



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) David A. Phillips	Project Number J1528
Project Title Which Is the Better Insulation Material?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to see which of a variety of materials that are commonly used in home construction acts as the better insulator against heat.</p> <p>Methods/Materials I went to our local home improvement store and selected several materials that can be used in the home as insulation. I selected Extruded Polystyrene, Foamed Plastic, Bubble Pack, Fiberglass Insulation and Loose Cellulose Insulation. For controls in my study, I used plywood, air and an aluminum plate. I researched the R value (resistance to heat flow) for all of the materials and my hypothesis was that the materials with the higher R value would act as better insulators.</p> <p>I built a testing station of glass and used two aluminum plates, one on each side of the material I was testing. Before testing, I cut each of the insulation materials to #" thickness so that my comparisons would be fair. I clamped the material being tested between the two aluminum plates to prevent any air gaps from affecting my results. I used a hair dryer to heat one of the aluminum plates for 20 minutes while I recorded the temperatures of the heated plate and the temperatures of the aluminum plate on the other side of the material being tested. I also recorded the room temperature as a control.</p> <p>After I collect all of the data, I analyzed it by looking at the rate of the rise in the temperature of the aluminum plate on the side of the test fixture away from the heat of the hair dryer. The smaller the temperature rise the better the material performed as a good insulator.</p> <p>Results The experiments showed that the insulation materials tested generally followed their R values. Bubble Pack was the best insulator followed by the extruded polystyrene, fiberglass, loose cellulose, plywood, foamed plastic, air and then finally the aluminum plate. Based on the R value, the foamed plastic should have acted as a better insulator than my test results showed.</p> <p>Conclusions/Discussion Published R values are a good indication of how well a material insulates against heat, though my results showed that the foamed plastic did not act as I had expected. This could be because foamed plastic is a better insulator at lower temperatures and so has a higher published R value, but at the higher temperatures where I took my temperature slope measurements, the foamed plastic passes more heat.</p>	
Summary Statement My project compares the insulation quality of a variety of commonly used insulation materials.	
Help Received My father helped me in buiding the test station. I borrowed the thermocouple monitor from his company.	