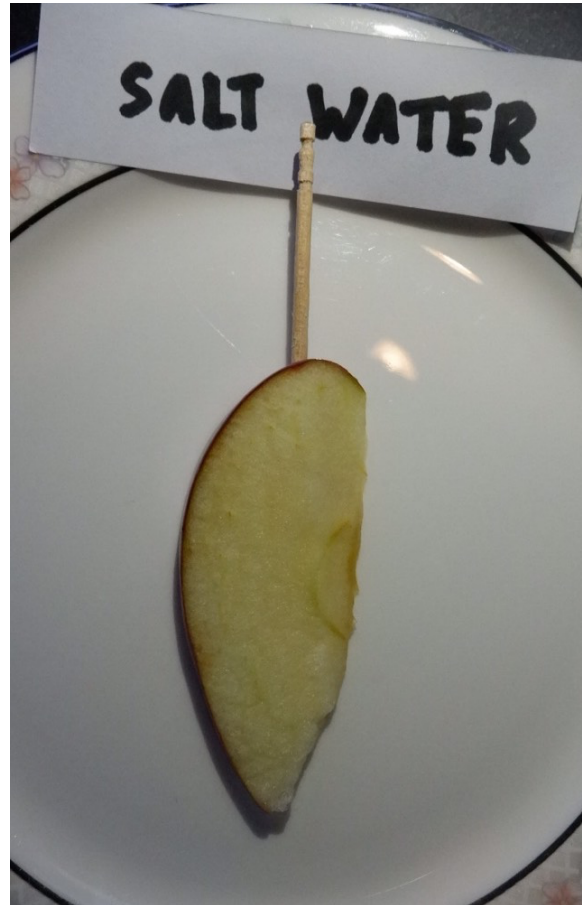
SALT WATER

Specs of browning

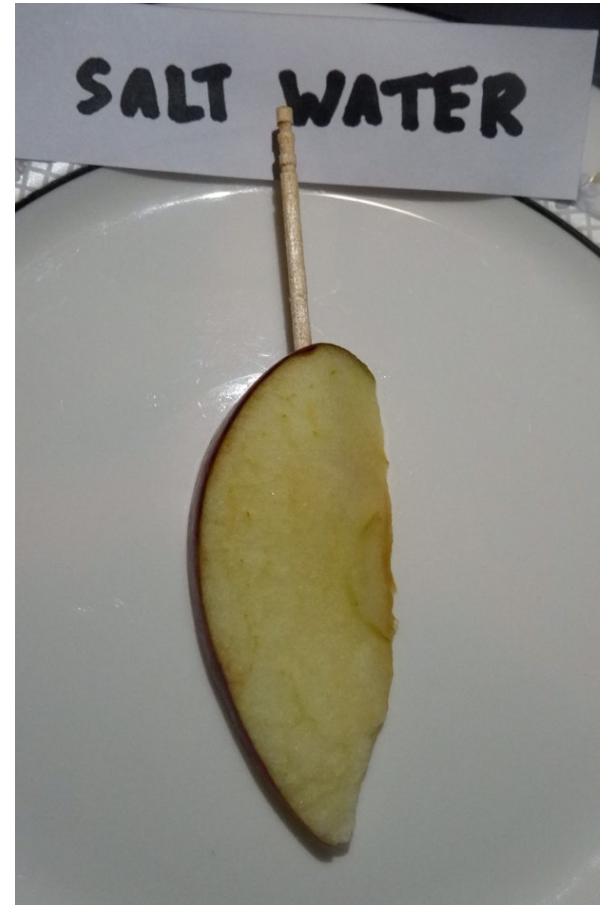
0 hour



2 hours



4 hours



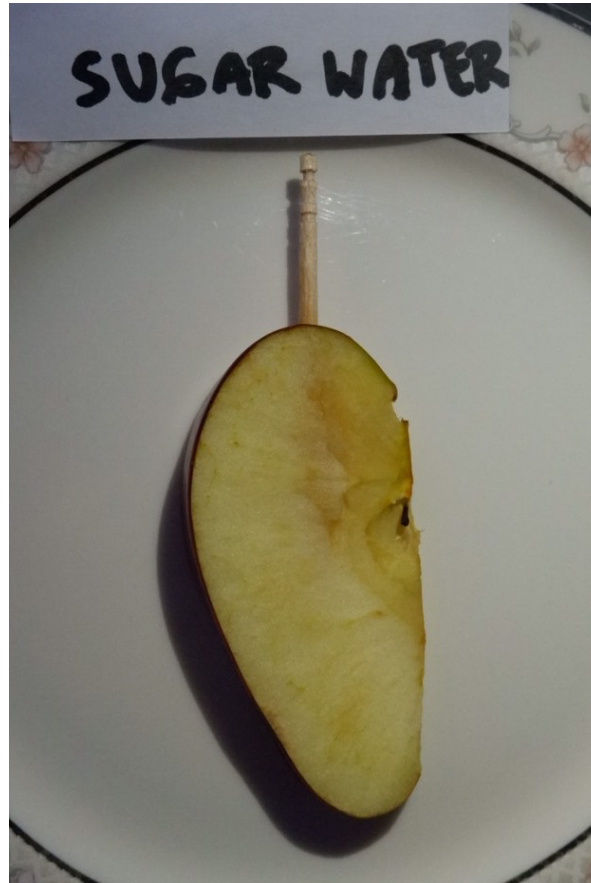
SUGAR WATER

Slightly browning

0 hour



2 hours



4 hours



LEMON

Specs of browning

0 hour



2 hours



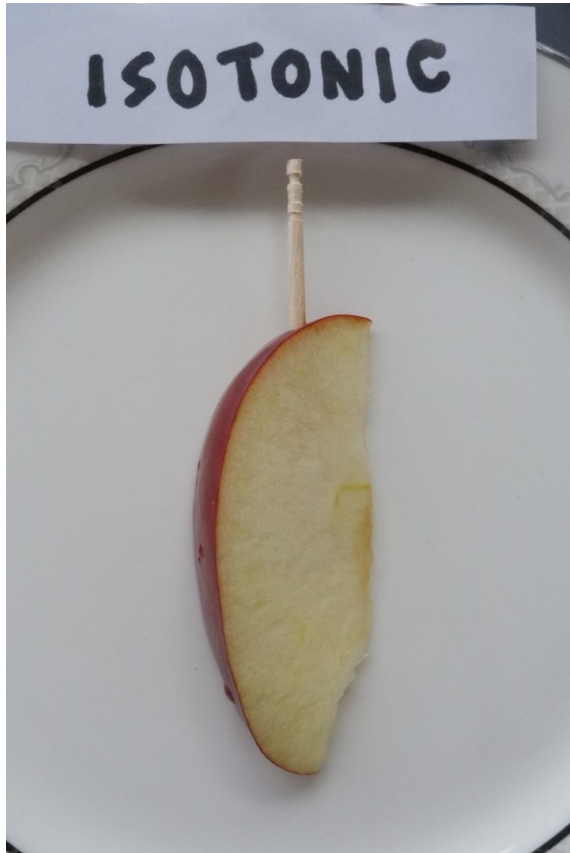
4 hours



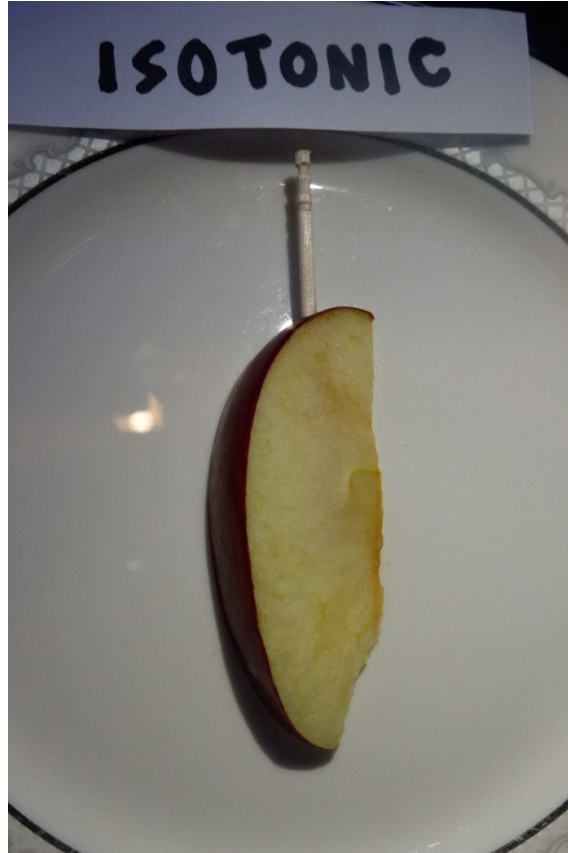
ISOTONIC DRINK

Specs of browning

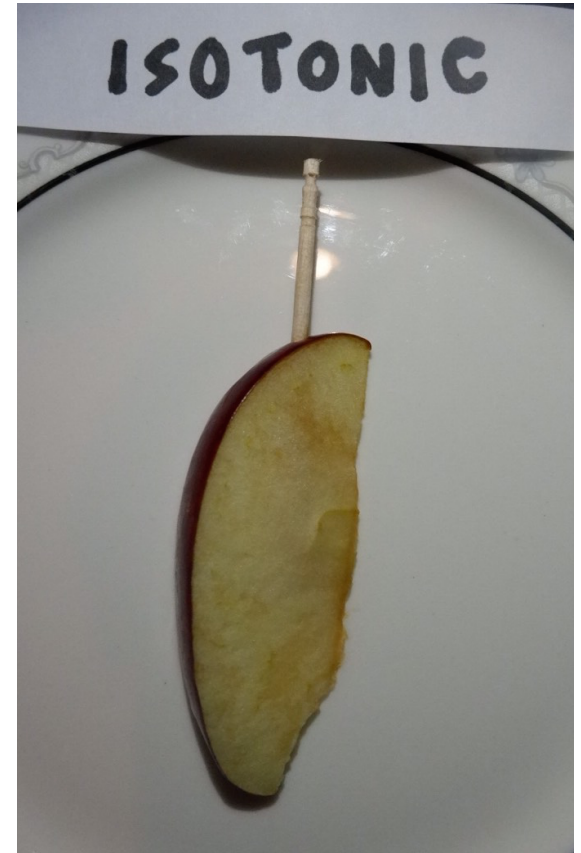
0 hour



2 hours



4 hours



THE EXPERIMENT (2)

- Find out : Which type of knife can mostly prevent apples from browning
- Materials :
 1. Apple
 2. Sharp Knife
 3. Dull Knife
 4. Plates

PROCEDURE

1. Slice the apple with a dull knife and a sharp knife
2. Place it on the plates
3. Observe what happens to each slices of apple



NO SOLUTION

Browns

0 hour



2 hours



4 hours



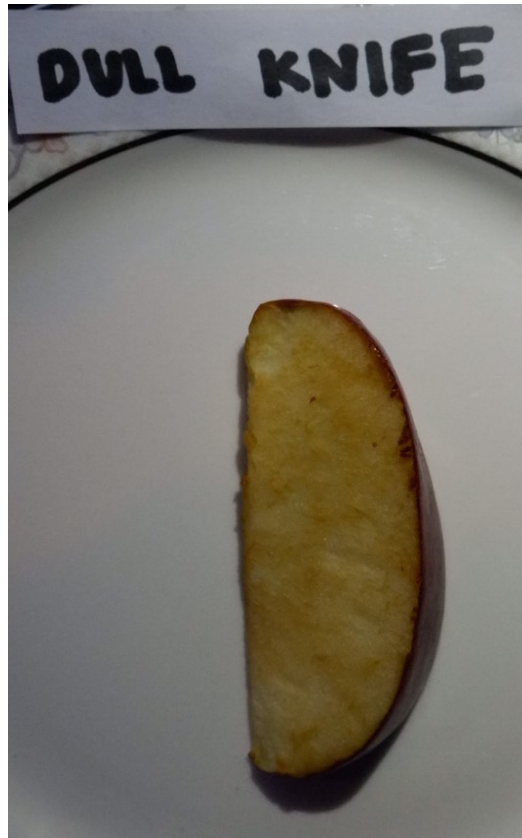
DULL KNIFE

Browns

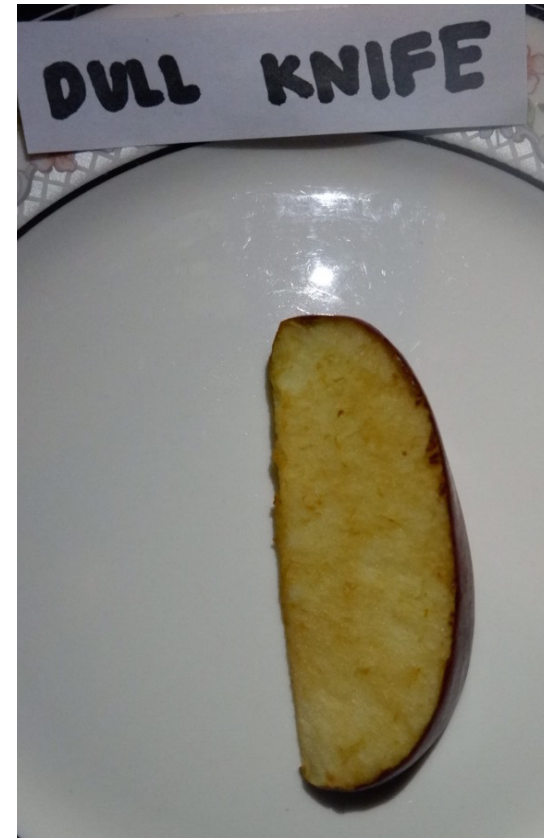
0 hour



2 hours



4 hours



SHARP KNIFE

0 hour



2 hours



Slightly browns

4 hours



DISCUSSION

Why lemon and salt can prevent apple from browning?



full of **ascorbic acid** (Vitamin C)

low pH level = acidic

- Ascorbic acid works because **oxygen will react with ascorbic acid before** it will react with the polyphenol oxidase.



Absorbs the water inside the apple

- So, the apple has less water, which causes less oxidation.

DISCUSSION

Why do dull and sharp knives have different ways of preventing apple from browning?



—— rip and pushes its way through the fruit

→ tears up the cells of the fruit and makes it spoil (brown) faster.

flies right through the fruit ——

→ Cells are not easily destroyed



CONCLUSION

- To prevent browning of apple slices, we can use the followings :

1. **Lemon juice.**

→ Because it contains ascorbic acid which has a low pH level (acidic).

Therefore, the oxygen will react with the ascorbic acid first before it reacts with the polyphenol oxidase inside the apple.

2. **Salt water.**

→ Because salt absorbs the water inside the apple.

Therefore, the water content in the apple is reduced. Then the ability of water to absorb oxygen from the air decreases, thus slowing the oxidation process.

CONCLUSION

3. Sharp knife.

→ Because when it cuts an apple, it flies right through it. Thus, cells are not easily destroyed.

Therefore, using a sharp knife is better to prevent an apple from browning rather than using a dull knife which pushes and rips its way through the fruit causing its cells to tear and spoil (brown) faster.

SOURCES

1) Ways to prevent apples from browning

→ "6 Ways To Stop Fruit From Browning." EasyLunchboxes. N.p., 23 Feb. 2017. Web.

2) Why apple slices turn brown

→ Chimezie, Ezra. "Why Do Apples and Potatoes Turn Brown When Sliced." - Live Well. Feel Better. N.p., 25 Aug. 2016. Web.

3) Why lemon can prevent apple from browning

→ "How Does Acid Keep Apples From Turning Brown?" Keep Apples Fresh and From Browning. N.p., n.d. Web.

4) Why salt can prevent apple from browning

→ Ask an Expert: Salt Water and Apple Browning. N.p., n.d. Web.

5) Causes to faster oxidation

→ "How Long Does It Take for an Apple to Turn Brown?" Reference. IAC Publishing, n.d. Web.

→ UCSB Science Line. N.p., n.d. Web.

6) Dull and sharp knife

→ "What Lisa Cooks." What Lisa Cooks - OK, so the Most Common Question I Get Is... N.p., n.d. Web.



thank
you

EXTRA

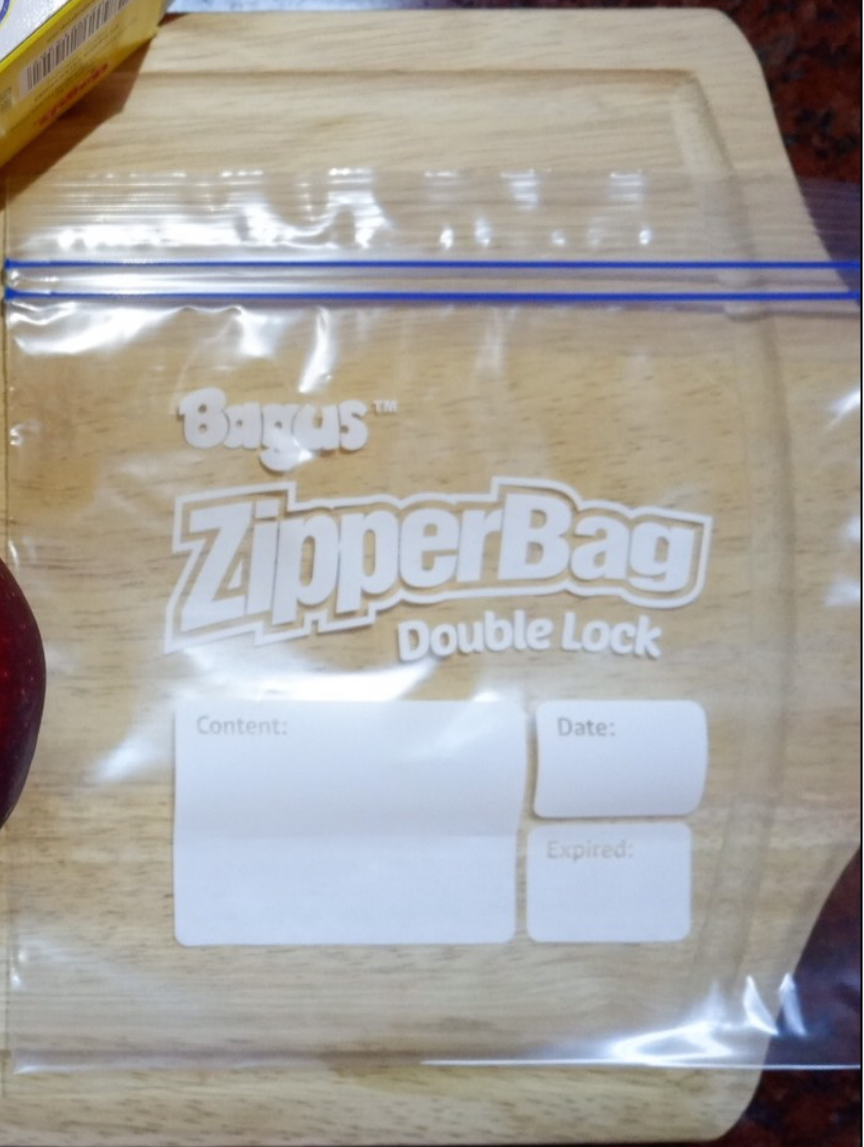
- Polyphenol oxidase / PPO → is present in the chloroplasts of plant tissue.
- Lemon juice on an apple
 - will change the pH of the environment enough so that the PPO doesn't function as well as it once did. (Lemon juice plays a double game. It's an antioxidant, meaning it will snap up the available oxygen itself, and keep the oxygen from reaching the apple tissue.)
 - Once the ascorbic acid gets used up, the oxygen will start reacting with the enzymes in the apple and browning will occur.

THE EXPERIMENT (3)

- Find out : If oxidation process really involves oxygen by experimenting using a well-sealed ziplock bag
- Materials :
 1. Apple
 2. Knife
 3. Ziplock bag

PROCEDURE

1. Slice the apple with a knife
2. Place it in the ziplock bag
3. Observe what happens to the slice of apple



ZIPLOCK BAG

0 hour



2 hours



4 hours



DISCUSSION

Why does a ziplock bag can prevent apple from browning?



— keeps the air away from the apple flesh

→ preventing the apple flesh from oxidizing.