GSCCC STEAM

DIY Giant Bubble Maker

Supplies:

- Two wooden dowels (you could also use sticks with a similar diameter)
- Yarn (the rougher and uglier, the better – wool yarn works especially well)
- Glue (Aleene's Tacky glue works the best)
- *(Optional)* Washers

Directions:

1. Using the glue and the yarn, wrap the final 3" of the dowel with yarn.
2. Cut two pieces of yarn, one 100" long and the other 65" inches long.
3. Tie the shorter piece of yarn to the dowels, about ½" from the end.
4. *(Optional)* Thread a washer or two onto the longer piece of yarn.
5. Tie the longer piece of yarn to the dowels, right near where you tied the shorter piece.
6. Allow your glue to dry for at least a day before trying out your new bubble maker!

DIY Giant Bubble Solution

Supplies:

- 1 cup liquid dish soap like Joy or Dawn (not "ultra")
- 6 cups distilled water inside a clean container that has a lid
- *(Optional)* 1 tablespoon glycerin **OR** 1/4 cup light corn syrup

You can try different recipes; there are a multitude of them online. The glycerin is not essential, but it will give your bubbles more staying power. **Important:** mix up the solution gently (no foam!) and let your solution rest for a while after mixing it up (a day or so is perfect). It is recommended to get a new 5 gallon bucket with a lid that will be your designated bubble solution container. When you are done having bubble fun, simply put the lid on the bucket and store the solution in a cool place.

Directions:

1. Mix up your bubble solution according to the recipe and directions above. Regular store-bought bubble solution is typically not strong enough for giant bubble makers.
2. Find a large open, flat region that you can get a little soapy. A very light breeze is ideal; too much wind will destroy your giant bubbles.
3. Position yourself so the light breeze is at your back, and you can slowly walk backward if needed to make your bubble "grow." (This will be essential if there is no breeze.)
4. Dip your bubble maker in the solution, making sure the yarn gets saturated. DO NOT swirl the bubble maker around or otherwise make the solution foamy. You will degrade the effectiveness of the solution and possibly tangle your yarn.
5. With the tips of the dowels held together, raise the dowels out of the solution, allowing the excess to drain back into the bucket.

6. Slowly open up the bubble maker by drawing the dowels apart. Let the breeze fill the space in between, and your giant bubble is born! To try to close off your bubble, bring the dowels back together.

STE(A)M Subject(s):

Chemistry, Physics, Engineering

FAQ:

What exactly is a bubble? Why do bubbles form in the first place?
A bubble is just air wrapped in soap film. Soap film is made from soap and water (or other liquid). The outside and inside surfaces of a bubble consist of soap molecules. A thin layer of water lies between the two layers of soap molecules, sort of like a water sandwich with soap molecules for bread. They work together to hold air inside. Bubbles form because of the surface tension of water. Hydrogen atoms in one water molecule are attracted to oxygen atoms in other water molecules. They like each other so much, they cling together.

Why is rough yarn the best material?
The roughness of the cord you use to create the giant bubble maker is important, because when it is really rough, it provides more surface area for the bubble solution to cling to.

Why do I have to follow a recipe for making up the bubble solution?
You do not have to follow the recipe exactly, but if you use too much soap or too much water, the bubbles will not be able to maintain surface tension, and will pop before they get large.

Why are bubbles round?
The tension in the bubble skin shrinks to the smallest possible shape for the volume of air it contains. That's why even if it had a goofy shape before you sealed it, once sealed shut, the bubble will shrink into a sphere shape. Compared to any other shape, a sphere has the smallest surface area for the amount of volume. When you stretch your bubbles across contraptions like pipe cleaners in strange shapes or a hula hoop, bubbles cling to the sides as you dip into the solution, making the bubbles all sorts of shapes.

Why would we need to add glycerin (or corn syrup, according to some recipes)?
The insertion of these molecules into the bubble structure actually makes the bubbles stronger. Think of them as rebar inside concrete when building a building. Or the strips of metal inside radial tires. They help to provide more structure and support. Once incorporated into the solution, it adds an oily film that slows down the evaporation process, so you get longer-lasting bubbles!

Why is it important to let the bubble solution rest after mixing it up, and to not make it too frothy when using it?
The introduction of air into the solution makes your bubbles weaker, which means you may not be able to form giant bubbles.

Why do bubbles pop? Why do bubbles not pop when I catch them on my already soap-covered hand?
Bubbles pop when the water between the soap film surfaces evaporates. But if your hand is already covered with solution, the surface of the bubble may not evaporate, allowing the bubble to linger on your skin.

My bubble solution worked great yesterday, but today, I can't get the bubbles to grow more than a foot or two long. What's going on?

It could be that your weather conditions have changed. If it is too breezy, the wind could be tearing apart your bubbles as they are forming. Or the humidity or temperature may have changed. When it is very hot and/or dry, your bubbles may suffer. Or if your bubble solution has been left uncovered, some of the water may have evaporated.

Related Badge(s) or Journey(s):

(B) Home Scientist (A) Water

Additional Resources:

Chemistry: http://chemistry.about.com/od/bubbles/a/bubblescience.htm

Bubble inside a bubble: http://www.stevespanglerscience.com/lab/experiments/bubble-inside-a-bubble/

Advanced – Science of bubbles: http://www.popsci.com/article/science/science-bubbles