

Chromatography Butterfly

Main Idea:

Is black just...black? Discover what other colors are hidden inside the markers you use every day! You can find these colors by using a process called chromatography, which means separating colors using water or gas. In this activity, you'll use water and a filter to separate different colors out of a single marker.

Materials:

- Coffee filter
- Pipe cleaner
- Washable marker
- Small cup of water



Making Your Butterfly:

1. Using a marker, make a circle in the middle of the coffee filter.
2. Put about an inch or so of water into a small cup.
3. Place the center of the coffee filter gently into the water so the colored circle is just touching the surface.
4. Watch what happens! The water will be drawn up the coffee filter and through the marker. As it flows up through the marker the water draws different colors at different rates up with it.
5. Take your coffee filter out of the water and let it dry.
6. Wrap the pipe cleaner around the middle of the filter to pull it into a butterfly shape. Bend the ends into antennae.
7. Experiment with other colored markers. Draw different patterns on another coffee filter and see what happens!

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3



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What's Happening?

This activity works because of **cohesion**, which is how water molecules naturally stick together like magnets, and through **adhesion**, which is how water molecules also naturally stick to other substances, like the **cellulose** in a plant stem, or in a coffee filter (remember: coffee filters are made of plants). When the adhesion is stronger than the cohesion, water is drawn upward, against gravity!

This is a process called **capillary action**, and it's how water gets from the ground to a plant's roots, up the stem, and out to its leaves. It's also how tiny blood vessels exchange gases in our bodies.

But what about the colors? You'll notice that a marker that looks like one color often has different colors within it. When water passed through them, different colored pigments separate out based on their solubility, or how easily they dissolve in liquid. The ones that dissolve easily race to the top of the filter as the water carries them up. Others don't dissolve easily, and stay down toward the original circle until a lot of water has passed through them.

Check out this website for a tutorial:

<https://buggyandbuddy.com/chromatography-butterflies-separating-colors-in-markers/>