Minds in Motion

Bubble-ology

Activity Rundown:

It's time to play with bubbles… FOR SCIENCE! In this activity, we'll be exploring if bubbles can be blown in different shapes, testing out some different bubble challenges, as well as making our own bubble solution!

You will need:

- Water
- Dishwashing liquid
- Container
- Shallow pan/plate (Pasta plates worked great for us!)
- Straws
- Pipe-cleaners
- Optional: glycerin or light corn syrup

Let's do it!

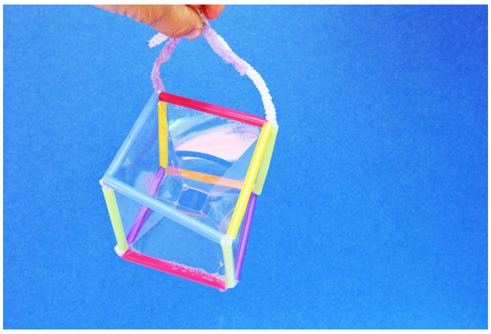
Time to make your very own bubble solution! To do this, you'll need **1 cup of dishwashing liquid for every 3 cups of water**. If you want to make your bubble solution even better, try adding ½ cup of light corn syrup! Add all these ingredients to a bowl and carefully mix until combined.

(For further experimentation, try coming up with your own bubble solution recipe to test! Try combining equal parts water and soap, or even try using different soaps!)

Geometric bubbles:

1. Time to test if bubbles can be blown in shapes besides circles. For this, you will need some pipe-cleaners and a bit of creativity!
2. To make a bubble wand, only use ⅓ of the pipecleaner to bend and shape. This way, you will still have a good handle to use for dipping.

3. Start off with 2-dimensional shapes, like squares, hearts, and triangles. How well are bubbles formed with these shapes as compared to a circle bubble wand?
4. Time for something a bit harder! Using additional pipe-cleaners, try making your bubble wand in the shape of a cube or a pyramid!



Need help making bubble wands? Check out this great instructional video: https://www.youtube.com/watch?v=2c3oL1fYZC4

Bubble challenge #1:

1. Your first bubble challenge is pretty easy: Which surfaces allow bubbles to sit for the longest time? These are the surfaces we want you to test:
    a. Kitchen counter
    b. Cutting board
    c. Bathtub or sink
    d. Your own hand
2. Before setting out to blow your bubbles, make some hypotheses (predictions)! Out of the four surfaces listed above, which ones will work the best?

3. Test the surfaces! Do your predictions match your results? Are there any other surfaces you think may allow bubbles to sit for even longer?
4. Come up with a way to allow for the bubbles to sit for an even *longer* amount of time. (Hint: It involves wetting the surface beforehand! But with what?)

Bubble challenge #2:

1. Can you blow a bubble INSIDE of another bubble?! Start off by blowing a large bubble on one of the better surfaces determined in challenge #1.
2. Using a straw, try to blow a small bubble inside the bigger bubble. Do you predict that it will work? What can you change about the situation that might make it work? (Hint: It involves wetting the straw! But how much of the straw has to be wet?)

Bubble challenge #3:

1. Can you catch a bubble with your bare hands? For this experiment, you'll need your hands to first be dry, then damp, then soaking wet! Predict beforehand which method you think will work best.
2. With dry hands, blow a bubble and try to catch it. Does it work?
3. Next, dampen your hands under a sink with warm water. Does this work better or worse? Try again with cold water. Is there a difference?
4. Finally, get your hands really wet and try catching a bubble!
5. Can you think of another way of making bubble catching easier? (Hint: It may involve dipping your hand in the bubble solution!)

Background:

- A bubble is just air wrapped in a soap envelope! The soapy envelope is made from soap and water (aka the bubble solution). 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.

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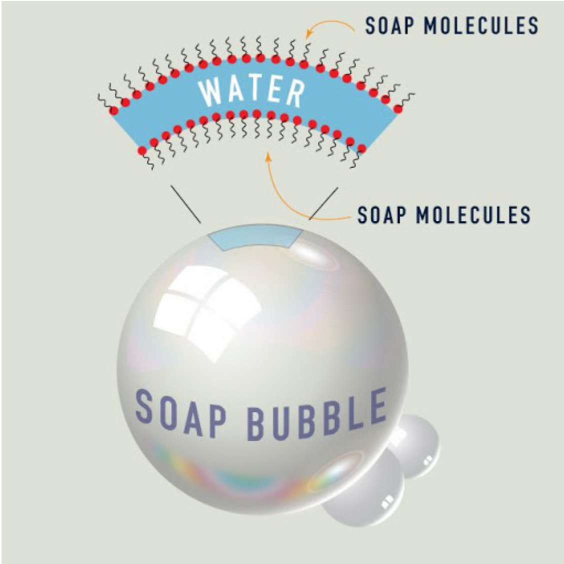

- Soap molecules have one end that repels water (**hydrophobic**), and one that attracts water (**hydrophilic**), and these molecules move to the inner and outer surfaces, moving their water-repelling ends out into the air, and their "heads" towards the watery layer.
- Once sealed and set off into the air, a bubble will always form a **spherical shape**. This is because there is an attractive force called **surface tension** that pulls molecules of water into the tightest possible groupings. And the tightest possible grouping that any collection of particles can achieve is to pack together into a sphere. Of all possible shapes — cubes, pyramids, irregular chunks — a sphere has the smallest amount of outside area.
- Other than being poked or landing on something sharp, bubbles pop when the water between the soap film surfaces **evaporates**. Evaporation takes place when a liquid changes into a gas due to a change in temperature or pressure. Because the layers of the bubble are so thin, this can happen very quickly! By adding glycerine or corn syrup, they may be able to last longer by toughening up the layers of soap.
- Different surfaces have different textures, some of which pop bubbles easier than others! You can observe this by dropping water onto a surface and seeing whether it forms big beads (**hydrophobic**) or spreads out in thin sheets (**hydrophilic**). Whether a material is hydrophobic or hydrophilic depends strongly on its surface roughness. Some materials, such as sandpaper, have **macroscopic** surface features, meaning you can feel the bumps and see them with your naked eye. Other materials, however,

have **microscopic** ones. Even if the material looks and feels smooth to you, it might have very tiny bumps or pores!

- By putting down a thin layer of water it forms a thin layer on top of the solid surface, preventing the bubble from touching the solid directly. This allows for the bubble to last for longer!
- Bubbles get their colour from **light waves** reflecting between the soap film's outer and inner surfaces. The distance between the layers gets smaller as the water evaporates, making the colors change. Bubbles can also reflect what's around them, like the faces peering at them.

Resources:

https://www.kidsdiscover.com/teacherresources/bubbles-for-kids/

https://robertwolke.com/what-einstein-didnt-know/why-are-soap-bubbles-round/

Reach out!

We would love to hear from you about all the amazing STEM projects you are doing at home! Show us your finished products on any of the following social media platforms by tagging us or by using the following hashtags. We hope these projects have brought some excitement to your day during these difficult times.

Let us know how we did! Please click here to fill out a short survey on how well we did and what you would like to see more of in the future. Thank you!

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