

Alternative Fuels: Bio-diesel

Standard(s): 3.4, 4.2, 4.8

Objective(s):

1. Students will study, manufacture, and analyze bio-diesel fuels as an alternate energy resource.
2. Students will make observations, design experiments, record and analyze data, make models, and infer their findings.

Procedure:

1. Lecture discussion:
 - a. Briefly discuss alternative energy resources and bio-diesel.
 - b. Discuss background information on fats and oils.
 - c. Discuss the experiment and basic setup.
2. Use the textbook, internet, or various other sources to find information on the following questions relating to the bio-diesel experiment:
 - a. Create a molecular model of a fat molecule
 - b. Alternative energy resources
 - c. Advantages and disadvantages of vegetable oils and bio-diesel
 - d. The transesterification reaction
 - e. Soap as a by-product
 - f. Conclusions of bio-diesel

Find the definitions to the following alternative fuels vocabulary:

- a. alternative fuels
 - b. esters
 - c. alcohol
 - d. organic acids
 - e. saturated
 - f. unsaturated
 - g. fatty acid
 - h. density
 - i. heat of combustion
 - j. purification
 - k. methanol
 - l. bio-diesel
 - m. petroleum diesel
3. After the textbook, internet, or various other sources research is completed we will have a class discussion on what we have found

Follow-up Activities:

1. Students can measure the heat of combustion of bio-diesel.
2. Students can blend and test bio-diesel fuels in diesel engines with aid from diesel technology instructor.
3. Students can determine bio-diesel fuel blends cold flow properties.
4. Students will make soap as a by-product.