

Activity Guide: Chromatography

Museum Connection: Diorama halls have excellent examples of art work.

Overview of activity: In this activity, we will learn about paper chromatography and along the way we'll also make a chromatography "flower"

Grade Level: Grades 1-5

Main Idea: Understand that chromatography is the chemistry of taking things apart through the use of colors.

Background Info:

Chromatography is used to separate a substance into its individual components. There are different phases with chromatography: Stationary (solid or liquid supported by a solid) and Mobile (liquid or gas).

One of the most common ways this chemical process is used is through paper chromatography. Most often, it is used to separate out the mixtures of different color dyes. For paper chromatography, dyes are marked out on a designated type of paper and a solvent (coffee filters and water in our case).



The solvent should be below the marks of dye. As the solvent travels up the paper, the different components of the dye travel at different rates- the more dye it has the more it will typically. This allows a chemist to determine what components came together to make a dye.

<http://www.chemguide.co.uk/analysis/chromatography/paper.html>

Food Paper Chromatography

Overview of activity: In this activity, we will learn about paper chromatography and along the way we'll also make a chromatography "flower"

Materials (read step-by-step instructions for exact materials needed)

Item	Quantity
Coffee Filter	1-2 per person

Markers (Vis a Vis, washable, permanent, etc)	X
Scissors	X
Clear Cups	At least 1 per person/test strip
Water	X
Tape	X
String	X
Clothespins	1 per paper strip
Paper towel	1 per person
Pipe cleaner	1 per person
Ruler	1 per person
Wooden skewer/toothpick	1 per test strip

Prep (10-15 minutes):

- Gather the necessary materials for the experiment. You should also decide on a design for the paper, for example, making individual “flowers” or test strips.
 - Flowers are great for younger ages, test strips are great for older ages.
- For Flowers, you may want to prep coffee filters by cutting a hole in the center and preparing the “paper towel wicks”.
- For test strips, you may choose to cut your coffee filters ahead of time into strips.
- Prepare cups and water or have them available when ready as well as prep the drying area.

Step-by-Step Instructions:

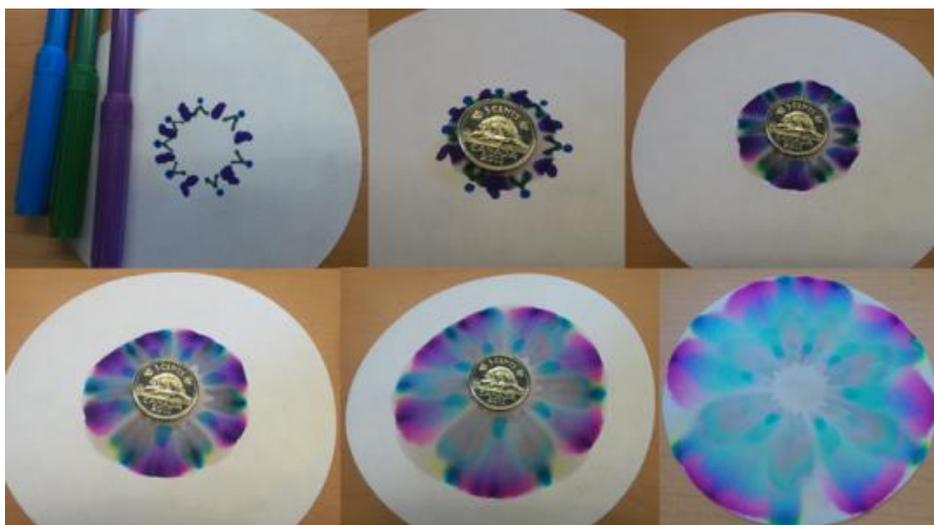
Flowers (15-20 minutes, drying takes longer):

1. Have a conversation around chromatography- what is it? Why do chemists use it? How are you going to use it today?
2. Begin by giving each person a coffee filter to color on. Allow them to use a variety of markers to decorate their filter. Vis-a-Vis markers will work best and encourage them to draw small or simple designs in different colors--don't just color the entire filter!
(Remember, we want to be able to see the colors separate and observe what happens)
3. Cut a hole in the center of the filter, about the size of a quarter. Folding the filter will aid in cutting the hole.
4. Take a paper towel and roll it up to make a wick, or long stem that will reach into the cup of water and draw the water up to the filter.
5. Make predictions around what you think will happen once you place the wick into the water.

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Igniting Inspiration

- a. What will happen to the wick? What will happen to the water? What will happen to the coffee filter?
 - b. What do you expect to see when the water reaches their marker decorations?
6. Fill cups about a quarter-half full and then place the wicks inside the cup.
 7. Watch as the water begins to travel up the wick to the coffee filter and make observations about what is happening when the water reaches the marker drawn onto the filter.
 - a. What is happening to the marker lines?
 - b. What is happening to the different colors on the flower?
 8. Discuss what our observations tell us about the colors they used to draw on their flowers.
 9. Remove flowers from water (this will begin to stop the chromatography process) and lay them flat to dry (you can also use paper towels under them to keep the marker dye from staining the table). Drying may take a couple hours.
 10. Once dry, attach a pipe cleaner to serve as a flower stem!



Test Strips (15-20 minutes, drying takes longer):

1. Have a conversation around chromatography- what is it? Why do chemists use it? How are we going to use it today?

2. You may want to split people into groups, or they can work individually. Begin by giving each group 1-2 coffee filters. Cut the filters into strips, about an 1-1 ½ thick.

3. Once all the filters are cut, select a number of colors to test (each group should get the same number of colors and cups). Draw a thick line of color about 2-3 inches up the coffee filter.

a. Hint: Have each person test a black or brown, primary color, and a secondary color for great comparisons!

4. Prep cups and filters: Place filter around a skewer and tape it, placing about an inch of water into clear cups.

5. Make predictions about what you will see.

a. What will happen to the wick? What will happen to the water? What will happen to the coffee filter?

b. What do you expect to see when the water reaches their marker decorations?

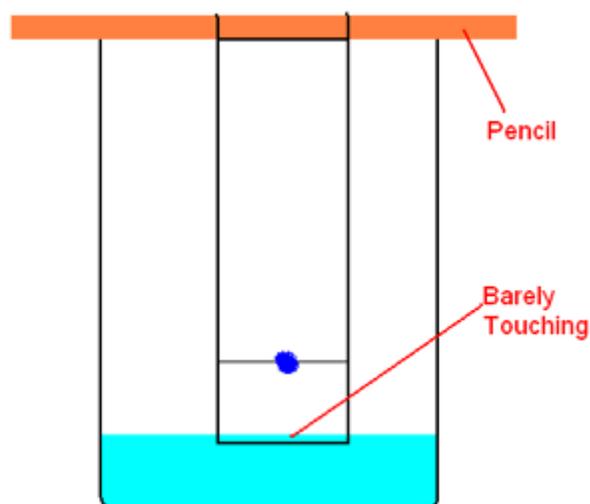
6. Carefully lower the bottom of the test strip into the water and place the wooden stick on top of the cup.

7. Watch as the water begins to travel up the wick to the coffee filter and make observations about what is happening when the water reaches the marker drawn onto the filter.

a. What is happening to the marker lines?



Paper Strip in Jar





- b. What is happening to the different colors they have on their test strips?
8. Discuss what our observations can tell us about the colors we chose to use.
9. Remove test strips from water (this will begin to stop the chromatography process) and then lay them flat to dry (you can also use paper towels under the strips to keep the marker dye from staining the table). Dry may take a couple hours.
10. Once dry, tape test strips onto a journal/worksheet.

Paper Chromatography

Name _____

Colors being tested:

My Test Strip:

Color tested:

My Predictions:

My Observations:
