

Primary
Physical Science
Chromatography

How can chromatography be used to separate a mixture?

Separating chemical solutions with a solvent (often water) is a very important scientific procedure. You can separate biological substances such as juice from a plant leaf such as spinach, purple plum tree, red cabbage, flower petals, etc. or common substances as drink mixes.

Materials:

- 1 package each of different flavors of drink mixes (cherry, lime, grape, etc.)
- small plastic cups
- 1 large plastic cup
- filter paper or coffee filters
- ruler
- pencil
- 1 dropper for each sample
- rubbing alcohol
- various colored leaves, flowers, vegetables
- paper clip

Procedure:

1. Prepare the powdered drink mixes beforehand.
 - The higher the concentration of solution, the better the results.
 - I used 1/8 tsp. in 1 Tbsp. water, and got nice color separation. Regular drink mix concentration yields pale results.
2. Cut the filter paper to make a rectangle that will fit in the cup.
3. Draw a line with the pencil approx. 4 cm. above the bottom edge of the long side of the paper.
4. With the droppers, put small dots of the sample liquid along line on the paper—be sure to not overlap and let the spots touch—mixing up the colors. Use a separate dropper for each color.
5. The darker the spot, the better color separation will be visible. Make a spot and let it dry. Repeat until the dot is quite dark.
6. Roll the rectangular paper into a cylinder and secure top edge with paper clip.
7. Set the paper into the large cup and carefully pour in water until the water is below the pencil line.
8. Watch as the water travels up the paper by capillary action. As the water moves, the pigments will move also. Different pigments travel at different speeds, so separation should become obvious.

9. Remove the paper when the colors almost reach the top of the paper.
10. Remove the paper clip and lay the filter paper flat on a paper towel to dry.
11. Measure how far each color has travelled.
12. To test plant specimens, just run a coin over the leaf, etc. over the line on a piece of filter paper.
13. Let it dry in between applications and try to make as dark and narrow a line as possible.
14. Put the paper in a glass of regular rubbing alcohol at a level below the pigment line and let set in a well-ventilated area. The different chlorophylls and other pigments in the leaves, petals, etc. will separate out quite well. Watch so that the pigments don't run off the top of the paper.
HAVE GOOD VENTILATION WHILE USING ALCOHOL!!

Teacher Info:

In plants, the general order of pigments is:

1. closest to top - carotene (orange)
2. xanthophyll (yellow)
3. chlorophyll a (yellow green)
4. chlorophyll b (blue green)
5. anthocyanin (red)