



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Todd A. Karin	Project Number S0514
Project Title Calcium Oxalate as a Protector of Marble	
Abstract Objectives/Goals Marble statues, buildings and flooring all have one major downfall: they deteriorate when they come in contact with acids. Commercial methods to protect marble require many steps that are awkward for large, intricate statues. Also, marble statues all over the world have been deteriorating due to damage caused by acid rain. My goal is to find a way to prevent marble from deterioration caused by acids. Methods/Materials For each test, calcium oxalate is formed on the surface of the marble. Stage 1 - Tested calcium oxalate (Ca Ox) for protective capabilities against acid disintegration. Stage 2 - Compared Ca Ox protection to a professionally used marble sealant. Stage 3 - Tested if spray application protects marble as well as a dipping application. Stage 4 - Tested effects of acid rain on Ca Ox protected marble. Stage 5 - Tested effectiveness of different application methods: dipping, spraying and rolling. Results Stage 1 - Ca Ox protects marble dipped in acids. Stage 2 - Ca Ox protects marble 16 times better than a commercial sealant. Stage 3 - A spray method is 6 times more protective than a dipping method. Stage 4 - Ca Ox protects marble from acid rain. Stage 5 - Results in progress. Conclusions/Discussion Ca Ox is an excellent protector of marble. Treated pieces have much more resistance to acids than untreated ones. Ca Ox has 16 times the protective effects of methods currently in practice. Spraying is a practical application method for large or intricate statues. Acid rain is much less destructive on calcium oxalate protected marble than untreated marble.	
Summary Statement To see if calcium oxalate is a useful method of protecting marble against deterioration caused by acids.	
Help Received Supervised by Vicky Wendell; Recieved a technical paper from Dr. Schrer of Princeton University	