

REVIEW ON BIODIESEL PRODUCED FROM WASTE COOKING OIL

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Presently the world confronts twin crisis of environment degradation and depletion of fossil fuels. As the increase in crude oil prices the demand for economically attractive and eco -friendly alternative fuels has increased. Waste cooking oils (WCO) contains volumetric amount of unsaturated fats which are provenance in restaurants these are conglomerated by the environmental protection agency in numerous parts of world and must be eliminated in an appropriate manner. Because of the elevated cost of the newfangled vegetable oil, researchers attracted towards the production of bio-diesel from WCO due to the relatively low price WCO. WCO Transesterified in presence of catalyst KOH with methanol, which results in FAME with glycerin as a by-product. The properties of FAME sample as biodiesel including density, flash and fire point, viscosity, pour point, sulphur content, calorific value and cetane index are tested according to ASTM standards and then compared to the standard diesel. The creation of biodiesel from WCO offers umbworld and economic solutions along with waste management.

Keywords: FAME, Transesterification, ASTM Standards, WCO,

I. INTRODUCTION

21st century has been going up against numerous issues like natural issues, vitality supportability, and rising fuel costs. Routine energizes transmit SO₂, CO₂, particulate matter and different gasses which may prompt to dirty the air. This may result to build explore in the field of exchange energizes and renewable wellspring of vitality. The vehicle division worldwide has essentially expanded the fuel utilization grasping 61.5% of the aggregate, particularly in the most recent couple of decades. As of now , India creates just 30% of the aggregate petroleum fills required for its utilization and the staying 70% is transported in, which costs about Rs. 80,000 million every year. It is obvious that blending of 5% of biodiesel fuel to the present diesel fuel can spare Rs.40, 000 million every year. Prefix bio alludes to organic and renewable nature, which lack to conventional fuel while the diesel alludes to utilization of diesel in motors.

Biodiesel named as exact blazing option fuel delivered from sustainable household assets. The principle ware hotspots in India to produce biodiesel is non-eatable plant species gives oil, for example “Bussia Latifolia (Mahua), Jatropha Curcas (Ratanjyot), Calophyllum inophyllum (Nagchampa), Pongamia Pinnata (Karanj), Orbignaya maritiana (Babassu), Mellia azadirachta (Neem), and so forth”. As per ASTM gauges Biodiesel is in fact characterized as ,”the mono alkyl esters of long chain unsaturated fats got from renewable fluid feedstock, for example, vegetable fats and creature oils ,for use in pressure start (CI) motors”.

II. Literature Reviewed

For understanding the relevance of biodiesel produced from WCO as a fuel we have reviewed following papers:

Fabio E. Sierra, Carlos A. Guerrero F., and Andrés Guerrero-Romero from National University of Colombia, 2012 [1] this paper helps me in understanding how exactly biodiesel is produced and how it is less pollutant than other conventional fuels. It also laid emphasis on using waste cooking oil as it is adverse in nature if not properly treated, so he best way to convert this into biodiesel.

Shashank Mohan and Amit Pal from DTU, 2014 [2] in this paper they presents economic analysis of biodiesel when they are produced from waste cooking oil. They gives a complete description of cost estimation of biodiesel production which helps me in understanding complete expenditures with the help of comparison between petrol, diesel and biodiesel.

N.Y. Sharma, P.Mohan and C.V. Sudhir [3] this paper presents a project of WCO potential as biodiesel feed stoke. They gives us a complete description about the WCO potential for preparation of biodiesel as feed stoke and also similitude fuel properties of resultant esters of WCO to the conventional fuel.

Murchana Pathak, Nilanjana Kalita, IIT Guwahati,[4], this paper involves the laboratory or the experimental work to define the procedure of producing biodiesel from WCO. And also compares mechanical characteristics of fuels like conventional petrol, diesel, and alternate fuel biodiesel.

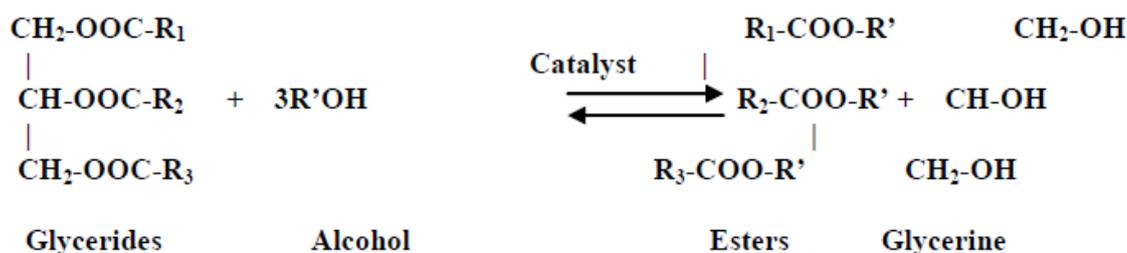
III. Methodologies

Transesterification

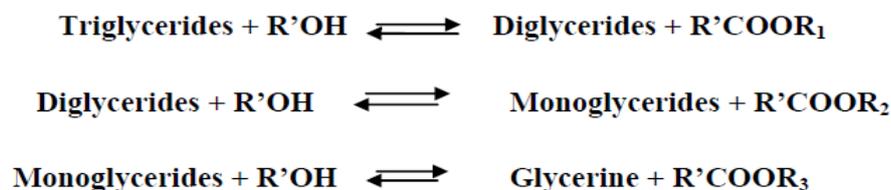
Biodiesel can be handled from various systems. Some of them are

- Coordinate utilize or blending in diesel fuel,
- Micro emulsions in diesel fuel,
- Thermal breaking of vegetable oils and
- Transesterification.

Transesterification has been concentrated in this review. Transesterification is a way toward isolating the fatty acids from glycerol to frame fatty acid esters and free glycerol. Fatty acid esters regularly known as bio-diesel can be created in bunch or ceaselessly by transesterifying triglycerides, for example, creature fat or vegetable oil with lower sub-atomic weight alcohols within the sight of a base or a corrosive impetus. This response happens stepwise, with monoglycerides and diglycerides as by products. The "R" gatherings are the fatty acid, which are generally 12 to 22 carbons long.



The procedure of transesterification achieves uncommon change in consistency of vegetable oil.



The general procedure is regularly an arrangement of three back to back strides, which are reversible responses. In the initial step from triglycerides, diglycerides are gotten. From diglyceride, monoglyceride is delivered and in the last stride from monoglycerides, glycerine is gotten. In every one of these responses esters are created.

Iv Processing of Biodiesel

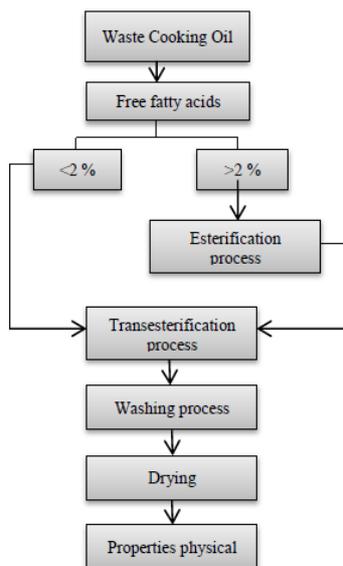


Figure 1. Flow Chart to Produce Biodiesel from WCO

Fig. 1 portrays the means, procedures and techniques used to deliver biodiesel item.

Biodiesel have two initial processes i.e., esterification and tranesterification. Segregation utilized to aloof two layer amongst catalyze and oil. Washing procedure is to deliver nonpartisan biodiesel and expel catalyzes cleanser, glycerol, and methanol.

CRA attempts to identify the potential for some risks to decrease the expected return of a cross border investment. At last the implication of this study can be stated as, there are many specific types of risk which have their origin in a diverse array of country risk and affects to FDI . These risks are economic, political, Transfer, exchange rate, location, and sovereign risk. If these risks analyzed then return on FDI will be increase. These risk analysis by some models or methods, Such as political risk analyses by State centric model Pluralist model, Bureaucratic policies- organizational behavior model, Transnational politics model. Models of risk can help identify potential sources of risks. Country Risk Premium is also influence the study of CRA.

V Properties of Biodiesel

Biodiesel can be compared to the other conventional fuels on the basis of its physical properties like cetane value, flash point, acid value, density, calorific value, water and dregs and so on.

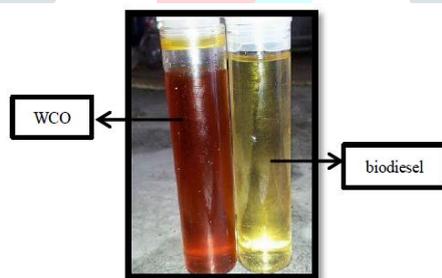
Properties	S.I. Units	Results	Standard (ASTM-6751)
Density (15.6°C)	Kg/m ³	889.9	860-900
Grades AP I		27	Minimum32
Kinematic Viscosity at 40°C	Cst	5.21	1.9 – 6
Cetane index		48	Minimum 47
Caloric value	J/g	40,873.00	37,216.00
Temperature 90% distilled	°C	332	Maximum 360
Acid number	mgKOH/g	0.29	0.80

Economics approximation of biodiesel produced from WCO

	Quantity (Litre)	Rate/ litre	Cost (Rs)	Revenue (Rs)	
Oil	1321	4.30	5680.3		Total Cost = 26553.7 Taxes (18 %) = 4779.6 Distribution (20 %) = 5310.74 Net Price = 36644.05 ∴ Rate of Biodiesel per litre = $\frac{36644.05}{1000} = 36.64 \text{ Rs}$
Reagents	22.510	8.7243	196.38		
Methanol	211.36	60	12681.6		
Electricity and Water	108.326	0.6711	72.69		
Filtration	1321	2.0133	2659.57		
Purification	1191.58	2.684	3198.69		
Labour	1000	4.28	4280		
Glycerine	471.614	4.69		2215.5	

VI Results

The utilized cooking oil that for the most part goes to waste can be used for creating biodiesel, which is both financially and ecologically ideal.



Biodiesel portrayed its fuel and physical properties for benign fuel quality utilizing ASTM techniques. From experiments, we get the values of some properties like the Flash point is 97°C, water and dregs 0.02, etc., where every one of them reach to the fuel standard criteria.

Comparison with Conventional fuels

	Diesel	Cooking oil	B100	B5
EMISSIONS				
Unburned hydrocarbons, ppm	3	14	9	3
Carbon monoxide, %	0	0.01	0	0
NOx, ppm	237	214	248	240
Particulates (opacity %)	2.9	1.6	1.1	2.4
FUEL ECONOMY				
City, mpg	20.1	20.8	22.3	22.6
Highway, mpg	44.9	42.1	44.2	48.5
ACCELERATION				
0-30 mph, sec.	4.5	4.5	4.5	4.5
0-60 mph, sec.	15	14.9	14.5	14.2
1/4-mile, mph	69.9	70.3	71.3	72.2

Present Catastasis

Presently United States producing biodiesel from soybean or rapeseed oil and also from the animal fats and WCO. Some of the machines are also invented through which you can produce biodiesel effortlessly such as BioPro 190 Automated Biodiesel Processor, bioPro 380 Automated Biodiesel Processor, etc. but there is also one machine which is a small, portable, non electrical processor i.e., BB20.

BB20 Processor (Biobot Bio Diesel Processor)



Biobot promotes all related hardware and consumables and full range of bio diesel processors. The ranges of Biobot processors will provenance bio diesel 20 to 150 lt. The units are small, safe and very easy to use requiring less than one hours work to produce enough fuel to run the family car or small van. Using our unique Accelerated Reaction Technology (ART) this process eliminates the need for long settling periods.

VII Conclusion

Biodiesel can be utilized in present motors, vehicles and foundations without any purposely differences. Power and mileage utilizing biodiesel is for all intents and purposes indistinguishable to petroleum diesel fuel, and year round operation can be accomplished by mixing with diesel fuel.

Low lubricity petroleum diesel fuel can bring about untimely disappointment of injection framework parts and diminished execution. Furthermore, biodiesel decreases outflows of carcinogenic compounds by as much as 85% contrasted and petrodiesel. At the point when mixed with petroleum diesel fuel, these outflows diminishments are by and large directly proportional to the measure of biodiesel in the mix.

VIII References

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