



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Nathalie I. Chardon	Project Number 22840
Project Title How Hot Is Solar Heating?	
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. Abstract Methods/Materials Three different pipes, liquids and insulations were used. The experimental layout consisted of a 16 by 24 by 2 inch cardboard box, three thermometers, three 1/2 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.	