CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
S0515

Project Title
The Effect of Steam on Gas Combustion for Emission Reduction

Abstract

Objectives/Goals
My objective was to lower the amount of toxic pollutants released during combustion.

Methods/Materials
Undesirable emissions are generally formed at different temperatures in different zones of a diffusion flame during combustion. These emissions may be reduced if the flame structure can be modified to become more homogeneous. An apparatus was built which allowed a controllable amount of steam to mix with a controllable amount of propane during combustion, to homogenize the flame structure, and hence reduce the amount of emissions.

Results
Results showed that with the correct proportion of steam and gas mixture, the structure of the flame can be significantly modified from a long yellowish flame with separate blue zone to becoming a short and homogeneous pale blue flame with lower amounts of emissions. However, this pure flame exhibits instability and can transition to a flame out unless the amount of steam and gas are maintained to a precise ratio.

Conclusions/Discussion
Steam can reduce the amount of emissions during combustion, but the amount of steam and gas must be kept at a certain ratio to prevent a flame out.

Summary Statement
By mixing steam with the gas fuel, the amounts of emissions were reduced during combustion.

Help Received
Father helped create apparatus and procedures