**Leaf Chromatography—Let’s do some chemistry at home!!**

**https://www.scientificamerican.com/article/bring-science-home-leaf-colors/**

**1) Define chromatography:**

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**2) Why do leaves change colour in the Fall?**

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**Materials**
•    Leaves at different stages of turning colors (the more the better—about 10 of each color is best)
•    Scissors
•    Strong, sturdy drinking glasses (three to four)
•    Rubbing alcohol (isopropyl alcohol)
•    Wooden spoon or another wooden utensil with a blunt end for crushing leaves
•    Fork
•    Very small bowls or tea-light candleholders (three to four)
•    Strong, white, heavyweight, ultra-absorbent paper towels
•    Ruler
•    Pencil
•    Toothpicks
•    Plate – tray etc (or other surface to protect working area from stains)
•    Tall glass jars, such as mason jars (three to four)
•    Clothespins or large paper clips (nine to twelve)

**Preparation**
•    Collect some leaves that are at different stages of color change during the fall, preferably from the same tree.
•    Separate your leaves into distinct groups arranged by  color, with about 10 large leaves per group. Separating them into green, yellow and red piles may be easiest.
•    Prepare paper towel strips, making three to four strips for each group of leaves. Cut up a strong, thick paper towel into long, one-inch-wide strips. They should be long enough to touch the bottom of the tall glass jars or mason jars and still extend over the top. With a pencil, gently draw a line one inch from the bottom of each strip.

**Procedure**
•    Cut the leaves into small pieces with scissors. Put each group of leaves into the bottom of a drinking glass.
•    Add one tablespoon of rubbing alcohol to each glass.
•    Crush the leaves into the rubbing alcohol using the blunt end of a wooden spoon for about five minutes, until the solution is dark. How has the color of the alcohol changed?
•    Let the solution sit for 30 minutes in a dark place indoors.
•    Use a fork to remove any leaf pieces from the solutions and discard these, while leaving the liquid in the glass.
•    Pour each solution into a very small bowl, and leave it in a dark place indoors to allow more of the alcohol to evaporate. You will be ready for the next step when you stir your solutions with a toothpick and they seem thicker.
•    Thoroughly stir each colored solution with a toothpick, using a different toothpick for each solution so as not to mix the colors.
•    Using a toothpick for each color, smoothly and evenly "paint" some of each solution across a paper towel strip on the pencil line you drew. Because some plant pigments can stain, you should do this on a plate so that the color will not stain your work surface. For each color, do this using a total of three to four strips.
•    Allow the strips to dry.
•    While the strips are drying, pour enough rubbing alcohol into each glass jar to just cover the bottom. Prepare one jar for each color solution.
•    With the dry strips, carefully put the pigmented end into the jar until the strip just touches the alcohol. Drape the top of the strip over the jar's opening and secure it with a clothespin. Make sure that each strip is not touching the jar's sides, but only contacts the jar where it is secured. Place and secure strips from the same solution into the same jar, but keep them from touching each other.
•    Let the glasses sit for 30 minutes and watch the paper strips. What is happening to the color of the paper strips?
•    When one of the colors reaches the top of a strip, remove all strips and let them dry.

**Observations: (data table—figure out how to present your results)**

**Analysis:**

**Question 1)** Look at the different dried strips. How are the colors in the strips different?

Do strips from different color solutions have unique colors, shared colors or both?

**Question 2)** Look at the order in which the colors appear on the different strips.

Is the same color on the same place in different strips or is it in a different place?

Do the colors appear in the same separation order or in different orders on each strip?

**Conclusion:**