



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Connor R. Ashton	Project Number 38228
Project Title Destroyed or Resistant: The Effect of Acid Rain on Building Materials	
Objectives/Goals The objective of this project was to determine which building material (granite, marble, concrete, brick, or wood) would resist acid rain the best. Abstract Methods/Materials Some of the key materials used included 10% sulfuric acid, distilled water, a kitchen scale, personal protective equipment, and same sized blocks of granite, brick, marble, wood, and concrete. After pre-soaking each sample and recording the initial mass, the samples were placed in the acid or water. After waiting for a week the samples were removed, the mass measured, any observations noted, and the samples returned to the fluid. This was repeated for a total of 4 weeks. The total mass loss was calculated by comparing the week 4 mass with the initial mass. Results The experimental results showed wood to resist the acid the best with granite and brick next, then marble, and concrete was the worst. The granite and brick samples suffered very little visible damage and mass loss (<3%) after 4 weeks. The marble samples formed a filmy white substance on the surface but also had little mass loss. The concrete samples broke into pieces and lost almost 80% of their initial mass. The wood samples gained mass, 17% for the samples in acid and 30% for the control samples. Conclusions/Discussion Based purely on science, granite and brick should have had the least mass loss, wood would be in the middle, marble the next worst, and concrete the worst. Granite is a hard, dense material not easily damaged by acid and brick is more susceptible to bases so minimal material loss was expected. Wood should have seen some loss because sulfuric acid attacks the lignin in wood. The wood gained mass in the experiment because it was not pre-soaked long enough. Marble should have seen much higher mass loss because sulfuric acid attacks calcium carbonate, the main component of marble. The experimental results did not show this because the filmy white substance, gypsum, did not wash away as it would in a real-life situation. Concrete should have and did see significant mass loss since its pH is highly basic and so would be damaged by acids.	
Summary Statement My experimental data simulating acid rain impact on building materials showed that the wood samples had the least mass loss when exposed to sulfuric acid for four weeks.	
Help Received Dr. Dale Brost to dilute the sulfuric acid and recommended appropriate personal protective equipment when working with the acid.	