CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31723

Project Title
If I Dye What Madders?

Abstract

Objectives/Goals
To achieve the brightest red dye out of fresh madder root. If the older (larger) roots are grinded, then the color of the dye extract will be deeper in color than using the young roots.
If the inner part/core of the roots is used after the grinding, then the color of the yarns will be redder than the outer part.
If the experimenter dyes the cotton, then the color of the dyed material will be more vibrant red than the nylon or wool.

Methods/Materials
What was used to conduct the preparation of the dye baths and the dyeing of the fibers were freshly ground madder root, distilled water, a thermometer or temperature probe in degrees Celsius, the SpectroVis and Vernier Lab Quest interface device as well as basic lab equipment. To make a dye bath one mixes the root and water, heats, filters, and then measures the absorbance levels in cuvettes with the Spectrometer; the process of dyeing is to make a dye bath with the concentration of 17.5 g to 300 mL of distilled water with samples 4A, 4B, and 4C. Soak, heat, filter, and heat it again then place the pre-soaked fibers into the samples.

Results
The results are not quantitative but rather qualitative data, based on subjective identification of color. Therefore the experimenter#s findings might differ from those of another person. None the less the experiment found that the core of the larger root and the wool a protein fiber produced the most vibrant red dye.

Conclusions/Discussion
In conclusion the brightest dye can be achieve when making an extract from the largest roots because they have the most surface area, the core of the roots since that is where most of the red dyeing chemical alizarin is, and using the wool which is the protein fiber. These findings will allow more people to understand the intermolecular forces between the dye material and the fibers.

Summary Statement
Various sizes and parts of the madder root as well as the type of fiber being dyed affects the brightness of the red color produced.

Help Received
Mrs. Carlberg lent the great madder and dyeing books; she also provided guidance and the madder plant was from her garden. Mrs. Wagner allowed me to use the chemistry lab and the Vernier lab equipment. Kim Nguyen told me what the graph of the Spectrometer should ideally look like.