CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Jennifer M. McKnight

Project Number
J1122

Project Title
Hot Stuff

Abstract

Objectives/Goals
The purpose of my project is to find out which substance is the best for filling microwave heated hot packs (bean bags): dried corn, rice, black turtle beans, macaroni, soybeans, calcite, or pinto beans.

Methods/Materials
Six cups of each item was put into identical cloth bags, then put in a bowl and weighed. Then each one was heated in the microwave, by itself, for exactly four minutes. I measured the temperature of each hot pack every 15 minutes (using the same thermometer). When the temperature went down to 125 degrees or below, I was done with the test.

Results
Most of the items tested got up to about 180 degrees (the corn, rice, black turtle beans, macaroni, and pinto beans). I noticed that generally they all retained heat for about the same time except the macaroni, which weighed less. The calcite hardly heated up at all but I found it had burnt my bag. The soybeans did not reach the same temperature as the others (only 151 degrees). I thought that maybe I had done this test wrong so I did it again but got basically the same results.

Conclusions/Discussion
As I was doing my research, I read that water, fats, and sugars absorb radio waves in microwave ovens. So, I soaked some soybeans in water, then measured out six cups and heated them like before. I was surprised that I got basically the same results this time also. I was never able to fully explain why the soybeans did not heat up to nearly 180 degrees like the other items. Overall, the corn and rice seemed to be the best items to use for filling hot packs.

Summary Statement
Which substance has the best heat retention, therefore, is the best for filling hot packs.

Help Received
My mom helped me edit the report and make the project display. My dad helped me set up the experiment and he borrowed a balance from his work.