CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
S0599

Project Title
The Effects of Dye on Different Types of Fabric

Abstract

Objectives/Goals
I love tie-dying yet I am often disappointed by the end result. Some fabrics just don't absorb dye as well as others, which makes me wonder: how exactly does dye work? Do different colors of dye have more impact on a fabric? Do different fabrics react and absorb dyes with varying outcomes? My experiment attempts to answer these questions by testing a given dye's effectiveness on a wide range of fabrics.

Methods/Materials
For my experiment, I chose four natural fibers (cotton, silk, linen, and wool), three synthetic fibers (polyester, rayon, and spandex), and one control fabric (cotton) and submitted them to the same dying process. In order to get the most accurate results, I repeated the dye process six times with different sets of fabric samples.

Results
I hypothesized that there would be significant variation across the different fabrics in terms of absorption of the dye, that the natural fabrics would absorb the dye more effectively than the synthetic fibers, and that the cotton would bond the best with the dye overall. According to both my data and further research, this assumption was correct.

Conclusions/Discussion
The purpose of this experiment was to test a given dyes effectiveness on a wide range of different types of fabrics. I wanted to see just what would happen so that when I ever tie-dye in the future, I might know just what to expect after the dying process is completed. At the start, I hypothesized that there would be significant variation across the different fabrics in terms of absorption of the dye, and that the natural fabrics would absorb the dye more effectively than the synthetic fibers, and that the cotton would bond the best with the dye overall. All of the different components of this hypothesis were supported by the data I collected. This is because cotton ended up being the fabric with the best scores, meaning closest to 100% saturation and 50% luminance, with an average of 100% saturation and 40% luminance. Because cotton is a natural fiber, the data I collected also supported that segment of my hypothesis. There was also a great deal of variation between each fabric, which supported the first segment of my hypothesis.

Summary Statement
My experiment attempts to explain how and why the chemicals in dye react differently with different types of fabric.

Help Received
I performed this experiment on my own.