



Colorado Science and Engineering Fair

2025 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Radiation Resilience: Evaluating Photostability in Natural and Synthetic Sunscreens

Finalist's Name: Violet Sandridge

School and City: Summit Middle Charter School, Boulder Colorado

Sponsor's Name: Valerie Keeney

Category: Chemistry

Division: Junior (grades 6 - 8)

Abstract (250 words or less):

Sunscreens protect against UV radiation using UV-blocking substances that prevent excited decay, reducing the risk of cancer, sunburn, and skin aging. Synthetic ingredients in commercial sunscreens tend to be more effective than natural alternatives. To test efficacy, various sunscreens were applied to clear plastic plates and exposed to UV light, with results compared to a commercial SPF 30 sunscreen. The study found that efficacy remained stable throughout testing, suggesting high photostability, though the low lamp strength may have influenced this outcome. The correlation between UVA and UVB transmission was relatively high ($R^2 \approx 0.768$). Natural sunscreens were less effective, allowing higher UVA ($\sim 1,000 \text{ mW/m}^2$) and UVB ($\sim 110 \text{ mW/m}^2$) transmission, whereas synthetic and commercial sunscreens performed better, with values around 350 mW/m^2 (UVA) and 20 mW/m^2 (UVB). However, there was considerable error in the data, with large standard deviations, low t-test values, and high variation even between identical trials. T-tests were close to 0, indicating low statistical significance. Overall, sunscreens containing synthetic materials were significantly more effective than natural ones, with commercial sunscreens performing best. This supports the idea that commercial sunscreens, rigorously tested for safety and efficacy, offer superior UV protection. The findings suggest that natural sunscreens may not provide adequate protection, reinforcing the importance of using scientifically validated commercial products.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**