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EVALUATION OF THUMBA AS SOURCE OF ZERO EFFLUENT DISCHARGE

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ABSTRACT

The fast exhaustion of fossil fuel holds with expanding interest and instability in their supply, and additionally the quick ascent in petroleum costs, has empowered the quest for different other options to fossil powers. In perspective of this, there is an earnest need to investigate new choices, which are prone to lessen our reliance on oil imports and in addition can help in ensuring the earth for economical improvement. In current situation, populaces keep on increasing, It will takes care of vitality requests has turned into an expanding sympathy toward world situation and one such arrangement is to use Biodiesel as an option fuel is investigated, alongside his alluring fuel qualities. The innovative necessities for procedure and creation of Biodiesel being relatively less unwieldy and its capacity to fuel a current diesel vehicle with no or minor adjustments additionally make it a promising interchange fuel. Contamination diminishment is presently real issue for changing world circumstances and it is understood by Biodiesel. One of the issue while setting up a biodiesel is its result Glycerin. Glycerin present in biodiesel is around 20 %. So by lessening the repercussion and to accomplish biodiesel with zero gushing release is prime target. One of the problem while preparing a biodiesel is its byproduct- Glycerin. Glycerin present in biodiesel is about 20 %. So by reducing the byproduct and to achieve biodiesel with zero effluent discharge is prime objective. Thumba is selected for producing biodiesel with zero effluent discharge.

KEYWORDS: Biodiesel, Thumba, zero effluent discharge.

INTRODUCTION

All Biodiesel develops as a standout amongst the most vitality proficient earth cordial choices as of late to full fill the future vitality needs. Biodiesel is a renewable diesel substitute that can be gotten by consolidating synthetically any common oil or fat with liquor. Amid the most recent 15 years, biodiesel has advanced from the exploration stage to a substantial scale generation in numerous creating nations. In Indian setting, non-eatable oils are developing as a favored feedstock and a few field trials have likewise been made for the creation of biodiesel. Biofuels are emphatically developing as fractional substitutes for fossil fuel from the monetary and also ecological point. Among the biofuels, vegetable oils like jatropha oil, karanja oil, castor oil, jojoba oil, cotton seed oil, neem oil, mahua oil, thumba oil, palm oil, soybean oil, sunflower oil and so on are being investigated as promising contrasting option to hydrocarbon based powers to full fill the future vitality needs. Vegetable oils can be utilized as option fills since they are biodegradable, non-poisonous and essentially diminish contamination. Vegetable oils and their subsidiaries as diesel motor fills lead to significant decreases in carbon monoxide, smoke and particulate discharges. Vegetable oils have roughly 90% warming estimation of mineral diesel because of higher oxygen content. One of the primary issues of vegetable oil use in diesel motors is high thickness than that of mineral diesel alongside that while planning biodiesel repercussion is framed. The rate of result is around 20-25 % which is basic issue for biodiesels. So to develop biodiesel with zero effluent discharge. The thumba biodiesel is considered as alternative fuels to diesel. Zero effluent discharge is formed using Thumba biodiesel.

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LITERATURE REVIEW

In the recent years, serious efforts have been made by several researchers to use different sources

Ma F, Hanna MA

Showed viscosity is unfavorable physical property and which restrict the use of straight vegetable oils as a biodiesel. Due to higher viscosity, vegetable oil causes incomplete combustion, poor fuel atomization and carbon deposition on the injector and valve seats. This resulting in serious engine fouling. To overcome the problem of higher viscosity one possible method is blending of vegetable oil with diesel in proper proportion. Transesterification is also used for produce biodiesel. [1]

Peterson CL et.al

Study reported that the transesterification process has been effective method of biodiesel production and viscosity reduction of vegetable oil. It was observed that transesterification process influence by temperatures, catalyst type, concentration ratio of alcohol to fuel and stirring speed rate a greater extent. [2]

Masjuki HH et.al

This study revealed that practical alternative fuel for older in-service engines. , it was observed that the vehicles had some improved power performance by the use of biodiesel from coconut oil (50/50 blend) using particulate matter was almost negligible with the use of this fuel. [3]

Ramadhas AS et.al.

It found that using blend 20 there was no luminous engine problems were reported in tests with urban bus fleets running. Fuel consumption of biodiesel blend only 2–5% higher than that of conventional diesel. Fuel economy was comparable with diesel. Ester blends have been reported to be stable, and did not separate at room temperature over a period of three months. Limitation of the use of biodiesel is it is crystallize at low temperatures below 0^0C.[4]

Wagner et al.

Test conducted on soybean oil ester fuel on John Deere (4239T Model) engine. It was showned that the engine performance with methyl, ethyl and butyl esters was nearly the same as that with diesel fuel. Emissions of oxides of nitrogen were significantly higher for the esters. It concluded that esters could be used on a short-term basis, and that further testing to be done for determining long-term ester fuel effects. [5]

Ryan and Bagby

Found that the vegetable oils (peanut, sunflower, cottonseed and soybean oils) reveal characteristics opposite to those expected in most other fossil fuels. For this purpose, an alternative liquid fuel that will blend readily with diesel fuel is required Many researchers have studied performance and emission characteristics of undi oil blended with diesel. [6]

C. Srinidhi et al.

Performed an experiment analysis of performance parameter (such as brake power, break specific fuel consumption, brake thermal efficiency and Exhaust Gas temperature) and emission characteristics (NOx, HC, CO. etc.) is obtained for various bio diesel and diesel blends and compared with ordinary diesel at various loads on a modified variable compression ratio CI engine. The results of the investigation shows that the performance and emission characteristics of the engine fuelled with Honne oil methyl ester – diesel blends is comparable to diesel. [7]

Bawane et al.

Performed experimental work to obtain the operating and emission characteristics of Undi Oil Biodiesel on Variable Compression Ratio (VCR) engine run on various blends of biodiesel, compression ratios and load conditions. From the comparison of results, it is inferred that the engine performance is improved with significant reduction in emissions for the chosen oils without any engine modification. [8]

LITERATURE OUTCOMES

The writing survey proposes that the vegetable oils delivered from various oils and seed crops have high vitality content and sensibly great fuel properties. The accessible writing demonstrates that the transesterification procedure has been a most reasonable and satisfactory strategy for biodiesel creation.

Albeit empowering work has been done on execution, emanations and ignition of biodiesel created from vegetable oils like jatropha oil, karanja oil, sunflower oil, soya oil and so forth, yet it was seen from writing overview that constrained measure of work has been done to assess for thumba oil. Be that as it may, restricted work has been accomplished for creating zero profluent release.

This literature gives great methods that can be connected in the work. Perusing the literature writing cleared up comprehension of transestrification. Review gives the best thought to define new strategy and procedures for

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proposed work and which will be best reasonable for further research in flow field. This scrutiny gives stimulation for research work to generate new methodology to find out biodiesel with zero effluent discharge

THUMBA

Citrullus colocyntis, normally known as the colocynth, firmly identified with watermelon, is an individual from the Cucurbitaceous family. Cucurbitaceous is a vast family which comprises of almost 100 genera and 750 species. This plant family is known for its awesome hereditary differing qualities and far reaching adjustment which incorporates tropical and subtropical districts, parched deserts and mild areas. Cucrbits are known for their high protein and oil content. The seeds of cucurbits are wellsprings of oils and protein with around half oil and up to 35% protein. This plant is a dry spell tolerant animal types with a profound root framework, broadly dispersed in the Sahara-Arabian deserts in Africa and the Mediterranean area. It is local to the Mediterranean Basin and Asia and is dispersed among the west shoreline of northern Africa, eastbound through the Sahara, Egypt until India and reaches likewise the north bank of the Mediterranean and the Caspian oceans. It becomes additionally in southern European nations as in Spain and on the islands of the Grecian archipelago.

Thumba oil is a non palatable vegetable oil which is generally found in western Rajasthan and Gujarat. Thumba oil is otherwise called Citrullus Colocyntis scientifically.Presently work depends on the generation of biodiesel with the utilization of Thumba oil as crude material. Thumba (Citrullus colocyntis) [1]. seeds contain 20-30% oil in it. In India biodiesel creation depends on jatropha and other vegetable seeds corps. After some examination demonstrates that Thumba likewise can possibly create biodiesel. Citrulluscolocyntisis known as Indrayanin Hindi or Bitter apple in English. It is tenant of Turkey furthermore found in Asia and Africa. The plant is through climbing plant and develops well in sandy soil, plant has annular and unpleasant trunks, harsh leaves which are 3 to 7 lobed, 5-10 cm long in center. Blossoms are monolecious and have yellow round natural product . It is discovered wild in the warm, bone-dry and sandy parts all through India, up to 1,500 m. It is most inexhaustible in north-western fields of India, particularly in the Barmer, Bikaner, Jaisalmer and Jodhpur locale of Rajasthan, and in Gujarat. Flourishes with sandy topsoil, sub desert soils, and along sandy ocean coasts. Table shows the biophysical limits of thumba[2].

S.No.	Properties	unit Test values
1	Color	Yellowish
2	Odor	Slightly sweet
3	Density gm/cc	0.927
4	Kinematic Viscosity @ 40°C mm^2/s	40.2
5	Acid value mgKOH/gm	2.30
6	Pour point °C	6
7	Cloud point °C	3.5
8	Flash point °C	225
9	Calorific value MJ/Kg	8742
10	Saponification value	184
11	Carbon residue wt%	1.51

Table No.1 Biophysical properties of Thumba

ZERO EFFLUENT DISCHARGE PROCESS

The catalyst, 2.5 wt % of calcium oxide (chemical based), is dissolved in methanol (8:1 molar ratio) and then mixed with and the pretreated oil and agitated it with 650 rpm. Once the reaction is completed, unreacted methanol is removed by distillation then after biodiesel and glycerin are allowed to settle and it was separated after 8-10 hrs.

Transesterification of triglycerides fatty acid into alkyl esters and glycerol. The glycerol layer which is negligible settles down at the bottom of the reaction vessel. Diglyceride and Monoglyceride are the intermediates in this process.

Once the reaction is complete, major product exists: biodiesel. The reacted mixture is sometimes neutralized at this step if needed. The glycerin produce in this process is zero or very negligible amount is much denser than biodiesel phase and the two can be gravity separated with glycerin simply drawn off the bottom of the settling vessel. Centrifuge is also used to separate the two materials faster.

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Figure . Showing Pure Biodiesel

Removal of water from Methyl ester by drying in oven at 100°C temperature. Finally get pure biodiesel (B100).

CONCLUSION

Transesterification reactions are emerged as the most acceptable reaction pathways to produce biodiesel. Any type of feedstock that contains free fatty acids or triglycerides such as vegetable oils, waste oils, animal fats, and waste greases can be converted into biodiesel by transesterification process. Esterification process has been found more effective, efficient and economical process to convert thumba vegetable oils into biodiesel. Thumba biodiesel are also very close to mineral diesel, therefore, Thumba biodiesel becomes a strong candidate to replace or substitute the diesel in compression ignition engines.Thumba biodiesel produced with zero effluent to produce pure biodiesel which in turns increase the efficiency

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