Leaf Pigments Experiment

Overview: This colorful, hands-on experiment will help kids connect with the pigments contained in leaves and deepen their understanding of seasonal color changes.

Materials:

- Assortment of leaves
- Watercolor paper
- Rubbing alcohol
- Small glass or ceramic containers
- Spoons or stirring sticks
- Scissors (Optional)

Approximate Time to Complete: 1 to 2 Hours

Location: Indoor or Outdoor

Grades: K-2, 3-5, 6-8, 9-12

Season: Spring, Summer, Fall

Background Information: Most plant leaves appear to us in varying shades of green because they contain a plant pigment called chlorophyll (klow·row·fill). Chlorophyll plays a vital role in capturing the energy contained in sunlight and transforming it into carbohydrates, such as sugars and starches, that plants use to survive. In the process, it releases oxygen. It isn't an overstatement to say that all life on Earth depends on this beautiful green pigment! Chlorophyll isn't the only pigment contained in plant foliage, but it dominates. Other pigments, such as yellow and orange carotenoids, are masked in most plants by the strong presence of chlorophyll.

In autumn, shorter days trigger plants to prepare for winter, breaking down chlorophyll, which the plant reabsorbs for food. Carotenoids take longer to break down, revealing their yellow and orange colors in fall foliage. Anthocyanins (an·thow·sai·uh·nins), deep red and purple pigments, are produced in some leaves in autumn, triggered by a reaction between trapped sugars and leaf sap, showing red to purple colors.

To learn more about leaf pigments and seasonal changes, check out our article Fall Foliage: Why Leaves Change Colors.

When leaves are agitated and mixed with rubbing alcohol, their cells break down and release the pigment molecules. By allowing kids to facilitate this and absorb the pigments onto another medium, they can experience natural pigments hands-on.

Instructions:

1. Take kids outside and collect leaves of varying shades and colors. Autumn is a great time to experiment with color/pigment variation, but varying shades of green also work well if fall colors aren't available. If collecting leaves from the surrounding environment is challenging, store-bought leaves like spinach can be a good alternative.

2. Have kids sort leaves into piles based on color if you're experimenting with more than one, then tear the leaves into small pieces with their hands or cut them with scissors. The smaller the pieces, the better.

3. Place each pile of leaf fragments into its own glass or ceramic container and add enough rubbing alcohol to soak them but not submerge them. The higher the leaf-to-alcohol ratio, the stronger the resulting pigmented solution.

4. Have kids stir and gently mash the leaves and rubbing alcohol for 1-2 minutes using a spoon or stirring stick.

5. Then, place one end of a strip of paper into the mixture, letting the remainder remain dry and extending out of the container.

6. Leave your materials for one hour and return to see the extracted pigments coloring your paper strips! Strips can be removed and allowed to dry, and the remainder of your pigmented alcohol can be used to dye more paper for keepsakes, crafting, or science reports.

   Tip: The longer you leave your leaf fragments in the alcohol, the stronger the pigment will become. If you have the time, ask kids to hypothesize what will happen if the mixture is left for a longer period. Test their hypotheses by dipping more paper strips into the mixture at advancing intervals and comparing the color saturation.

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