



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Diego R. Munoz-Cowan	Project Number J0920
Project Title The Biodiesel Tests	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine which of three different plant based oils would produce the greatest quantity of biodiesel fuel. I used new (unused), slightly used and heavily used oils in equal quantities. The slightly and heavily used oils were obtained from restaurants. It is the the oil they discard. I hypothesized that the new (unused) oil would produce the greatest quantity of biodiesel because it contains the least amount of free fatty acids.</p> <p>Methods/Materials I started out with 500ml. of oil for each of the nine tests. I tested each of the three oils three times. The oil was titrated to determine the amount of free fatty acids present. This gave me the titration value that I used to determine how much KOH catalyst was needed to make the biodiesel. Then, KOH was mixed with methanol to make methoxide. Oil was heated to 130 degrees F. Methoxide and oil were combined in a separatory funnel. The solution was mixed producing glycerine as a by-product. Glycerine was drained off and 100 ml of cold water was added to the oil in a separatory funnel. Solution was mixed then allowed to settle. Water and emulsion were then drained, leaving biodiesel. The wash was repeated three more times to remove impurities from the biodiesel.</p> <p>Results The slightly used oil produced the greatest quantity of finished biodiesel-491.6 ml average. The new (unused) oil produced the second greatest amount of finished biodiesel-463.3 ml average. The heavily used oil produced the least amount of finished biodiesel-433.3 ml. average.`</p> <p>Conclusions/Discussion My hypothesis was incorrect. Having the least amount of free fatty acids the new (unused) oil did not produce the greatest quantity of finished biodiesel as I had thought it would. I think the slightly used oil produced the greatest quantity of biodiesel because I used the perfect amount of catalyst. I think I didn't get as much biodiesel with the new (unused) oil because the amount of catalyst used may have been a major factor (too much or too little catalyst). Another possibility is that I need to adjust the formula I used to make biodiesel, so it works better with the new (unused) oil. Based on my results, if you wanted to produce the highest yield of biodiesel that you could, using the formula I used, you should use slightly used oil.</p>	
Summary Statement My project focus is to determine which of three plant based oils: unused, slightly used and heavily used oils would produce the greatest quantity of biodiesel fuel.	
Help Received My cousin, Dan Sharp provided some of the equipment and the initial guidance I needed to complete my project.	