



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Travis M. Osterback</b>  | <b>Project Number</b><br><b>J0527</b> |
| <b>Project Title</b><br><b>Heat of Combustion of Various Oils</b>   |                                       |
| <b>Objectives/Goals</b><br>Introduction: Veggie cars are good to drive because they run on the renewable resource - vegetable oil. My motivation for this project was to see which oil is the best for a #veggie# oil powered car. With rising gas prices and dwindling fossil fuel resources, I want to help find alternatives. I am concerned about the environment and also about what gas prices will be like when I can drive.<br>This project will compare the heat of combustion (calories) per gram generated by ethanol and various vegetable oils.<br>Hypothesis: The oil with the highest smoke point will have the largest heat of combustion per gram. |                                       |
| <b>Abstract</b><br><b>Methods/Materials</b><br>Materials: Chemicals # Distilled water, ethanol, corn, olive oil, almond, paraffin, grape seed; Supplies - Erlenmeyer flask, thermometer, oil burners, scale, stopwatch<br><br>Procedures: 1) Calibrate the calorimeter using ethanol. 2) For each oil, determine the heat of combustion and the average time to raise the temperature of the water in the calorimeter. 3) Calculate the number of calories per gram, by dividing the heat of combustion of the oil by the number of grams of oil burned. 4) Compare heat of combustion per gram to the smoke point of the oil.                                      |                                       |
| <b>Results</b><br>Results:<br>· The heat of combustion for ethanol was determined to be 3550 cal<br>· The heat of combustion/gram for paraffin, olive oil, corn oil and almond oil was 9564.6 cal/g. The heat of combustion/gram for grapeseed oil was 5916.7 cal/g<br>· The average time (minutes) it took to raise the temp. of the water 5oC was: 9.8 (almond), 4.3 (grapeseed), 3.1 (olive), 2.1 (corn), and 1.4 (paraffin)<br>· The smoke point (oC) of the oils were as follows: 242oC (olive), 232oC (corn), 221oC (almond), 215oC (grapeseed), 201oC (paraffin)   |                                       |
| <b>Conclusions/Discussion</b><br>Conclusions/Discussion: 1) There seems to be no relation between smoke point & the heat of combustion; 2) all of the oils tested had the same heat of combustion except for grape seed; 3) corn oil would be the best choice for a fuel because it takes the least amount of time to heat up, and it has the second highest smoke point. Corn can be grown as a crop to make fuel and eventually eliminate the demand on our dwindling fossil fuels.   |                                       |
| <b>Summary Statement</b><br>This project will compare the heat of combustion (calories) per gram generated by ethanol and various vegetable oils.   |                                       |
| <b>Help Received</b><br>Used lab equipment at A Schmahl Science Workshop under the supervision of Ken Schmahl and Belinda Lowe-Schmahl; Jerry Kakannad assisted me with the calculations  |                                       |