Leaf Color Chromatography

Time needed: 2 hours and 30 minutes.
Reveal the secret colors of leaves with this science experiment.

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Supplies Needed

Leaves **–Find a variety of colors**
Jars or glasses
Rubbing Alcohol
Butter knife (or other item that can “mash leaves”)
Large bowl or dish that fits the jars
Hot water
Coffee filters
Plates
Scissors
Pencils or Straws and Tape (optional)

Directions

1. Collect leaves

Collect several different types of leaves in different stages of color change. When you find your leaves to pick, gather 5-6 of each one.

2. Set up Your Experiment

Set out one jar or glass for each leaf you collected. Begin ripping up your leaves and placing them in the jar or glass. You will want to get them very small.

3. Add Alcohol and Mash

Add just enough rubbing alcohol to cover the leaves, then using a knife or other utensil mash up the leaves into the alcohol even more. You should start to see the rubbing alcohol turning a bit green.

4. Heat the Jars

Set the jars in a large dish or bowls. Add hot water to the bowl or dish and cover the jars with lids or plastic wrap.

5. Wait

Now let them sit for approximately one hour. Give the jars a little swish every once in a while to help release the chlorophyll. Your alcohol should be turning a nice green. You can also refresh the hot water if it cools too much.

6. Add the Filter Paper

Cut a coffee filter into quarters and place on a plate. Using a teaspoon or dropper add a couple of drops of the liquid to the tip of the filter. You could also tape the filter around a pencil and allow to barely touch the leaf solution in the jar or glass.

7. Wait

Wait approximately 30 min to one hour to see how the colors move up the filter paper and separate. Pretty cool!

8. Wait longer

What happens if you leave it in the solution even longer? Maybe overnight? The colors will become more bold and larger, making the colors easier to see.

The Science Of Leaf Color Changes In Fall

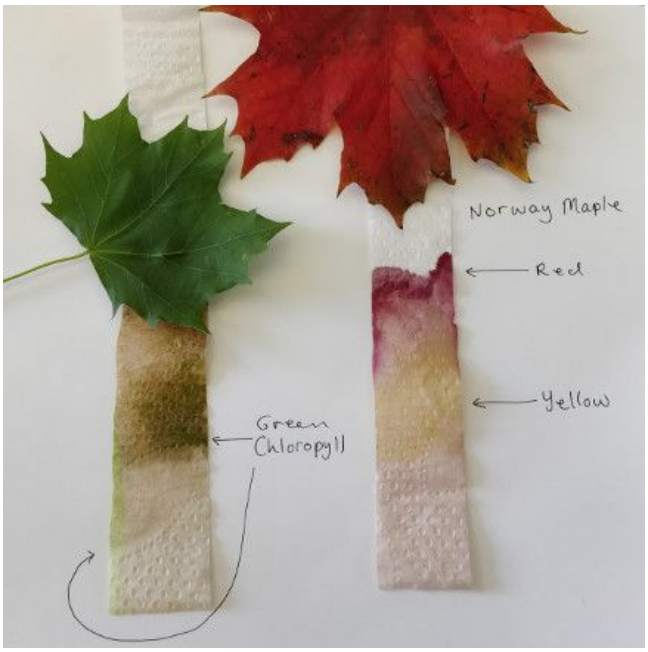
Let's dig into the big question: *Why do leaves change color?*

Leaves, like all green plants, contain Chlorophyll. Chlorophyll is the molecule that traps the energy of the sun and is called a photoreceptor. It is found in the chloroplasts of green plants, and is what makes green plants, green. It is also a key part of photosynthesis which is what allows plant to get energy from sunlight.

Leaves are actually more colors than just green but Chlorophyll is so dominant most of the summer that its green color covers up all the other natural colors in the leaves. We can separate the colors of a leaf by doing this leaf chromatography science experiment.

In this science experiment we used rubbing alcohol and two types of energy to separate the colors. We used mechanical energy by ripping up the leaves and mashing them, plus heat energy from the hot water.

Look closely at the rubbing alcohol, do you see any other colors in there? Most commonly you will see green, but depending on the type of leaf you may also see purple, red, yellow, or orange.



What about Purple Leaves?

First a bit of science behind purple leaves. Some plants have a lot of compounds called anthrocyanins which can be red or purple in color. If a plant has enough anthrocyanins, the purple will block out the green color even though the chlorophyll is still there. With this particular type of tree we see that in action because the leaves are green in the spring and turn purple for the summer.

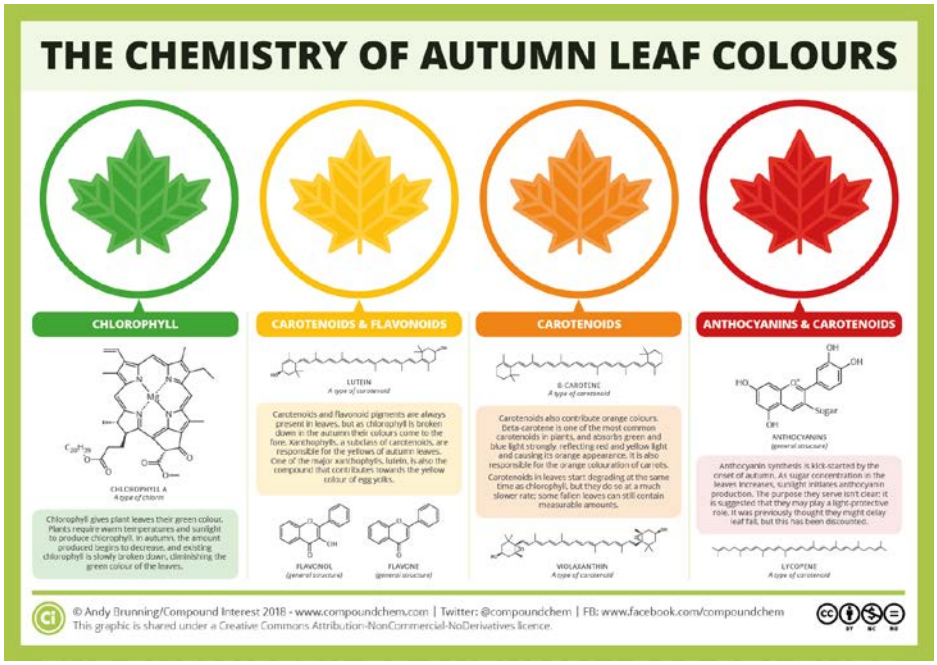
During our walk about collecting leaves we came upon a tree with purple leaves. These trees are quite common around here and we were excited to see how it performed in this experiment.

It was interesting to note that the rubbing alcohol turned green initially, then became purple over time.

Another cool fact about purple leaves, the purple color protects the leaves from sun damage. It's like tree sunscreen! So cool!

Chemistry makes the colors!

Yellow leaves have pigments called **xanthophyll**. **Carotenoids** are the pigment in orange leaves. **Anthocyanins**, give leaves intense red and purple coloring. Plus of course we have **chlorophyll** which gives leaves their green color. When looking at your chromatography, each color in your papers is created by those molecules.

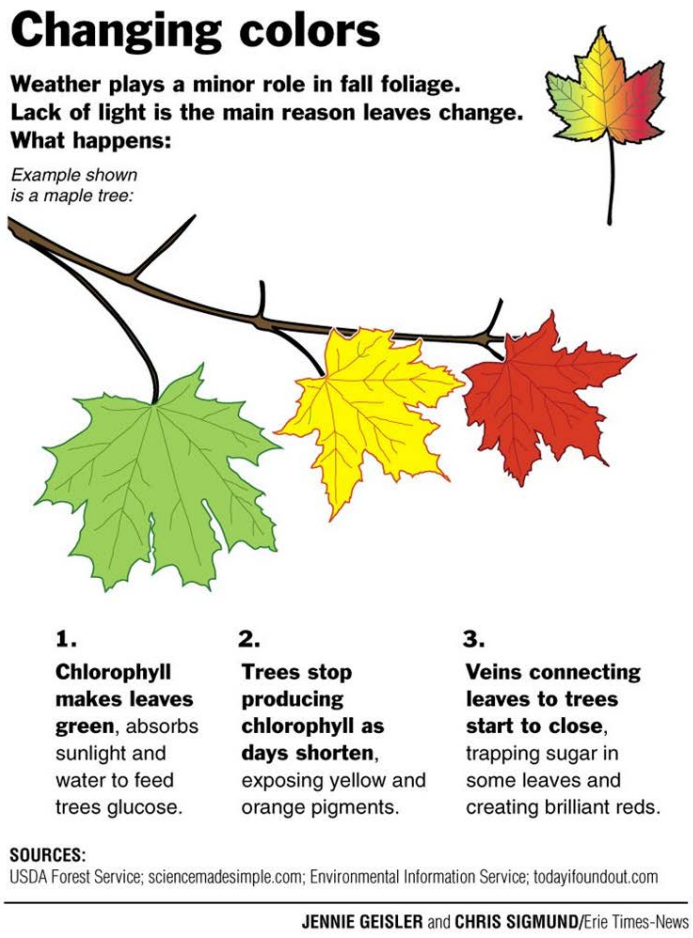




So why do leaves change color in the fall?

As we know, Chlorophyll gives leaves their green color and is so dominant that it hides the other colors in the leaves during the spring and summer. But in the fall, chlorophyll in the leaves breaks down, finally allowing the it's other natural colors to have their moment in the sun!

The beautiful reds, yellows, and oranges might be short lived before the leaves fall to the ground. This year, think about the amazing science behind those changing colors as the trees around you put on their colorful fall displays.



https://extension.unh.edu/blog/learn-science-behind-fall-foliage
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