



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>David L. Polyakov</b>	<b>Project Number</b> <b>S0512</b>
<b>Project Title</b> <b>Up in Smoke: The Effects of Additives on the Fire Resistance of Paint</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> To determine if the addition of common chemicals to interior and exterior house paint improves the fire resistance of the paint.</p> <p><b>Methods/Materials</b> Methods: Purchased necessary materials. Cut the wood into equal one-foot pieces and painted each with an appropriate mixture of paint and additive. I constructed a testing assembly and then painted testing boards with each solution, resulting in a total of 47 trials. I used a power drill with a whisk attachment to mix in the additives and then evenly painted each board. I labeled the backside of each board. I photographed the experiment and recorded the burning time with a stop watch. After burning a Control Group of unpainted wood, I randomly selected painted sample to eliminate bias. After the torch was started, I then measured the time it took for the paint to separate from the wood and for the wood to catch on fire. Materials: 1. Stopwatch, 2. Propane Torch, 3. Propane gas, 4. 4in by 1in by 10ft pieces of wood (cut into one foot sections), 5. Fire Extinguisher, 6. Sodium bicarbonate (baking soda), 7. Potassium bicarbonate, 8. Calcium carbonate, 9. Flour, 10. 2 gal of Glidden exterior paint, 11. 2 gal of Glidden Interior paint, 12. Paint roller, 13. Power drill, 14. Whisk</p> <p><b>Results</b> The experiment produced rather consistent results. The exterior paint proved to be more fire resistant than the interior paint on almost every trial regardless of additive. Sodium bicarbonate provided more resistance to fire than the other two chemicals. The best fire protection result came from the mixture of 6% sodium bicarbonate and exterior paint, as it took over 5 minutes to catch on fire. The best time for the calcium carbonate was the mixture of 5% combined with interior paint. This sample lasted just over 4 minutes. The best result for the potassium bicarbonate was also the mixture of 5% with the interior paint which lasted for just over three minutes. Unpainted wood performed the worst.</p> <p><b>Conclusions/Discussion</b> Sodium bicarbonate worked best, calcium carbonate second best, and potassium bicarbonate was last. But each of the three additives provided more fire protection than the paint alone or bare wood. The best results were achieved with the mixture consisting of 5 to 6 percent additives combined with paint. Too much of an additive caused the paint to separate from the wood and the wood to catch fire faster.</p>	
<b>Summary Statement</b> My project tested whether adding various chemicals to interior and exterior paint will increase their fire resistance.	
<b>Help Received</b> Father helped buy supplies, build structure, light torch, prepare video showing actual burning.	