

Title of Component/Activity: Making Biodiesel		Code:
Time Frame: 1-1.5 Hours	Main/Intended Audience: 20 High School Students	Presentation Format: Hands-On Lab
Special Considerations for Program: A person to help answer questions would be helpful with every group		
Goals and Objectives: <ul style="list-style-type: none"> By the end of the activity, each student will have transformed vegetable oil into biodiesel 		
Concepts (Science and Math) <ul style="list-style-type: none"> Experimental Design Scientific Method Energy 		Vocabulary: Triglyceride * Oil * Transesterification * Biodiesel
Technology Used Computer with Electronic Notebooking		
Materials Needs: Computer Sodium Hydroxide Methanol Vegetable Oil Beaker Weigh Boat and Scale Hot Plate		
Setup: Divide students into pairs and give each a computer and tray with other materials		
21ST Century Skills Developed: Critical Thinking and Problem Solving * Communication and Collaboration * Information Literacy * Flexibility and Adaptability * Initiative and Self-Direction		

Delivery:

Start out by trying to light vegetable oil on fire. Why does it not light on fire? Why is this a good thing.

Then hand out materials to make biodiesel. (See materials list)

Students must follow instructions closely, otherwise, they will be unsuccessful in making the biodiesel.

Students will measure out sodium hydroxide, add it to methanol and mix over heat until dissolved.

Then students will add this to the oil and mix this over heat, though not too much as this will cause the methanol to boil which releases toxic fumes.

Once the solution goes clear, it will be ready to sit and settle. While these settle, students can journal and work on practice exercises.

After the solution has settled into two layers, pour off the top and leave the bottom. This top layer can then be used for a variety of other activities.

Dip a cottonball into this and see if it will ignite. It should burn quite well.

Extensions to Activity:**Evaluation**

Evaluation will be based on whether the final product has the correct properties.

Hazards/Safety Issues:

Hot plates will be in use and they will be making a flammable liquid which needs to be monitored.

Equity Strategies:

Students who do not understand any science will be identified and hopefully particular attention can be paid to them to bring them up to the rest of the group.

Student groups will form independent of age, race, or gender.

Different Audience Strategies:

Level of objectives could be modified to increase or decrease difficulty based on scientific understanding, grade level, or literacy

Related Activities:

All activities are related to these experiments as experimental design skills are universal.

Resources Used:

Activity is based on scientific principles and not based on a curriculum.

Activity Outline:

1. Students will begin day by signing onto computer and viewing the student instructions for the activity.
2. They will then follow those instructions to create their biodiesel.
3. There will be a break after everything is mixed and no longer appears cloudy. The solutions should be set to the side in the fume hood (turned on) and left to cool
4. In the mean time, students will then journal and work on other exercises.
5. After there is a separation, the top layer is poured off into a separate container and flame tested.
6. If it passes the flame test, it can be used as a fuel.

Making Biodiesel

Objective: Your group will be creating biodiesel. Unlike bioethanol, this won't take very long at all as it is a simple chemical reaction. However you must follow these steps exactly to get the desired product.

1. Measure out 2.25 g of sodium hydroxide.
2. Crush this to a fine powder using the mortar and pestle.
3. Place this into a beaker.
4. Add 50 mL Methanol to this (CAUTION: Methanol is toxic and can make you go blind.)
5. Heat on low and stir until dissolved.
6. Now add 200 mL of vegetable oil and stir.
7. Turn heat to medium, but make sure that it does not go above 60 degrees Celsius.
8. Once the solution appears translucent, it should be done. Set aside for 30 minutes.
9. During this time, you will need to write in your journal and complete Khan Exercises.
10. Check on your solution. If the layers have separated then you may pour this off into another container and deposit the remainder in a labeled container.
11. After this you may go on to the next activity.