# CANDY CHROMATOGRAPHY

## QUICK PEEK

*In this lesson, students learn about chromatography and how it is performed as they discover what really makes M&Ms and Reese's candy coating brown.*

**SUGGESTED GRADE LEVELS:** 3-6

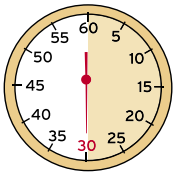
### ILLINOIS STATE LEARNING GOALS

**SCIENCE**
11.A, 12.A

**LANGUAGE ARTS**
4.A

### OBJECTIVES

- ★ Students will perform chromatography.
- ★ Students will work effectively in groups.




**PACE YOURSELF:**
30 MINUTES

## PREPARE YOURSELF

1. Dampen some brown M&Ms and smudge them 1/3 of the way up the filter paper.
2. This will be your "crime scene" candy so make one for each group of students.
3. Divide students into lab groups.

## MATERIALS

**Per Group:**

- ☐ Brown M&Ms
- ☐ Brown Reese's Pieces
- ☐ Filter paper (cut-up coffee filters work well)
- ☐ Small coffee stirrers
- ☐ Clear tape
- ☐ Glass
- ☐ Water
- ☐ Scissors

## WHAT YOU NEED TO KNOW...

Your class will be using paper chromatography to separate the food dyes from candies. Paper chromatography is an important separation technique that depends upon differences in how strongly the dyes are adsorbed onto the paper (stationary phase) and how soluble the dyes are in the developing solvent (mobile phase). In paper chromatography, a small amount of the mixture to be separated is placed close to the edge of a piece of paper. The edge of the paper is then immersed in a developing solution. As the developing solution climbs up the paper by capillary action, the components of the sample are carried along at different rates, resulting in separate bands of color.

Scientists use chromatography for many different things, such as detecting pollutants in water and identifying drugs.

## WARM UP!

Play hangman with students until they discover the word **chromatography**. Do any students know what this is, or have they done it before? Explain to students that chromatography is the separation of a mixture into its separate parts. Tell students that today they are going to have the opportunity to perform chromatography and they will be discovering what really makes candy coating brown.

While studying the coloring materials in plant life, a Russian botanist named M.S. Tswett invented chromatography in 1903.

## THE HOW TO

1. Pass out the brown M&Ms and brown Reese's Pieces. Model for students how to wet the candy and make smudges roughly 1/3 of the way up the filter paper.
2. Take a stirring straw and poke it through the filter paper.
3. Fill cups with a small amount of water, just enough to touch the bottom of the filter paper, but NOT the smudge.
4. Allow water to rise, and observe what happens to the smudge.
5. After you allow time for the water to spread, you can remove the filter paper from water and lay it out to dry.
6. Students then compare the colors from their papers to the "crime scene" candy to determine if it is an M&M or a Reese's Pieces.

## WHAT'S GOING ON HERE?

The word "chromatography" is derived from two Greek words: "chroma" meaning color and "graphein" to write. The solution, or solvent, is called the mobile phase, and the paper the stationary phase. We use the word "affinity" to refer to the tendency of the dyes to prefer one phase over the other. The dyes that travel the furthest have more affinity for the solution (the mobile phase); the dyes that travel the least have more affinity for the paper (the stationary phase).

There are four main types of chromatography; liquid chromatography, gas chromatography, thin-layer chromatography and paper chromatography.

## DID THEY GET IT?

**SUGGESTED ASSESSMENTS**

1. Have students answer the following questions in a whole group or individually:
    1. What colors made up the coating for your M&M candy? The Reese's?
    2. How were the two candies the same? How were they different?
    3. Were you surprised with what your chromatogram displayed? Why or why not?
2. Have students create Venn diagrams comparing the chromatogram of the two candies.

## ET CETERA

1. You can also perform this experiment with other color candies to see how the results vary.
2. Have students perform paper chromatography with ink. Repeat the same steps as above, instead using an ink sample from a water soluble marker (Mr. Sharpie, Crayola, and Sharpie work well). Have students compare results between each marker.