

Making Biodiesel

Making Biodiesel Instructions

Materials

vegetable oil	graduated cylinder
corn oil	serological pipette
methanol or HEET® Gasoline Anti-freeze	pipette pump
potassium hydroxide (KOH) or sodium hydroxide (NaOH)	distilled water
glass jar	separatory funnel and ring stand w/ring
200mL beaker	OR
magnetic stir bar	quart sized glass jars with lids
hot plate	pH probe or litmus paper

Procedure

Part 1: Making the Biodiesel (Day 1)

1. At the lab station, in a clean beaker, warm 75mL of oil sample to 50°C.
2. Under a fume hood measure out 30mL of methanol (or Heet®) and add to glass jar, then seal jar quickly.
3. Weigh out 0.75g of KOH (or NaOH) and quickly add it to the jar of methanol. Seal jar immediately and shake until completely dissolved. This mixture is methoxide. Make sure to not leave the cap off of the KOH or NaOH for too long because it is hygroscopic.
4. Once oil is at 50°C, add oil to the jar of methoxide solution.
5. Add magnetic stir bar to the jar, loosely place lid back on jar, place jar back on magnetic/stirring hot plate to **stir** on high for 15 min. Turn off heat. Alternatively, tighten the lid and shake vigorously for 15 minutes.
6. Remove the jar from hot plate and leave for 24 hours to allow for separation of the raw biodiesel and glycerin. (If using separatory funnels, pour mixture into a labeled separatory funnel.)
7. Repeat steps 1-5 with other oil sample. Make sure samples are properly labeled.



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Data for Part 1: (Day 1)

Visual Observations from Part 1 of Making Biodiesel

(make sure to describe both samples)

1. Immediately upon adding the methoxide, what did you observe about the vegetable oil? Was there any change in color in each sample?
2. What did the solution look like after it began stirring?

Part 2: (Day 2)

1. Now that the biodiesel has rested for 24 hours in the jar or separatory funnel, describe your sample.
2. Record the following characteristics of your biodiesel sample: color, consistency, odor

Initial Removal of Glycerin

1. Drain the glycerin from the biodiesel samples into another beaker or container.
Note: if using a separatory funnel, glycerin will be easily drained from the bottom of the funnel. If using a glass jar, use a pipette pump and serological pipette to remove the glycerin from the bottom of the jar.
2. Using a graduated cylinder record the amount of glycerin retrieved from sample (for use in formula below, in step 7).
 - *Note: Crude renewable diesel contains impurities such as soap, incompletely transesterified glycerides, and methanol and must be cleaned/washed prior to use).*

Wash and Dry Biodiesel

1. Using a serological pipette, slowly add a total of 10 mL distilled water down the side of the jar or separatory funnel to the raw renewable diesel.
2. Gently rock the jar or separatory funnel back and forth for five minutes to wash the renewable diesel. (*Do not shake vigorously*).
3. Set the jar aside or place funnel back into ring stand and wait 10 minutes for the mixture to separate into two layers. Discharge the bottom “soapy” layer. Remove soap/glycerin waste into a waste flask.
4. Using pH paper or probe, test the pH of the “soapy” layer and record below.
5. Repeat washing procedure steps 1-3 for a second washing.
6. Remove the “soapy” layer.

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7. After removing the last water wash, remove the biodiesel and place into a 250 mL beaker.
8. Let the sample sit uncovered overnight. The remaining water will evaporate.
9. Measure the quantity of biodiesel in a graduated cylinder and record.
10. Calculate the % yield of your biodiesel production using the following equation:

$$\% \text{ Yield} = [\text{Volume Biodiesel} / (\text{Volume Biodiesel} + \text{Volume Glycerin})] \times 100\%$$

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