



Curiosity Guide #501

Polymers

Accompanies Curious Crew, Season 5, Episode 1 (#501)

Disappearing Water

Investigation #1

Description

Challenge your friends to keep their eyes on the water!

Materials

3 Styrofoam cups

3 clear cups

Pitcher of distilled water

Measuring Cup

Sodium Polyacrylate

Procedure #1: Prepare

- 1) When you are alone, pour about 1 tablespoon of Sodium Polyacrylate into the bottom of a Styrofoam cup.
- 2) Pour about $\frac{1}{4}$ cup of distilled water into the cup.
- 3) Check that the Sodium Polyacrylate soaks up all the water.
- 4) Adjust the amounts of Sodium Polyacrylate and water if necessary. Measure out the adjusted amounts in the following activity to astonish your friends.

Procedure #2: Amaze your friends

- 1) Secretly sprinkle the correct amount of Sodium Polyacrylate in the bottom of one of the Styrofoam cups.
- 2) Gather your friends.
- 3) Place the three foam cups in front of you. Demonstrate that you will challenge the friends to the shell game to track where the water is.
- 4) Pour the correct amount of water into one of the empty foam cups. Move the cups around and ask your friends where the water is.

- 5) When your friends guess, show that their answer is correct. Then pour the water into the second foam cup and do the game again.
- 6) On the third time, pour the water into the cup with the powder.
- 7) Demonstrate turning over each cup to show that nothing falls out.
- 8) Stack the cups inside of one another with the full cup on top.
- 9) Ask the question, "What happened to the water?"
- 10) Demonstrate the game again with the clear cups, so your friends can see the physical change.

My Results

Explanation

Sodium Polyacrylate is a polymer that can hold a lot of water. If we could magnify the powder, we would see long chains of molecules. When the water is added, the Sodium Polyacrylate draws the water into the center of each of the molecules.

The water will continue to absorb into the powder until there is an equal concentration of liquid both inside and outside the polymer. The result is a bonded gel that doesn't fall out of the cup when the cup is turned over. The water seems to have vanished! If you scoop the gel out of the cup, you can feel its interesting texture and notice that the gel is cool to the touch. This is a physical reaction. If you spread out and leave the gel, the water will eventually evaporate out of it.

Then the gel could be used again. However, if you add salt to the gel, a chemical reaction causes the gel to liquefy and separate the ingredients.

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