CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1115

Project Title
Concrete: A Use for Used Tires

Abstract

Objectives/Goals
The purpose of this project was to determine if crumb rubber (ground up used tires) could be substituted for sand in the making of concrete as a solution to the great environmental problem of what to do with scrap tires, as well as reduce the rate at which sand is being depleted from the available reserves.

Methods/Materials
Concrete was tested with 0%, 25%, 50%, and 100% substitutions of crumb rubber. Sand, rock, crumb rubber, Portland Cement and water were measured and mixed in a concrete mixer. Each mix of concrete was poured into 6 plastic test cylinders, then placed in a curing tank and left to harden for 7, 14, and 21 days. On each test day, two samples of each mix were taken out of the curing tank and placed in a compression machine to determine their compressive strength, measured in Pounds per Square Inch. Data was recorded, graphed and analyzed.

Results
After 21 days of curing, the 25% substitution samples were 29% stronger than the 50% samples and 122% stronger than the 100% samples. Further, the 25% samples achieved strengths that were within the specified strength of the control mix design.

Conclusions/Discussion
This project demonstrates that crumb rubber is a viable substitute for sand in the making of concrete. At 25% substitution, the compressive strength was within the allowable range for most applications of concrete. If crumb rubber were substituted for only 10% of the sand in all concrete produced in the United States, all scrap tires generated each year in the US would be consumed. This would eliminate one of the most significant environmental problems we face and would help to reduce the rate at which sand is being depleted from the available reserves.

Summary Statement
The main purpose of this project was to determine if used tires, which represent a major environmental problem, could be substituted, in their ground-up form, for sand in the making of concrete.

Help Received
My mentor provided lab equipment at iCRETE and supervised the mixing and testing; my father assisted me and proofed my report.