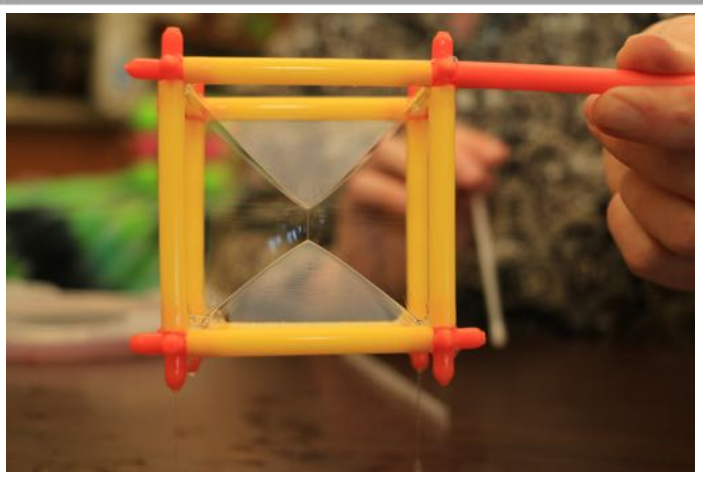


Bubbles. . . They're All About the Liquid!

A laboratory experiment from the
Little Shop of Physics at
Colorado State University



Square bubble makers are so much fun that students won't realize they are learning about properties of liquids.

Grade Level

- 3rd and above

Science Focus

- Molecules
- Liquid
- Stretchiness

Time Required

- 20 minutes, but could last an hour or more.

Overview

Students know a lot about liquids from exploring them as little kids, playing in the tub or the pool. They've also had opportunities to experiment with solids and liquids in the first few years of school. In this activity, students will be directed to think about liquids in a slightly different way, as they make, explore, and observe square bubbles. They will also focus on the behavior of molecules at the microscopic level and how this determines the properties of a liquids that we see and use everyday.

Theory

The molecular behavior of liquids allows them to flow, take the shape of any container, and makes them incompressible. The molecules in a liquid are more energetic than when they are a solid, so they can move more and are connected to other molecules, but they can slide past other molecules of the liquid. This allows them to flow and take the shape of containers. Something special about water is that the molecules are sticky. When water is in its liquid state, the molecules pull themselves into the tightest situation possible—a sphere.

Necessary materials:

- 6 square bubble makers
- 1 bottle of bubble fluid
- 1 rectangular container for dipping square bubble makers
- A funnel to use when pouring the bubble solution back into the bottle
- Plastic plates or plastic coated plates with a little bubble solution on the plate
- Straws
- Cloth or paper towels for spills
- The bubble solution we use is called beeboo. It is a concentrate and 1 bottle makes a gallon. We were able to buy it on Amazon.com.

With the square bubble maker, you can observe another special property of liquid water—its ability to stick to other molecules and other surfaces, stretching and creating a film. Students will be able to marvel at this in the square bubble maker.

Doing the Experiment

Before beginning the lesson: You will need to assemble the other five bubble makers so you will have six altogether. Set up a bubble dipping station in a central location in your room, but don't pour the liquid into the canister yet. You will be using this when you first talk to your class about the lesson. You may want small plastic coated plates to place under the square bubble makers, so students can carry the square bubble makers back to their cooperative groups without dripping soap on the floor.

Begin the lesson: Pull students together and tell them that they are going to work with bubbles today to learn more about the State of Matter called liquids. Ask your students what is in the bubble solution. Students might say soap with mostly water.

Tell them that they are going to review the properties of liquids and that is important to carefully observe the bubble solution as you get ready for the activity. Show them the bottle of solution and ask them some questions about it. Where does the solution sit in the bottle? It settles to the bottom. What if I tip the bottle sideways? Now it spreads out on the bottom of the bottle when it is sideways. Does it take the shape of the container? Yes! Now, tip the empty rectangular container slightly, and carefully pour the bottle of bubble solution in slowly to avoid making tiny bubbles. What is happening to the liquid now? It's getting poured into the container. That's right! You can pour liquids because they flow.

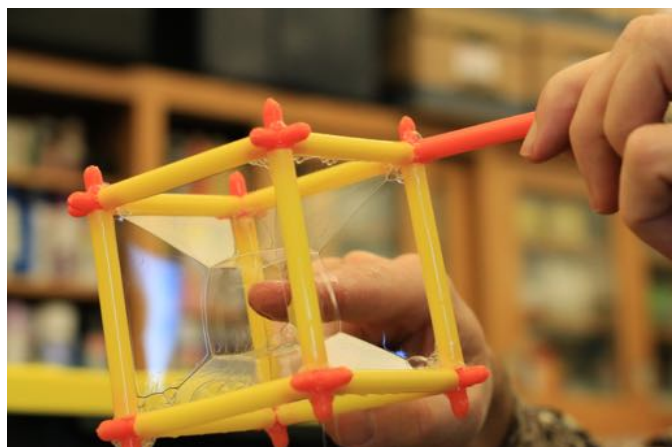
Show students the square bubble makers and explain that they have one bubble maker per group. They will work and make observations and suggestions as a group, but each student should have equal turns to experiment with the bubble makers. Show them with one bubble maker how they use the handle to put it in the canister making sure that they immerse the bubble maker in the bubble solution, so all sides are covered.

Send students to their small group areas, with a bubble maker, straws for everyone in the group, and some paper towels. They should choose one person from each group to come over to the bubble stations and dip the bubble maker into the canister. Have them put a plate, with a tiny bit of solution on it, underneath the bubble maker to keep the solution from dripping on the floor.

Have students experiment in their groups and then call on groups to share some of their findings.

Here are some things students might discover and if not, you can suggest they try:

- What shapes can they make or discover in the bubble maker? Triangles, squares, spheres, and unusual bubble shapes with edges. Can they break some of the bubbles and get different shapes?
- Can they blow bubbles inside the bubble maker with a straw? Could they make a square in the middle of the bubble maker? Is there a way to make the square bigger? How about making it smaller?
- Try putting your finger into the bubble. What do you need to do, so the bubble doesn't pop?
- What do they notice about the colors? What color do the bubbles get before they pop?



Checking out the square in the bubble and stretching the edges.

Extension 1: Be the liquid. Have students act as liquid molecules as they did in the first activity, *Be the Molecule*.

Summing Up:

This is a wonderful exploration for students to discover the special properties of liquid water.

For More Information:

CMMAP, the Center for Multi-Scale Modeling of Atmospheric Processes: <http://cmmmap.colostate.edu>

Little Shop of Physics: <http://littleshop.physics.colostate.edu>