

# Green chemistry: Biodiesel made with Vegetable oil

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**Abstract:** Biodiesel is a revolutionary step in the world of fuel. The pollutionary effects of biodiesel is much less than mineral fuels and even cost less. because the fuel features(power ,combustibility/safety, storage, production/refining, fuel availability/economy, lubricity,enviromental impact, usage) of it. Although biodiesel is greatly promising, its use has been introduced gradually all over the world. In fact, most countries are establishing rules to its introduction based on mixture contents with mineral diesel in form of (B100, B20, and B10).The increased demand and high price for energy sources are driving efforts to convert organic compounds into useful hydrocarbon fuel. It can be obtained by Transesterification with alcohol i.e methanol majorly of vegetable oil and animal fat feedstock. Biodiesel can also be used as a heating fuel in domestic and commercial boilers, a mix of heating oil and biofuel which is standardized and taxed slightly differently than diesel fuel used for transportation. It is sometimes known as "bioheat" (which is a registered trademark of the National Biodiesel Board [NBB] and the National Oilheat Research Alliance [NORA] in the U.S., and Columbia Fuels in Canada).

**Index Terms-**biodiesel, vegetable oil, Transesterification ,Fuel features

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## 1. Introduction

Bio-diesel is the Fuel which consists of hydrocarbon i.e. esters of methyl and ethyl made by the reaction of vegetable oil. It is the fuel which is used in vehicles to run. Bio-diesel is renewable energy resources .Bio-diesel is one of the economic way in united states. Biodiesel is less polluted than petroleum and diesel. The absence of sulfur in 100% biodiesel should extend the life of catalytic converters. **Biodiesel** fuel can also be used in combination with heating oil to heat residential and industrial buildings. This can reduce dependence on non-renewable and increasingly expensive heating oil. Biodiesel burns cleaner & is made of non-toxic chemicals so it does not give out poisonous fumes, unlike the ordinary fuel.

## 2. Procedure:

Measure out 200 ml of antifreeze and put it in one plastic container. The oil needs to be pre-heated, and well filtered before use to prevent coagulation.

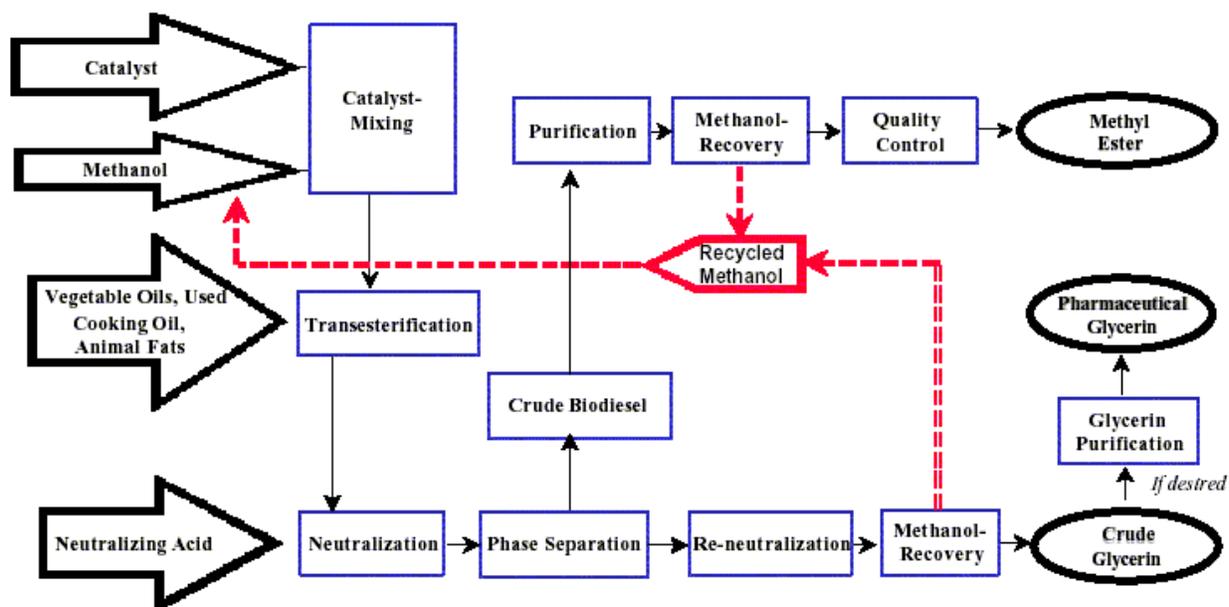
Add in lye so that the antifreeze is absorbed. Cover container and mix well by shaking it. It is mixed when it starts to feel warm and is foamy. The mixture has now become sodium methoxide .Blend 1 liter of vegetable oil with the sodium methoxide in a blender for 20 minutes. Pour mixture into a bottle and wait 8 hours until the byproduct, glycerin, separates form the biodiesel. The glycerin will be on the solid on the bottom. Separate out the biodiesel by pouring into a glass bottle. Prepare a wash bottle by poking a small hole in the corner of the bottle and covering it with duct tape. Wash the biodiesel by pouring it into the wash bottle and adding in ½ a liter of water Roll the bottle around to mix it and then remove the duct tape and drain the water. Repeat the washing process until the biodiesel is clear. This may need to be done numerous times over the course of a week to complete the process. Store the biodiesel in a glass container until ready to use.

**3. Test:** Add 3ml of Bio-diesel to 27ml of methanol. Shake for about 30 seconds and allow to sit for 5 minutes. The methanol should completely absorb the Bio-diesel. No fall out should be visible.

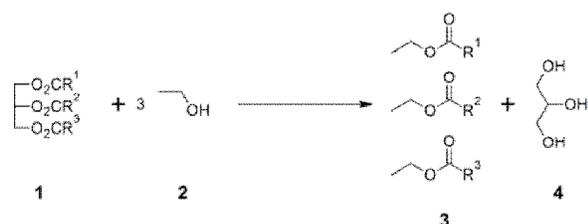
**4. Reaction Involved Transesterification:** Animal & plant fats & oils are typically made of triglycerides which are esters of free fatty acids with the trihydric alcohol, glycerol. In the

transesterification process, the alcohol is deprotonated with a base to make it a stronger nucleophile. Commonly, ethanol or methanol is used. As can be seen, the reaction has no other inputs than the triglyceride & the alcohol. Normally, this reaction will precede either exceedingly slowly or not at all. Heat, as well as an acid or base are used to help the reaction more quickly.

### 5 Production Process



An example of a simple production flow chart is proved below with a brief explanation of each step.



**6. Features:6.1 POWER:** Bio-diesel can be used in existing engines & fuel injection equipment (no modification required) without negative impact to operating performance.

**6.2Fuel availability/economy:** Virtually the same MPG rating as petrol-diesel & the only alternative

fuel for heavyweight vehicles requiring no special dispensing & storage equipment.

**6.3 Production/Refining:** Can be done at home (wasted veggie oil) & farms (virgin oils from seeds), being the only alternative fuel that can boost of a zero total emissions production facility. By selling the simultaneously produced glycerol, the cost of BD is basically the same cost of the oil used to make it.

**6.4 Storage:** Readily blends & stays blended with petrol-diesel so it can be stored & dispensed wherever diesel is stored or sold. very high flash point (300°F) making it one

**6.5 Lubricity:** The only alternative fuel that can actually extend engine life because of its superior lubricating & cleaning properties. The present "low sulphur" diesel fuel is badly wearing the injection pumps of not protected diesel engine.

**6.6 Usage:** Biodiesel fuel can generally be used in existing oil heating systems and diesel engines without modification, and it can be distributed through existing diesel fuel pumps. This is an advantage over other alternative fuels, which can be expensive to use initially due to high cost of equipment modifications or new purchases. Biodiesel provides almost the same energy per gallon as petroleum diesel.

**6.7 Environment Impact:** The only renewable alternative diesel fuel that actually reduces major

greenhouse gas components in the atmosphere. The use of biodiesel will also reduce the following emissions: carbon monoxide, ozone-forming-hydrocarbons, hazardous diesel particulate, acid rain-causing sulphur dioxide, lifecycle carbon dioxide.

Biodiesel burns up to 75% cleaner than petroleum diesel fuel. Bio-diesel helps in reducing harmful gases producing diases. Amount of SULPHUR is not present. Bio-diesel helps in preventing Green House effect. Bio-diesel prevent Ozone layer. Less amount of Nitrogen produces. Bio-diesel helps in preventing eye irritation. In case of vehicle, performance & fuel economy with biodiesel is the same as with petrol-diesel.

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