

## Problem/Testable Question

Carbon dioxide is the leading greenhouse gas in the world, essential for plants and humans to live. However, there is excess carbon pollution in the current world, and modern CCUS (Carbon capture usage and storage) technologies are too expensive to be implemented into houses. This project aims to use cost-effective household materials to reduce carbon dioxide levels in indoor conditions.

Our testable question was, "How does the type of household carbon-capture material affect the reduction of carbon dioxide levels in simulated indoor conditions?"

## Experimental Procedures

- Generated CO<sub>2</sub> in an airtight jar using the baking soda and vinegar reaction of approximately 5000 ppm
- Measured the carbon dioxide, along with temperature and humidity inside jar, with a digital sensor (+/- 50 ppm)
- Three trials were done for each carbon-capture material, with 15 trials being there in total
- Carbon capture materials were the lime water solution, Dracaena plant, Golden Pothos plant, activated carbon, and the control for base comparison
- Compared the groups by the time when CO<sub>2</sub> began decreasing to normal amounts, and calculated the mean average for each material

## Data Results

- Limewater reduced carbon dioxide the fastest (mean decreasing time: **10:02 min**)
- Pothos reduced carbon dioxide the second fastest (mean decreasing time: **15:02 min**)
- Dracaena reduced carbon dioxide the third fastest (mean decreasing time: **16:06 min**)
- Activated carbon reduced carbon dioxide the second slowest (mean decreasing time: **17:40 min**)
- Control stayed at 5000 ppm for the whole 25 minute testing time all 3 trials (mean decreasing time: **25:13 min**)

## Conclusion/Discussion

The hypothesis of the Dracaena plant reducing the most carbon dioxide was not supported. Limewater outperformed all of the other tested materials, which proves that direct chemical reactions are better than biological methods when it comes to taking in carbon dioxide. While limewater may be the best solution for the CO<sub>2</sub> problem, the Pothos plant is the ideal option in households, because limewater is more of an obscure household item.

Room for improvement includes:

- Improving consistency of air leaks and sealing
- Cleaning the jar more properly
- Run additional trials for longer time periods to further ensure data results