



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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Project Title
UV or Not UV: How Does the Type and Color of a Material Affect Its Ability to Block UV Radiation?

Abstract

Objectives/Goals
My objective was to determine how the type and color of a fabric affects how much UV radiation can get through it.

Methods/Materials
I cut and tested 2x2 swatches from each of 64 fabrics, namely, eight different colors (red, orange, yellow, green, blue, purple, black, and white) of each of eight different fabrics (all available at JoAnne's Fabrics: Costume Satin (100% Polyester); Country Classics (100% Cotton); Cozy Flannel (100% Cotton); Dance/Swim Fabric (87% Nylon 13% Spandex); Kona Cotton (100% Cotton); Party Taffeta (100% Acetate); Quilter's Only Solids (100% Cotton); and Symphony Broadcloth (65% Polyester 35% Cotton)). I attached the swatches to a poster board in a way that allowed UV Fastcheck Strips to be inserted behind a single layer of cloth. After exposing the board to sunlight for 3 different time intervals, I compared the Strips to a UV Fastcheck Chart (Strips and Chart are available from uvprocess.com) to determine the amount of UV permitted through the fabric. I repeated this process five times and calculated averages of the data found.

Results
UV Average in mJ per color (all fabrics combined) at each time interval (5 min, 30 min, 60 min): Red (5.63, 25.35, 37.25); Orange (11.63, 39.5, 51.56); Yellow (21.13, 66.63, 115.29); Green (7.38, 30.31, 57.69); Blue (9.81, 53.81, 92.38); Purple (12.81, 58.88, 102.88); Black (1.75, 14, 24.38); and White (22.25, 71.94, 117.06).
UV Average in mJ per fabric (all colors combined) at each time interval (5 min, 30 min, 60 min): Dance (2.75, 12.81, 19.38); Symph (19.5, 79.56, 116.63); Kona (5.25, 20, 30.54); Quilters (9.63, 47.25, 74.44); Taffeta (30.5, 114.6, 207.69); Flannel (0.75, 4.75, 9.75); Country (17.88, 61.81, 95.88); and Satin (6.13, 19.63, 44.19).

Conclusions/Discussion
I found that within each fabric type, the colors black and red blocked UV radiation the best, and that the next best colors were orange and green. I also found that when the results for each color were combined on a per fabric basis, the Cozy Flannel and Dance/Swim fabrics blocked UV radiation the best, and that the next best fabrics were Kona Cotton and Costume Satin. These results supported my hypothesis in part, and helped me obtain my objective. Knowing which fabrics and colors block UV best helps people to make better choices of UV protective clothing.

Summary Statement
My goal was to determine which fabrics and which colors of fabrics block UV radiation best.

Help Received
My mom helped me get all the materials I needed, and she helped check my work.