Leaf Chromatography

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Grade Level: 8

Time: 2 Class Periods

Goals:

Students will understand the role of plant pigments, such as chlorophyll, in photosynthesis.

Objectives:

Students will be able to:

- relate the basic principles of photosynthesis
- use paper chromatography to evaluate a hypothesis regarding plant pigments
- understand the role of chlorophyll and other pigments in photosynthesis

Materials:

- Leaves collected from a variety of deciduous trees at the School of Conservation, labeled according to each tree and placed in plastic bags
- Glass jars with lids
- Rubbing alcohol
- Scissors
- Shallow tray with hot water
- Plastic spoons
- Coffee filters

NJCCS: 5.5.8.A, 5.5.8.B, 5.8.8.A, 5.8.8.C, 5.8.8.D, 5.10.8.A, 5.10.8.B

Vocabulary:

- photosynthesis
- chromatography
- chlorophyll
- chloroplast
- chemical reaction

Procedure:

Day 1:

1. Ask the class to think about why the leaves of some trees change color in the fall. Ask them whether they believe that the red, yellow, and orange colors are present in the leaf when the leaf is green, or whether these colors are formed in the leaf only during the fall.
2. Ask students to formulate a hypothesis regarding whether the red, yellow, or orange pigments are present in green leaves and write it down on paper or in their science journals. Have students raise their hand to indicate which hypothesis they formed.
3. Review the principles of paper chromatography. Ask students how they could use paper chromatography to find out whether the red, yellow, or orange pigments are present in the green leaf.
4. Distribute included instructions for the chromatography lab.
5. Have students carry out the lab, and then label their coffee filter.
6. Ask students to summarize their results on paper or in their science journals.

Day 2:

7. Looking at the filters, ask students to return to their hypothesis, and formulate a conclusion on paper or in their journals.
8. Ask students to describe their results and share their conclusions.

Accommodations:

- Students are placed in groups of mixed ability and assigned specific tasks
- Images and written guidelines are provided for visual learners and English language learners

Assessment:

- Make observations as students work together
- Have students answer questions on lab sheet
- Allow students to present findings to the class.

Follow-up/Homework:

Using the Internet, have students research the following topics:

- the identity and purpose yellow and orange colors they observed on the filters;
- the identity and purpose of the red and purple pigments that only appear in the fall; or
- what happens to the green pigments in the fall

Leaf Chromatography Lab Procedure

Name:

Class:

Instructions:

1. Remove leaves from plastic bag and cut into small pieces.
2. Place pieces on the bottom of jar.
3. Label jar with your name and the name of the leaf.
4. Cover pieces with rubbing alcohol and grind with plastic spoon until liquid turns green.
5. Place in shallow pan filled with hot water and place lid loosely over jar. Mix every 5-10 minutes during the next 30 minutes.
6. Cut coffee filter into long strips.
7. After 30 minutes, the liquid should be dark. Place the coffee filter strip in the jar so that it touches the liquid and tape it to the side of the jar.
8. Leave for approximately 45 minutes.

Questions:

1. Why do you think leaves change color in the fall? Do you think that the red, yellow, and orange colors are present in the leaf when the leaf is green, or whether these colors are formed in the leaf only during the fall? Why or why not?
2. Explain the identity and purpose of the different pigments in each leaf?
3. What happens to green pigments in the fall?