CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

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Project Number
S0605

Project Title
Biodiesel: Fuel for the Future

Abstract

Objectives/Goals
Is algae oil biodiesel a comparable fuel source when compared to olive oil biodiesel in terms of viscosity, freezing point, and heat combustion?

Methods/Materials
The materials used include 80 ml 95% Ethanol Solution, 40 ml Olive Oil, 40 ml Algae Oil, 150 ml Distilled water, 1.4 g Sodium Hydroxide Pellets, 40 drops 0.1 M Acetic Acid, and 12 pellets Calcium Chloride.
Make each ethanol biodiesel by combining 20 ml of ethanol with 0.35 grams of NaOH and stir until dissolved. Then add 20 ml of oil and heat until 40ͦ C while stirring for thirty minutes. Pour the mixture into test tubes, cover, and leave overnight. Pipette the top layer of biodiesel into a graduated cylinder leaving the glycerol and then use a pH strip to measure the pH of the biodiesel. Neutralize the biodiesel by adding 20 drop of 0.1 M acetic acid and then measure the pH again using a pH indicator strip. To finish, add six pellets of calcium chloride to the biodiesel and stir the mixture. To test for heat combustion, puncture holes the base of the larger aluminum can and below the rim of both the large and small can. Measure the change in heat of the water. To test for viscosity, pour each of the algae biodiesel, olive oil biodiesel, and distilled water separately through a long necked funnel and time how long each takes to drain. To test for freezing point, combine ice and rock salt to make an ice bath. Place a test tube with 10 ml of biodiesel into the ice bath. Record the temperature of the biodiesel when the environment is -10ͦ C and note the physical attributes of the biodiesel.

Results
Algae oil biodiesel is less viscous, handles a lower freezing point, and is comprable in terms of heat combustion when compared to olive oil biodiesel.

Conclusions/Discussion
Olive oil biodiesel was chosen to be the standard because of a previous experiment which determined that is was a good replacement for diesel. The independent variables were the different kinds of oils and the dependent variables were the viscosity, heat combustion, and freezing point. The experiment was a success. Based on tests, algae oil biodiesel is indeed comparable to olive oil biodiesel because the results yielded were similar to each other.

Summary Statement
ALgae biodiesel is comprable to olive oil biodiesel in terms of viscosity, heat combustion, and freezing point.

Help Received
Used equipment at Cornelia Connelly School