

# Synthesis of Biodiesel Experimental Procedures

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Biodiesel fuel is made from soybean oil and methanol with some sodium hydroxide dissolved. The soybean (or other vegetable oil) is heated and then stirred for 45 minutes. The mixture is allowed to stand for a few days until the mixture separates, then the biodiesel is removed. We will save the biodiesel we produce for testing next week.

## The Problem

Produce biodiesel from soybean oil, and compare the properties of biodiesel to other fuels.

## The Approach

Work in groups of 2 or three to synthesize the biodiesel.

### Equipment needed:

250 mL Erlenmeyer flask

50 mL Beaker

100 mL Beaker

Graduated Cylinder

Magnetic stir bar

Heating and Stirring Plate

Thermometer (-20 – 100 °C)

Parafilm to cover the 50 mL beaker while being stored

### Chemicals Needed:

0.4 M solution of NaOH in methanol

Soybean or other vegetable oil

### Day 1

1. Note: Remember that water and vegetable oil reacts to form the unwanted fatty acid product, so please use all clean and dry glassware for this experiment.
2. Use a graduated cylinder to measure 40 mL of soybean oil (vegetable oil). Transfer the oil in a 250 mL Erlenmeyer flask and warm the oil to between 40 and 50°C while rapidly stirring with a magnetic stir bar. (Note: For both your safety and the effectiveness of the reaction do not allow the temperature to exceed 50°C.
3. Turn off the heat.
4. Add 10 mL of the 0.4 M sodium hydroxide in methanol solution to the warm oil.
5. Stirring the reaction for 45 minutes.

6. Stop the stirring and pour the mixture into a 50 mL beaker. Allow the mixture to cool and then cover the beaker with parafilm. Label the beaker with your name and date.
7. You will store the mixture in the lab drawer until next week, which will give ample time for the layers to separate.

Note: Use the remainder of your lab time to count the seeds in the germination experiment started during the last lab period. Directions and tables for this data collection can be found in the previous experiment!

### Day 2

1. By comparing the densities for each of the products, identify the biodiesel layer. (Remember liquids that are less dense float on liquids that are denser.) Determine the amount of biodiesel in mL. Record this value in your lab notebook.
2. Transfer the biodiesel to a 100 mL beaker.
3. Dry your biodiesel by heating the biodiesel at 80°C while stirring for 20 min. Heating your sample will generate methanol vapors and other fumes, so this MUST be done in the fume hood.
4. Measure the volume of your final isolated biodiesel. Record this value in your notebook.