



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Ish B. Bhanu	Project Number S0501
Project Title "Blocking" Ultraviolet Light: Do Sunscreens and Sunglasses Block UV Light?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal is to understand the protection offered by sunscreens and sunglasses to ultraviolet light. To understand the blocking of ultraviolet light and the underlying physics and chemistry of sunscreens six scientific experiments are performed. The experiments compare and quantify the effectiveness of sunscreens of various strengths, brands and ages under different conditions.</p> <p>Methods/Materials Ultraviolet (UV) light sensitive disks are used to test the amount of light that is able to make its way through a sunscreen or a protective surface. When the disks absorb ultraviolet light their color changes to red or blue depending upon the kind of disks that are selected. Both physics and chemistry-based analyses are performed.</p> <p>Physics-based analysis: The blockage of ultraviolet light is measured by performing color related experiments on the computer. In particular, images of control and test groups of disks are taken with a digital camera. The disks within the test group are exposed to the known amount of ultraviolet light. On exposure the disks change their color. The change in color, which is proportional to the amount of absorption of ultraviolet light, is found by measuring the saturation of the color. Quantitative experiments are done for a large number of images that are down loaded on the computer. The results so obtained are evaluated with respect to the composition of chemicals in a sunscreen.</p> <p>Chemistry-based analysis: Active ingredients in a sunscreen include (1) octocrylene, (2) Octyl methoxycinnamate, (3) octyl salicylate, (4) oxybenzone, (5) homosalate, (6) octyl dimethyl PABA, (7) octisalate, and (8) titanium dioxide. Different brands of sunscreen have a little different composition of chemicals. It is this composition that has a significant effect on the efficacy of any given sun block.</p> <p>Results Experiments were carried out to answer the following questions: how do various SPF strengths compare in blocking UV light? Does the brand of sunscreen really make a difference? Does sunscreen block UV light in water? Is sunscreen as effective as a t-shirt for UV light blockage? Does the age of sunscreen matter in its ability to block UV light? How do various colored sunglasses compare in blocking UV light?</p> <p>Conclusions/Discussion Combinations of the active ingredients and standard protection factor have a significant effect on the efficacy of any given sun block.</p>	
Summary Statement Standard protection factor (SPF) of a sunscreen and its chemical composition are important considerations when deciding which sunscreen to use in different environmental conditions.	
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