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Educational Innovations Inc.®

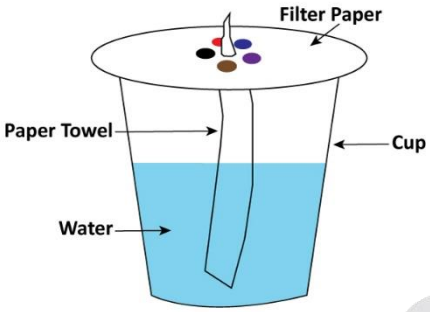
# Chromatography Filter Paper

FIL-309, FIL-311

Did you know that the black ink in your markers is not actually pure black ink? It's actually a combination of the primary colors of pigment (red, blue, and yellow). Our Chromatography Filter Paper discs allow students to separate most water-soluble inks into their original blended pigments, revealing their hidden identities.

## You will need:

- Chromatography Filter Paper discs
- Water-soluble markers (i.e., Vis-à-vis, Crayola)
- A small cup
- Paper towel
- Nail or sharpened pencil
- Water




## What to do:

1. Fill the cup at least halfway with water.

2. Use the nail or pencil to poke a hole in the center of a filter disc.

3. With your water-soluble markers, draw a ring or several dots around the hole.

4. Cut the paper towel about 1.5 cm by 8 cm and twist one end of the strip into a point.

5. Poke the pointed end of the paper towel through the hole in the filter disc so it sticks through about 1 cm and the rest hangs below, with the marker design on the top.

6. Lower the paper towel into the cup with the filter paper resting on the rim.

7. Watch the colors spread out across the filter paper.

**Note:** You will get the best results if you take the filter paper out of the water **before** the colors reach the edge of the disk.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## What happened?

**Chromatography** involves separating a mixture in a solution to analyze its components. There's quite a bit of interesting science going on in this chromatography demonstration. First, the water is drawn up the paper towel and then across the filter disc as a result of capillary action and surface tension. **Capillary action** demonstrates how water is drawn from one fiber to the next as it seeks equilibrium with other water molecules. You can observe this principle by holding a paper towel vertically and lowering it until the edge touches water. You can watch the water "climb" up the towel.

As the water moves across the filter disc, it pulls the ink's color pigments with it. Because different colors of inks have different densities, some colors are harder for the water to pull along, and they get left behind as the water continues to travel. This is how you get the separated colors that you see on your disc.

The word *chromatography* comes from the Greek words *chroma,* which means "color" and *graphein,* which means "to write." In your filter paper demo, the water acts as a solvent to separate the ink from the marker into individual pigments. More complex forms of chromatography can identify samples taken from crime scenes and detect pollutants in water samples.

## Why do only some colors separate?

Some marker colors, like yellow and red, are made from a single pigment. Other colors, like brown and black, are made from a few pigments. Each brand of marker will be different, so you can compare the black markers from two different brands and see which pigments they are each made from by using this filter paper.

## Nothing happened. What did I do wrong?

You might have tried this experiment with permanent markers, which are not water-soluble. Markers that have a strong odor usually do not separate. Don't despair! These markers are soluble in isopropyl alcohol (rubbing alcohol).

## What does this teach?

Scientists use chromatography to separate pigments in plants to see how they produce food and attract pollinators. Forensic scientists can use chromatography to match a particular pen to ink that was found on a ransom note. It also demonstrates color mixing and visual perception, because our eyes are not able to separate colors when they are closely blended together.

# Take Your Lesson Further

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**http://blog.TeacherSource.com**

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## Capillary Tube Set (PHY-225)

Can water flow upward? Our Capillary Tube Set is the perfect tool to demonstrate the science behind rising fluids. Four clear glass capillary tubes--each with a different inner diameter-are mounted on a plastic stand, allowing your students to observe the processes of capillary action, cohesion, adhesion, and electrostatic attractive forces. This device will strengthen your students' understanding of particles and the forces that hold them together. The 8-page Teacher's Guide contains a broad assortment of classroom activities, discussion questions and a student quiz. Height of tubes is about 15 cm (6 in.).


## Dissolving Paper (SM-510)

This is real paper, made of sodium carboxyl methyl cellulose. The amazing thing is that it dissolves in water. Dip it in hot or cold water and watch it disappear before your eyes! Can be used in most laser printers and copiers. After it's printed on, the paper will dissolve, but the letters will remain! Make your own alphabet soup! 21.5 x 28 cm (8.5 x 11 inch) sheets of paper. Available in packs of 15, 30, or 100 sheets.

## Magnetic Water Molecule Kit (MOD-200)


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