GRADES: 2+

# CANDY CHROMATOGRAPHY

*Science Experiment*

## WHAT YOU NEED:

- ☐ M&Ms and Skittles, or other candy with colored coating
- ☐ Petri dish or a clean plate
- ☐ Pipet or dropper
- ☐ Filter paper (or coffee filters cut into strips)
- ☐ Toothpick
- ☐ Water
- ☐ Salt
- ☐ Ruler or pencil
- ☐ Clips or tape
- ☐ Beaker

## WHAT YOU DO:

1. **PREPARE A SALT WATER SOLUTION** by mixing 1/8 teaspoon of salt into 3 cups of water, shaking or stirring until completely dissolved. This will be your chromatography solvent. Pour about 100 ml of salt water into the beaker.

2. **GET TWO PIECES OF CHROMATOGRAPHY PAPER,** or cut out two 4×8 cm rectangles from the coffee filter. Mark a line in pencil 1 cm from the bottom of each. Use the pencil to label one for Skittles and one for M&Ms.

3. **SORT THE CANDIES** to find several matching colors: both packs should contain some red, orange, green, etc.

4. **USE THE PIPET TO PUT A SINGLE DROP OF WATER FOR EACH M&M COLOR** in the bottom of the petri dish. (Make sure the drops are evenly spaced.) Place an M&M on each water drop and set aside. The water will dissolve the candy coloring. Remove the candy after 1-2 minutes.

5. **REPEAT STEP 3 FOR THE SKITTLES,** this time using the lid of the petri dish.

6. **DAB THE END OF A TOOTHPICK IN ONE OF THE COLORED WATER DROPLETS** and apply the pigment to the filter paper. Apply 2-3 coats, letting the spots dry in between. Use a clean toothpick and repeat for each color.

7. **TAPE OR CLIP THE PAPERS SIDE-BY-SIDE** (but not touching) to your pencil or ruler. Place the pencil or ruler over the mouth of the beaker. You want your papers barely touching the water. The paper will soak up the water and move up the paper. When the water nears the top, take the papers out, transfer them to a clean, dry, flat surface, and let them dry.

## EXAMINE YOUR RESULTS:

What colors do you see on your chromatogram? Are the two chromatograms similar? Where do you see differences? Look at the ingredient list on the packaging and see if some of the same dyes are listed. If the dyes overlap, what do you think might be the reason for different chromatograms?

## WHAT HAPPENED:

The water travels up the paper strip by capillary action. Capillary action occurs because the water is attracted to the surface of the paper, and as the first water molecules stick to the paper, they pull others along with them. (Capillary action is one way water moves up through the roots of plants.) As the candy coating dissolves in the water, it is pulled up the paper too.

You probably found that the candy coating is actually a mixture of several pigments. Certain pigments dissolve in water more easily and are pulled with the water farther up the paper. Others are more attracted to the paper and move more slowly. Usually smaller molecules move farther than larger ones.

For further study, repeat the experiment with colored markers, flavored gelatin, powdered drink mix, or food coloring. Try to predict your results.

## CHROMATOGRAPHY CONCEPTS:

The word chromatography comes from the two Greek words for color and writing, and this project will teach you why. Chromatography is a simple technique for separating a mixture's individual components.

In chemistry, a mixture is a combination of substances that can be separated because they are not chemically bonded. Conversely, a compound cannot be separated since its elements are chemically bonded.

In this paper chromatography project, a mixture is dissolved and pulled across a piece of paper. The mixture separates and its components travel across the paper at different rates. The result is what's known as a chromatogram, or the pattern of separated substances revealed through chromatography.

## NOTES: