



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) David L. Polyakov	Project Number 31638
Project Title Up In Smoke: The Effects of Additives on the Fire Resistance of Paint, Year 2	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Determining whether the addition of readily-available, low-cost substances, when mixed with exterior or interior house paint, improves the fire resistance of the paint through the release of carbon dioxide, which reduces oxygen, and/or through an endothermic reaction, which reduces heat, two of the three necessary components of fire?</p> <p>Methods/Materials Pine wood cut into equal 30 cm, by 10 cm, by 2 cm pieces, stop watch, propane torch, propane gas, fire extinguisher, sodium carbonate, sodium bicarbonate, calcium carbonate, potassium bicarbonate, Glidden brand interior paint, Speedcoat brand exterior paint, paint roller, power drill, whisk, infrared thermometer, camera, video camera, plastic cups, and homemade burning assembly.</p> <p>Results With additives, interior paint was more fire resistant than the exterior paint, and potassium bicarbonate additive provided the greatest fire resistance when mixed at 5% with the interior paint. The mixture of interior paint with single additive 2% sodium bicarbonate provided the most fire resistance. Combination additives of potassium bicarbonate and sodium carbonate provided the greatest fire resistance and lowest average temperature when mixed with interior paint. Interior paint with 5 percent additives produced the lowest average temperatures.</p> <p>Conclusions/Discussion By adding a small amount of common chemicals to paint, one can enhance its fire resistance. The endothermic reaction occurring when the torch flame strikes the painted wood results in less heat being emitted, thus eliminating a necessary component of fire. When heated, the additives in the paint also release carbon dioxide which displaces oxygen, another necessary component of fire. Mixing two additives with the paint enhanced the fire resistance. In addition to the type of additive, the percentage of additive to the paint was telling, since too much of an additive caused the paint to separate from the wood during the trials. With no paint and additive to absorb the heat and release carbon dioxide, the wood was less fire resistant.</p>	
Summary Statement Testing whether the addition of low-cost, readily available substances to interior and exterior paint improve its fire resistance.	
Help Received Father helped buy supplies, build structure, light torch, and video record experiment.	