

DISTILLING GLYCERIN FROM BIODIESEL

Name:

Hr:

Background: Distillation is a process by which molecules can be separated by their various boiling points. This procedure has thousands of practical applications. One of the most important applications is the fractional distillation of crude oil. We will draw that here:

The molecules with a lower amount of carbons boil off first. These small molecules also have the lowest density. Almost everywhere you look you can see materials that came from crude oil. Oil is very valuable for this reason – but it is also not a renewable resource.

Biodiesel, on the other hand, we can grow relatively quickly from feedstock like soybeans or algae! One of the byproducts of biodiesel production is glycerin (glycerol). It is important to separate methanol from the glycerin because methanol is poisonous to living things. The methanol can then be reused and the glycerin can be used. Later, we will test our product to see what percentage of the product is alcohol (Refraction Action Lab)

Common Molecules and Boiling Points:

Chemical Name	Formula	Lewis Structure	°C boiling point
water			
acetone (nail polish remover)			
methanol (wood alcohol)			

ethanol (gasoline additive)			
propanol			
glycerol (glycerin)			

Purpose: To distill a solution that contains at least two solutions of different boiling points to draw conclusions about the number of carbon atoms and boiling point.

Materials:

- 2 – 250 Erlenmeyer flasks
- #6 stopper with 2 holes
- ice
- thermometer
- clear vinyl tubing
- pyrex dish
- 6mm glass tubing
- hot plate

Safety: Glass doesn't change colors when hot so beware of hot glass. The glassware has a tendency to tip so secure with clamps and ring stands as needed.

Procedure:

1. Place the unknown (or biodiesel glycerol) in an Erlenmeyer flask.
2. Using a #6 stopper with 2 holes, insert a thermometer (or Go-Temperature probe) in one hole and a 3-inch piece of 6mm glass tubing in the other.
3. Connect a 3 feet piece of 5/16 outer diameter clean vinyl tubing to the glass tubing.
4. Position the second Erlenmeyer flask that should sit in an ice bath, at the other end of the tubing so that the solution when distilled will drip into the second flask.
5. Position ring stands as needed so that the apparatus will not tip over.
6. Turn on the hot plate and record the temperature at which the solution begins to boil. If a second boiling point is observed record it as well.

Data:

Questions:

1. Using the recorded boiling point, what do you think was in the distillate? Provide data to support your conclusion.
2. Why would distillation not be a good technique for separating a water/propanol homogenous mixture?
3. What conclusions can you draw about the relationship between the Lewis structure of a molecule and its boiling point?
4. Given an unknown mixture of gases at a very high temperature, how might you determine the identity of the unknown gases? (Hint: think in reverse...)