Biodiesel Production by Using Transesterification Process

Prof. Tejashri Kulkarni [1], Akshaya K. Bagul[2], Ankita B. Khandvi[3], Pallavi S. Avhad[4], Ashwini K. Ushir[5]

[1] *Assistant Professor, Civil Department, Guru Gobind Singh College Of Engineering & ResearchCenter, Nashik, Maharashtra, India*
[2] *B.E Student, Civil Department, Guru Gobind Singh College Of Engineering & Research Center,Nashik, Maharashtra, India*
[3] *B.E Student, Civil Department, Guru Gobind Singh College Of Engineering & Research Center,Nashik, Maharashtra, India*
[4] *B.E Student, Civil Department, Guru Gobind Singh College Of Engineering & Research Center,Nashik, Maharashtra, India*
[5]*B.E Student, Civil Department, Guru Gobind Singh College Of Engineering & Research Center,Nashik, Maharashtra, India*

ABSTRACT

Keyword : *- Biodiesel, Bio fuel, energy Cataclysm, Pyrolysis.*

I. INTRODUCTION

1.1 Introduction-

Biodiesel means a fat based diesel fuel containing long chain alkyl ester. Biodiesel is generally produced by vicious circle of various lipids.
Biodiesel can be utilized in diesel engine by blending. Biodiesel can be utilized solely, or can be blend with petro diesel by using any proportions. Biodiesel blends may be utilized as heating oil also.
Historical Background:-
In 1853patrick Duffy had been carried out the transesterification of vegetable oil, before four decades first diesel engine came in function that is Rudolf diesel's prime model, a single 10 ft. Iron cylinder having flywheel at the base, working on its own power first time in Augsburg, Germany, on 10 august 1893 working on peanut oil. In memory of this event,10 august declared as "international biodiesel day".
During 1920-1930 the use of diesel engine became popular more than petroleum engine. During world war-ii Belgium, France, Italy, UK, Portugal, Germany, Brazil Argentina, Japan and china had been utilized vegetable oil during this time period. There are few technical and operational issues due to high viscosity of vegetable oil were reported, due to which there are poor authorization of fuel spray, compressor etc. For overwhelm this problem they started heating vegetable oil, blending with petroleum diesel, pyrolysis etc.
In this patent alcohol sis of vegetable oil and ethanol is described to form biodiesel. Which is generally utilized now-a-days,
The first industrial procedure of biodiesel formation was submitted for patent by Brazilian scientist expeditor parental in 1977. This procedure is verified as biodiesel by international norms, conferring a "standardized identity

and quality also in 2010, parent's company taboo is working together with Boeing and Nasa to certify bio kerosene , which is the another product produced and patented by the Brazilian scientist.
Scrutiny into the use of transesterifies sunflower oil, and refining it to diesel fuel standards, was initiated in South Africa in 1979. Local formation of biodiesel was launched by France from rapeseed oil, which is mixed into regular diesel fuel at a level of 5%, and into the diesel fuel utilized by some common vehicles at a level of 30% Renault, Peugeot and other producers have certified truck engines for use with up to that level of blended biodiesel.

A law passed under Massachusetts governor devil Patrick requires all home heating diesels in that state to be 2% bio fuel by July 1, 2010, and 5% bio fuel by 2013.new York city has passed a similar law.

In 2001, us riverside installed a 6-megawatt backup power system that is entirely fueled by biodiesel. Backup diesel-fueled generators allow companies to avoid damaging blackouts of critical operations at the expense of high pollution and emission rates. By using b100, these generators were able to essentially eliminate the byproducts that result in smog, ozone, and sulfur emissions. The use of these generators in residential areas around schools, hospitals, and the general public result in substantial reductions in poisonous carbon monoxide and particulate matter.

1.2 Need of Study-

The recent development of bio fuels has been driven by three key global challenges: Energy security is the constant availability and supply of affordable energy for consumers and industry. Risks to energy security incorporate, for example, disruptions to the supply of imported fossil fuels, limited availability of fuel, and energy price spikes. The possibility of deriving bio fuels from locally grown headspring and using them as replacements to petrol products is attractive for many countries, in conjunction the UK, that currently depend largely on fossil fuels.

Indictment in bio fuels could lead to a remarkable boost in economic development, in conjunction the creation of new jobs and new headspring of income for farmers. This would be of particular benefit to developing countries in which a large proportion of the populations are employed in agriculture. Global economic growth has contributed to a dramatic rise in world energy demand. In developing countries, energy implementation is predicted to increase by 84 per cent by 2035, and new headspring of energy, such as bio fuels, may have a role to play in meeting this demand.

In the UK, transport accounts for around a fifth of total greenhouse gas emissions. It is hoped that, with suitable formation procedures, bio fuels will produce remarkable fewer greenhouse gas emissions than are currently produced by fossil fuels. The apparent potential of bio fuels to address all three of the above challenges makes them an attractive option to policy makers.

1.3 Problem Statement-

In India there is large difference in between the fuel demand and supply. Due to which there is problem of fuel crisis. Also there is large amount of waste vegetable oil get wasted and disposed directly into the basins which causes

the blocking and erosion of the pipelines. For solving this issue we can use this project by which we can utilize the waste vegetable oil in to biodiesel production.

Whereas biodiesel is an environment friendly fuel and does not produce any kind of pollutant while burning so it can be used as an effective alternative to the petroleum fuel. So that we can solve the biggest worldwide issue of pollution. And ozone layer depletion.

This project is one solution to many problems and hence very much effective.

1.4 Objective-

As we know that fuel cataclysm is a barrier to whole world. So we want to provide a solution to this problem by producing biodiesel from left over vegetable oil. Also we want implementation of left over vegetable oil. This project provides us in costly replacement to fossil fuels.

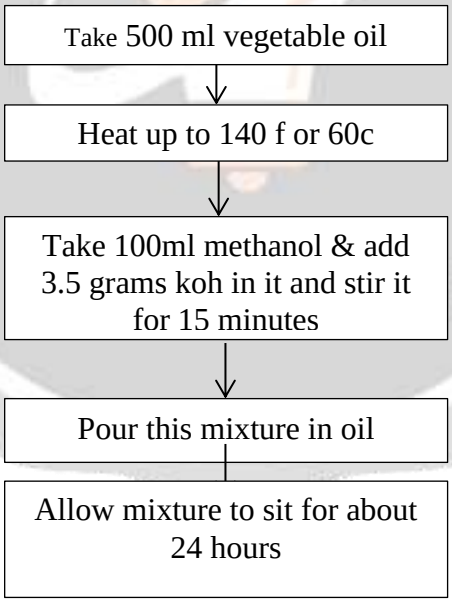
1) To study the economic, social & environmental effects of biodiesel
2) To introduce biodiesel as an replacement to petroleum fuels and overcome the fuel crises
3) To utilize left over vegetable oil for formation of environment friendly fuel
4) To design an compacted biodiesel producer

II. METHODOLOGY

2.1 Methodology-

From various hotels we have been collected different vegetable oil left over. This vegetable oil is then screened so as to remove the small food particles present in it. After that by using lye and pure methanol we carried out the transesterification process. From which we get Biodiesel as product and glycerol as byproduct.
This biodiesel is then tested for calorific value. And glycerol is used in pellet formation.

2.2 Flow Chart-



2.3 Calorific analysis-

After getting biodiesel from various waste vegetable oil, we perform the calorific value test by using Bomb calorimeter so as to find out the feasibility of waste vegetable oils. Also from waste glycerin we formed the glycerin pellets by using wood waste and gelatin paper. Again perform calorific value test on it also.

2.4 Glycerol-

Glycerol is a simple polyol compound. It is a colorless, odorless, viscous liquid that is sweet tasting and non-toxic. The glycerol backbone is found in all lipids known as triglycerides. It is widely utilized in the food industry as a

sweetener and humectants and in pharmaceutical formulations. Glycerol has three hydroxyl groups that are responsible for its solubility in water and its hygroscopic nature .Glycerol is generally obtained from plant and animal headspring where it occurs as triglycerides. Triglycerides are esters of glycerol with long-chain carboxylic acids. The hydrolysis, Specifications or transesterification of these triglycerides produces glycerol as well as the fatty acid derivative:

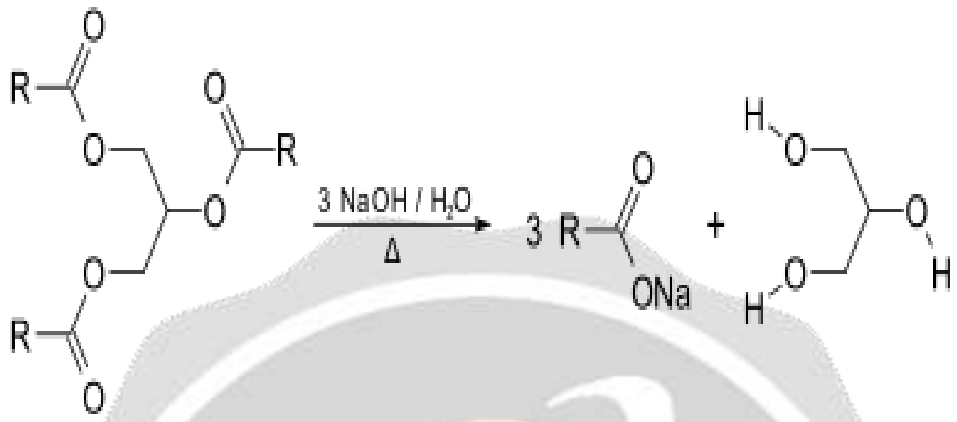


Fig .Glycerol

III. RESULT

3.1 Questionary Survey-

3.1.1 Questions-

1) How much vegetable oil you utilized per month?
2) How much is the per month wastage of vegetable oil from that?

Sr no.	Hotel name	Address	Monthly usage (liters)	Monthly wastage
1	Saptsrungi	Rathchakra	450	60
2	Abhiruchi	Rathchakra	450	120
3	Sali sweet	Kishor nagar	450	120
4	Sai krupa	Rane nagar,sidko	90	15
5	Sai krupa	Vijay bus stop	75	5
6	Saiba	Vijay nagar	450	30
7	New gokul sweet	Vijay nagar, sidako	300	60
8	Sitai	Vijay nagar, stand	225	60
9	Sarvagha	Vijay nagar stop	155	11
10	Balaji	Uttam nagar	150	20
11	Sinnar vadapav	Pavan nagar	280	93
12	Amrut sweet	Pavan Nagar	230	40
13	Sudhama	Trimurti chowk	150	20
14	Vadajankjan	Trimurti chowk	300	40
15	Petumal samosawala	Trimurti chowk	230	50

Table 3.1 Hotel Survey of Nashik

3.2 Quantity Analysis-

From 500 ml of waste vegetable oil and 100 ml of pure methanol in presence of 3.5 gm KOH we can obtain 350 ml of Biodiesel and 250 ml of glycerol. So that from 1 liter waste vegetable oil by using 200 ml of pure methanol and 7 gm of KOH we can obtain 700 ml of Biodiesel and 500 ml of Glycerol.

3.3 Calorific Analysis-

3.3.1Calorific analysis of biodiesel produced from various left over vegetable oil-

Sr. no	Type of vegetable oil	Calorific amount of biodiesel produced from it KJ/Cal
1	Sunflower oil	38.9
2	Soybean oil	38
3	Ground nut	40

Table 3.3 Calorific Analysis

From sunflower oil we get biodiesel having 38.9 KJ/cal calorific amount.

From soybean oil we get biodiesel having 38 KJ/cal calorific amount.

From groundnut oil we get biodiesel having 40 KJ/cal calorific amount.

Hence biodiesel with optimum effectiveness can be produced using groundnut oil.

IV. CONCLUSION

4.1 Conclusions-

- From sunflower oil we get biodiesel having 38.9 KJ/cal calorific amount.
- From soybean oil we get biodiesel having 38 KJ/cal calorific amount.
- From groundnut oil we get biodiesel having 40 KJ/cal calorific amount.
- Hence biodiesel with optimum effectiveness can be produced using groundnut oil.
- We can use Biodiesel because it does not produce any kind of green house gas emission.
- It is Sulphur free and carbon free.
- It is having calorific value of 40 KJ/Cal, which is near about the petro diesel having calorific value of 42.8 KJ/Cal.
- It is having near about same efficiency as petro diesel.
- It is more economical than petro diesel i.e. price of biodiesel is Rs35/lit and price of petro diesel is Rs 65/lit.

4.2 Recommendations-

We can use this biodiesel in following blends –

- B 10 i.e. 10% Biodiesel and 90% Petro Diesel.
- B 20 i.e. 20% Biodiesel and 80% Petro Diesel.
- B 30 i.e. 30% Biodiesel and 70% Petro Diesel.
- B 40 i.e. 40% Biodiesel and 60% Petro Diesel.
- B 50 i.e. 50% Biodiesel and 50% Petro Diesel.
- B 60 i.e. 60% Biodiesel and 40% Petro Diesel.

4.3 Future Scope of the Model-

From above survey we can conclude that the total monthly wastage of vegetable oil from 100 hotels in Nashik is **523** lit. We need **104.6** lit Methanol, **3.661**kg koh for biodiesel formation from it. Then we can get **366.1** lit of biodiesel and **130.75** lit of glycerol from it. It will utilize the huge amount of left over vegetable oil and also produce an excellent bio fuel.

In Nashik there are approximately 100+ hotels are there having monthly usage of **2430650** liter of vegetable oil from which **26150** liter vegetable oil is left over per month. So by using this model on large scale we can produce **18305** liter of biodiesel and **13075** liter of glycerol.

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