Classroom Central
TURNING PENCILS INTO POSSIBILITIES

STEM Lesson Kits

Lessons & materials made possible by Duke Energy | Piedmont Natural Gas

— Coffee Filter Flowers, Butterflies and Leaves —

Suggested Grade Level: 1st through 3rd
NC Standard: 3.P.2.2 - Compare solids, liquids, and gases based on their basic properties.
Lesson: Chromatography
Words and Phrases to Discuss:
Chromatography: A process in which a liquid or gas "carries" a mixture along a special paper and separates it into its components.

Materials List:

- Coffee Filters (2 per student or group)
- Washable markers in black and assorted colors (do not use permanent or dry erase—they will not work for this experiment)
- Small cups
- Water (about an inch deep in each cup) which serves as a solvent
- Pipe cleaners, optional

Activity: Ask - Can mixtures be separated even if the components cannot be seen? Have students tell you about times when they have mixed paints or food coloring. Prompt students to explain how each color changed. Record their ideas. Explain to students that they will separate ink into its hidden colors during this investigation. Distribute materials for the experiment.

Instructions: Instruct students through the process of separating colors by asking them to draw a thick ring around the center of a coffee filter (near where the flat surface meets the ridged area) using a black water soluble marker.

To make flowers: Stack two filters together and fold in half. Then fold in half two more times. Use a pipe cleaner to tie the tip of the filters and carefully separate each layer outward to form a flower.

To make butterflies: Gently fold the filter like an accordion. Pinch the center together. Fold a pipe cleaner in half and place the center on the center of the filter. Twist a couple of times to secure in place. Curl the tips of the pipe cleaners to form antennae.

To make leaves: Cut the filters into various leaf shapes. Hang using fishing line or string to resemble falling leaves.

Have students fold the coffee filter three times until they get a small cone shape. Dip the tip of the cone into the cup of water. Unfold the cone slightly and watch the colors begin to separate as the water is absorbed. When the colors have spread about an inch, take the filter out of the water and place aside to dry.

In the black filter, you should be able to see the rainbow colors once the ink has spread. Circulate around the room and discuss what students have observed. Have students repeat the process for another marker. Allow students to share and discuss the changes they observed and any questions they may have.

Science Notebook Helper: Before the lesson, students can predict what will happen when they dip the filters into the water. Students draw, label, and write about the changes they observe during the investigation of separating colors.

Tips and Talking Points: There are several components inside of black ink. The components travel at different speeds depending on how polar the substance is. The less polar the component, the less it bonds with the paper and therefore travels farther. Once the components spread, they separate into the different colors. The same will happen for other colored ink—with the exception of primary colors such as blue, red and yellow.

Guiding Questions

- Is black really black? How did the black ink change? What colors make up black?
- How did the other color ink change? What colors were mixed to make green (or other color) ink?
- Did anything surprise you? If so, what?