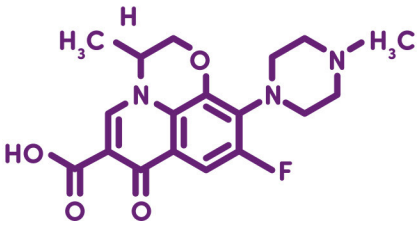
science museum OKLAHOMA

CHEMISTRY DAY



American Chemical Society's National Chemistry Week is October 16-22, 2022. We celebrate Chemistry Day on November 4th here at SMO, but the goals of Chemistry Day and National Chemistry Week are the same — to promote the value of chemistry in everyday life, or as we like to say, reveal the wonder and the relevance of chemistry!

Teacher's Resource Guide

Here are three activities that you can use at home or in your classroom to celebrate chemistry before or after your trip to Science Museum Oklahoma.

Chemistry surrounds us. As we breathe in and out we each take in a complex mix of chemicals we call our atmosphere. It can be easy to overlook this everyday wonder, but if we slow down, we might notice how incredible the chemistry of gases can be. Here are just a few examples:

1. Around 80% of our atmosphere is nitrogen. It is an odorless colorless gas. While it is not very reactive and inert, it is still a very important part of amino acids found in all living things.

2. The molecules of gas in the atmosphere get farther and farther apart as you get higher above the ground. 99% of the gas in the atmosphere is less than 20 mile above the ground.

3. Organisms can also make gas. Yeasts are single celled organisms that convert carbohydrates into carbon dioxide gas. Did you know the yeast makes the gas that makes your bread look like it is full of tiny bubbles?

4. Oxygen wasn't discovered until 1774, only two years before the Declaration of Independence. It was discovered by an English Chemist named Joseph Priestly. He didn't call it oxygen. That name was given to it by a French chemist named Antoine Lavosier. He named it oxygen because of the chemical reactions he was studying. Oxygen means acid maker in Greek.

5. The largest free floating soap bubble ever made held 3,399 cubic feet of air. With that volume, you could fit more than three school bus loads of children inside.

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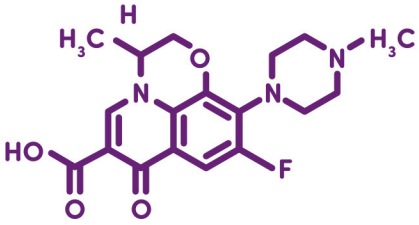

Bubble Solution

Bubbles are always fun to play with! This simple bubble solution allows you to capture gases. You can combine this bubble solution with any of these experiments and then use the bubbles in your own bubbly or foamy experiments!

Materials

- 4 cups of water
- ½ cup of dish soap
- ½ cup of sugar (or 2 tablespoons of glycerin for long lasting bubbles)
- A container to mix it in

What to do

1. **Add the soap, water and sugar to a container and stir well.**
2. **Let the mixture sit overnight.**
3. **Enjoy making bubbles!**
   For a longer lasting bubble mix use glycerin instead of sugar. It is available in the pharmacy section.

What is happening?

The air inside a bubble is held together by a film of bubble solution that is one of the thinnest things we can see with our eyes. That film is made up of an outer layer one soap molecule thick, a middle layer of water molecules, and another inner layer of soap.

This film is not only thin, but also very strong for its size. Hydrogen in the water molecule is responsible for the strength. Each hydrogen in H2O attracts soap molecules very strongly, so strong in fact that the force that hold it together gets a special name called hydrogen bonds.

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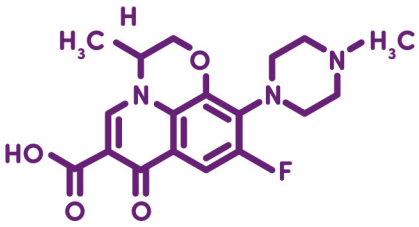

Carbon Dioxide Fire Extinguisher

Make a gas that can put out fires! Carbon Dioxide (CO2) makes up a small part of the atmosphere. It is one of the heavier components in the atmosphere. Plants need it, but too much in the air can cause air pollution locally and temperature increase globally. Two common kitchen chemicals can be mixed to make it.

What you need

- Small glass or bottle
- Vinegar
- Baking soda
- Matches

What to do

1. **Add several drops of vinegar to the small container.**
2. **Sprinkle baking soda over the vinegar. You should see a fizzing reaction take place.**
3. **Light a match and lower it carefully into the container. You should see the match go out when it gets low enough.**
4. **Repeat with more vinegar and baking soda.**
5. **Lower another lighted match into the container. The level where the match goes out should be higher in the container as more gas has been created.**
6. **Light one more match and hold it up as you magically pour the gas out of the container and over the match. Since carbon dioxide is heavier than air the match should go out.**

What is happening?

Vinegar and baking soda react with each other to form carbonic acid which immediately breaks down into water and carbon dioxide gas. The gas makes the bubbles you see. Carbon dioxide is one and a half times heavier than air. This is why it can stay in the bottom of the container and why you can pour it.

The match goes out because combustion requires oxygen. As the carbon dioxide sinks to the bottom of the container, the oxygen is pushed upward. You will find a layer below which the match will not burn because there is not enough oxygen. Incidentally, the burning match also produces carbon dioxide so if the container has a small opening, and you do this experiment several times, the match may go out as soon as you put it into the container, in part because of the carbon dioxide pushing the oxygen rich air out of the container, but also in part because previous matches have used up some of the oxygen and replaced it with carbon dioxide.

Try This!

Add some of the bubble solution you made to the vinegar and baking soda reaction. You can make bubbles full of carbon dioxide. When you pop the bubble with a lit match, the bubble can extinguish the flame.

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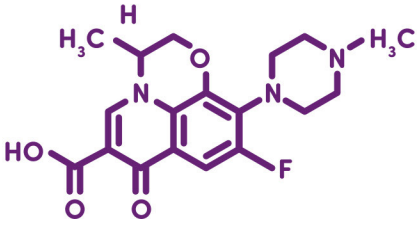

Anti-Bubbles

Materials

- Large clear container
- Bubble Solution you made earlier.
- Water
- Small container
- Food coloring
- Dropper or baster
- Sugar

What to do

1. **Fill the large container with water**
2. **Add a small amount of bubble solution to the water and stir it in slowly to avoid making bubbles on the surface. Any bubbles that do form can be skimmed off. The surface must be mostly flat and free of bubbles.**
3. **Add one cup of sugar to the liquid in the large container. Do not stir!**
4. **Put one or two drops of food color in the small container.**
5. **Use the dropper to suck up a little bit of the water from the bottom of the large container. Try to get some from just above any undissolved sugar.**
6. **Put the liquid from the dropper into the small container and mix it with the food coloring.**
7. **Use the dropper to suck up a small amount of the colorful liquid from the small container.**
8. **Squirt the colored liquid at the surface of the liquid in the large container at about a 45 degree angle. A bubble of colored water should form beneath the surface and float downward until it pops. The food coloring should make the bubble of water easy to see.**

What's happening?

When you put the bubble solution into the clear container the soap formed a film at the top of the water. Play with the angle and the force when you squirt the liquid at the surface. When everything is just right, you break the surface tension forming a bubble around the liquid you're adding. This forms a film of soap that has a single layer of soap molecules held in place by the hydrogen bonds of the water on the inside. Sometimes the layer of soap pulls a bit of air under water with it. That thin layer of air will form tiny bubbles that have a shimmery metallic look.

Because the anti-bubble is filled with liquid instead of gas they tend to hover just under the water level. They are hard to spot if you didn't add enough food coloring. They may sink slow or fast depending on the density of the liquid you added to the food coloring. By pulling this liquid from near the layer of sugar, you added liquid that had a lot of sugar in it and was heavier than the liquid at the top of the container. The bubbles stop sinking when the density of the liquid around them is equal to the density of the liquid inside. When the anti-bubble pops, the water inside it will join with the rest of the water and any air that was surrounding it will form small air bubbles that float to the top of the bowl.