



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Tom J. Hiel</b>	<b>Project Number</b> <b>S1609</b>
<b>Project Title</b> <b>Heat Transfer in Hydrogen Fuel Storage Tank Insulation</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Hydrogen Fuel cell vehicles are currently the more environmentally friendly option to replace the present-day gasoline powered cars. The hydrogen used to power the vehicles must be kept at cool temperatures inside the fuel tank. In this experiment, I used insulating foam and determined how adding layers affected the rate at which heat was transferred to the tank.</p> <p><b>Methods/Materials</b> For the experiment, I used a metal fuel tank with three thermocouples attached that I put in the freezer. One thermocouple measured the temperature inside the tank. One measured the temperature on the outside surface of the tank. The third thermocouple measured the temperature on the outside of the insulation being tested. I removed the tank from the freezer let it sit at room temperature. The thermocouples were attached to the computer which records the slow heating of the tank.</p> <p><b>Results</b> The results from 1, 2, 3 and no layers were analyzed. The correlation between the number of layers and time to reach room temperature was determined. In addition, an exponential was used to fit the heating curves and the time constant was determined for the different layers of materials.</p> <p><b>Conclusions/Discussion</b> The most effective insulation was determined by the longest time it took for the hydrogen tank to return to room temperature. I will analyze the curves created by the graphs. All my data has been described and graphs have been created showing my findings. In the future, I hope to expand the project and use different insulating materials as well as examine the cost to determine which insulation is the most effective.</p>	
<b>Summary Statement</b> In this experiment, I used insulating foam and determined how adding layers affected the rate at which heat was transferred to the tank.	
<b>Help Received</b> I would like to thank my parents for their help and support in this project. Without them I would not have had the equipment to complete my experiment.	