

**Quality Analysis of Biodiesel**

*Adapted from Quality Tests of Biodiesel lab by C. Kohn, Waterford Union High School, Waterford WI*

1. PURPOSE

The purpose of this lab is

1. To determine the level of reaction completion of prepared biodiesel.
2. To determine the clarity of prepared biodiesel using physical properties.
3. To determine the density of prepared biodiesel.
4. MATERIALS

15 mL sample of prepared biodiesel Stirring rod

10 mL methanol Graduated cylinder

10 mL deionized water Thermometer

pH paper Balance

3 test tubes with stoppers

1. SAFETY CONCERNS

You must wear goggles, gloves and an apron. Methanol is flammable and poisonous. Methanol can be absorbed through the skin – avoid contact at all times. Potassium hydroxide is corrosive – never remove gloves or goggles when handling.

Do NOT wear sandals, flip flops, or other open toes shoes. Spills can be hazardous on exposed skin. If you do spill biodiesel or methanol onto exposed skin, immediately flush with copious amounts of water.

Never attempt these procedures without the supervision of a trained adult. This work should not be performed at home. It is very important that all materials are safely stored away and returned to their storage location. Do NOT leave potentially hazardous chemicals in a location where they may cause later harm. Do NOT remove any chemicals from the lab area.

1. PROCEDURE
   1. Test 1 – Density: Mass your sample of biodiesel and record its volume. Calculate the density in g/mL. Biodiesel should have a density of approximately 0.88 g/mL.
   2. Test 2 – Visual Inspection: Biodiesel will be clear if it is free of water and other impurities. See if you can easily read this text through your sample in a test tube.
   3. Test 3 – Level of Reaction Completion: Dissolve 1 mL of prepared biodiesel in 10 mL methanol. If you observe undissolved material at the bottom of the sample, the reaction did not proceed to completion. Record your observations in the table below.
   4. Test 4 – Emulsification: Combine 10 mL prepared biodiesel with 10 mL deionized water in a large test tube. Place the stopper tightly in the test tube. Shake vigorously for 10 seconds. If the fuel is clean, the mixture will separate quickly. The biodiesel layer on top will appear clear and bright and the water layer on bottom will appear clear and free of debris. Record your observations in the table below.
   5. Test 5 – pH: Prepared biodiesel should have a pH near 7. Dip a stirring rod into the biodiesel sample and touch it to a strip of wide-range pH paper to determine the pH. Record your value in the table below.
2. DATA

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| --- | --- | --- | --- |
| TABLE 1. For each test, circle the most appropriate result. | | | |
| Test 1  Density | Mass (g): | Volume (mL): | Density (g/mL): |
| Test 2  Visual Inspection | Text is easily readable through biodiesel | Text is readable but with some effort | Text is not readable through biodiesel |
| Test 3  Level of Reaction Completion | No undissolved material settled at the bottom after test | Some undissolved material settled at the bottom after test |  |
| Test 4  Emulsification | Mixture separated quickly; biodiesel is clear on top and water is clear on bottom | Mixture separated but was cloudy | Mixture did not separate or took a long time to separate |
| Test 5  pH | pH was close to 7 | pH was not close to 7 | Record pH here: |

1. CONCLUSIONS
2. Describe why your actual value for density could be different from the given theoretical value.
3. Comment on the corrosive properties of the biodiesel, depending on the pH value you obtained.
4. Is this batch of biodiesel saleable? Explain.