CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

S1010

Project Title

The Engineering of Carbon Dioxide Reduction, Part 2

Abstract

Objectives/Goals

Every year, over two trillion pounds of CO2 are emitted from cars and trucks globally. The goal of our innovation is to reduce CO2 by half through air filtration of the exhaust of a petrol-based automobile.

Methods/Materials

Throughout this procedure, a galvanized steel pipe was filled with flywire mesh capsules containing sodium hydroxide, a chemical compound that has CO2 absorption properties. Metal protrusions were added to each side of the pipe in order to disperse heat.

Results

The cars tested were a 1998 Toyota Camry (inline 4), a 2006 BMW 325i (inline 6), and a 2015 Mercedes CLS63 AMG (V8), which reduced the CO2 emitted by 38%, 44%, and 36% respectively. In all trials executed with the three different types of cars, all showed similar success in the reduction of CO2.

Conclusions/Discussion

Our tests of the wide variety of cars showed that the filter reduced the CO2 emissions by almost 50%. One problem is that we tested in an open environment, which meant that we were not able to exactly measure the gaseous compounds that were being inducted into the engine, going through the exhaust system, and passing through the filter. In the future we will implement an airtight gas analyzer which will measure the exact compounds inducted into the engine and emitted by the exhaust.

The cooler the crystals, the more CO2 they absorb. Since steel is a good conductor of heat, the temperature of the crystals became very high, reducing their efficiency. To address this we added metal protrusions to disperse heat.

Summary Statement

Our innovation filters out CO2 from an automobile using sodium hydroxide, a chemical compound that absorbs CO2 and thus contributes to CO2 reduction.

Help Received

None, my team members and I designed, built, and performed the experiments ourselves.