

Making Bubbles

OBJECTIVES

In this activity, students first investigate the differences between plain and soapy water. Students then use bubble wands to make bubbles and learn that bubbles are always round, regardless of the shape of the wand.

The students

- ▶ compare plain and soapy water
- ▶ blow bubbles using a traditional bubble wand
- ▶ examine bubble behaviors
- ▶ predict and observe the shape of bubbles blown with oddly shaped wands

SCHEDULE

Session I About 20 minutes

Session II About 40 minutes

VOCABULARY

bubble

MATERIALS

For each student

- 1 Activity Sheet 6

For each team of four

- 4 bubble wands
- 2 cups, plastic, 9-oz
- 1 pail
- 1 sponge
- 1 tub, plastic

All ready

For the class

- 4 basters
- 1 btl corn syrup
- 2 btls detergent, yellow
- 4 eggbeaters*
- paper towels*
- 4 spatulas*
- 1 straw
- water, tap*
- 4 whisks*
- 64 wires, plastic-coated

*provided by the teacher

All ready

PREPARATION

Session I

All ready

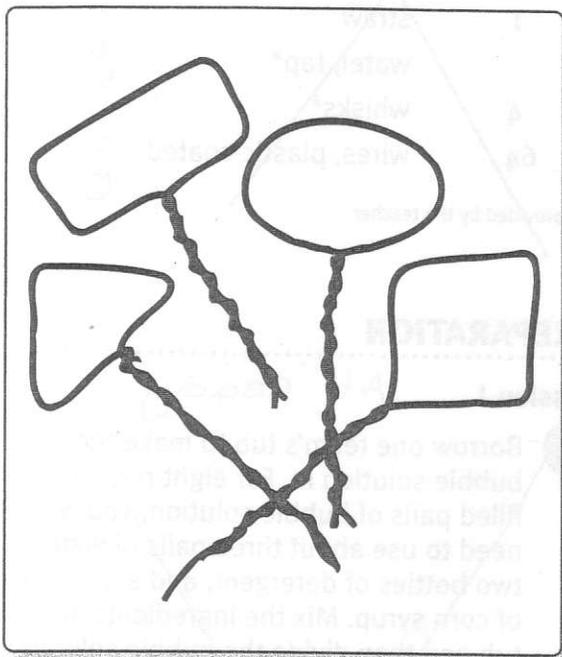
- 1 Borrow one team's tub to make the bubble solution in. For eight partially filled pails of bubble solution, you will need to use about three pails of water, two bottles of detergent, and a half-bottle of corn syrup. Mix the ingredients in the tub and then divide the bubble solution among eight pails.
- 2 Fill eight tubs half-full of water.
- 3 Each team of students will need a tub of water, a pail of soapy water, an eggbeater or a whisk, a spatula or a baster, two plastic cups, a sponge, and paper towels. The straw is for a teacher demonstration.

Session II

- 1 Make a copy of Activity Sheet 6 for each student.
- 2 If the bubble blowing is to be indoors, you may wish to purchase an absorbent drop cloth with one cloth side and one plastic side from a paint or hardware store. These

drop cloths are only a few dollars and will cover a large area and help absorb the soapy water when the bubbles pop.

- All ready
- 3 Shape the wires into an assortment of bubble frames, including rectangular frames, triangular frames, oval frames, and diamond frames, as shown in Figure 6-1. (Enough wires are included to use two in each wand.)
 - 4 Each team of students will need four bubble wands, paper towels, and a pail of soapy water (from Session I).



▲ Figure 6-1. A variety of bubble frames.

BACKGROUND INFORMATION

A **bubble** is defined as a thin skin of liquid surrounding a gas. Bubbles are usually made from soapy water. The thin skin of a soap bubble is composed of water and soap molecules. The gas inside a blown soap bubble is composed of carbon dioxide and other gases we exhale.

When soap is mixed with water, large numbers of soap molecules at the water's surface aggregate together. The soap molecules crowd the water molecules, vying for position at the surface. As the soap molecules push the water molecules

at the surface farther apart, they weaken the bonds between neighboring water molecules. Thus, soap reduces water's degree of cohesion and, therefore, its surface tension. As a result, soap helps water to be more elastic.

Bubbles burst because water eventually evaporates from the surface of the bubbles, making the soap film break. This is why when a soap bubble hits something dry, it pops. If a bubble lands on something wet with soap solution, it does not dry out as quickly, and so does not immediately pop.

The addition of corn syrup to water reduces water's rate of evaporation. Corn syrup is a substance that is strongly attracted to water. As a result, corn syrup prevents water molecules from evaporating, thereby further elongating the life of the bubbles.

Bubbles are always round, regardless of the shape of the wand they are blown with, because the soapy water that forms the skin of the bubbles tries to pull itself into as small a shape as possible, just like drops of water.

▼ Activity Sheet 6

Making Bubbles

1. Draw your bubble frame in the space below.

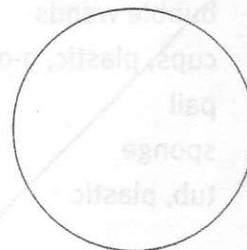
Drawings will vary.

2. What shape do you think your bubbles will be?

Predictions will vary.

3. What shape were your bubbles?

(round)



Guiding the Activity

Session 1

1

Ask, **Do you think soapy water has the same properties as plain water?**

Tell students that they are going to compare the properties of plain and soapy water. Distribute an egg beater or a whisk, a baster or a spatula, two plastic cups, a pail of soapy water, and a tub of plain water to each team. Have students compare the effect of these utensils in the pail of soapy water and in the tub of plain water.

Give students a short time to manipulate the water in both of their containers. Then ask, **How does soapy water feel?**

Write *soapy water feels slippery* on the board, saying the sentence aloud as you write it. Ask, **Does soapy water pour easily from one cup to another?**

2

Ask, **What happened when you stirred the two types of water with the whisk or the eggbeater?**

Invite students to watch you while you use a straw to blow bubbles in one of the tubs of plain water and one of the tubs of soapy water.

Ask, **What happened when I put the straw in the two types of water and blew?**

Write *soapy water makes bubbles* on the board, saying the sentence aloud as you write it. Ask students if they found any other properties of soapy water that they would like to add to the list on the board.

Additional Information

Students' answers will vary.

Remind students not to drink or taste the water.

Students can also manipulate the water with their hands.

Students should say that soapy water feels slippery.

Students should answer that it does.

Students should say some bubbles formed in the soapy water and a few bubbles formed, but popped right away, in the plain water.

Note: Depending on the abilities of your students, you may wish to let them use straws to investigate the water by blowing bubbles. Each student should have his or her own straw. Supervise carefully to be sure students blow, not inhale or taste.

Lots of bubbles formed in the soapy water. A few bubbles formed but then popped immediately in the plain water.

For example, some students may notice that soapy water smells different than plain water. Or, the soapy water may have a slight tint to it.

Remind students to wipe up any spills as they occur because floors can become quite slippery when they are wet.

Guiding the Activity

Tell students that in the next session they will look at how soapy water can be used to blow bubbles.

- 3 Tell the students that you are going to give each of them a bubble wand and a pail of soapy water, which they are going to use to make bubbles.

Distribute a copy of **Activity Sheet 6** to each student. Distribute four bubble wands, a pail of bubble solution, and a sponge to each team. Do questions one + two

on the activity sheet inside before going outside.

(outside.)

Session II

- 4 Hold up a bubble wand, and dip it in some bubble solution. Show students how there is now some soapy water stretched across the circle of the wand.

Carefully blow on the soapy water and make a bubble. Ask, **How was I able to make a bubble by blowing into the soapy water?**

Lead students to conclude that when you blew on the film of soap, the air made the bubble by pushing the soap away from the wand until the film of soap closed around itself.

Ask, **What is inside a bubble?**

Write the word *bubble* on the board, saying it aloud as you write it. Tell students that a **bubble** is a film of soap surrounding the air we breathe out. Explain to students that soap makes the surface of water stretchy so that it can form bubbles.

Additional Information

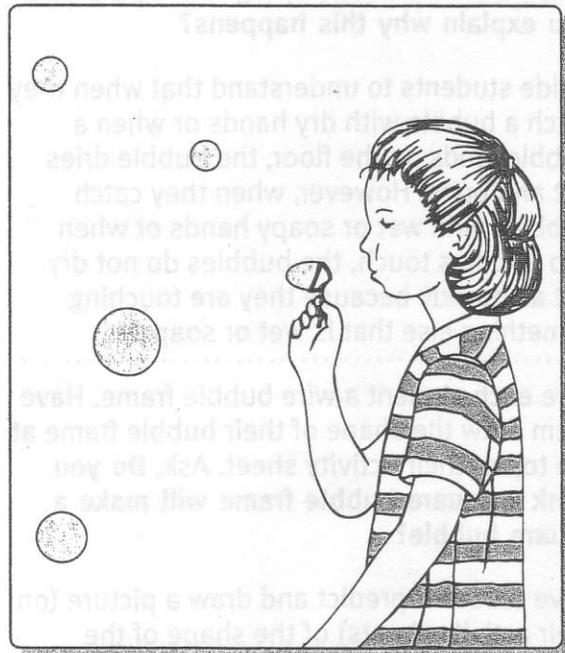
Note: Let the bubble solution sit undisturbed between sessions. Experiment with the solution yourself before distributing to students. Depending on the hardness of your tap water, you may need to adjust the amounts of detergent and corn syrup.

Borrow a bubble wand and a pail of soapy water from one of the teams.

Students may say that it is a little like blowing up a balloon.

Students should say that air is inside a bubble.

5 **5** Encourage students to experiment freely with their wands and soapy water for several minutes. Allow them to blow a number of bubbles before calling them together again (see Figure 6-2).



▲ Figure 6-2. Blowing bubbles.

Next, have students pair up and face their partners. Then tell students to blow bubbles toward their partners so that their bubbles hit their partners' bubbles. Ask, **What happens to the bubbles when one bubble touches another bubble?**

Tell students to watch what happens when the bubbles they blow fall to the ground. Ask, **What happens to the bubbles when they touch the ground?**

6 **7** Have students continue to work in pairs for this part of the experiment. Tell one student from each pair to blow a bubble while his or her partner tries to catch the bubble with dry hands. Ask, **Is it easy or hard to catch a soap bubble with dry hands?**

When two bubbles touch one another, they either bounce away from each other or they stick together.

Students should say the bubbles pop and leave a small puddle of soapy water behind.

Students should find that it is hard. As soon as they catch the bubble, it pops.

Guiding the Activity

Now tell the students to repeat this game of catch, only this time the catcher should wet his or her hands in the soapy water. Ask, **Is it easier to catch bubbles when you have water or bubble soap on your hands?**

Remind students that bubbles that touched the ground or dry hands popped right away, but bubbles that touched other bubbles or soapy hands did not pop right away. Ask, **Can you explain why this happens?**

Guide students to understand that when they catch a bubble with dry hands or when a bubble lands on the floor, the bubble dries out and pops. However, when they catch bubbles with wet or soapy hands or when two bubbles touch, the bubbles do not dry out as quickly because they are touching something else that is wet or soapy.

8 Give each student a wire bubble frame. Have them draw the shape of their bubble frame at the top of their activity sheet. Ask, **Do you think a square bubble frame will make a square bubble?**

Have students predict and draw a picture (on their activity sheets) of the shape of the bubbles they think they will make with their bubble frames.

Have students blow bubbles with their bubble frames. Tell students to draw a picture, in the space provided on their activity sheets, of the bubbles they made with their bubble frame. Ask, **What shape bubbles did your bubble frame make?**

Acknowledge that when the students dipped their bubble frames in the soapy water, the bubble film that formed on their frames was indeed the shape of the frame. For example, hold up a rectangular frame and dip it in soapy water. Ask, **What shape is the soap film on this bubble frame?**

However, tell students that when you make a bubble, the bubble frame is no longer holding the soap film in a square shape. The bubble gets its shape from the air inside it. All bubbles are round.

Additional Information

Students should find that it is easier to catch bubbles with wet or soapy hands.

Answers may vary.

Answers will vary. Do not confirm or deny any predictions at this point.

Students will find that no matter what the shape of their bubble frame, the bubbles were always round.

Students should say the soap film is rectangular, or square.