Name(s)	Project Number
Regina E. Lee	**S0620**

Project Title

Utilization of Triglycerides from Spent Coffee Grounds to Create Methyl Esters through Transesterification

Abstract

Objectives/Goals
Converting lipids extracted from used coffee grounds into usable biodiesel efficiently by using a strong acid catalyst and comparing it to other fuels, such as vegetable biodiesel and Diesel No. 2.

Methods/Materials
Extracted oil from used coffee grounds using a Soxhlet extractor. Then put the oil through a transesterification process using methanol and Sulfuric Acid as the strong acid catalyst by letting it reflux. After filtering it and taking out the layer of biodiesel, it was put through a GC/MS test to find the concentration of methyl ester groups inside, as well as the percent of biodiesel recovered. The energy density was also found using a calorimeter.

Results
The coffee biodiesel samples contained about 62.69% biodiesel, while the vegetable biodiesel yielded about 80.1%. They had an average energy density of 2095.71 calories/gram of fuel, while the vegetable biodiesel had 2246.8 cal/g and the Diesel No. 2 had 2265.65 cal/g.

Conclusions/Discussion
The experiment was successful in that an efficient way of creating biodiesel from used coffee grounds was found. The unwanted residue left behind after the transesterification process was reduced significantly, increasing the yield. The energy density is comparable to that of Diesel No. 2 and vegetable biodiesel. This project also has potential to be produced on a larger scale as most of the chemicals, such as hexane, can be recycled and be used for future processes.

Summary Statement

I created usable biodiesel from waste coffee grounds and found that it compared favorably well to Diesel No. 2 and vegetable biodiesel.

Help Received

My mentors from the Hyperion Treatment Plant taught me about biodiesel and organic chemistry, as well as supplied and taught me how to use the equipment necessary to complete my project. They also oversaw my procedure and helped me when I had questions.