

Wizards of Wright

Lesson: Bubbles and Water

Use WOW! Lesson Intro to begin.

<p>Background Info for Wizards:</p>	<p>The Bubbles and Water lesson will be a brief introduction to what cohesion and surface tension are.</p> <p>They will watch and participate in several activities that show them the dome shape that water takes.</p> <p>They will experiment with the shapes of bubbles.</p>
<p>Materials:</p>	<p>Beakers for water Bottle of Bubbles Bubble liquid Coins Different shaped wands (flower, triangle, multi, star, square) Empty Jug for Water Paperclips Pencils for students to keep. Pipettes Shallow plates Squeegee Station Cards Toothpicks Tray Wax paper Worksheets</p> <p>Supplied by the teacher: tables, paper towels, clipboards</p>
<p>Lesson Time: 60-80 minutes</p>	<p>Introduction: 5 minutes Wizard Demonstrations: 10-15 minutes Student Activity #1: 5-7 minutes Student Activity #2: 30-40 minutes Conclusion: 5 minutes</p>
<p>Learning Targets:</p>	<p>Students will be introduced to the terms surface tension and cohesion.</p> <p>Students will develop predictions and hypothesize the outcome of experiments.</p> <p>Students will analyze and draw conclusions from their data.</p>

Introduction for Students:
5 minutes

Part I:

Ask students what they already know about bubbles, when they've played with bubbles, etc.

Ask students what shape they normally see bubbles in.

Part II: Share some Facts

Have you ever blown through a straw and made bubbles in your water or milk? When you blow air into a liquid, you make bubbles. When the bubble gets too big, or bumps into something else, it pops.

Have you ever heard the word molecule or atom? Even if you've heard of them, you've never seen one, because they are so tiny they can only be seen with a microscope. Everything is made up of atoms – you, your friend, your desk, an apple, a chalkboard. Everything. And atoms make up molecules.

Let me give you an example. Take the word LEARN. (write that on the board and then circle each individual letter)

L E A R N

The word learn is made up of letters. Letters make up words and words are found in sentences. The letters are like atoms. Atoms make up molecules, and molecules are found in everything.

We are going to experiment with water today. Water is a molecule made up of atoms. It has 2 Hydrogen atoms and 1 Oxygen atom. (*show picture*)

The molecules in water are attracted to each other. This is called cohesion. When things are cohesive, they stick together. The molecules in water stick together, like sticking with or hugging your best friend.

The cohesion makes a water molecule strong, and the strength of the water molecule is called surface tension. We're going to do an experiment so we can see surface tension. It is what makes a bubble possible.

We see surface tension when you see a drop of water – it creates a little “bead” of water, like a little dome.

Wizard Demonstrations:
10-15 minutes

Wizard Demonstration 1:

1. Fill a cup of water as high as you can without it spilling.
2. Use a dropper or pipette to add the last few drops, so it's as full as you can possibly get it.
3. Have students estimate how many paperclips they think will fit into the cup before the water overflows.
4. Begin dropping the paperclips in one at a time.
5. Ask students if they can see the dome at the top of the water.
 - Keep track of how many you've dropped in.
 - Keep going until the water finally overflows.



What's Going On?

Remember cohesion? The drops of water are sticking to each other. As we added the paper clips the top of water formed a dome, the water molecules stuck to each other, instead of spilling out. Eventually, there were too many paperclips and the surface tension broken. That's when the water spills over.

Wizard Demonstration 2:

1. Lay out a piece of wax paper.
2. Use the pipette to put a few drops of water on the wax paper.
3. Ask the students to look closely at the drops.
 - What do you see?
 - What shape does it take? (round, circle, sphere)
 - Do you see the dome shape?
 - What is this called? (cohesion and surface tension)

Ask the students:

What would happen if we tried to separate the droplet?

4. Poke the water drop with a clean toothpick.
 - What happens?



5. Now let's try this. Poke the water drop with a toothpick that has been dipped in dish soap or bubble solution.
 - What happens?
 - Why do you think this happened?

What's Going On?

When you poke it with a clean toothpick, nothing happens, but, when you poke it with a soapy toothpick, the water spreads out.

We already know that drops of water stick to each other. This is called surface

	<p>tension. When soap is added to the water, the molecules of the soap spread over the water and break the surface tension.</p> <p><u>Wizard Demonstration 3:</u></p> <ol style="list-style-type: none"> 1. Pull out the small bottles of bubbles. 2. Blow a few bubbles, pointing out that you are using a round wand. 3. Discuss the shape and size of the bubble.
<p><i>Student Activity #1:</i> 5-7 minutes</p>	<p>You may want to demonstrate this first.</p> <p>After your demonstration, lay out pennies for the students to experiment with.</p> <ol style="list-style-type: none"> 1. Give each student a pipette. 2. Ask them to predict how many drops of water will fit on the penny without spilling. 3. Have the students test their predictions.
<p><i>Student Activity #2:</i> 30-40 minutes</p>	<ol style="list-style-type: none"> 1. Give students the Bubbles and Water worksheet. Have students attach it to their clipboard and put their name on their worksheet. 2. Explain that they will test making bubbles with different shaped wands. 3. Discuss the word prediction. 4. Show the students the different wands. 5. Have the students fill out the first column of their worksheet. What shape do they think the bubble will be when using different shaped wands? <p>Have tables and stations set up. The shallow pie plates should already be full of the bubble liquid. Each station will have a different shaped wand. (see attached sheet)</p> <p>Group students so a small group of 3 or 4 will travel from station to station together. Have the teacher help!</p> <p>Go over safety rules.</p> <ul style="list-style-type: none"> - Do not blow bubbles towards someone face and eyes. - Swinging the wand may give a good result, but they need to be careful of how close they are to other people. - Make sure they understand they will only go to one station before returning to their seat in the grass.

	<ol style="list-style-type: none"> 1. Send the students to their first station. (They should leave their pencils and clipboard at their seat in the grass.) 2. Give them a few minutes to blow bubbles with the wands only at that station. They will need to share and take turns. Remind them to observe shape and size. 3. Have them return to their seats and fill out the last two columns of their worksheet for the station they tested. 4. Make sure everyone knows where their second station is. 5. Repeat until all students have completed all 5 stations. <p>Gather everyone to review results. Hopefully, they noticed that all bubble shapes were circles, not matter the shape of the wand.</p>
<p>Conclusion: 5 minutes</p>	<ol style="list-style-type: none"> 1. Review with students that a water molecule has 2 Hydrogen atoms and 1 Oxygen atom. 2. Review with students that water molecules are attracted to each other because hydrogen and oxygen stick together tightly. This is called cohesion. 3. Review with students that the effect of this attraction is called surface tension. Surface tension is what makes the dome shape. 4. Review with students that no matter the shape or size of a wand, bubbles are round.

photos: <https://www.redbubble.com/people/yhtan74/works/8544655-water-droplet-on-smooth-surface>; <https://buggyandbuddy.com/science-experiments-kids-exploring-surface-tension/>