

Oxygen – The 21% Solution!

The chemical reaction that causes rusting uses up oxygen from the air. Try the activity below, and if you are patient, you will see the effects of oxygen in the air being used up in a chemical reaction. You'll also get an idea of about how much of the air is made up of oxygen!

Materials:

- 2 tall narrow jars with labels removed (8-oz baby food jars or olive jars)
- Steel wool (not treated, no soap)
- 2 clear plastic containers (at least 4 centimeters high)
- 2 rubber bands
- Metric ruler
- Water

Procedures:

1. Wet a piece of steel wool and push it into the bottom of one jar so that the steel wool stays when the jar is turned upside down. If it falls down, use a larger piece of steel wool.
2. Pour water into your two clear plastic containers until the water is about 3-4 centimeters deep. Turn both jars upside down and place each straight down into the water in each container.
3. Now, tilt the jars so that air can escape and then stand the jars back up in the water so that the height of the water inside the jars is about the same as the height as the water in the containers.



4. Place a rubber band around each jar right at the water level in the jar. This will mark the water level in case it changes. Let the jars sit undisturbed for about two days.
5. After 2 days, what do you notice about the water level in the jar with the steel wool compared to the water level in the jar with no steel wool?

Think about this ...

If you think about it, using a straw to suck up a drink works in a similar way to the rusting steel wool. If you simply place a straw in a cup of water, the water will only move up into the straw up to the water level in the cup. To make it come up any higher, you have to remove the air in the straw by sucking the air out. The rusting steel wool is a chemical reaction way of removing oxygen from the air that allows water to get sucked up into the jar.

Where's the Chemistry?

As oxygen was used up by the rusting of the steel wool, water moved up into the jar to take its place. If all the oxygen in the jar was used up in the rusting process, then the height that the water rose can tell you something about the amount of oxygen in the air. Use a ruler to measure the distance from the rubber band to the bottom of the steel wool. Record that distance. Now measure the distance from the rubber band to the new water level. This is the distance that the water rose because of the oxygen that was used up. The distance that the water moved up should be about 1/5 of the distance between the rubber band and the bottom of the steel wool because oxygen makes up about 1/5 of the air.



The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

