

Observation, prediction

Walking Water

Learning about the process of capillary action

Have you ever wondered how trees bring water from their roots and stems to the rest of the plant? Think about when you spill something and use a paper towel to clean it up. Plants use a procession called **capillary action**: the ability of a liquid to flow in narrow spaces without the assistance of, or even in opposition to, external forces like gravity. Our paper towels use this process as well, they fill the small spaces between the fibers with liquid.

What is required for capillary action to occur, why doesn't water just move all the time? This process requires the walls of a vessel, so the stems and roots of a plant work great, in this case we will use a paper towel as the vessel. The **adhesion** to the walls is stronger than the **cohesive** forces between the liquid molecules. This process can also be sped up or slowed down based on temperature, tube diameter, and viscosity of the liquid.

Today in this At-Home Science experiment, you will explore capillary action in a colorful way: you'll see and feel the cohesive and adhesive properties of water and watch capillary action occur.

Materials

- 5 cups of equal height
- Food Coloring
- Paper Towels
- Stirring Instrument (spoon)
- Water

Protocol

1. Position your empty glasses in a straight line and pour water in every other glass so they are $\frac{3}{4}$ of the way full, pictured above.
2. Add a few drops of food coloring into the glasses with water: glass 1 red, glass 2 empty, glass 3 yellow, glass 4 empty, glass 5 blue. Stir the food coloring to mix it in.
3. Grab your paper towels and fold them in half horizontally, in half again, and then in half vertically. Your paper towel should be in a V shape when you finish. You will need 4 of these.
4. Predict what colors will go in the empty glasses.
5. Place one end of your paper towel into the glasses with water and one end into the empty glasses.
6. Leave your glasses sit for one or several hours.
7. After time passes come observe your results! The longer you let your glasses sit the more water will move.
8. Was your prediction correct?

Glass 1 Glass 2 Glass 3 Glass 4 Glass 5



Why did this happen?

Just like plants our paper towels were involved in capillary action today. As soon as we put the paper towels in the glass the water slowly started to make the move to the other glass. Although this process happens very slowly once it is complete you can see the water that has accumulated in the empty glasses when the water levels are even. During this experiment we made water walk but we also made a rainbow using only three colors. As the water from one glass moves to another the colors mixed on their own.

CONTENT AREA(S)

Capillary action, adhesion, gravity, cohesion, surface tension, chromatography

SAFETY

This activity requires some adult supervision for younger scientists. Be aware that the food coloring can stain hands/clothes.