



A2 4.5/C

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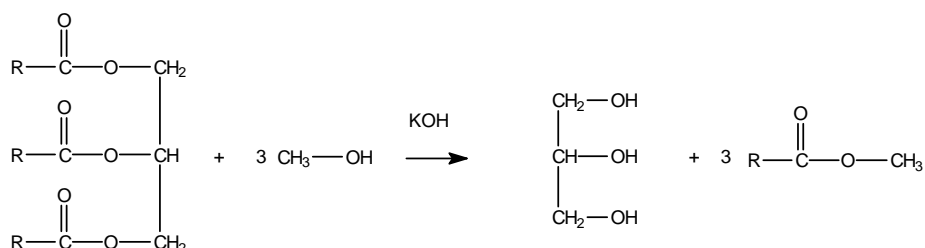
MAKING BIODIESEL



Aim

Biodiesel is a mixture of methyl esters of fatty acids (long chain carboxylic acids). It has similar properties to the diesel fuel made from crude oil that is used to fuel many vehicles. It can be made easily from vegetable cooking oil that contains esters of fatty acids.

The synthesis is a simple chemical reaction that produces biodiesel and propane-1,2,3-triol (glycerol). Cooking oil is mixed with methanol and potassium hydroxide is added as a catalyst. The products separate into two layers, with the biodiesel on the top. The biodiesel is separated and washed.



Safety

		methanol is toxic and flammable		potassium hydroxide is corrosive
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Method

- 1) Measure 100 cm³ of vegetable oil into a 250 cm³ conical flask. Weigh the flask before and after to determine the mass of oil you used.
- 2) Carefully add 15 cm³ of methanol.
- 3) Slowly add 1 cm³ of 50% potassium hydroxide.
- 4) Stir or swirl the mixture for 10 minutes.
- 5) Allow the mixture to stand until it separates into two layers.
- 6) Carefully remove the top layer (this is impure biodiesel) using a teat pipette.
- 7) Wash the product by shaking it with 10 cm³ of distilled or deionised water.
- 8) Allow the mixture to stand until it separates into two layers.
- 9) Carefully remove the top layer of biodiesel using a teat pipette.
- 10) Weigh the amount of biodiesel you have collected.
- 11) Place 1 cm³ of biodiesel on a watch glass **on a mat** and light it using a splint to observe its combustion.

Masses

Mass of vegetable oil used =

Mass of biodiesel formed =

Questions

1) The main fatty acid in the esters in rapeseed oil is $\text{CH}_3(\text{CH}_2)_{14}\text{COOH}$. Write an equation for your reaction to form biodiesel.

2) Calculate the percentage yield for your production of rapeseed oil.

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3) How does this compare to the industrial production which has a yield of about 90%?

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4) Suggest ways in which your method could be improved to increase the yield.

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5) Why was the reaction mixture washed in step 7?

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