



CALIFORNIA STATE SCIENCE FAIR 2004 PROJECT SUMMARY

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Project Title Static Discharge Danger at the Pumps	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This science fair project investigates everyday activities that could create static electricity sufficient to cause a danger at a gas station. If two materials rub together, a static charge can be created and cause a fire or explosion if the right mixture of gas fumes and oxygen are present. Based on the triboelectric series, the following hypothesis was made for the experiment: If analyzing static generating activities at gas stations, then sliding across a polypropylene seat cover while wearing leather would generate the most static electricity, while combing hair with a polypropylene comb would be the next highest static generator.</p> <p>Methods/Materials In defining the experiment, a list was first made of everyday activities that occur at gas stations. Those activities include for example sliding across the car seat, taking a hat off, removing your cell phone or wallet from your pocket, rubbing your cell phone against your hair, removing a sweater. A list of materials that rub together during these activities was generated. After gathering samples of the materials, combinations of materials were rubbed together and an electrostatic voltmeter was used to measure the static voltage that had been generated. The experiment was performed on both a high and low humidity day.</p> <p>Results Standard deviations were consistently on the order of 33% of the average value for all measurements, indicating acceptable experimental variation. The plots of voltage versus material combinations showed good agreement with that predicted using the triboelectric series. An additional experiment was run to investigate one major discrepancy with that predicted. Tests run on a low humidity day showed higher average voltages compared to tests on a high humidity day, as expected. Combinations of materials which generated in excess of the 1000 volts which could cause a static discharge to ignite gas fumes are identified on the plots. Polypropylene and hair created the biggest voltage.</p> <p>Conclusions/Discussion My conclusion is that there are a number of material combinations which can create a danger when rubbed together during normal activities while pumping gas. While signs at gas stations warn people not to use cell phones while pumping gas, there are other common activities besides using a cell phone that are potentially dangerous.</p>	
Summary Statement The purpose of this project is to investigate dangers at gas pumps from static charge build-up that can result from normal things people do.	
Help Received dad helped rub materials, Unisys lent me an electrostatic voltmeter	