

Quick and Easy Bubble Experiments to Share with Your Kids

By Aurora Lipper

If you pour a few droplets of water onto a sweater or fabric, you'll notice the water will just sit there on the surface in a ball (or oval, if the drop is large enough). If you touch the ball of water with a soapy finger, the ball disappears into the fibers of the fabric! What happened?

Soap makes water "wetter" by breaking down the water's surface tension by about two-thirds. The force that keeps the water droplet in a sphere shape is called *surface tension*. It's the reason you can fill a cup of water past the brim without it spilling over. Water becomes "wetter" because without soap, it can't get into the fibers of your clothes to get them clean. That's why you need soap in the washing machine.

Soap also makes water stretchy. If you've ever tried making bubbles with your mouth just using spit, you know that you can't get the larger, fist-sized spit-bubbles to form completely and detach to float away in the air. Water by itself has too much surface tension, too many forces holding the molecules together. When you add soap to it, they relax a bit and stretch out. Soap makes water stretch and form into a bubble.

The soap molecule looks a lot like a snake – it's a long chain that has two very different ends. The head of the snake loves water, and the tail end loves dirt. When the soap molecule find a dirt particle, it will wrap its tail around the dirt and hold it there.

To make the best bubbles, you'll first need to make the best bubble solution. Gently mix together 12 cups cold water in a shallow tub with one cup green Dawn (or clear Ivory) dish soap. If it's a hot dry day, add a few tablespoons of glycerin. (Glycerin can be found at the drug store.) You can add all sorts of things to find the perfect soap solution: lemon juice, corn syrup, maple syrup, glycerin... to name a few. Each will add its own properties to the bubble solution. (When I teach this class, I have buckets of each variation along with plain dish soap and water so we can compare.)

The absolute best time to make gigantic bubbles is on an overcast day, right after it rains. Bubbles have a thin cell wall that evaporates quickly in direct sun, especially on a low-humidity day. The glycerin adds moisture and deters this rapid thinning of the bubble's cell wall.

Zillions of Tiny Bubbles can be made with strawberry baskets. Simply dip the basket into the bubble solution and twirl around. You can also use plastic six-pack soda can holders.

Trumpet Bubbles are created by using a modified a water bottle. Cut off the bottom of the bottle, dip the large end in the soap solution, put the small end to your lips and blow. You can separate the bubble away from the trumpet by rolling the large end up and away from your bubble.

Bubble Castles are built with a straw and a plate. First, spread bubble solution all over a smooth surface (such as a clean cookie sheet, plate, or table top). Dip one end of a straw in the bubble solution and blow bubbles all over the surface. Make larger domes with smaller ones inside. Notice the bubble changes shape and size when it connects with another.

Stretch and Squish! Get one hand-sized bubble in each hand. Slap them together (so they join, not pop!). What if you join them together s l o w l y?

Light Show is one of the favorites when I teach this class. Find a BIG flashlight and stand it on end (or use a thin one with three clothespins). Rub soap solution all over the bottom of an uncolored plastic lid (like from a coffee can). Balance the lid, soapy side up, on the flashlight (or on the spring-type clothespins). Blow a hemisphere bubble on top of the lid. Find a dark room, turn on the flashlight, and blow gently along the side of the bubble and watch the colors swirl.

Weird Shapes are the simplest way to show how soap makes water stretchy. Dip a rubber band completely in the soap solution and pull it up. Stretch the rubber band using your fingers. Twist and tweak into all sorts of shapes. Note that the bubble always finds a way of filling the shape with the minimum amount of surface area. Make a Moebius Bubble by cutting open a thick rubber band or 1/2" thick ribbon, give one end a half-twist, and reattach it together.

Polygon Shapes allow you to make square and tetrahedral bubbles. Create different 3D shapes by bending pipe cleaners made into cubes, tetrahedrons, or whatever you wish. Alternatively you can use straws threaded onto string made into 3D triangular shapes. Notice how the film always finds its minimum surface area. Can you make square bubbles?

Gigantic Bubbles Using the straws and string, thread two straws on three feet of string and tie off. Grasp one straw in each hand and dip in soap solution. Use a gentle wind as you walk to make BIG bubbles. Find air thermals (warm pockets of air) to take your bubbles up, up, UP!

Really, Really, Really Big Bubbles Gather together a ½" x 36" wooden dowel, one eye-screw, 7-8' lightweight chain, and a large nut that slides easily over the dowel. Pre-drill a hole for the eye-screw at the end of the dowel. Slide the nut down along the length of the dowel. Attach one end of the chain (using pliers) to the eye-screw, then to the bolt (about 18" away), and then drape about 5-6' before attaching the end back to the eye-screw, making a large ring of chain that can be opened and closed with the sliding action of the bolt. Dip the bubble wand into soap solution with the ring closed, raise it up out of the bucket, open the ring, walk a few feet until a large bubble forms, then close the ring. (You can make a lighter-weight version by substituting crocheted lace for the chain and a lighter ring for the weight.)

Kid-In-A-Bubble In a child's plastic swimming pool, pour your best bubble solution. Lay a hula hoop down, making sure there is enough bubble solution to just cover the hoop. Have your child stand in the pool (use a stool if you don't want to get your feet wet), and lift the hoop! For a more permanent project, use an old car tire sliced in half lengthwise (the hard way) to hold the bubble solution.