



A Cycle in Air

Presented By:
Lane Regional Air Pollution Authority

Our world is made up entirely of matter that may exist in any of three states. These three states are solid, liquid or gas.

A solid has a firmness unlike liquids or gases. It has a fixed shape and volume and cannot be compressed. Solid matter is everywhere. Rocks, salt, sugar and coins are just a few examples.

A liquid has no specific shape, but has a specific volume. It will take on the shape of any container holding it. Liquid matter is everywhere. Water, milk, gasoline and oil are a few examples.

A gas has no shape or fixed volume of its own. It takes the shape and volume of any container holding it. It can be compressed into a small container or expand to fill a large container. Gaseous matter is everywhere. Oxygen, ozone, carbon dioxide and carbon monoxide are examples of gases. People breathe in oxygen and breathe out

carbon dioxide. Plants take in carbon dioxide and release oxygen. Some gases you can see and/or smell while other gases you can't see and can't smell. Some gases are harmless or even necessary for life while others are dangerous or hurtful to life.

Solids, liquids and gases can change form due to temperature changes or chemical reactions. A simple change you are probably familiar with is the liquid, water, which when frozen, becomes the solid, ice.

Air is a gas and its container is the atmosphere of the earth. We want to teach you a little about the air we breathe and how it can be affected by nature and by people. During the time you spend in this session of Outdoor School, you will perform experiments that will show a cycle that a gas can follow. You will also see how the gas can affect the environment around it - even gas you cannot see!



Experiment 1

Using a film canister, fill it from 1/4 full to 1/2 full of vinegar. Add either one or two quarters of an Alka Seltzer tablet (sodium bicarbonate) then quickly snap on then film canister lid, place on level ground and step back. You will soon see how a liquid and a solid can react together to form a gas. In this experiment, the gas formed is carbon dioxide. What happens? If there is enough time, you will be allowed to try different amounts of vinegar and antacid tablets to see how the reaction changes.



Experiment 2

Put about one inch of water in the small aquarium provided. Under adult supervision, add small chunks of dry ice to the water then quickly cover the aquarium. **DO NOT** handle the dry ice with your bare hands because you could be badly hurt! Dry ice is frozen carbon dioxide. Because carbon dioxide is a gas at room temperature, it must be chilled to extremely cold temperatures to freeze as a solid.

While the dry ice is dissolving in the water, place two candles side by side and light them with adult supervision. Once the dry ice has dissolved and the air is clear in the aquarium, use a cup to scoop up the air in the aquarium (do not scoop in water, just the air). “Pour” the air from the cup over the taller candle in a way that allows the air to tumble to the shorter candle. What happens? Is it magic?



Experiment 3

By mixing your breath with water, you will see one way a gas can effect a liquid. Using a cup of water that has already been colored with an agent to measure change, place a straw in the cup and blow. Remember that you breathe in oxygen and breathe out carbon dioxide. When you blow through the straw into the colored water you are adding carbon dioxide to the water. Do you see any changes in the color of the water. A color change means that you have changed the water. Can you change it more by blowing more or less? Does the change remain longer when the water is at room temperature or when the water is chilled? Why?



In Conclusion

We hope you will have fun with these experiments and will learn that reactions are happening in the world around us. Many of these reactions happen in ways that we cannot see, but can affect us in good ways and in bad ways.

An example of good reaction is breathing, but an example of a bad reaction is what happens when there are other things in the air we breathe that aren't good for us.

Air pollution is a concern in Lane County. One problem comes from wood burning and open burning. Wood is a solid that, when burned, changes into gases and tiny particles. When the tiny particles get into our lungs they can cause health problems.

Another cause of air pollution comes from burning gasoline or diesel in cars and trucks. When burned in engines, these liquids also change into gases and tiny particles. Some of these gases contribute to smog. The more people drive, the bigger the problem becomes. This is especially true in the warmer months of the year when smog can be bad enough that some people must stay inside to stay healthy.

The people at LRAPA are working to check the air every day to make sure it is safe to breathe. They make sure companies do what they can to pollute the air less. They also educate people about when it is safe to burn and what they can do to help keep the air as clean as possible.

If you are interested in what you can do to help improve the quality of the air we breathe in Lane County, talk to someone from LRAPA. You can call toll free at 1-877-285-7272. They'll be happy to help you!