## Chemistry 238 Biodiesel Synthesis Winter 2008

Experiments are to be done *individually*. Data for Part B will be *shared* between students in the class.

• **Pre-lab:**

**Print out**: • The biodiesel synthesis handout

**Read:** • The biodiesel synthesis handout
• Technique 7.2 (pp. 600 – 602)

**Review**: • Technique 25 (pp. 833 – 867) IR spectroscopy
• Technique 28 (pp. 924 – 941) mass spectroscopy

**Prepare for class on Tuesday, February 5: "**Purpose," "Materials and equipment", "Procedure" and "Data"

Note that you will have to write your own "Purpose" for this experiment.

Write the chemical equation for this synthesis IMMEDIATELY under the "Purpose".

In the "Calculations" section (special placement!), set up the stoichiometric calculation that allows you to determine the expected yield of biodiesel from X grams of vegetable oil. You will have to know the identity of the vegetable oil in order to do this.

In the "Materials" section, state the vegetable oil you are going to use, as well as the other chemicals given in the handout.

In the "Equipment" section, copy the appropriate sketch from Technique 7.2 in PLKE. Also, design and describe a method and/or an apparatus with commonly-available lab equipment to compare the viscosity of your biodiesel against the viscosity of the starting material. Your description should include what measurement or observation will allow you to draw a conclusion.

Reserve the next few pages for "Procedure". Reserve enough pages to accommodate the procedure pages of the biodiesel synthesis handout, since you will be taping these sheets to your lab notebook.

"Data" section (combined with "Results" section): Lay out a data table to fill in during lab.

| Table 1 | |
|---|---|
| Identity of vegetable oil | |
| Mass of vegetable oil used (g) | |
| Mass of biodiesel recovered (g) | |

| | |
|---|---|
| Expected mass of biodiesel (g) | |
| Percent yield (%) | |

Leave enough pages to tape in your IR spectrum, your NMR spectrum, and your GC/MS output.

Leave enough pages to make data tables for recording the calorimetry results, as well as the (optional) viscosity results.

## • Post-lab

Write a **conclusion** that summarizes:

• Did you make biodiesel? How can you tell?

• How much (what yield) of biodiesel did you make? Compare your yield to the yield that commercial generators achieve (you will have to do some outside research for this — CITE THE SOURCE OF THIS NUMBER).

• How pure was your biodiesel? Use the spectroscopic and other data to back up your claim.

## • Lab Result Report: (Due Thursday, February 14 at the beginning of lab)

**Photocopy** the lab, all parts.

**Answer questions**

1. Why isn't finding the C=O peak in the IR spectrum necessarily good or bad for determining whether you made biodiesel?

2. According to http://www.ag.ndsu.edu/pubs/ageng/machine/ae1305w.htm#cold, viscosity is measured in "centistokes". Find a definition of centistokes, and describe the equipment that would allow you to measure the viscosity in those units. Is it qualitatively different than what you did?

**No abstract** is due for this lab.