Name:_____ Per._____ Date:_____

Chromatography Lab

Background:

Photosynthesis requires the presence of special pigments that can absorb the energy of light. A pigment is a substance that absorbs light of a particular wavelength. Its color depends upon the color of light that it reflects. For example, a green substance appears green because it reflects green light and absorbs all other colors, especially red and blue.

The most important plant pigments in photosynthesis are chlorophylls. There are two major types: chlorophyll a, which are a light green color, and chlorophyll b, which are a green to dark green color. Green plants contain both types. In addition to chlorophyll, the leaves of many green plants also contain one or more other pigments, including carotenes which are orange, and xanthophylls, which are yellow. The presence of these other pigments is masked by the abundance of chlorophyll during most of the year.

In the fall, however, when chlorophyll production decreases, the other pigments show up, giving leaves their bright red, orange, and yellow autumn colors. As temperatures during autumn drop and the days shorten, cells at the base of the leaves break up which block the passages from leaves to branches and cause chlorophyll to decompose. As the chlorophyll decreases, colors in other pigments (carotenoids and anthocyanins) come to the surface.

The pigments in plant cells can be separated from one another by a technique known as "chromatography". Chromatography is a technique for separating and identifying substances in a mixture, based upon their solubility in a solvent. It is one of the most valuable techniques chemists and biochemists use to determine the ingredients that give flavor or scent, analyze environmental pollutants, identify drugs in urine, and even separate proteins that can identify evolutionary relationships. The name "chromatography" is derived from the Greek words "chroma" and "graph" which means "color writing".

Purpose/Objectives:

- To separate and observe the pigments that gives a leaf its color using chromatography
- To describe the function of plant pigments during photosynthesis

Materials:

Chromatography Paper	Pencil	acetone
10 ml Graduated Cylinder	100 ml beaker	Ruler
Pipette	Plant Pigment Extract	Scissors

Proceedure:

Day 1:

1. Collect a green leaf from a plant nearby. Write the location the leaf was taken from in your Data section.
2. Cut up the leaf into small pieces using scissors.
3. Place the pieces in a mortar and use the pestle to grind the leaf. Add some isopropyl alcohol as needed to make a liquid consistency. Continue to grind material until well ground.
4. Transfer solution to a 10 mL beaker and cover with plastic wrap. Write your names and period on the beaker with an Expo marker.

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Procedure Day 2:

1. Collect your beaker of plant solution, a 100 ml beaker, a pencil, and a piece of chromatography paper. ***Be careful about touching the paper because oils from your hands will destroy the capillary action of the paper.***
2. At the end of the chromatography paper, draw a faint line 2cm from the bottom (above the tapered end) with a pencil across the strip of paper.
3. Use a pipette to collect a small amount of your plant solution and place **one drop** in the middle of the pencil line. Allow it to dry completely. Place 2 more drops, allowing time to dry between applications.
4. Attach the flat end of your chromatography paper to a pencil at the length so just the tapered tip will hang just above the bottom of the beaker.
5. Set the pencil across the opening of the beaker so the chromatography paper hangs directly in the center.
6. Slowly pour a small amount of acetone into the bottom of the beaker so that just the tapered tip is submerged in the acetone.
7. Observe closely as the acetone begins to climb the paper, this will take some time. Complete your diagram on the back of your first page of the set up while the capillary action is taking place.
8. After the solvent has traveled up the paper, examine the colors with a hand lens. Draw a second diagram of the chromatography paper **INCLUDE the colors observed.**
9. Complete Analysis & Conclusion.

Analysis:

1. What colors are visible on your chromatography paper?

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2. What kinds of pigments within the plant do you think these colors represent?

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3. Review the section of the Background reading about chromatography to complete your Conclusion.

Conclusion:

Explain what occurred during this chromatography experiment to get your results.

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