CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Charlie K. Thrift

Project Number
36145

Project Title
Using Sound Waves to Extinguish Flames

Abstract

Objectives/Goals
The purpose of this experiment is to test if it is possible to use sound frequencies to put out a fire.

Methods/Materials
Subwoofer, lighter, computer, timer, video camera, tone generator, camera stand and decibel reader.

Tested to determine if it is possible to extinguish fire using sound waves. Timed in seconds the how long it took to extinguish fire at various frequencies and volumes to determine the most effective sound waves.

Results
In this experiment low frequencies between 30-65 Hz easily put the flame out. Interestingly, frequencies outside that range did not extinguish the flame. 45-60 Hz were the most effective frequencies. The lower and upper ends within the working frequency rage had inconsistent results where the trials for the frequencies between 40-60 Hz had nearly identical results.

Conclusions/Discussion
This experiment showed that exposing flame in the direct path of frequency waves at 30-65 Hz can put out a flame. This could lead to a more effective, safer and cleaner way to put out fires. The physics of sound tell us that frequency is determined by the number of sound waves per second. In the range of 30-65 Hz the waves are just the right density to efficiently extinguish the flame. Fire requires three element to burn: heat, fuel and oxygen. There are two theories as to why sound waves put out a fire. One is based on the Ideal Gas Theory that the drop in pressure caused by the sound waves lowers the heat extinguishing the flame. The second theory is that the sound waves thin the oxygen causing the fire to extinguish.

Summary Statement
My data showed that in the frequency range of 30-65 Hz a standard lighter flame can be extinguished.

Help Received
I devised this experiment on my own and conducted my own research.

Preliminary