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American Chemical Society Chem Club

ACTIVITY

By Erica K. Jacobsen

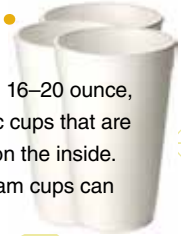
The Secrets of Chemistry

"Abracadabra!" "Hocus pocus!" says the magician before revealing the dramatic finish of a trick. Magicians rely on illusion. They show what seems impossible, leading to amazement. You know it is not possible, but because the secret behind the trick is not revealed, the illusion remains intact. Some chemistry demonstrators call their performances "magic shows." *Are they really magic? What's different?* A demo leads to wonder and amazement. However, the "secret" is revealed as the science behind it is explained.

Amaze your friends and family by making water "disappear"! And be sure to share the secrets of the science behind it.

Where's the Water?

Materials



- Three identical 16–20 ounce, opaque, plastic cups that are colored white on the inside. (White Styrofoam cups can be used.)
- 1 teaspoon of sodium polyacrylate powder.
- 1/2 cup (120 mL) of distilled water in a clear plastic cup.

Safety

Exposure to sodium polyacrylate powder and any dust it generates can be irritating. Avoid direct contact with the powder and gels. Place hydrated gels in the trash.

1. Put on safety goggles and wear them throughout preparation and the entire demonstration.
2. **Preparation:** Place 1 teaspoon of sodium polyacrylate powder in the bottom of an opaque plastic cup.
3. **Demo:** Line up the powder cup along with two empty cups. Pour 1/2 cup of distilled water into one of the empty cups.
4. Ask the audience to keep track of the cup that contains the water. Swap the places that each cup has, multiple times. Boast about your speed, but then move the cups fairly slowly.
5. When done swapping, ask the audience which cup contains the water. When the audience does so correctly, pour the water into the other empty cup.
6. Repeat steps 4 and 5 two more times, each time moving a little faster. The last time, when they correctly choose the cup with the water, pour it into the cup with the powder.
7. Move the cups one final time at top speed. When done swapping, ask an audience member to tell you which cup contains the water. Carefully tip and invert the cup to "show" that it contains no water. Set it off to the side. Ask another person to select one of the remaining two cups. Invert it to show it is empty, and then set it aside.
8. Call on one final person and ask them to stand as you invert the final cup over their head. They will wait for a splash—but the water has magically disappeared!
9. Wash your hands and dispose of the cups, according to your teacher's instructions.

What's the "secret"? Where did the water go? The sodium polyacrylate powder can absorb 800 times or more of its weight in water. The resulting gel swells with the water trapped within a network of sodium polyacrylate chains and remains in the bottom of the cup.

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