



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) David A. Linton	Project Number 33504
Project Title Combust This: Can Wood Preservatives Increase the Effectiveness of Fire Retardants?	
Objectives/Goals To see if wood preservatives can increase the effectiveness of a fire retardant and to find an improved fire retardant. Abstract Methods/Materials 110 pieces of wood, a two burner camping stove, 2 ring stands, a postal scale, paint, and wire. The chemicals compared were borax and copper sulfate (aqueous solutions). The wood pieces were soaked or painted using these solutions. A wire hanger that hung the wood pieces above the burner was crafted. It was found that the insides of the burners produced a more powerful flame. The pieces of wood were burned at 4 one minute increments. The weight of each wood piece was measured before and after burning. Results Experiment 2 tested wood soaked in the solutions. Piece A was untreated wood, piece B was wood soaked in borax, piece C was wood soaked in copper sulfate and piece D was wood soaked in borax and copper sulfate. In this experiment, piece D had the best results, losing an average of 1 gram. Experiment 3 tested wood dipped in paint mixed with the chemical solutions. Piece A was dipped in only white exterior paint, piece B was dipped in paint mixed with borax, piece C was dipped in paint mixed with copper sulfate, and piece D was dipped in paint mixed with borax and copper sulfate. Piece C showed the best results in experiment 3, losing an average of 1 gram. Experiment 4 compared the winners of experiment 2 and 3 to barricade gel (commercial fire retardant). Piece A was untreated wood, piece B was wood soaked in a mixture of borax and copper sulfate. Piece C was wood dipped in paint mixed with copper sulfate, and piece D was wood coated in barricade gel fire retardant. Barricade gel showed the best results with losing an average of 0 grams. Conclusions/Discussion The experimental hypothesis stated that the combination of borax as a fire retardant and copper sulfate as a wood preservative in both the soaked wood and paint will provide 2 times more resistance than if either chemical is used alone. The experimental results proved the hypothesis when comparing the test articles using soaked wood, because the mixture provided roughly 2 times greater fire resistance than the other test articles, as stated in the hypothesis. In experiment 4, wood soaked in the 1:1 mixture of borax and copper sulfate protected the wood approximately 10 times better than the negative control, untreated wood, and 7 times better than the wood painted with the copper sulfate solution.	
Summary Statement This project compared the fire resistant characteristics of borax and copper sulfate when applied to wood either by soaking or by adding it to paint.	
Help Received Mr. Craig McIntyre gave the idea to use these chemicals. My Parents drove to get materials, proof read my work, and assisted me through experimentation. My science teacher guided me through science fair.	