PRODUCTION OF BIODIESEL FROM COTTON SEED OIL

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Abstract - "Biofuels such as Biodiesel are the future of energy in this nation and around the world". Due to decrease in output of fossil fuels and resources day by day for environmental issues, the biofuels like biodiesel became the most important fuels in this time. Biofuels production such as biodiesel is an important field of research and project today as the increase in prices of petroleum and diesel also the disadvantages to environment. We are supposed to use the transesterification reaction for the production of biodiesel from cotton seed oil. This is very uncommon process for production of biodiesel which is comparatively low-cost process than other.

***Key Words*: 1) Biofuel 2) Biodiesel 3) Cottonseed oil 4) Transesterification**

1. INTRODUCTION

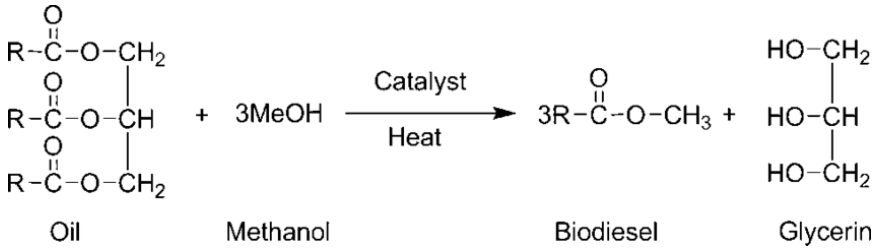
The energy crises become one of the global issues disturbing us today. Fuels are of great importance because they can be burned to produce significant amounts of energy. Most of the aspects of everyday life depends on fuels as in transport of goods, people, etc. "Main energy resources come from fossil fuels such as petrol oil, coal and natural gas etc. Fossil fuel supplies 80-85% of the world's energy requirements **[10].** The importance of biodiesel for diesel engines is growing due to both the environmental costs and dwindling petroleum reserves of fossil fuels **[7].** The energy density of biodiesel is similar to that of regular diesel" **[1-2]**.

1.1 What is bio-diesel?

A bio diesel is a mono-alkyl esters of long chain fatty acids. Bio diesel is simply a liquid fuel derived from cotton seed oils and fats, which has similar combustion properties to regular petroleum diesel fuel. Bio-diesel can be produced from straight vegetable oil, animal oil/fats, tallow and waste cooking oil **[9].** Bio diesel is biodegradable, nontoxic and has significantly fewer emissions than petroleum-based diesel when burned **[5].**

1.2 Transesterification of oil

Transesterification Reaction of Oil: Transesterification is a most suitable process to convert oils and fats into biodiesel. It is the most popular reaction used for the conversion of vegetable oils into biodiesel in order to reduce its viscosity **[6].** It is the reaction of an alcohol, in most cases ethanol, with the triglycerides present in oils, fats or recycled grease, forming biodiesel (fatty acid alkyl esters) and glycerol. The reaction requires heat and a strong base catalyst, such as NaOH or KOH.

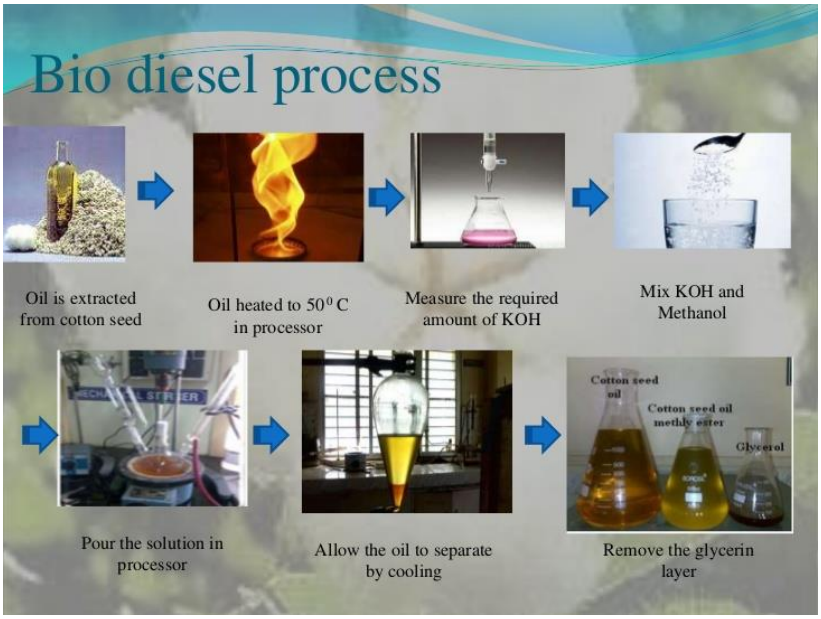


2. Material used for preparation of biodiesels

Raw Materials used for project	Equipment's used for project
Alcohol: Ethanol	Three necked flasks (500 ml capacity)
Catalyst: Sodium Hydroxide	Magnetic stirrer
Cotton seed oil	Thermometer
Water	Heater with stirrer
	Reflux condenser
	Stop watch

3. Procedure for experiment

- The setup for preparation of biodiesel was applied in the laboratory with the help of magnetic stirrer with heater and three necked flasks.
- The cotton seed oil, ethanol and catalyst (Sodium Hydroxide) were used for the production of biodiesel.
- *The batch reactor used for transesterification had a capacity of 500 ml and was equipped with a reflux condenser and magnetic stirrer. The reactor was initially filled with 500 ml cotton seed oil and heated to the desired temperature.
- The various mole ratios of ethanol to oil i.e. 3:1, 6:1, 9:1 and known amount of catalyst varied from (1, 2, 3 wt%) were added into the three necked round bottom flask and was preheated at the various temperature of about (80*, 90*, 95* Celsius).
- Which was then fixed with the mechanical stirrer, condenser and temperature measuring device (thermometer)
- After the reaction is complete, a mixture was allowed to cool and then the solid catalyst was removed by filtration to get the product.
- The reactor contents were reflux for 90 minutes and all the samples methyl ester and glycerol phases were allowed to stabilize.
- And then the mixture is kept into the separating funnel for 24 hours and separated by using separating funnel.



4. Result and discussion

- The analysis is conducted at laboratory level such as its density, kinetic viscosity and other properties have been determined.
- According to the literature retrieved biodiesel is "liquid, transport and reddish colour without any content of solid or gels and glycerol give white colour and in solid form.
- Taking into a count the results of biodiesel appearance, it can be concluded that the catalyst percentage influences in biodiesel stability because that similar condition were equal appearance.
- The optimum result obtained with refines cotton seed oil used.
- Properties of biodiesel as compared to other oil to obtain pure biodiesel.

Ethanol to oil ratio	Ethanol (ml)	Oil (ml)	Catalyst (wt %)	Yield of biodiesel obtained (%)
3:1	90	30	1	58.33
6:1	120	20	1	71
9:1	180	20	1	75

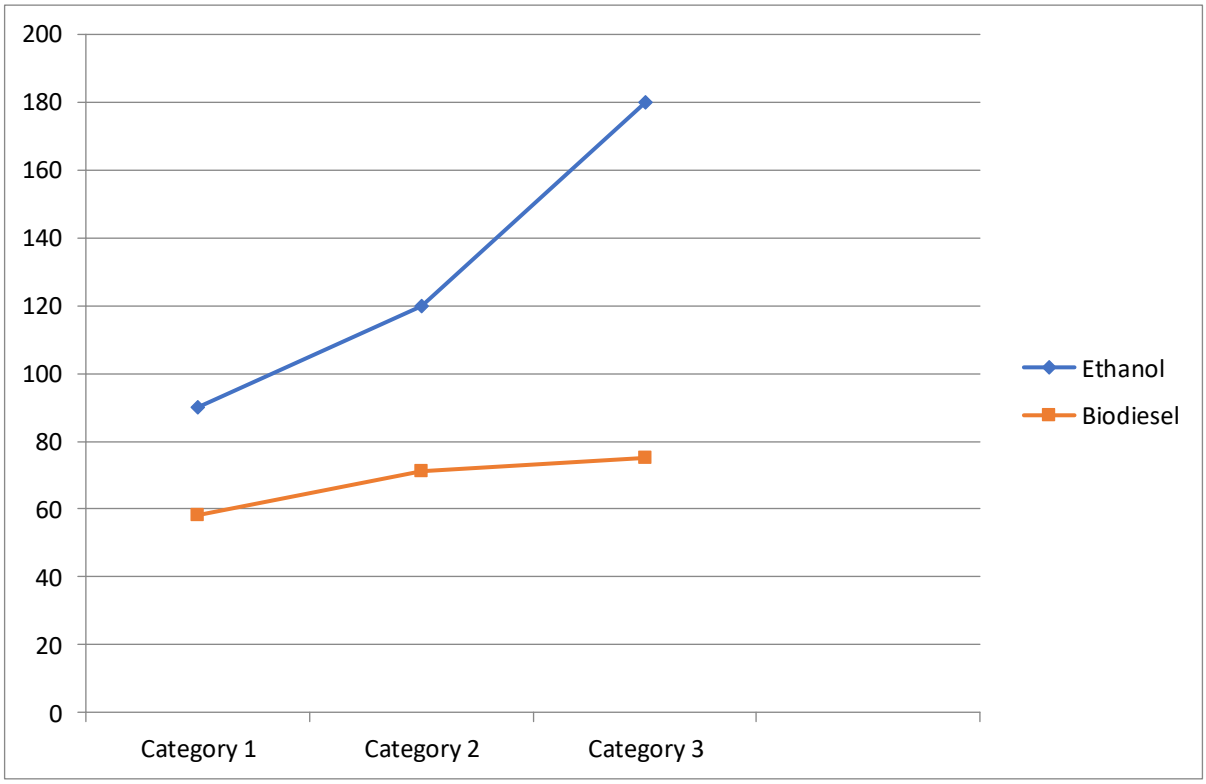


Chart -1: Ethanol vs Biodiesel obtained

5. CONCLUSIONS

- For the preparation of biodiesel from cotton seed oil the study was carried out by base of transesterification process **[3]** Totally focused on increasing ester content through the changing of basic process parameters.
- The present study of production of methyl ester of cotton seed oil, it was found that the optimum process parameters like temperature, constant catalyst and oil to alcohol ratio were 65^0 C, 1.0 wt % and 1:9 respectively for better yield of biodiesel.
- Continuous supply of diesel or its substitutes has become very important over the last few decades due to rapid industrialization and urbanization all over the globe.
- Depletion of crude petroleum may result in huge scarcity of this fuel future.
- The limits of American Society for Testing and Materials standards were found within the Biodiesel **[4].** So, no engine modification should be required if diesel–biodiesel blend (with lower per cent of biodiesel) is used.
- It was found that only NO_x emission for combustion of this biodiesel is higher than that of diesel, whereas emission of other gases likes CO, Co2 **[8].**

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BIOGRAPHIES

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