CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1512

Project Title
Too Hot to Handle: A Comparative Analysis of Thermal Energy Retained in Tile

Abstract

Objectives/Goals
The goal of my investigation was to find an inexpensive, durable tile that can be used for reentry into Earth's atmosphere and for flooring and countertop use. This tile must not conduct heat very well.

Methods/Materials
1. Cut five, 1cm x 10cm rod from each 10cm x 10cm tile square except slate rock tile and cut five 1cm x 9cm slate rock tile rods. 2. Melt lard on the stove for 300 seconds on the "HI" temperature setting. 3. Label all ten test tubes. Two (2) test tubes for each number one through five (1-5). 4. Place the graduated cylinder into the metal pan and place the metal pan and the graduated cylinder in the testing area. 5. Place test tube 1in the test tube rack. 6. Poor fifteen (15) ounces of lard into test tube 1. 7. Place the test tube in the test tube rack in the refrigerator for 600 seconds. 8. Place a porcelain rod in the oven at 177 degrees Celsius (350 degrees Fahrenheit) on the 30cm x 45cm cookie sheet for 120 seconds, after the lard has been in the refrigerator for 480 seconds. 9. Take the lard out of the refrigerator after 600 seconds and take the tile rod out of the oven with the hot mitt on after 120 seconds and after fifteen (15) seconds of the rod being out of the oven and the test tube being out of the refrigerator, push the rod into the test tube with tongs while the test tube is on the test tube rack for twenty-five (25) seconds. 10. Pour melted lard into the graduated cylinder using the tongs. 11. Record results. 12. Wash the rod with cool water and remove all lard on the rod with the wash cloth. 13. Remove all lard in the graduated cylinder. 14. Repeat steps 2-13 (except step 3) for each tile rod and use test tubes labeled one (1) for porcelain, test tubes two (2) for glass, test tubes three (3) for slate rock, test tubes four (4) for ceramic, and test tubes five (5) for clay. 15. Test each tile 100 times.

Results
I found that porcelain was the least heat conductive (best) on average. After porcelain came slate rock, glass, ceramic, and clay. The order is from best to worst (least heat conductive to most heat conducive).

Conclusions/Discussion
In conclusion, if a craft like the International Space Station in lower Earth orbit or possibly a future luxury space hotel, needs tiles for flooring, countertops, or other such uses, they now know to use porcelain for countertops and clay for flooring (it gets down to -250 degrees Fahrenheit/ -157 degrees Celsius). They can use the information from my investigation to know this. They can use the porcelain tiles for emergency replacement of tiles in areas that need protection from heat for both reentry into earth's atmosphere and in orbit around earth. They also will now know that if they do not have porcelain, that they should use slate rock, then glass, followed by ceramic, and if desperately needed, clay.

Summary Statement
My project's purpose is to try help save NASA from being exterminated (because of the budget) by helping reduce material costs.

Help Received
My father and mother helped critique my board and papers. Mrs. Lopez and Mrs. Delgado helped me cut and mat my papers on my board. Mr. Metzler helped me cut my tiles into rods.