



Color Full Inks

Although you would never know by looking, many drawing markers are made of a mix of colorful inks. In the following activity, you will find out which colors make a black pen black or blue pen blue.

You'll need:

- Several water-based, non-permanent felt-tip markers in a variety of colors (black, blue & purple work well)
- Cone-shaped white paper coffee filter
- Tap water
- Baking pan or container that holds at least half an inch of water

Try this:

1. Use the felt-tip pens to make a series of different colored dots (bigger than a pencil eraser) along a line at the wide end of the coffee filter. Keep the dots at least $\frac{3}{4}$ of inch from the top edge.
2. Pour $\frac{1}{2}$ an inch of tap water into the bottom of the baking pan. Place the filter in the pan with the wide end of the filter in the water. The water should not touch any of the colored dots. For the next half-hour, check how the filter looks every five to ten minutes.
3. When the water has moved all the way to the top of the filter, remove it from the pan and let it dry. Examine the colors revealed. What happens to the dots as the water moves up the filter? Do you see any new colors? Where did they new colors come from?

What's happening?

You may not be able to tell when you look at a line written by a pen, but the ink is actually a mixture of different colored pigments. Some pigments do not dissolve well in water. These move slower up the filter and appear closer to the original colored dot. Others dissolve well in water and so move farther up the filter.

By separating pen ink into the different colors of pigments used to make it, you have uncovered the ingredients of the ink. This process is a kind of chemistry called chromatography. Chromatography is an ancient technique used to separate the parts of a mixture. In this example, water works to separate or dissolve the ink into many pigments.