



Leaf Chromatography

ALABAMA OUTDOOR CLASSROOM ACTIVITY

Grade Levels

5-12

Overview

Leaves contain several different colors of pigments that help capture sunlight. Through this activity, the students will discover the hidden pigments through a process called chromatography.

Subject Areas

Biology, Chemistry, Environmental Sciences, & Mathematics

Duration

2 periods of at least 45 minutes

Learning Objectives

Students will 1) experiment with plant pigments and try to separate them using chromatography, and 2) discover that the colors we see can contain other colors

Materials

- Filter paper cut in 1” strips
- Fresh leaves
- Edge of quarter or other rough object
- rubbing alcohol
- Tape
- Pencils
- Glass beakers or jars

Vocabulary

Chromatography, medium, solution, solvent, soluble

Background Info

Leaves have a green pigment called chlorophyll that is used in the process of photosynthesis. In addition to the green pigmentation, leaves also contain other pigmentations that help the plant collect the other colors of sunlight. Through chromatography, the students will be able to see the different pigmentations that are not usually visible.

Chromatography is a technique used for separating mixtures. During the process, a substance is placed onto or into a medium and then a solvent is passed through the treated medium. As the solvent passes through the substance being tested, some of the substance may be attracted to the solvent and follow it up the medium. Since the substance is made of different molecules some of them will be transported further up the medium, causing them to separate and show their true colors.

In this activity, filter paper is the medium, rubbing alcohol is the solvent, and the plant stain or pigment is the test substance.

Chromatography is used in crime labs to separate components of “clue” substances such as blood, ink, or other mixtures found at the scene of the crime.

Preparation

As you prepare to do this activity with the students, you will want to have them observe the plant materials and make a list of the colors they see. Ask them if they have ever heard of chromatography.

Procedure

1. Collect green leaves from several different species of trees.
2. Cut coffee filters into one inch wide strips that are at least 5 inches long.
3. Cut one end of each strip into a point.
4. Place a green leaf 1/4” above the point on the filter strip and roll the edge of a coin or other rough object over the leaf, pressing green leaf juice into the strip.
5. Let the green stain dry.
6. Pour 1/2 inch layer of rubbing alcohol into the bottom of a glass beaker or jar (jelly jars work well).
7. Tape the filter strip to the middle of a pencil so that the pointed end of the strip touches the alcohol (don’t let the green pigment hang down into the alcohol) and lay the pencil across the top of the beaker or jar and adjust the filter strip.





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Outdoor Classroom Connection

The students can compare different species of trees and trees of the same species to see if location makes a difference in the colored pigments found in the leaves. The students can learn about careers that are associated with the study of chromatography such as precision agriculture.

Alabama Course of Study Objectives

Science

Fifth: 1, 2, 5, 7,

Seventh: 1, 2, 5, 6, 7

Eight: 1, 6, 7,

H.S. Physical: 2, 5

H.S. Biology: 1, 3

Literature Connections:

Maestro, Betsey. **Why Do Leaves Change Color.** ISBN-10:0064451267

Reiley, Peter D. **Light and Color.** ISBN-10:0531153711

Other Related Conservation Education Activities

Project Learning Tree

⇒ *Sunlight and Shades of Green*

Discovering Alabama Videos

⇒ *Alabama Trees*

⇒ *Alabama Soils*

Procedure continued...

8. Lay a piece of foil or plastic wrap over the top of the jar to keep the alcohol from evaporating.
9. Carefully observe the alcohol as it moves up the filter paper, carrying the pigments with it.
10. In about 10-20 minutes, the colored pigments should be separated.
11. Remove the strips before the alcohol reaches the top of the filter paper.
12. Carefully observe and list the different colored pigments that you see.
13. Repeat these steps with leaves from other species of trees and see if all species contain the same pigments.
14. Compare your results to the fall colors that can be found in the leaves from different species.

Extensions

Mathematics:

- The students can measure the distance each pigment traveled before it was left on the medium.

Science:

- The students can investigate other variables such as solvents to see if they can learn other information regarding pigments.

Language Arts:

- The students can research the science associated with chromatography and the related careers.

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Alabama Wildlife Federation

www.alabamawildlife.org/classrooms/



Alabama Department of
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