CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
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Project Number
J1138

Project Title
Insulation and Flammability Characteristics of Straw BAle, Fiberglass, and Styrofoam

Abstract

Objectives/Goals
This experiment compared the flammability and insulating effectiveness of three materials: straw bale, fiberglass, and Styrofoam. There has been renewed interest recently in straw bale construction because it is a renewable resource.

Methods/Materials
For the insulation test, a glass jar filled with water heated to 79 degrees Celsius was placed in a box filled with insulation material. A thermometer probe was placed in the jar through a hole in its lid and the water temperature was recorded at 15, 30, 60,120, and 180 minutes. The test was performed three times for each of the insulation materials with air used as a control. For the flammability experiment, a torch heated to 700 degrees Celsius was placed on equal amounts of each material for two minutes. The combustibility of each material was observed and recorded. The experiment was performed outside, wearing a mask and goggles.

Results
The results of the insulation tests demonstrated that Styrofoam was the most effective of the insulating materials while straw bale was the least effective. After three hours, the average temperature loss was 10 degrees Celsius for Styrofoam, 19 degrees Celsius for fiberglass, 23 degrees Celsius for straw bale, and 50 degrees for air (the control). Fiberglass is not flammable and seems that it might even help block a fire. The Styrofoam melted quickly and disappeared under the flame, which might allow a fire to move through a house. The loose ends of the straw caught on fire, but the rest of the bale did not burn.

Conclusions/Discussion
These results indicate that of these materials fiberglass is the best choice when fire-resistance is the main consideration, while Styrofoam should be used when insulation ability is of greatest importance. Straw bale may be a desirable insulating material when environmental impact is of greatest concern.

Summary Statement
This experiment compared the flammability and insulating effectiveness of three materials: straw bale, fiberglass, and Styrofoam.

Help Received
Mother supervised my project; Grandpa helped me build my experiment apparatus.