

“The Colors of Autumn”

MATERIALS

- filter paper strips
- colored markers from different manufacturers
- plant leaves
- mortar and pestle
- ethanol (or isopropyl) alcohol
- sand

S.S.S. Addressed

S.C.C. 2.3

S.C.F. 1.3
2.3

S.C.H. 1.3
2.3
3.3

M.A.A. 4.4
5.4

M.A.E. 3.4

“The Colors of Autumn” Paper Chromatography Activity

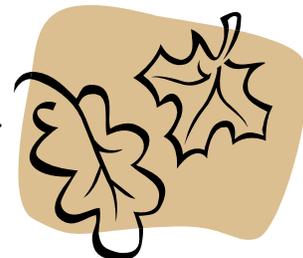
The idea of using chromatography to “see” inside of something is very ancient...and the process, while made more complex with the invention of the gas chromatograph, has remained essentially unchanged.

Simply put, paper chromatography is about dissolving a substance into smaller sections, and separating those sections by their individual masses. As the separation occurs, those more

massive sections are not carried up the paper as far as the less massive pieces. The result is a vertically layered “picture” of the individual colored pigments that made up the original sample.

While the directions detailed below are quite simple, the following three points are extremely important:

1. the pigment placed onto the filter paper must be **COMPLETELY DRY** before the paper is placed into the alcohol



Students will see that the “colors of Autumn” exist within leaves all year round.

2. the pigment must remain **ABOVE** the level of alcohol for the entire process.

3. the process will need to be observed with moderate care, because if the filter paper is left in the alcohol for too much time, the lower pigments will end up being completely dissolved and disappear from the filter paper. Remove the paper when the lowest pigment begins to fade away.

Activity Directions

While paper chromatography is easy to do and relatively safe, it does involve the use of a strong alcohol...so be aware that the marker section of this activity can be completed, although less dramatically, with water as a substitute, but that the plant pigments must be dissolved in an alcohol.

Procedures: 1. Cut the filter paper strips as shown on the back of this sheet.

2. Begin by having students draw a dot of marker just above the v at the bottom of the paper...setting it aside to dry.

3. grind the leaf into a liquid, adding very small amounts of water (and possibly sand) at a time until the leaf is completely liquid.

3. Place a small dot of plant material in the same place on a new paper and set aside to dry.

4. Place the marker paper into

the alcohol container so that the pigment stays above the level of the alcohol. Fold the top of the paper so as to keep it at a fixed height. Remove when complete (see #3 above) and set face up on a towel to dry.

5. When the plant liquid is dry, repeat step #4.

6. Have students draw what pigments are observed on each paper, comparing their results to the rest of the class.

“The Colors of Autumn” Student Activity Sheet

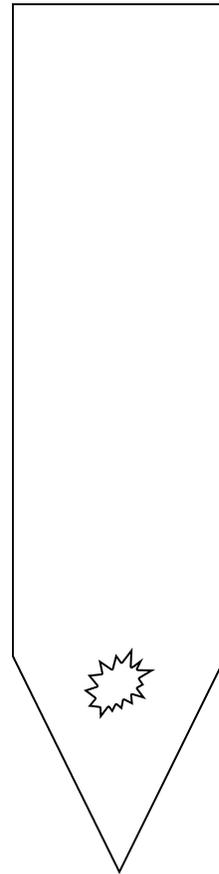
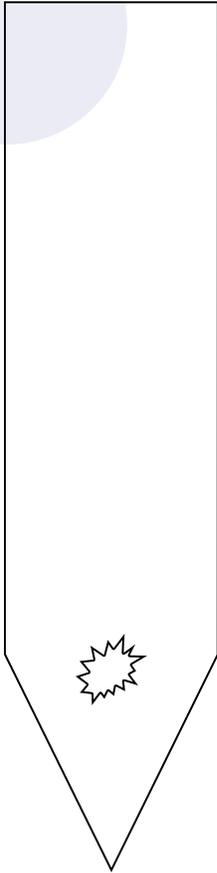
Chromatography Science Activity

Label and Color the filter papers below.

_____ colored marker pigments

(_____ brand)

_____ leaf pigments



CONCLUSION QUESTIONS:

1. Were there any differences between the same colored markers from different manufacturers? Describe them.
2. Were there any pigments “hidden” in the plant’s leaf that were not visible when the leaf was whole? Describe them.
3. How could this process provide evidence to police about a forgery case?