



explora!



The “Best Bubble”

What You’ll Need:

- Liquid soap - try a few different types or brands (make sure they are safe for your skin)
- Things to add: glycerin, corn syrup, food coloring, scented oils, like lavender
- Several plastic tubs, like yogurt or to-go food containers
- Bubble wands
- Water

Here’s What to Do:

- Describe what you mean by “best bubble.” Chances are, ‘the best’ might mean different things to different people.
- As you discuss, consider color, how long it lasts, size, reflectivity, stickiness, and more.
- Mix up some different mixtures of water, soap, and other ingredients listed under ‘things to add.’
- How many different kinds of bubbles can you make?



What’s Going On?

Soap makes bubbles easily, because each soap molecule has a water-loving, or *hydrophilic* end, and a water-repelling, or *hydrophobic* end. These molecules form a layer that can be filled with air like a balloon.

Your “best” bubble depends on the *solution*, or the mixture of water and other ingredients, that you create. Bubbles that last a long time have a low *surface tension* that keeps the bubble from popping. Glycerin in the bubble solution slows the evaporation of the water.

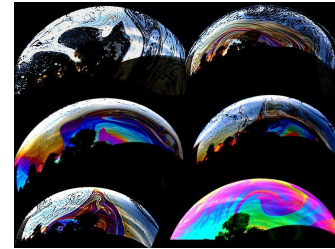


Photo credit Brocken Inaglory

Career Connections

Bubbles can be used to learn how gases and liquids move. The study of how fluids behave in movement is called **fluid dynamics**. Engineers, meteorologists, oceanographers, and more use fluid dynamics to better understand the world.



Feel the Heat!

What you'll need:

- Medium plastic container, like a yogurt tub or to-go container
- Ice and water
- Various objects made of different materials: crayon, pencil sharpened at both ends, plastic spoon or straw, metal spoon or wire, wooden spoon or stick
- Tape
- Stopwatch or timer

Here's what to do:

1. Use tape to secure each utensil to the inside of the container so they stick out at equal heights.
2. Fill the container with equal parts ice and water, so the bottom of all utensils are submerged. Keep the water level below the tape, so it doesn't unstick.
3. Ask: which objects will be the first to become cold?
4. Once every minute, touch the top of each object. Write down which ones feel cold. Which objects became cold the fastest? Was this your prediction?

Now try this!

Try the same experiment by filling different kinds of cups (plastic, metal, glass, ceramic, wood) with ice. Make a prediction - which ones will feel cold the fastest? Time how long it takes for the rim to feel cold.

The science behind it: Heat is a kind of energy given off by atoms, resulting in heat transfer from one object to the next. When you feel that something is cold, it is because your body's heat is leaving your hand and moving into the cooler object. When heat moves from one object to another, it's called conduction. It's easier for heat to move into certain materials. Materials that don't allow heat to transfer very quickly are *insulators*.

Connections to everyday life: Heat transfers through air and water - but one conducts heat better than the other. An insulated jacket (insulation is filled with air) keeps heat near your body, while a cold swimming pool moves heat away from you, because water is a better conductor. How could you test this?

