



Super Bubble Solution

(ScienceWorks bubble solution recipe)

Objective: Let's explore more about the science of bubbles. First, we'll make a recipe for super big, super strong bubbles. Then, you can construct an at-home version of ScienceWorks' bubble screen. Finally, we'll investigate the science of what makes bubbles work.

Difficulty Level: Easy (ages 6-14)/(2-6 may need help)

Materials:

- Dish soap (Dawn works best)
- Water
- 1-tablespoon glycerin
- Large shallow pan, like a roasting pan
- Cotton string
- 2 Drinking straws
- Scissors
- 2 film canisters
- Sharp knife
- Pen
- Black paper

Have you ever played with the soapy suds when you wash dishes, or have a bath? Maybe you like to make bubbles in your milk with a straw. At ScienceWorks, we love to investigate the science of bubbles.

Procedure:

1. Mix up the bubble solution with 2/3 cup of dish soap, 1 gallon of water, 1 tablespoon of glycerin and let it sit overnight. Pour the solution into a shallow pan, at least 1 inch deep.
2. Cut the bottoms off your film cans. You can use a sharp knife to puncture the can and then use scissors to cut through.
3. Measure a length of string so it is at least four times as long as your straw. Thread it through the straws and tie the ends together to make a loop.

4. Arrange the straws and string into a rectangle shape. Tighten the string if necessary, and cut off the excess. Hide the knot inside one of the straws. Your straws and string will look like this.
5. Measure another piece of string that is at least 3 times as long as your straws. Cut it, thread it through the top straw, and tie it in a double knot to make a handle.
6. Hold the frame by the handle and dip the straws and connecting string into the bubble solution.
7. Gently lift the straws and string out. You should have a bubble film suspended between the straws.
8. If you hold the frame in front of a suspended piece of black paper, you will be able to see the swirling colors in your bubble.
9. If you get your finger wet in the bubble solution, you can poke your finger through the bubble film without popping it. Why do you think you need your finger to be wet?
10. See if you can gently blow bubbles through the suspended film.

What's the Science?

Soap bubbles are made from layers of soap film that entraps a layer of gas. The soap film is made from a thin layer of water, sandwiched between two layers of soap molecules. One end of each soap molecule is attracted to water, and the other end repels it.

Surface tension—an invisible bond that holds water molecules together—is the secret to making soap bubbles. Where does the surface tension come from?

Water molecules are polar—that means that a molecule of water has a positive end and a negative end, like a magnet, and these charged ends attract each other and stick together. When the water molecules stick together, this creates surface tension.

Take a straw and put it into a glass of ordinary water. What do you predict will happen? Now, blow through it. Record your results in your science journal.

Now, take the straw and put it into a glass of soapy water. What happens when you blow through it? Why did the ordinary water not react the same as the soapy water?

The surface tension of ordinary water is too strong to make bubbles that will last unless air is actively being blown.

The detergent in our bubble solution relaxes the water's surface tension, and allows it to be stretchy. Now, the water reacts more like the skin of a balloon when air is blown inside, trapping the air there to create a soap bubble.

Explore More:

What bubble recipe makes the longest lasting bubbles? You can do an experiment and find out!

First, make your three solutions:

Solution #1: 1 cup of water, 1 tablespoon of detergent, like Dawn dish soap

Solution #2: 1 cup of water, 2 tablespoons of the same detergent as solution #1, 1 tablespoon of glycerin

Solution #3: 1 cup of water, 2 tablespoons of the same detergent as solution #1 and #2, 1 tablespoon of corn syrup

Make a chart in your science journal, with a column for each solution. Be sure you write down the ingredients of each solution, and be sure you use the same amount of water and detergent for each solution. You should have the same volume for each solution, even though they are made from different ingredients.

Take three long pipe cleaners. Bend the end of each pipe cleaner into a circle. You'll use one pipe cleaner bubble wand for each solution.

Go outside, and test your solutions. First, blow a bubble with solution #1 and catch it gently on the wet pipe cleaner ring. Use a stopwatch or cell phone timer feature to time how long the bubble lasts before it pops. Record the time in your journal (this may take some practice, don't give up!)

Repeat this procedure with solution #1 at least three times, but you can repeat it more than three times if you want to. Be sure to record the time for each bubble.

Repeat this procedure with the bubble wands for solutions #2 and #3.

When you have collected all your data, you can figure out the average amount of time each bubble solution lasted, by adding up the times for all the trials in the solution and dividing by the number of times you tested.

Which formula made bubbles that lasted the longest?

Can you think of a way to make a test to see which formula makes the biggest bubbles?

Take a picture and share it with us, so we can see what you made! For more engineering projects and science activities, [subscribe to our newsletter!](#) Have an adult send it to online@scienceworksmuseum.org or share it using the hashtag #ScienceWorksOnline