



FALL COLORS



In many areas of the world, some **deciduous** trees and plants put on a magical show of color before they lose their leaves for the winter. **Deciduous** plants lose their leaves in the fall and grow new leaves in the spring. Leaves that are green in the spring and summer may turn into brilliant clusters of gold, red, orange, yellow, or purple in autumn.

These beautiful colors come from plant **pigments**, which are substances produced by leaf cells. The different plant pigments are:

- **chlorophyll** - gives leaves their green color
- **carotenoid** - produces yellow, orange and brown
- **anthocyanin** - responsible for red, purple, or crimson color

Plants need water, sunlight, carbon dioxide, and other nutrients to grow. The leaves of plants use **chlorophyll** to turn sunlight into food through a process called **photosynthesis** during warm, sunny months. As the days become shorter and colder in the fall and winter, trees react to less sunlight by making less chlorophyll. When that happens, the other colors already in the leaves begin to show through. Carotenoids are always present in leaves, and these are not affected by the weather.

You may notice that red leaves are brighter in some years compared to others. When days are warm, and the nights cool, but not freezing cold, there will be a lot of red leaves. The warm days allow the leaves to continue making sugar. The cool nights stop the sugar sap from flowing through the plants down to the branches and trunk. When this happens, **anthocyanins** are produced to help protect the plant! They help the plants use the nutrients in the leaves before the fall.

ACTIVITY: See the different plant pigments in green leaves before they change color in the fall

Materials

- approximately 3-4 leaves from one or more trees
- one clear jar for each set of leaves you have chosen
- isopropyl alcohol
- plastic wrap
- coffee filter
- scissors
- a bowl to set the jar(s) in
- water
- scissors
- plastic wrap
- **an adult helper**





1. Pick several leaves from one or more trees
2. Cut or tear them into tiny pieces
3. If you are using more than one tree, place the leaves from each tree in separate jars
4. With adult supervision, cover the leaves with alcohol and mash them up very well
5. Cover the jar(s) with plastic wrap
6. Place the covered jars in a bowl/container
7. Add hot water to the container, and leave the jar(s) in the container of hot water for about an hour
8. Cut a strip from a coffee filter – about 2 inches wide
9. Remove the jar(s) from the water, and remove the plastic cover
10. Place one end of the paper strip in the alcohol
11. Let the paper sit in the alcohol overnight



Steps 1 -4



Steps 5 – 7



Steps 8 – 11





Finished! In these sample, you can see green, yellow, brown, and a hint of orange.

What happened?

The alcohol and hot water help separate the colors in the leaves. In addition to green, you may see brown, orange, red, and yellow in your samples. As the alcohol moves up the paper, the pigments in the leaves also travel up through a process called **chromatography**. **Chromatography** is a method used by chemists to separate the parts of a solution. Paper chromatography is used for separating mixtures that are colored.

Get outdoors and enjoy the cooler weather and bright colors that fall brings. The leaves won't last, and winter will be here before you know it!

ADDITIONAL RESOURCES

Books available from the Washoe County Library System:

[*Autumn Leaves*](#) by Ken Robbins

[*Autumn: Signs of the Season Around North America*](#) by Mary Pat Finnegan and Jeremy Schultz

[*Autumn Weather*](#) by John Mason

[*A Chill in the Air: Nature Poems for Fall and Winter*](#) by John Frank and Mike Reed

[*Learning About the Changing Seasons*](#) by Heidi Gold-Dworkin

[*Secrets of the Seasons: Orbiting the Sun in Our Backyard*](#) by Kathleen Weidner and Priscilla Lamont

[*A Tree for All Seasons*](#) by Robin Bernard

[*Why Do Leaves Change Color?*](#) by Terry Allan Hicks

Videos:

American Chemical Society, "Why Do Leaves Change Color?" <https://youtu.be/X0nWmTeQPfo>



CBS Sunday Morning, "A Colorful Guide to New England's Autumn Leaves" <https://youtu.be/2cvW1OGDpEQ>

Scientific American, "Why Do Autumn Leaves Change Color? - Instant Egghead #51"
<https://youtu.be/IPvbl1mu7kM>

SciShow Kids, "The Science of Fall – Compilation" <https://www.youtube.com/watch?v=xB2DiiAOpCg>

Websites:

California Department of Parks and Recreation, Fall Colors https://www.parks.ca.gov/?page_id=23487

Harvard University, Harvard Forest, Autumn Foliage Color
<https://harvardforest.fas.harvard.edu/autumn-foliage-color>

National Oceanic and Atmospheric Administration (NOAA), SkiJinks, Why do leaves change color?
<https://scijinks.gov/leaves-color/>

