CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J0221

Project Title
Knock Down NOx: Can Urea Reduce Small Engine Pollution?

Abstract

Objectives/Goals
The objective is to determine if urea can reduce small engine pollution.

Methods/Materials
A catalytic device was constructed using a soda can half filled with zinc-plated BBs. Granulated urea was dissolved in distilled water. A 2-stroke 100cc Go-Kart engine was smog inspected at a certified California smog station (control trial). The engine exhaust pipe was replaced with the catalytic device. The engine was again smog inspected while simultaneously spraying the urea solution into a small hole drilled on the side of the catalytic device (urea trial).

Results
At the most typical operating engine speed of 6000 RPMs, there was a 41.8% reduction in exhaust NOx concentration in the urea trial compared to the control trial.

Conclusions/Discussion
There was a significant reduction in the small engine exhaust NOx levels with urea. This proved my hypothesis that urea can effectively reduce small engine pollution. Small engines are a large source of environmental air pollution. Further development of this device could lead to a simple and effective way to reduce air pollution.

Summary Statement
The purpose of this project is to discover if urea can reduce small engine pollution.

Help Received
Mother bought urea granules; Father helped me use tools in making catalytic device; Brother took pictures; Ahmad from In-n-Out Smog in San Juan Capistrano, CA performed the smog tests at a reduced rate.