



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Lucas Brumm</b>	<b>Project Number</b> <b>J1503</b>
<b>Project Title</b> <b>Do You Need Proof That Acid Rain Will Deteriorate Your Roof?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My science fair project will demonstrate which type of roofing material will resist deterioration due to acid rain. Acids can be measured using the pH scale from 1 to 14. Acids are on the lower end of the pH scale with neutral (pure water) being 7. Acid rain can have a pH ranging from 1 to 4. Acid rain can be formed in the atmosphere when Sulfur Dioxide and Nitrous Oxide combine and react with water, oxygen, and other oxidants in the clouds.</p> <p><b>Methods/Materials</b> I will create a controlled experiment. I will place 1 wooden shake shingle, 1 asphalt shingle, and tile shingle in the 9-1 pint jars after recording the beginning weight of each sample. I will keep the samples in the water and the acid for 12 days. I will place a set of roofing materials (1 tile, 1 shake, 1 asphalt) in rain water, and a set in pure water, and the final set in acidified water. I will weigh each material before and after the project. I will also observe the liquids for clarity using the scale of 0 for clear and 10 for opaque after the project to determine the amount of material leached into the liquids. Then I will dry each sample. After they are dried we will weigh them to get the results. We will use comparative weight losses for each material after drying since we don't have a good method to determine beginning or ending moistures. The 2 water samples will be used as a control.</p> <p><b>Results</b> In conclusion, it appears that the acid rain affected the concrete roof tile the most followed by the asphalt roofing. Looking at the data, the cedar shake material all lost the same amount of weight whether immersed in the pure water, rain water, or acidified water. Since all these samples had to be dried after the test, it looks like the wood all lost the same amount of weight relatively. I can only conclude that since the wood all lost the about same amount of weight, the acidified water had little to no affect.</p> <p><b>Conclusions/Discussion</b> Since my hypothesis was that the acid rain would deteriorate the wood at a faster rate, I was a little surprised that the concrete actually deteriorated faster compared to the water controls. I found an article called #A material loss; acid rain is leaving its mark on buildings, statues, automobiles and other man-made structures# discussing the erosion of the ancient stone cities of the Anasazi Indians in Colorado. This article discusses that the acid attacks the Calcium Carbonate in limestone, and cement.</p>	
<b>Summary Statement</b> To determine which roof material will hold up best to acid rain.	
<b>Help Received</b> Mother helped with board. Dad helped me organize the project. and helped get the supplies.	