CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
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Project Number
36243

Project Title
Stop the Burn!

Abstract

Objectives/Goals

The purpose of the project is to determine if newer sunscreens protect better than expired older sunscreens with the same Sun Protection Factor (SPF) and brand. The sun emits electromagnetic radiation in the form of visible, ultraviolet (UV), and infrared. UV radiation is divided into three types: UVA rays 400 # 320 nm, UVB rays 320 # 290 nm, and UVC rays 290 # 320 nm. UVA rays play a part in skin aging and cancers and penetrate glass. UVB rays cause skin burning, play a part in skin cancer, and do not pass through glass. UVC rays are absorbed by the ozone layer. Sunscreens contain inorganic chemicals, such as zinc oxide, and organic chemicals, such as avobenzone that protect against UVA rays and salicylates that protect against UVB rays. Research showed that older expired sunscreens are less effective, because the benzone chemicals break down. The hypothesis is that older expired sunscreens do not protect as well as new sunscreens with the same SPF and brand.

Methods/Materials

UV radiation was measured with a UV meter. UV readings taken through clean glass pieces is the control. Four separate glass pieces were used as trials. Each type of sunscreen (0.1 to 0.15 grams) was smeared on each of the four glass pieces. The sunscreens are variables. Ten UV readings were taken for each glass piece. The glass pieces were cleaned between sunscreens. Four different groups of sunscreens with the same SPF and brand were tested.

Results

Of the four groups of sunscreens only the new Coppertone SPF 30 sunscreen protects better than the old Coppertone SPF 30. The new Equate SPF 30, Banana Boat SPF 30 cream, and Banana Boat SPF 30 spray sunscreens are all less protective than the expired older sunscreens with the same SPF and brand. Even the Banana Boat SPF 30 cream that turned brown and grainy protects more than the new Banana Boat SPF 30 cream.

Conclusions/Discussion

The hypothesis that expired older sunscreens do not protect as well as new sunscreens with the same SPF and brand is partially correct. Only UVA rays pass through glass. UVB rays do not. The chemicals in the sunscreens that protect against UVA rays are Avobenzone, Oxybenzone & Zinc Oxide. Avobenzone and oxybenzone chemicals are reported to break down with time. All the sunscreens contain those chemicals. But there is no relationship between those chemicals and the results.

Summary Statement

The project compares the effectiveness of new sunscreens with old expired sunscreens with the same SPF and brand.

Help Received

My parents helped me with the experiment and board.