CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J1517

Project Title
Planes, Panes, and Automobiles: Quantifying the Transmission of Ultraviolet Light

Abstract

Objectives/Goals
It is well known that cumulative doses of ultraviolet light can lead to deadly skin cancer and cataracts. In my project, I wanted to test the variation of UV light throughout sunny and rainy days followed by testing different products that were able to block dangerous ultraviolet light. I decided to test sunscreens, eyeglasses, home window films, car windows, and aircraft windows.

Methods/Materials
I quantified nearly 20,000 readings in my experiment. I tested ordinary glass and four other window films; ultraviolet treated acrylic used in aircraft windows, various car windshields and two SPF 30 and three SPF 50 sunscreens to see how well they blocked ultraviolet light. I tested the substances by using a Styrofoam box to block out any other ambient ultraviolet light and using Vernier software and equipment. I took 180 sample readings for each substance I tested.

Results
I compared home window films. The bronze window film blocked the most ultraviolet light. Ultraviolet treated acrylic material used in aircraft windows blocked more ultraviolet light than any of the coated glass home windows. Automobile windows also blocked much of the ultraviolet light. Windshields blocked much more UV light than the side windows. The eyeglasses I tested showed that ultraviolet protective eyeglasses offered much better protection from UV rays than untreated eyeglasses. I tested five different sunscreens. The most expensive sunscreen (SPF 50) contained titanium particles. This sunscreen blocked the most UVA light although my least expensive SPF 50 sunscreen blocked the most UVB light.

Conclusions/Discussion
Products such as aircraft windows, automobile windshields, UV protective eyeglasses and home window UV films all effectively lowered transmittance of ultraviolet light. All of the sunscreens tested (SPF 30-50) blocked at least 90% of the ultraviolet light that was present.

Summary Statement
In my project I tested the amount of ultraviolet light present over the course of a day and a variety of materials used to reduce UV light transmission, including tinted home windows, automobile windows, aircraft windows, eyeglasses and sun

Help Received
Vernier Software and Technology supplied equipment, my parents gave guidance and support, my science teacher helped explain some of the research.