CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
J1108

Project Title
How Hot Is Solar Heating?

Abstract

Objectives/Goals
My objective was to test three different materials of pipes (plastic, copper and steel), three different liquids (glycol, glycol mixed with water and water), and three different insulations (fiberglass, foam and no insulation) to see which combination heats the liquid the quickest and cools down the slowest.

Methods/Materials
Three different pipes, liquids and insulations were used. The experimental layout consisted of a 16 by 23 by 2 inch cardboard box, three thermometers, three 18 by 3/4 inch pipes (either plastic, copper or steel) filled with either glycol, glycol mixed with water, or water, insulation (third experiment only), an 18 by 24 inch glass plate, and a 24 by 25.5 inch reflective insulation. The setup was placed on a slanted spot hit by direct sunlight to heat the liquids, and then moved to a shaded spot to cool the liquids.

Results
Six trials showed that the combination of a plastic pipe and glycol results in the highest temperature, and that a combination of a plastic pipe, glycol mixed with water and foam insulation cools down the slowest.

Conclusions/Discussion
Solar heating is a definite alternative to conventional heating in climate zones comparable to Santa Barbara, California. To generate enough hot water, large heating surfaces are needed, as well as a well insulated storage tank. The system needs to be designed in a way that loses as little heat as possible.

Summary Statement
To find optimal materials to generate and maintain heat in liquids using solar energy.

Help Received
Parents helped with purchasing materials and proofreading report, younger sister helped with setting up experiment.