



Giant Bubbles

Amount of time Demo takes: 2 minutes

Try this at home!

Lesson's Big Ideas

- Bubbles are round because of the surface tension in the liquid in the bubble. The atoms in bubble solution like to stick together--the inside surface of the bubble and the outside surface of the bubble are both trying to stay close to the thin film of solution that makes the bubble.
- When you make a bubble, the air inside it is pushing out equally in all directions. The bubble breaks when the surface tension of the bubble solution is broken.
- Bubbles reflect light. Differences in the thickness of the bubble cause the light to be refracted into different colors. Light can be reflected off of both the inside and outside of the film and the combination of those reflections determines the color seen by the eye(s).

Materials

- Kiddie pool (1) and cinder block to place in center
- 6 tablespoons (2 oz) of Glycerol or Glycerin
- 1 gallon distilled water (1/day)
- 80-120 oz of commercial bubble solution, The best is Mr. Bubbles from Tootsie Toy [not the bubble bath!]. As a second choice try Super Miracle Bubbles. (Pustifix or Gazillion Bubbles work extremely well, but are more expensive) (1/day)
- 24 oz of classic Dawn Original Scent (non Ultra) (1/day)
- Hula hoop, large and small (2)
- Rugs (2)
- 5 gallon bucket (1)
- Paper towel
- Rubber gloves

SAFETY!

- Area will get slippery; place rug out for volunteers to step onto when they get out of the pool.

Background Information

- Soap decreases water's surface tension to approximately $\frac{1}{3}$. Soap does not strengthen bubbles; it stabilizes them, known as the Marangoni effect. As the soap film stretches, the surface concentration of soap decreases, which in turn causes the surface tension to increase. This increase in inward tension keeps the bubble together. Thus, soap works by selectively strengthening the weakest parts of the bubble, preventing any one part of the bubble from stretching excessively.
- The surface tension of pure water is great enough such that this inward force will pull the water together into drops and not create bubbles.

Setup Instructions

1. Lay out the two rugs where the demonstration will be set up and tape them down with gaff tape to avoid tripping.
2. Place the pool in the center of the rugs.
3. Add the entire gallon of distilled water to the baby pool.
4. Stirring slowly, to not make lather, add in the 24 oz of the Dawn soap.
5. Stir in 6 tablespoons (2 oz) of Glycerin.
6. Add the 80-120 oz of quality commercial bubble solution.
7. Set cinder block into the center of the pool for participants to stand on.
8. Use hula hoop as "wand" to make bubbles.

Instructional Procedure

1. Have volunteer stand in the kiddie pool on a brick, place the hula hoop around them in the pool, and pull up to create a bubble around them.
2. Give the participants a few facts about bubbles as you make bubbles around them.
3. There are extra supplies in the kit for young participants to make their own bubbles with wands.

Tips & Tricks

- If the bubbles aren't strong enough add glycerol
- Mix solution slowly, you don't want too many bubbles to form in the pool
- If there are a lot of bubbles in the pool scoop them out and it will be easier to make giant bubbles.
- This demonstration will require a lot of bending and movement. If you get tired, have the student create the bubble around each other.

- If foam builds up in the pool, it will affect the bubbles. Skim the foam off of the bubble solution and place it in the 5 gallon bucket. You may need to rinse out the bucket if you create too much foam.

Assessment Questions

- Why are bubbles round?
 - Bubbles are round because of the surface tension in the liquid in the bubble. The bubble breaks when the surface tension of the bubble solution is broken.
- Why do soap bubbles have an iridescent color?
 - Bubbles reflect light. Differences in the thickness of the bubble cause the light to be refracted into different colors. Light can be reflected off of both the inside and outside of the film and the combination of those reflections determines the color seen by the eye(s).
- Why can't a bubble be made with plain water?
 - The surface tension of pure water is great enough such that this inward force will pull the water together into drops and not create bubbles. You need the soap to decrease the surface tension.

Careers & Real-World Applications

- **Careers:**
 - Chemical Analysis Technician
 - R&D Inkjet Formulator
 - Chemical Engineer

Clean Up

- If on tiled floor, be aware of how slippery the floor may become.
- Rugs should be dried out before being rolled up. Rugs can be used for multiple events before having to be disposed of.
- **Recycle** empty plastic containers from creating the bubble mixture.
- Clean up between demos if needed. When completely finished gather all materials listed for this demo and make sure everything is accounted for. If something was used up, broken, or damaged, let someone know so it can get replaced or fixed.

References

- <http://www.eclectichomeschool.org/articles/article.asp?articleid=149>

Related Next Generation Science Standards

- K-5
 - 1-PS4 Waves and their Applications in Technology for Information Transfer
 - 2-PS1 Matter and Its Interactions
 - 3 Motion and Stability: Forces and Interactions
 - 4 PS4 Waves and their Applications in Technology for Information Transfer
 - 5-PS1 Matter and Its interactions
- 6-8
 - MS-PS1 Matter and Its Interactions
 - MS-PS2 Motion and Stability: Forces and Interactions
 - MS-PS4 Waves and their Applications in Technology for Information Transfer