# Exploring Properties—Capillary Action

*Can liquid defy gravity?*

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# Exploring Properties—Capillary Action

## Try this!

1. Hold an acrylic setup in a small amount of colored water.
2. Observe the water level between the two pieces of acrylic. What happens? Is the water level the same across the setup?

## What's going on?

The water level between the two acrylic pieces rose as a result of capillary action. **Capillary action** is the ability of a liquid to flow in narrow spaces—even against gravity. The water level was higher where the pieces were closer together and the space was narrower. As capillary spaces get smaller and smaller, liquids can move farther and faster.

## Now try this!

1. Use water-based markers to draw on a coffee filter.
2. Add several drops of water to the coffee filter.
3. Now hold the paper up vertically and watch the water move. What do you notice?

## What's going on?

**Color moving on paper**

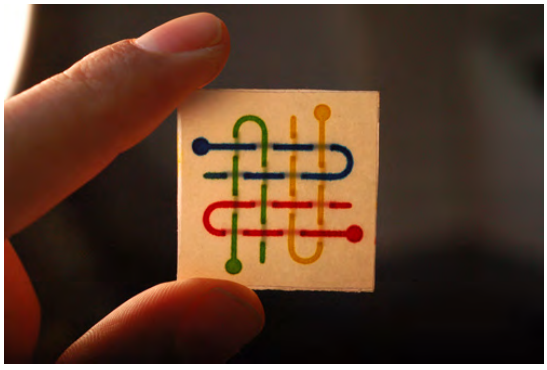
The ink pigment dissolves in the water because it is water-soluble. As the water travels up the paper by capillary action, it carries the pigment along with it. How fast each pigment travels depends on the size of the pigment molecule and on how strongly the pigment is attracted to the paper. The spaces between the fibers in the paper act as capillary tubes.

This technique is called chromatography and was originally used for separating pigments that made up plant dyes. There are many different types of chromatography. In all of them, a liquid (like the water) or a gas flows through a stationary substance (like the paper). Chromatography can determine the chemical makeup of a flavor or scent, the components of pollutants, and can separate blood proteins.

## How is this nano?

**When things get small they can behave in surprising ways.** Different physical forces dominate when things get very, very small. For example, gravity is very important to us on the macroscale, but it's hardly noticeable at the nanoscale.

Researchers at Harvard University are making special patterned paper that wicks small volumes of fluid by capillary action. The fluid is tested and analyzed through different sensors printed right onto the paper. The result is a flexible, disposable test that can check a tiny amount of urine or blood for evidence of infectious diseases or chronic conditions. Currently, paper diagnostics use microtechnologies, but nanoscale features may make them even more useful and accurate.



**Paper diagnostics**