Safety Warnings

In some of these labs you will be working with toxic chemicals. When working with these chemicals, you must follow these rules:

- Everyone must wear safety glasses or goggles, and gloves, while working in the laboratory.
- Lab coats or aprons should be worn by those involved with pouring or mixing chemicals.
- If a fire occurs, leave the building immediately. Do not try to fight it!

The following dangerous chemicals are commonly used for biodiesel production:

- Sodium hydroxide (NaOH) and potassium hydroxide (KOH) are dangerous chemicals. Please read the Material Safety Data Sheets before handling these hazardous chemicals. They can severely burn your skin on contact. If you get any in your eye, it can blind you. If you get any on your skin, the prescribed treatment is to flush with LOTS of water for up to 30 minutes. Always wear safety goggles when using NaOH and KOH.

- Methanol is highly toxic. It can easily enter the blood stream by breathing the vapors and by absorption through the skin. Methanol may cause liver damage, swelling of the retina of the eye, and brain damage or death in extreme cases. When making biodiesel, catalysts like potassium or sodium hydroxide are dissolved in methanol to form methoxides. These compounds in solution with methanol are even more toxic and corrosive.

In addition, some of these labs use other potential dangerous chemicals:

- Isopropyl alcohol is highly flammable.

- Ethanol is highly flammable.

- Toluene is highly flammable.

- Potassium nitrate can irritate the eyes, skin, and lungs (if inhaled).

- Petroleum diesel can cause skin irritation, and is poisonous.

Facts About Biodiesel

What is Biodiesel?

Biodiesel is a diesel fuel replacement made from vegetable oil or animal fat. It is not the same as ethanol, which is made from sugar or starch, and which is used in engines that run on gasoline. Biodiesel is used in engines that run on diesel fuel.

Commonly used feedstocks for the production of biodiesel include soybean oil, rapeseed/canola oil, used (waste) vegetable oils, and animal fat. Warm climate tree oils such as palm oil and jatropha are used to make biodiesel in some parts of the world.

Biodiesel is also not the same as straight vegetable oil or animal fat. A normal diesel engine will eventually be damaged through the use of straight vegetable oil or straight animal fat fuel. Vegetable oils or animal fats must be converted into biodiesel by reacting the oil or fat with an alcohol in the presence of a catalyst. This process is referred to as *transesterification.*

In chemical terms, biodiesel can be called *fatty acid methyl esters* when made with methanol or *fatty acid ethyl esters* when made with ethanol. These terms are often shortened to methyl esters and ethyl esters. Sometimes biodiesel is referred to as *alkyl esters*. This is a general term that includes biodiesel made with any alcohol.

Is Using Biodiesel Good for the Environment?

Biodiesel produces 5.5 times more energy than the fossil energy used to produce it. This is a fantastic *energy balance,* and proves that biodiesel is a renewable fuel.

Using biodiesel can help reduce greenhouse gas emissions. Although burning biodiesel does release carbon dioxide (a major greenhouse gas) into the air, this carbon was first removed from the air by the plant feedstock. However, biodiesel is not carbon neutral, because the process of growing the feedstock generally uses some fossil fuels (such as fertilizer and tractor fuel).

Biodiesel produces less air pollution (exhaust emissions) when burned in an engine than diesel made from fossil fuels.

How Much Biodiesel is Produced in the U.S.?

In 2011, over a billion gallons of biodiesel were produced in the United States. While this is an impressive number, it represents only 1/40 of the amount of the diesel fuel used in the U.S.

For more information about biodiesel, visit the biodiesel pages on eXtension:
http://www.extension.org/pages/28783/farm-energy-biodiesel-table-of-contents