



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Jesse T. Feinstein	Project Number J1807
Project Title All Fuels Are Not Created Equal	
Abstract Objectives/Goals My objective was to test the hypothesis that bioethanol (E85) would have the highest heat content compared with other commonly used fuels, specifically diesel, kerosene, gasoline, ethanol and isopropanol. My hypothesis was based upon the extensive media coverage devoted to bioethanol. Methods/Materials I built a homemade calorimeter with materials provided by Dr. Eric McFarland (UCSB Dept. of Chemical Engineering). Specifically, the calorimeter had ceramic insulating walls with a small porcelain "boat" inside. Fuel was injected into the boat with a syringe pump and the fuel ignited by a platinum wire hooked up to an electric supply. Finally, a flask with 50 ml water was suspended above the boat, with a thermocouple to measure the changing temperature of the water, sending the data to a computer as a function of time. Finally, I combusted a defined volume of each fuel, measured the change in temperature of the water and determined its heat content in calories/ml of fuel. Results Diesel, kerosene, gasoline and E85 all had about the same heat content per ml of fuel. While the trend was diesel>gasoline>kerosene>E85, the differences were not statistically significant. Pure ethanol had statistically less heat content than these fuels, and isopropanol was statistically even lower than ethanol in heat content. Conclusions/Discussion While E85 did not have greater heat content than the more conventional fuels (gasoline, diesel, kerosene), its heat content was equal to each of them (within experimental error). Therefore, my original hypothesis was not supported. However, this is still a very exciting outcome, because the United States can produce large quantities of E85 through our agricultural system. Additionally, E85 burns cleaner than gasoline, diesel and kerosene, which will reduce pollutants.	
Summary Statement My project sought to assess the hypothesis that bioethanol contains enough energy to eventually replace other commonly used fuels.	
Help Received Used laboratory equipment and facilities in the laboratory of Dr. Eric McFarland, Department of Chemical Engineering at UCSB	