CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J0816

Project Title
What's Hot, What's Not? Solar Oven Testing

Abstract

Objectives/Goals
My objective was to discover which shape of parabolic solar oven, between a trough and a cone, would reach a higher temperature quicker, and if insulation would make a difference in reaching higher temperatures. My hypothesis stated that the parabolic cone shaped oven would reach higher temperatures quicker and that insulation would make a significant difference in reaching those temperatures.

Methods/Materials
I built four solar ovens, two trough and two cone shaped, one of each design with insulation and one without. Both designs were based on the same parabolic shape. The inside of each oven was lined with reflective mylar. On five separate testing days, temperatures were recorded every five minutes for the first hour of the testing period and every thirty minutes for two additional hours. The temperature readings were taken on the cooking surface, which was positioned at the focal point of the parabola.

Results
On three of the five test days, the trough oven without insulation was the quickest to heat up out of the four ovens. The trough oven with insulation reached the highest temperature over all and maintained higher temperatures over the testing period on each testing day. Neither of the cone ovens reached the highest temperature in the least amount of time on any testing day. On three of the five testing days, the cone oven with insulation reached higher temperatures quicker than the cone oven without insulation and stayed warmer throughout the testing period.

Conclusions/Discussion
My hypothesis that the parabolic cone shaped ovens would heat up the quickest was based on the idea that the reflection of the solar energy coming to a focal point would create increased heat as compared to that energy being spread along a focal line as in the trough shaped ovens. My results did not support this. The trough ovens had both a greater surface area of the reflective material, a larger aperture and a larger volume as compared to the cone ovens. These may be the main overriding factors in the outcome. The science of a parabola can be a great tool in the design and development of solar ovens. My project demonstrates that shape and use of materials are the most important factors in designing solar ovens. These practical considerations are especially important in remote areas and undeveloped countries.

Summary Statement
My project compares temperatures reached by two different parabolic solar oven designs, each with and without insulation.

Help Received
My father helped me build the ovens; My brother taught me about parabolas; My mother helped me oganize my data and cut and paste my backboard; Ms. Skiles (my teacher) taught me the scientific process.