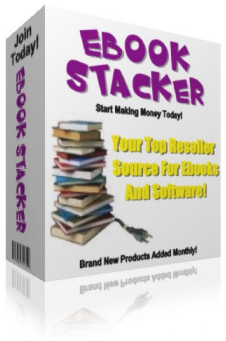
How To Make Your Own Biodiesel!

The Quick And Easy Way!



CAUTION!

Methanol is Flammable and Dissolves Rubber
Lye can Damage Skin, Eyes, and Lungs
Both Can Be Fatal if Swallowed

Be sure to wear proper protective gloves, an apron, and eye protection and be careful not inhale any vapors. Methanol can cause blindness and death even if absorbed through the skin in a large enough quantity. Sodium hydroxide is a base and can cause severe burns. Together these two chemicals form sodium methoxide, an extremely corrosive chemical. They are dangerous chemicals and should be treated as such! Always have access to running water and your work area must be thoroughly ventilated. No children or pets should be around the work area!

Biodiesel experiences difficulties in cold weather, this can be solved through the use of winterizing agents used in ordinary diesel vehicles or through the addition of heating devices

User beware. We claim no responsibility for the safety or results of these directions due to user error and so forth.

This is the fastest and easiest way to make Bio-Diesel. We have provided a link below to a much more advanced procedure for those of you who are pretty hard core about this process. We hope you enjoy this resource!

Now you can make your own biodiesel fuel from used cooking oil, fryer grease, animal fats and lard! All you need are a few easy to find chemicals which we will list below and some basic equipment that you can easily buy or make yourself. By following the directions in this eBook you will be able to make a cheap, clean-burning, non-toxic, renewable, high-quality diesel motor fuel you can use in your car without modifications.

WHAT IS BIODIESEL?

- **Biodiesel is made from used or new vegetable oils or animal fats**
- **Used oils are abundantly available at major restaurants and diners**
- **In addition to vegetable oils, biodiesel is made from Methanol and Lye**
- **Biodiesel can be used in any Diesel vehicle without modification of the engine**
- **Biodiesel can be used alone or reliably mixed with any proportion of petroleum diesel**
- **Biodiesel is safe to handle and store and is biodegradable and non-toxic**
- **Biodiesel reliably cuts emissions on all diesel engines**

- **Biodiesel is considered an alternative fuel under EP Act as long as it contains a minimum of 20% biodiesel, 80% diesel mix**

- **Biodiesel has been tested at major universities and is being used by the U.S. Postal Service, the U.S. Departments of Energy and Agriculture, countless school districts, transit authorities, national parks, public utility companies, and garbage and recycling companies**

A FEW FACTS ON BIODIESEL:

Biodiesel is biodegradable and non-toxic.100% biodiesel is as biodegradable as sugar and less toxic than table salt. Biodiesel biodegrades up-to four times faster than petroleum diesel fuel with up-to 98% biodegradation in three weeks. Compared to crappy fossil fuel diesel, biodiesel has the following emissions characteristics:

- **100% reduction of net carbon dioxide**
  100% reduction of sulphur dioxide
- **40-60% reduction of soot emissions**
- **10-50% reduction of carbon monoxide**
- **a reduction of all polycyclic aromatic hydrocarbons (PAHs) and specifically the reduction of the following carcinogenic PAHs:**
- **phenanthren by 97%**
- **benxofloroanthen by 56%**
- **benz-a-pyrene by 71%**
- **aldehydes and aromatic compounds by 13%**
- **5-10% reduction of nitrous oxide depending on age and tuning of vehicle.**

For every one ton of fossil fuel burnt, 3 tons of CO2 is released into the atmosphere, biodiesel only releases the CO2 that it has taken in while the plants it is made from were growing, therefore there is no negative impact on the carbon cycle.

HOW TO BUILD A SINGLE TANK BIODIESEL PROCESSOR:

EQUIPMENT REQUIRED

- **45 gallon drum.**
- **1/2 or 3/4 Hp electric motor.**
- **Two pulleys which produce 250 rpm and a max of 750 rpm at mixer blade.**
- **A belt for the above.**
- **12 inch rolled steel rod.**
- **Two steel shelf brackets (for the blade).**
- **1 1/2 inch (38mm) brass ball valve.**
- **A hinge and a spring to act as a belt tensioned.**
- **2000-watt electric water heater element.**
- **A water heater thermostat.**
- **1 1/2 diameter piece of steel pipe * 3-5 inches long with male threads on one end.**
- **Assorted tat: angle iron, wood, screws etc.**

ASSEMBLY

1 Cut a large opening (about half the top) in the top of the steel drum.
2 Drill 11/2-inch hole in the bottom of the drum.
3 Weld the 1 1/2-diameter pipe in the hole at the bottom of the drum.
4 Attach the 1 1/2-inch brass ball valve to the pipe. This is the drain valve.
5 Drill a hole in the side of the drum at the bottom, same size as the heater element.
6 Fit the heater element making sure it is not touching the side of the drum.
6 Wire up the heater element.

CHEMICAL MIXER

1 Attach one pulley to the rolled steel rod.
2 Attach the other pulley to the spindle of the electric motor.
3 Weld the propeller to the other end of the rolled steel rod (shelf brackets).
4 Attach the rod, pulley and propeller assembly to one side of the hinge.
5 Weld a piece of angle iron across the top of the drum.

6 Weld the unattached side of the hinge to the angle iron so the propeller and rod assembly sits in the middle of the drum. The hinge should swing the propeller and rod back and forth.
7 Mount the electric motor on the side of the drum.
8 Fit the belt to the pulleys and tighten by wedging a block of wood into the hinge.
You also need to fashion a simple wooden measuring stick with 10 litre increments.

SPECIFIC GRAVITY

A hydrometer is a good piece of kit to have to measure the specific gravity of the biodiesel. The specific gravity of biodiesel should be between 0.860 and 0.900, usually 0.880. The specific gravity of vegetable oil is 0.920 therefore the specific gravity of biodiesel should be lower than the vegetable oil used to make the biodiesel.

HOW TO MAKE BIODIESEL

Every time you make a new batch of biodiesel using old vegetable oil you have to find out the amount of reactants required to get the correct reaction, this process is know as titration. In addition to the above equipment you will also need the following equipment:

Petri dish
20 ml beaker
1500 ml beaker
500 ml beaker
Isopropyl alcohol
A graduated eye dropper
Litmus paper
Blender with a glass bowl.
Methanol
New vegetable oil (New vegetable is a bit more expensive than used but easier to obtain and doesn't require purification measures like that of used oil.)
Sodium Hydroxide Sodium Hydroxide (NaOH caustic soda, lye) (Must be dry)

TITRATION

STEP 1 TITRATION: TO DETERMINE THE QUANTITY OF CATALYST REQUIRED

1. Measure 1 gram of Sodium Hydroxide onto a petri dish
2. Measure 1 ltr. of distilled water into a 1500 ml beaker.
3. Pour the 1 gram of Sodium Hydroxide into the 1 Ltr. of distilled water
4. Label 'do not drink Sodium Hydroxide'
5. Measure 10 ml of isopropyl alcohol into a 20ml beaker
6. Dissolve 1ml of used vegetable oil into the isopropyl alcohol.
7. Label oil/alcohol.
8. Use the graduated eye dropper to drop 1 milliliter of Sodium Hydroxide /water solution into the oil/alcohol solution
9. After 1 milliliter of Sodium Hydroxide /water solution is added check the pH
10. Repeat steps 8&9 until the oil/alcohol reaches a pH of between 8&9. The pH increase will usually occur suddenly. Usually no more than 3 milliliters of Sodium Hydroxide /water solution will need to be added.
11. Use the following equation:
the number of milliliters of the Sodium Hydroxide/water solution dropped into the oil/alcohol mixture = x
(x+3.5)=N
N= the number of grams of Sodium Hydroxide required to neutralize and react 1 Liter of used vegetable oil.
N will be between 4.5-6.5, but it can be higher if the oil has been used for a long time.

STEP 2. MEASURE THE REACTANTS

Measure the reactants in separate containers
1 Liter of filtered used oil into a 1500ml beaker
200 ml of methanol into a 500 ml beaker
N grams of Sodium Hydroxide onto a petri dish

STEP 3. DISSOLVE THE SODIUM HYDROXIDE INTO THE

Methanol

The third step is to combine the methanol with the Sodium Hydroxide to create sodium methoxide, an extremely strong base. Once the Sodium Hydroxide has been dissolved in the methanol, the sodium methoxide must be mixed with the vegetable oil straight away.

- **Carefully pour the methanol into the blender, any spills must be cleaned immediately with a water and vinegar solution.**
- **Carefully pour the Sodium Hydroxide into the blender**
- **Replace the lid of the blender and blend on the lowest setting for 30 seconds, until the Sodium Hydroxide has dissolved. Sodium methoxide has been produced and caution must be exercised**

Step 4. Mix the Reactants

Remove the lid of the blender keeping your face well away from the top of the blender

Carefully (filter the cooking oil removing any pieces of debris if used) and then pour it into the blender

Place the lid on the blender and blend on a medium/high setting for 15 minutes. If the bowl or the blender motor over heat, switch off the blender and leave until cooled down sufficiently to continue again.

Step 5. Allow the Glycerin to Settle

Settling takes about 8 hours but since 75% of the separation occurs within the first hour after the reaction immediate separation will be visible. Within 8 hours the glycerin will have fallen to the bottom leaving a layer on top, this is methyl esters, or more commonly referred to as bio-diesel.

Step 6. Separation

After blending, the contents can either be transferred into a 1500ml container with a stopcock or left in the blender for at least 8 hours.

STEP 7. CLEAN UP

Store the leftover used vegetable oil in a dry cool place
Clean all the equipment with water and vinegar so it is ready to use again
Expose the glycerin to air and sunlight for 1 week and then use as soap.
Pour the biodiesel into your fuel tank and enjoy the ride!

So there you have it, fuel from vegetable oil. Of course this is only one method of making biodiesel, there are many recipes for making biodiesel just take a look through the web sites at the end of this article. Don't be fooled into thinking that biodiesel is anything but a serious contender in the alternative fuels market, throughout the world there are commercial processors being built to supply a rapidly emerging market. The U.S. government however, has chosen to ignore biodiesel, this is their mistake and something we can capitalize on. Let's start making biodiesel and get production down to the local small scale level with co-operatives and individuals supplying all our needs while taking power away from the mega-corporations.

Below is an excellent resource if you wish to have a more advanced, in depth approach to making biodiesel.

http://journeytoforever.org/biodiesel_make.html

These guys on this web site give a highly detailed step by step process using a little more advanced equipment and descriptions. Recommended reading for those with a little bit of a chemistry background.