



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Raymond Salcedo	Project Number 33748
Project Title What Building Materials Are Most Affected by Acid Rain Corrosion?	
Objectives/Goals The objective is to determine which building material will be most resistant to corrosion from exposure to acetic acid, an acid similar in pH to acid rain. The experiment sampled fourteen different building materials including wood, clay brick, concrete, marble, granite, travertine, porcelain tile, ceramic tile, steel, tin, aluminum, asphalt roof shingle, copper, and glass. Methods/Materials Four sets of fourteen materials were used including wood, clay brick, concrete, marble, granite, travertine, porcelain tile, ceramic tile, steel, tin, aluminum, copper, asphalt roof shingle, and glass. Each material was dried, weighed, and reimmersed into acetic acid baths daily for five days. Corrosion was measured based on the percent decrease of weight over five days. Results Travertine had the highest percentage corrosion losing an average of 37% of its starting weight. Marble was next losing an average of 25% of its starting weight. The remaining materials' percent decreases are as follows: clay 8%; concrete 7%; tin <6%; copper <5%; steel and asphalt <4%; aluminum <2%; ceramic tile, wood, and glass about 1%; and granite and porcelain tile <1%. Conclusions/Discussion In this experiment, the corrosion of different building materials by acetic acid was measured. The data showed that over five days travertine lost an average of thirty-seven percent of its starting weight, and marble lost an average of twenty-five percent of its starting weight. Clay brick, concrete, tin, copper, steel, and asphalt roof shingle corroded much less. Aluminum and ceramic tile corroded even less. The amount of wood corrosion was difficult to determine because wood is porous. Glass, ceramic, granite, and porcelain tile proved to be the most resistant to corrosion by acetic acid as they lost the least percentage of weight over the time period. This differed from my hypothesis where the predicted softer material of wood would be damaged the most and the harder material of concrete would be corroded the least. The chemical makeup of building materials explain why they are broken down by acetic acid.	
Summary Statement Fourteen common building materials were exposed to corrosion by acetic acid, and travertine and marble corroded the most while glass, ceramic, granite, and porcelain corroded the least.	
Help Received Parents bought and helped prepare and cut building materials for project.	