



# CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

<b>Name(s)</b> <b>Ruchi S. Pandya</b>	<b>Project Number</b> <b>S0622</b>
<b>Project Title</b> <b>The Effects of Eliminating Oxidizers from Various Substances to Form Flame Retardant Substances</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Every year, more than 475,000 structures are burned down due to fire. The purpose of this experiment is to create an affordable and practical flame retardant paint. Once this solution is found, it can be applied to homes and commercial buildings all over the world to prevent fires.</p> <p><b>Methods/Materials</b> To conduct this experiment, 11 by 1 inch strips of paper were painted with 0%, 10%, 20%, and 30% concentrated solutions of commonly found salts (Ammonium Chloride, Ammonium Phosphate Dibasic, Sodium Acetate, and Borax) and exterior house paint. The strips were allowed to dry. Detailed time experiments were conducted, measuring the combustion time and total burn time. The experiment was repeated with a weathering aspect, which allowed the flame retardant paint to be tested as a practical, long-term solution to fires. As the amount of salt added to the paint increased, the combustion time increased, as did the burn time.</p> <p><b>Results</b> Ammonium Phosphate Dibasic and Ammonium Chloride were the most effective solutions in both the weathered as well as the unweathered portions of this experiment. Ammonium Phosphate Dibasic had a 20 second combustion time in the weathered portion, and took an average of 104.73 seconds to burn. Ammonium Chloride did not ignite with the 30% concentration in the unweathered portion, proving to be an unbeatable flame retardant. Full internal structure of the strips painted with 20% and 30% concentrations of Ammonium Phosphate Dibasic or Ammonium Chloride and exterior house paint remained intact.</p> <p><b>Conclusions/Discussion</b> The painted solutions of Ammonium Phosphate Dibasic and Ammonium Chloride were effective to the point that some of the strips used for the experiment did not meet the combustion requirements. These strips served as excellent flame retardants. The acidic and basic properties of the strips served as barriers between the oxidizer and the surface of the paper. This experiment could be tweaked to fit different climate regions all over the world, as the unweathered and weathered portions (representing rain and no rain) were both effective. My hypothesis was that if the oxidizer, in most cases oxygen, was eliminated from the equation, then the flame would not ignite. The most effective solutions had strong acidic and basic properties, which eliminated the oxidizer.</p>	
<b>Summary Statement</b> Commonly found salts with acidic and basic properties, when mixed with exterior house paint in 20% and 30% concentrations prove to be a significant flame retardant because they eliminate the oxidizer, thus inhibiting the flame.	
<b>Help Received</b> Fume hood, burn stand, and salts that I wanted were provided by the school.	