CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
J1507

Project Title
Emissivity: A Study on Infrared Viewing

Abstract

Objectives/Goals
The purpose of my science project was to study the influence of the surface and the temperature of a material on its ability to emit infrared radiation. I wanted to see if material, color, and texture affected infrared viewing. I will also be studying the transmission of infrared light through materials. I hypothesized that only material will affect infrared viewing, not color or texture.

Methods/Materials
To test my hypothesis on color, I tested 11 different colored tapes. Affects of texture were recorded by testing glass, Teflon, Styrofoam, tin, schedule 80 pipe, ice cylinder with a cavity, metal box, and a cardboard box. Material affects were observed and recorded while testing for texture and color differences. A small oxygen activated rapid oxidation hand warmer was also tested inside or behind all material and texture test objects. Every item tested was photographed before and during the testing. All results were recorded in my logbook.

Results
Emissivity is the measure of how much radiation is emitted from the object compared to that if it was a perfect black body. The colored tapes had the same emittance of .97. The Aluminum tape however reflected most of the heat and emitted a .02. The heat source was not detectable through objects unless it came in close enough contact to the object that heat transference occurred.

Conclusions/Discussion
Emissivity is the measure of how much radiation is emitted from the object compared to that if it was a perfect black body. The colored tapes had the same emittance of .97. The Aluminum tape however reflected most of the heat and emitted a .02. The heat source was not detectable through objects unless it came in close enough contact to the object that heat transference occurred.

Summary Statement
I used an infrared camera to test the emissivity of material, color, and texture.

Help Received
Infrared testing was preformed at NAVSEA Corona Div. under the supervision of Engineers Kevin Janosky, Dan King, and Regina Medrano. Metal box welded by my baseball coach, wood box built by my dad, and my mom helped with some typing and driving to Staples.