Western Engineering

Outreach

Dying Flowers Using Science!

Grade 6-8

Meet Today's ENG HERO!

George Nakhla- Professor, Salamander Chair in Environmental Engineering at Western University

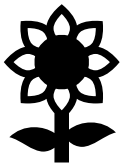
His research interests lie in the general area of environmental engineering and water and soil pollution control. The main areas of expertise are biological municipal and industrial wastewater treatment, biological nutrient removal processes, biological detoxification of hazardous contaminants, soil and ground water bioremediation, and landfill leachate treatment. To learn more about Dr. Nakhla: https://www.eng.uwo.ca/chemical/faculty/nakhla_g/index.html

Learning Goal:

- Students will consider how plants suck up the water from the soil to live using flowers
- Curriculum Connections:
  Grade 7- Interactions in the Environment
  Grade 8- Fluids

Materials Needed:

- White flowers
- Food coloring
- Cups or glasses
- Scissors
- Paper Towels



Engineering and Science Connections:

Today we will be becoming chemical engineers! Chemical engineers help create and research all different kinds of things that have chemicals in them.

A concept we will have to go over today is capillary action. Capillary action is defined as the movement of water within the spaces of a porous material due to the forces of adhesion, cohesion, and surface tension.

Capillary action occurs because water is known to be "sticky," that is the forces of cohesion (water molecules like to stay close together) and adhesion (water molecules are attracted and stick to other substances). The adhesion of water to the walls will cause an upward force on the liquid at the edges. The surface tension acts to hold the surface intact. Capillary action occurs when the adhesion to the walls is stronger than the cohesive forces between the liquid molecules. How high the water will travel in a uniform circular tube is depending on how strong the force of surface tension is and gravity.

Not only does water tend to stick together in a drop, it sticks to glass, cloth, organic tissues, soil, and, luckily, to the fibers in a paper towel.

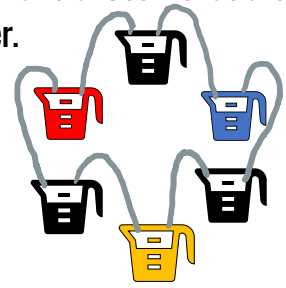
Video Recommendation: *The Color-Changing Celery Experiment!*

https://www.youtube.com/watch?v=Klug9Foou3s

Walking Water Experiment

Now using this knowledge lets try the walking water experiment.
Get 6 glasses and fill one with red, one with blue and once with yellow food coloring.

Next add a paper towel and fold it so 2 ends are in different cups and make a chain like this for all 6 cups, then fill the cups half full of water.



Now observe, from what you have learned about capillary action, explain how does the water move?

Dying Flowers Experiment

Step 1. Fill the glasses with water so they are ¾ full

Step 2. Add food coloring to each glass, they can be the same color or different

Step 3. Cut the flowers stems by a few centimeters and place 1 flower in each glass

Step 4. Let the flowers sit for 10 days and see what how the flower has changed

What Did You Learn?

- Why do the flowers change color?
- How does the water travel through the flower?
- How is the water absorbed?

Future Learning

- Try this experiment with other plants and flowers.
- Will this work with celery? What about lettuce?
- Try cutting the stem of a single flower in half and placing the two pieces into different colors of water. What happens?

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.
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Twitter: @westernueng
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Thanks for discovering with us!