**The Art of Making Bubbles**

**Materials**

* Bubble solutions
  + Solution 1: 2 parts water, 1 part dish detergent
  + Solution 2: 2 parts water, 1 part dish detergent, *1 part glycerin*
* Mix all the ingredients together and let it sit (preferably overnight)
* Containers for the solutions
* Something to make bubbles with (recommend using pipe cleaners, or the top ½ of a plastic bottle)

**Procedure**

1. Make bubbles!
2. Compare and contrast the bubbles made from each solution (how long they last, shape, color, etc)

**What’s happening?**

How do bubbles work?

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.

Why are bubbles round?

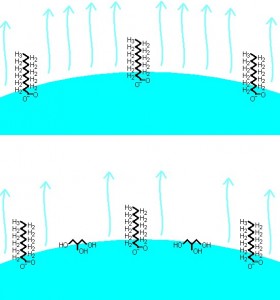
Bubbles can stretch and become all kinds of crazy looking shapes. But if you seal a bubble by flipping it off your wand, the tension in the bubble skin shrinks to the smallest possible shape for the volume of air it contains. That’s why even if it had a goofy shape before you sealed it, once sealed shut, 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.

Why do bubbles pop?

Other than being poked or landing on something sharp, bubbles pop when the water between the soap film surfaces evaporates. To note, when it’s cold, those molecules take longer to leave. If you blow a bubble on a calm winter day, a bubble can even freeze and last for several minutes before it wisps away.

Why does glycerine make the bubble last longer?

Water is continuously evaporating from a soap bubble. As a result of this process the soap film becomes thinner and thinner until it breaks. The glycerin in the bubble mixture will stay right at the soap film surface, and will therefore reduce the number of water molecules at the surface. As a result the evaporation will be slower in a soap film with glycerin, because it is always water from the surface that disappears from the soap film during the evaporation process. The glycerin molecules attract water molecules and form weak chemical bonds, the so-called hydrogen bonds. These bonds make it more difficult for the water molecules to leave the surface. One can say that it gets more difficult for the water to evaporate, since the glycerin is pulling the water back into the soap film. For these reasons soap bubbles will generally have a longer life span if they contain glycerin.



**Top:** Soap film without glycerin. The film only contains water and soap molecules. The evaporation of water from the film is relatively large.

**Bottom:** Soap film with glycerin. The glycerin is positioned at the surface of the film and thereby inhibits the evaporation of water.

It is said that the glycerin makes a soap film suppler, more flexible. The explanation is supposedly that the glycerin molecules will go in-between the soap molecules. When the film is bending, the long (and charged) soap molecules will move around the smaller glycerin molecules instead of moving around other big (and charged) soap molecules. This gives that soap molecules more freedom of movement and therefore makes the film more flexible.

According to many soap bubble recipes, the bubble mixture should be prepared hours before use. An explanation for this could be that the glycerin needs time to become packed in-between the soap molecules.

*Sources:* [*http://soapbubble.dk/english/science/glycerin-in-soap-bubble-mixtures/*](http://soapbubble.dk/english/science/glycerin-in-soap-bubble-mixtures/)

[*http://www.kidsdiscover.com/teacherresources/bubbles-for-kids/*](http://www.kidsdiscover.com/teacherresources/bubbles-for-kids/)