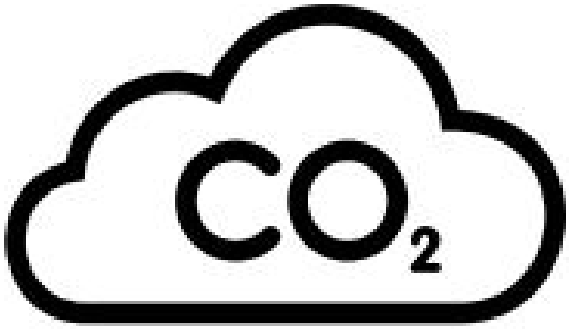
Cave of Dogs!

Challenge - Let's Clear the Air!



Grades: 5-8
Time: 30 minutes or longer
Subject: Chemistry, Engineering

Overview

This engineering design challenge poses the real-world problem of ventilation. How do you control the air quality in a closed space?

Background

After studying the weight of air and CO2 and observing the behavior of gas in the Cave of Dogs, you are now equipped and prepared to take on the job of gas wrangler! Your mission in this design challenge will be to carefully control the CO2 levels in your Cave of Dogs, turning it into a new type of tourist attraction, one that is safe for man, woman, and beast!.

Objectives

Understand & Recognize:

- Gases have weight, and different gases are heavier or lighter than others.
- CO2 is:
  - an invisible and odorless gas.
  - deadly to animals in concentrated amounts.
  - heavier than air.
  - varying in levels in the air around us depending on many factors.
- A fumarole is a volcanic vent, an opening in the earth's crust, that emits steam and gases.

What You'll Need

You will need the complete set of materials from your Cave of Dogs experiment including your databot™ and smart device with Phyphox. You may also use other materials that you will brainstorm for solving the design challenge. These materials are up to you to design and create, so good luck!

Prep (5 mins)

- Conduct the Cave of Dogs experiment successfully!
- Think about how ventilation works - how do we maintain fresh air in closed buildings?

Design Challenge (25 mins)

As a team or individually, engineer a ventilation system that will keep CO2 levels in your Cave of Dogs at databot's™ lowest level (400 ppm) without blowing out the candles.

Next, challenge your ventilation system design to carefully control the ppm levels of CO2 such that only one candle goes out, or two, etc.

Your design should result in complete control of the CO2 levels that are seeping into the Cave of Dogs from the dangerous volcanic fumarole. The final goal is to make the Cave of Dogs safe for all to enter and explore.

Good luck!

Cool bananas – engineering holds no fear for you!

It's now time for some community and group hugs. Next and final stop – a collaboration activity. Enjoy!

Next Step, Collaboration!

Educator Resources

Notes

This is a great design challenge that can be done as a *"what-if"* scenario where students simply draw their designs, or it can be done as a complete engineering challenge.

For those of you who complete the challenge successfully, please send us pictures of your solutions to share with all. Use our contact form - we look forward to seeing some ingenious solutions.

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