



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Emmaline A. Meill</b>	<b>Project Number</b> <b>S1821</b>
<b>Project Title</b> <b>Burn Notice! The Effect of Different Types and States of Materials on Ignition Time and Combustion Rate of Cloth Swatch</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to determine how quickly different types of cloth under different states of wear and different temperatures ignite and how quickly they combust.</p> <p><b>Methods/Materials</b> 20.32 cm by 20.32 cm swatches of different materials -100% wool, linen, acetate, cotton, and polyester, silk, felt, nylon, 50/50 nylon polyester blend, 80% polyester, 20% spandex blend, and hemp- were subjected to wear (repeated washings in a washer and dryer) and different temperatures, then the swatches, both worn and new, at room temperature and body temperature, were burned and their ignition time and combustion rate timed/calculated. Combustion rate was calculated by dividing the amount burned (in cm<sup>2</sup>) by the time burned to find the rate in cm<sup>2</sup>/second.</p> <p><b>Results</b> The material with the longest ignition time was polyester, with a 9.98 second ignition time, while the materials with the shortest ignition times were hemp and silk, both with 1.58 second ignition times. The material with the slowest combustion rate was wool with 2.39cm<sup>2</sup> burned per second, while acetate burned the most quickly, with a combustion rate of 17.52 cm<sup>2</sup> burned per second. The data for wear and temperature for both ignition times and combustion rates was found to be statistically insignificant.</p> <p><b>Conclusions/Discussion</b> This experiment provides examples of materials that are in their nature, without any specific flame-retardant treatment, flame resistant # materials that take longer to ignite and combust slower, that could better one#s chance of survival and/or not sustaining serious injury in a fire-related situation. The findings of the experiment were that polyester had the longest ignition time while hemp and silk had the shortest, and that wool had the slowest combustion rate while acetate had the fastest.</p>	
<b>Summary Statement</b> The purpose of this experiment was to test the effect of different types of materials, the temperature of materials, and wear of materials on the time taken for a material to ignite and the rate the material combusts.	
<b>Help Received</b> My mother assisted me in conducting the trials, as well as in assembling the necessary materials for the experimental setup.	