CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35390

Project Title

Do Greenhouse Gases Really Trap Heat?

Abstract

Objectives/Goals

The objective of this project was to determine how well Methane and Carbon Dioxide trap heat in a controlled environment. The results of this experiment could provide evidence for or against the theory of global warming/climate change. The goal of this experiment was to quantify how an increase in the concentration of greenhouse gases could affect the average temperature as well as comparing the heat retaining properties of methane against carbon dioxide.

Methods/Materials

To conduct the experiment I build an airtight box out of MDF and glass. The whole box was put together using nails and wood glue. The glass was attached to the front of the box using silicon sealant. On the front side of the box under the glass, two holes were cut out. Gloves were then attached to the holes so that I could have access to the inside of the box while conducting trials. To conduct trials, a balloon was filled with the correct amount of Methane or Carbon Dioxide gas. Then the balloon was cut inside the box, releasing the gas. The box was then sealed and the internal temperature was raised to 40 deg. C using halogen lights. Once the temperature reached 40 degrees, the halogen lights were turned off. The box was then cooled for 18 minutes, with the internal temperature being recorded every 2 minutes.

Results

I found that for almost every concentration, methane was more effective at trapping heat than carbon dioxide. Also, higher concentrations yielded higher temperatures at the end of the tests. My graph gives the impression that at certain points of the cooling phase, the 4% carbon dioxide atmosphere was actually warmer than the 4% methane atmosphere. At the end of the test (18 min) however, the 4% carbon dioxide average actually went below the 2% methane average.

Conclusions/Discussion

In conclusion, the experiment was successful in proving my hypothesis. In the experiment, Methane was more effective at retaining heat than Carbon Dioxide. This supports my hypothesis. The 4% concentration of methane had an average temp of 28.8, thats 1.8 C higher than the control (28.0) and 0.6 C higher than the Carbon Dioxide at the same concentration. A look at the inferential statistics suggests that the data is statistically significant, which supports the idea that climate change is a potential consequence of increasing greenhouse gas emissions.

Summary Statement

The Effect of Increasing CH4 and CO2 Concentrations on Heat Retention in a Closed Atmosphere.

Help Received

Dad helped build an airtight box according to my specifications

Preliminary