



Try This at Home Science: Invisible Fire Extinguisher

Activity Overview:

Generate an invisible gas that is heavier than air and able to put out fire from a candle.

Materials:

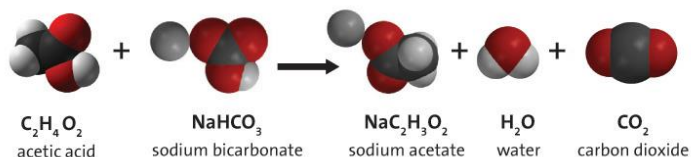
- 1 cup vinegar
- 2 tablespoons vinegar
- Pitcher or large glass
- Tea light candles
- Lighter

Try this!

1. Set out your materials on the table in front of you. Grab an adult to supervise or assist with this experiment.
2. In the pitcher, add 2 tablespoons of baking soda and one cup of vinegar. Observe the reaction.
3. While the reaction settles, arrange tea candles in a line then light them with the lighter.
4. Once the bubbles have settled, carefully pick up the pitcher and “pour” only the gas that was generated by the reaction over top the candles. Do not pour any liquid out of the container.
5. Notice what happened to the flame!

What’s happening?

When baking soda and vinegar combine, an acid-base reaction takes place that creates a bunch of invisible carbon dioxide gas! Carbon dioxide is much heavier than the air around us, so it remains in the pitcher instead of floating away into the atmosphere, which leaves us with a container full of carbon dioxide.



When the gas was poured over the candle flames, the carbon dioxide pushed all the other air molecules out of the way on its way down, including the oxygen that the candle flame needs in order to continue burning. Since the flame lacked the oxygen needed for a combustion reaction, the fire went out.

Is carbon dioxide dangerous to humans?

With every breath, humans and other animals expel carbon dioxide into the air. However, even more carbon dioxide is emitted by cars, engines, fossil fuel burning factories, and household appliances. Collectively, these carbon dioxide emissions contribute to global warming by acting as a greenhouse gas. Greenhouse gases trap heat inside our atmosphere, which warms our planet significantly over time.

Carbon dioxide also contributes to the phenomenon known as acid rain. Carbon dioxide emitted by factories combines with moisture in the air to form acidic compounds, which fall back to Earth as rain or snow. This acid rain is then absorbed into our ground water which contributes to soil and water pollution.



If we are to stop global warming, humans will need to find newer and greener ways of powering our factories and vehicles very soon. If we do not curb our emissions, soon the Earth will be too warm and too polluted to continue sustaining life of the creatures that live on it. Just like the flame in this experiment, without oxygen to breathe and cool temperatures to live in, carbon dioxide emissions could greatly impair life on Earth before we know it.

Additional Resources

- Calculate your Carbon Footprint
<https://www.carbonfootprint.com/calculator.aspx>
- NASA Ozone Watch
<https://ozonewatch.gsfc.nasa.gov/>

For more “Try This at Home Science” activities, visit www.mi-sci.org.