



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> <b>Max P. Brown</b>	<b>Project Number</b> <b>J0605</b>
<b>Project Title</b> <b>Shield the Steel: Protection from the Advancement of Rust</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My objective is to find the most effective substance which would shield carbon steel from the accumulation of rust due to corrosion. I believe motor oil will be the most effective coating on carbon steel to resist corrosion compared to lemon juice, honey, Coke Cola, Barricade, WD-40, polyurethane and canola oil. <b>Methods/Materials</b> Three steel samples were coated with each substance (independent variable), sprayed with a 10% saline solution every 48 hours for 14 days (control variables). The area of non-corroded steel calculated the percentage of protected steel. Rust Color Value (RCV), rust based on shades of color within a sample area, quantified the total amount of corrosion (dependent variable) which demonstrated the accumulation of rust. <b>Results</b> Motor oil, polyurethane and canola oil all provided 0% protection against corrosion. Of the former three substances motor oil with RCV of 192 was the least effective substance compared to polyurethane with RCV of 181 and canola oil with an RCV of 151. Honey, however, not only was the most effective shield providing 95% protection but also measured an RCV of 13. My control sample provided 0% protection with an RCV of 159. In addition to rust colors a black color appeared on 3 samples, lemon, Coke Cola, and honey, inhibiting corrosion. <b>Conclusions/Discussion</b> My conclusion is motor oil not only failed to repel water containing threatening oxygen atoms but actually accumulated more rust than the control sample with no substance at all. Although my hypothesis was proven wrong I found honey to be the most effective substance shielding steel against corrosion. This may provide a new additive in steel manufacturing which may result in safer structures and minimizing cost for all people. Honey is organic and not toxic to the environment. Replacing toxic additives with "green" additives reduces harm to people as well as the environment.	
<b>Summary Statement</b> This project investigates the most effective substance protecting steel from the accumulation of rust.	
<b>Help Received</b> Mr. Pannell helped understand scientific method, Dad helped with materials and setting up experiment, Mom helped organize board and edit final report	