

Bubbles

Materials Needed

Bubble solution (homemade or commercial)
Variety of bubble wands (homemade or commercial)
Containers to hold bubble solution
Straws

Purpose of the Study of Bubbles

A bubble is a thin, elastic membrane of liquid enclosing gases and is an example of a state of equilibrium between air pressure and surface tension. Bubbles are spherical in shape because the soap film stretches to take up the least amount of surface area possible. Children will have the opportunity to notice that no matter the shape of the wands they use, their bubbles are always spherical. Because light bends when it strikes a bubble, a myriad of colors are displayed on its surface. The colors vary as the soap film changes in thickness, and a black dot appears on each bubble just before it bursts. As children experiment with bubbles, they may notice the myriad of colors as the light strikes their bubbles. If they observe a bubble in motion, they may notice that it changes colors. However, they will probably not construct the relationship between the thickness of the soap film and the variations in the colors.

Experimenting with bubbles made of soap film gives children an opportunity to construct relationships that will serve as a practical foundation for later conceptual understanding. For example, they will have the opportunity to construct relationships about light and color, surface tension, and chemical composition. Some of the cause and effect relationships children can construct are:

- the shape and size of bubbles in relation to the quantity and force of air forced through the soap film;
- the way bubbles react when pierced with objects covered with soap film in relation to those that are not;
- the way the soap film reacts on wet surfaces in relation to the way it reacts on dry surfaces (bubbles form on wet surfaces and burst on dry);
- the quantity of bubbles resulting from using a blowing instrument with many small holes in compared to a wand with only one hole;
- the staying power of the bubble in relation to the amount of soap mixed with the water (if children are making their own bubble solution).

In general, this mental process of making relationships is the basis for intellectual development and enables children to become more intelligent and to figure out new ways to solve problems.

Beginning the Study of Bubbles

Because many children have had experiences with bubbles, an easy way to introduce bubbles is to set the materials out during activity time and invite children to experiment. One way to begin is to have the children place solution directly on the table or in a paper cup. The children blow bubbles using a straw. Another way is to provide instruments that can be dipped into the solution. Children can use commercial or homemade instruments such as bubble wands, berry baskets, bubble pipes, or straws.

Extending the Study of Bubbles

When children have satisfied their need to explore with the first material you have provided, we suggest you experiment with the following activities.

- Making Hand Bubbles

If you dip your hands into bubble solution, you can make bubbles by blowing through openings you create with your hands. For example, if you place your thumb and forefinger together to form a circle, you can blow bubbles into the air or onto a wet table. You can place a straw in bubble solution on your palm and blow bubbles on your hand. Ask the children if they can figure out ways to make bubbles using their own hands. You can extend this activity by asking if they can figure out ways to make bubbles with other parts of their body or with more hands.

- **Making Bubble Wands**
Provide pipe cleaners and invite children to make their own wands. Young children often make square, triangular, or heart-shaped bubble wands and are surprised when the bubbles come out spherical! When children are ready to try investigating other avenues, you can invite them to think of other materials they could use to make bubbles. A few suggestions are kitchen utensils, berry baskets, and floral wire. Through experimenting children will discover that the key to a good bubble wand is an enclosed shape. That is, shapes that are open on one end, such as a U-shaped or V-shaped wand, will not work.
- **Making Bubble Clusters**
Cut a hole in the bottom of a tall plastic cup and cover the mouth with different kinds of fabric held in place with a rubber band. We suggest you begin with three cups each covered with a different mesh fabric, one tulle or net, one aida cloth, and one cheese cloth. Dip the cloth end in the bubble solution and blow through the hole in the bottom of the cup. You will see a cluster forming on the outer side of the fabric. The more you blow, the longer the cluster becomes. The density of the fabric determines the number of bubbles generated. Children can construct the relationship between the size of the holes in the fabric and the number and size of the bubbles.
- **Making Bubble Windows**
Run yarn through two straws and connect the ends of the yarn, leaving it loose enough to form a rectangle when you hold the straws opposite one another. Submerge the rectangle in the solution. When you remove it, a film will fill the inside like a windowpane. If the tension is decreased by moving the straws toward one another, the yarn will be drawn toward the center of the rectangle giving it an hour glass appearance as the film condenses to take up the least area possible. Children can gently manipulate the film and observe the results. For example, they can twist the straws and watch the film undulate, or blow gently against the film and watch it expand and spring back to its original shape.
- **Placing Children Inside Bubbles**
To make a bubble around a child, place a tub inside a swimming pool and ask the child to stand in it. Pour bubble solution inside the pool and outside the tub. Place a Hula Hoop into the solution. Being careful not to brush the sides of the pool with the hoop, pull it straight up. A soap film will be drawn up with the hoop and will surround the child.
- **Making bubble solution**
Of the many different bubble solution recipes, the following is one we have found to be successful.
1/3 Cup of dishwashing detergent (we use Ultra Dawn with no additives)
4 Cups water
1 Tablespoon glycerin (obtainable in pharmacies)

Older children may want to experiment with the solution to figure out what makes the best bubbles. They might want to change the proportions and/or exchange the glycerin for white syrup, sugar, or Jell-O. These products make the bubbles tougher. They cause the molecules to draw closer together enabling the bubble to stay moist for a longer period of time. Drying out or bumping into something dry causes bubbles to burst. This is why bubbles work best in high humidity. Some teachers mist their rooms with a spray bottle the night before they are going to do bubble activities.

Safety tips

A tile or linoleum floor gets very slippery. Some teachers put down a drop cloth under the table on which the children are working. Some teachers recommend setting up the bubble blowing on a carpeted floor. They suggest the bubble residue will dry in the carpet and can later be vacuumed up.

Some teachers attach the containers filled with bubble solution to the table with duct tape so the solution does not spill on the floor.

If children are having a problem sucking up the solution instead of blowing it out, you can cut a small diamond on one side near the mouth of the straw. This will prevent liquid from coming up the straw into the mouth and does not interfere with blowing.

Clean-up tip

We have found a solution of vinegar and water will cut the bubble solution at clean up time!