



Try This at Home Science: Ink Chromatography

Activity Overview:

Use the process of chromatography to separate the colors within washable markers.

Materials:

- Black washable markers
- Coffee filters
- Small cup
- Pencil
- Water
- Tape

Try this!

1. Cut a coffee filter into 1 inch wide strips, slightly longer than your cup is tall.
2. Tape your coffee filter to the pencil so it makes a "T" shape.
3. Draw a thick line 1 inch above the bottom of the coffee filter.
4. Fill the small cup with $\frac{1}{2}$ inch of water.
5. Place the pencil with the marked coffee filter on the rim of the cup so the coffee filter sits in the water, but that the colored line is not covered.
6. Observe what happens as the water moves up the coffee filter.
7. Clean up by pouring the water down the sink removing the coffee filter from the pencil.

What's happening?

All markers are made up of different color dyes, and we can separate those colors out of our washable markers by adding water! We are doing paper chromatography, where we separate the dyes within a marker using the movement of water. As the water makes it way up the coffee filter it moves the ink from the marker along with it using a process called capillary action. Capillary action is the process of water moving into an open space, and if molecules smaller than water are in the way they get taken for a ride.



Each dye within the marker is pulled along at a different rate based on the size of the molecules. Larger molecules are heavier, which make them more difficult to be moved by the water and remain near the bottom of the filter paper. Smaller and lighter molecules move more easily and travel higher up the filter. The specific arrangement of the dyes are unique to each marker and can be used by scientists to compare different samples of ink!

What is chromatography used for?

Chromatography is used in labs across the globe when scientists wish to know what molecules make up a compound substance. In the case of markers, we can see what individual dyes go into making our favorite shade, but forensic scientists can also use the process of paper chromatography to compare different ink samples. This process allows

investigators to test ink or paint samples from evidence to see if the same ink or paint was used in another part of the crime scene or to detect forged paintings.



Now try...

- Instead of cutting the coffee filters into strips, fold it into a cone shape. Repeat the experiment and observe.
- Use a black wet erase marker instead of a washable marker. Repeat the experiment and observe.
- Use different colored washable markers instead of a black marker. Repeat the experiment and observe the difference.
- Get crafty and make several cones from the coffee filters, draw multiple colored lines on each cone. Repeat the experiment and lay the filters flat to dry. Once dry, use a piece of yarn or a twist tie to gather the coffee filter to look like a butterfly!



Additional Information

Watch MiSci [ECHO Live! Episode 46](#) to see how Ink Chromatography is used in forensic science investigations. Can you crack the case?