



# APPLE OXIDATION

Why do skinned apples go brown if you leave them out?

## YOU WILL NEED

- An apple
- A lemon
- A knife
- A bowl
- Water
- A plate



This experiment must be done under the **supervision of an adult** to ensure safety when using a knife.

## WHAT YOU DO

### Step 1

Skin the apple and cut it into three equal pieces.

### Step 2

Place one third in a bowl of water, making sure the apple is fully submerged.

### Step 3

Hold a second piece of apple over the sink and squeeze lemon juice all over it, then place it on one side of the plate.

### Step 4

Take the final piece of apple and place it on the other side of the plate. Try and make sure that no lemon juice from the other piece of apple touches it.



### Step 5

Wait for about an hour and then return to compare your pieces of apple!

### THE SCIENCE BEHIND IT

You will find that the piece of apple that is under water, and the piece that had lemon juice squeezed over it, both still look fresh and white. However, the piece of apple on its own will have turned brown.

This is because you cut the apple open and exposed the apple's cells to oxygen in the air, which was then able to get inside the apple's cells and cause chemical reactions. These reactions are called oxidation reactions, and they make the surface of the apple brown. This could be considered 'apple rusting', because it's similar to how iron rusts - oxidation by oxygen in the air!

However, it is possible to stop this happening, and that's what you did! When you put a piece of apple under water this kept it away from oxygen in the air, and so it did not go brown due to oxidation. And when you squeezed lemon juice over a piece of apple, this stopped it going brown for a different reason. The reason is that lemon juice contains citric acid, making lemon juice acidic. And the chemical reactions that make an apple go brown are inhibited in an acidic environment. Also, lemon juice contains lots of vitamin C, which is an antioxidant, and this helped stop the apple going brown by reacting with the oxygen instead of the apple!

That's why it's important to eat lots of fruit and vegetables, because you breathe in oxygen and all of the antioxidants in fruit and vegetable stops the oxygen you breathe in from oxidising you!



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