CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J0519

Project Title
Biodiesel: Transesterification of Soy and Corn Oils: Green Light for the Future

Abstract

Objectives/Goals
The purpose of my experiment is to determine how biodiesel is made and produce a sample quantity of biodiesel from two different vegetable oils. I will then determine if the two fuels burn differently and if they are a better fuel than the original oil.

Methods/Materials
500mL of 120 degree F oil is combined with 137mL of potassium ethoxide and allowed to react in a blender for 10 minutes. This was transferred to a jar to allow the biodiesel and glycerin to separate into two layers. The glycerin was removed and the biodiesel was washed with water to remove excess reactants, soap and glycerin. The biodiesel was heated to remove excess water and alcohol. The 100 percent biodiesel fuels, b100 soy and b100 corn, were placed into lamps and burned. Pictures were taken to record color and height for later analysis. The b100 soy and soy oil were burned and recorded the same way. The results were compared.

Results
The 100 percent biodiesel fuels, b100 soy and b100 corn, performed equally well in the burning tests. They burned at the same height and had flames of the same shape and color. The pure soy oil burned about 25-30% the height of the b100 soy. The pure soy did have the same shape and color of the biodiesel flame, just smaller.

Conclusions/Discussion
I learned and applied the techniques to make biodiesel. It is made by a chemical process called transesterification. In this process, a glycerol is exchanged with an ethyl alcohol on a fatty acid. An ethyl ester of the fatty acid was created (i.e. biodiesel). Soy biodiesel, corn biodiesel and glycerin were successfully produced. In a burning test, both had a flame of just over four inches with the same shape and color. They burn equally well. Because the color and intensity were identical they are probably about equal as fuels. I used soy oil as a control to test if biodiesel is a better burning fuel than oil alone. The biodiesel had a flame that was about three times the height of the soy oil. Soy oil does not burn as well as biodiesel. Converting vegetable oil to biodiesel provides a usable fuel. This fuel can be used in diesel engines and perhaps it can be used for cooking and light as an alternative to kerosene for camping and third world countries.

Summary Statement
I produced biodiesel from different vegetable oils to determine if there is a difference between them as fuels and to determine if biodiesel is a better burning fuel than the original vegetable oil.

Help Received
Mother helped type report; Father supervised safety in production with chemicals, stove and burning tests; Utah Biodiesel Supply provided rerference information for biodiesel production.