

Praxis “Making Science Fun”

The Air Out There



Air is all around us even if you can't see it. Wind is the air pushing against you. But what makes up the air? Today's experiment is related to the previous one on Volcanoes in that you will use the same home chemicals but you will be looking (in Science we call it observing) for a different result. We'll use baking soda and vinegar to create a chemical reaction but this time we'll explore the gas that is coming out of the rapidly fizzing mixture. And as always, please try this at home BUT “be sure to have your parent's permission” and they have the time to watch and help as you do your experiment; especially since this one involves lighting a candle.

Materials (What you'll need):

- Baking Soda (make sure it's not baking powder)
- Vinegar
- Tall Candle
- Matches
- Two glass jars (a 500 mL pickle jar will work) and its lid (or a piece of cardboard)
- Paper towels or a cloth (just in case)
- Measuring cup

Procedure (this is sometimes called the Method):

1. Mix together $\frac{1}{2}$ cup of vinegar and $\frac{1}{4}$ cup of baking soda in the glass jar. A reaction takes place causing the mixture to fizz!
2. Mostly cover the jar opening by placing the lid upside down on top the jar (don't screw it on) and set it aside for a short while. If you don't have the lid just use a piece of stiff paper or cardboard. Let it rest for a short time.
3. In another jar insert a tall candle (that is about $\frac{2}{3}$ of the height of the jar and have an adult light the candle.
4. Lift the cover off the first jar (it should be done fizzing) and slowly pour the “air” that is in this jar into the jar with the lighted candle. Be careful not to dump any of the mixture into the jar or onto your counter. It won't ruin the experiment but it would make a mess.

What's happening?

Although baking soda and vinegar can be found in the kitchen, both are chemicals that react with each other. The baking soda (sodium bicarbonate) is a base while the vinegar (acetic acid) is an acid. When they react together they form carbonic acid which is very unstable. It instantly breaks apart into water and carbon dioxide (CO_2), which creates all the fizzing as it escapes into the air. Carbon dioxide is heavier than air and it remains in the jar with the loose lid. Carbon dioxide is heavier but invisible. It may appear funny to pour an empty jar into the lighted candle jar yet the candle goes out.

Oxygen makes up about 1/5 of the air we breathe. As the oxygen level in the jar decreases, the intensity of the flame decreases; burning slows down as less heat is produced, until the candle is too cool to burn.

Project Extension:

Try relighting the candle. The candle needs oxygen to burn and the carbon dioxide has filled the candle jar preventing the oxygen from reaching the candle. Eventually the carbon dioxide will dissolve into the surrounding air and you will be able to relight the candle.

Background:

This is just one of many experiments suggested in the support material in the “Air and Aerodynamics” kit that we have at Praxis. Lauren Hider, with the Science Department at Medicine Hat High School, suggested featuring experiments that may be found in our kits. This will give you an idea of the learning kits available at Praxis and their activities. Each of our teaching kits is loaned out for FREE to help give teachers and parents of home schooled children an opportunity to explore Science in interesting ways

Lorne Cooper, Regional Executive Director

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