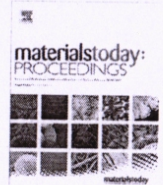




Contents lists available at ScienceDirect

# Materials Today: Proceedings

journal homepage: [www.elsevier.com/locate/matpr](http://www.elsevier.com/locate/matpr)



## Review of Bio-diesel production from waste cooking oil and analyze the IC engine performance

S. Nandha Gopan<sup>a</sup>, A. Vennimalai Rajan<sup>a</sup>, B. Radha Krishnan<sup>b,\*</sup>

<sup>a</sup> Mechanical Engineering, K.Ramakrishnan College of Engineering, Trichy, India

<sup>b</sup> Mechanical Engineering, Nadar Saraswathi College of Engineering and Technology, Theni, India

### ARTICLE INFO

#### Article history:

Received 9 May 2020

Accepted 19 June 2020

Available online xxxx

#### Keywords:

Biodiesel

Waste cooking oil (WCO)

Alternate fuel

Honge oil

Renewable energy

### ABSTRACT

Today the world faces the shortage of fuels in many fields. The demand for fuel oil refinery companies increased the oils and its sub-products (petrol, diesel) prices. Bio-diesel production is one of the alternate methods to full fill the fuel requirements in engines and vehicles. But some researchers said the source of the production of bio-diesel is minimum and also high cost. Here this process conducted with waste cooking oil, which is available in homes and other food industries, so we can reduce the overall manufacturing cost and produce the bulk amount of bio-diesel products. After that, the bio-diesel performance was measured by the Testing model IC engine.

© 2020 Elsevier Ltd. All rights reserved.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Newer Trends and Innovation in Mechanical Engineering: Materials Science.

### 1. Introduction

Diesel, a conventional petroleum-based fuel, is a mixture of hydrocarbons in the range (C15-C18). Finding a substitute for this fuel has now become a pressing need, and the promising alternatives are the triglycerides or the vegetable oils. Most of these oils contain fatty acids with very similar carbon content (C14-C18). Hence extensive research has been focused on the preparation of biodiesel using vegetable oils. In Madurai, and most parts of Tamilnadu, the frying oils extensively used are sunflower, palm, gingelly, and groundnut oils, which contain C16-C18 carbon atoms mostly. Tran's esterification of the thrown out waste cooking oil with CH<sub>3</sub>-OH, will yield the methyl ester of the fatty acids along with some free fatty acids. These Trans esterified esters will serve as a good substitute for biodiesel. The petroleum product being a non-renewable source of energy. It is getting fastly depleted, and if this situation proceeds, in twenty years of time, there will not be any petroleum products Figs. 1-4.

Government of India's National Policy on biofuels [Ref: National Policy on Biofuels, Ministry of New & Renewable Energy, Govt. Of India, Sec. 5.19, page 12, 2009] attempts to tackle this crisis by giving a major thrust to innovation, research and development, and

demonstration in the field of biofuels. In this line, the proposed research work attempts to use waste cooking oil (WCO) as a feed-stock for biofuel production. Also, in this research compatibility of WCO for diesel engines is analyzed to eliminate health hazards involved in reusing the WCO. The major objectives of this project are listed below:

1. Investigating the feasibility of using waste cooking oil (WCO) as fuel
2. Optimization of engine parameters to find the suitable amount of WCO to blend with diesel in the view of better efficiency and acceptable emissions
3. To find a better and hazard free recycle method to waste cooking oil
4. Viability of using pooled WCO obtained from both animal meat/vegetable cooking oil
5. To develop an indigenous technology using local feedstock (WCO) for biofuel production

### 2. Technical details

The sample oil is taken in a flask, which is connected, to a water-cooled condenser. The flask is kept in a water bath; few glass beads are put in the flask to prevent bumping of the liquid during heating. The distillate can be collected in a clean reservoir. Since the honge oil having low vapor pressure, it is not possible to get distillates Tables 1 and 2.

\* Corresponding author.

E-mail address: [radhakrishnancadcam@gmail.com](mailto:radhakrishnancadcam@gmail.com) (B.R. Krishnan).

<https://doi.org/10.1016/j.matpr.2020.06.373>

2214-7853/© 2020 Elsevier Ltd. All rights reserved.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Newer Trends and Innovation in Mechanical Engineering: Materials Science.

Please cite this article as: S. N. Gopan, A. V. Rajan and B. R. Krishnan, Review of Bio-diesel production from waste cooking oil and analyze the IC engine performance, Materials Today: Proceedings, <https://doi.org/10.1016/j.matpr.2020.06.373>



*Hem*  
**Dr. C. MATHALAI SUNDARAM M.E, M.B.A, Ph.D**  
**Principal**  
**Nadar Saraswathi College of Engineering and Technology**  
**Vadapudupatti, Theni-625 531.**