Scientific Journal of Impact Factor (SJIF): 5.71

p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

International Conference on Momentous Role of Nanomaterials in Renewable Energy Devices

Volume 5, Special Issue 07, April-2018 (UGC Approved)

EXPERIMENTAL INVESTIGATIONS OF SPECIFIC GRAVITY ON TRANSESTERIFIED RUBBER SEED METHYL ESTER

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ABSTRACT - *In the present study, rubber seed oil obtained from rubber seed cotyledons has been considered as a potential feed stock for the production of biodiesel. Physicochemical properties of the oil were analyzed and the production of biodiesel through conventional transesterification technique was well established in this study. The specific objective of the research is to measure the specific gravity of the biodiesel with respect to temperature, molar ratio and alkaline catalyst. Also a comparison between the fuel properties of as-prepared biodiesel and standard biodiesel were made. Results of transesterification of rubber seed oil shows an enhancement in fuel properties and found to meet the ASTM D 6751 standards of biodiesel. Storage of biodiesel leads to degradation of fuel properties and affects the performance of an engine. Hence, an attempt has been made to check the stability of a biodiesel for a period of year. Overall study suggests that rubber seed oil methyl ester can also be used as a substitute to the conventional diesel even after a year.*

Keywords: *rubber seed oil; specific gravity, biodiesel; transesterification; catalyst; FFA.*

I. INTRODUCTION

Technological refinement on the production of biofuels is in progress all over the world and using biodiesel is known for more than 50 years [1, 2]. Biodiesel is a renewable fuel and can be derived from vegetable oils or animal fats or used oils [3]. Further, compared with petroleum based diesel, biodiesel has more favourable combustion emission profile such as low emission of carbon monoxide, particulate matter and unburned hydrocarbons [4,5]. Therefore, researchers and scientific community in worldwide have focused on the development of biodiesel, optimization of the process to meet the standards and specifications needed for the fuel to be used commercially without compromising on the durability of the engine parts.

An ample variety of non edible oil crops are available in nature. The promising non edible oil yielding crops suitable for biodiesel production in India are *Jatropha curcas, Pongamia pinnata, Calophyllum inophyllum and Hevea brasilienisis*. Non edible oil from such crops is currently being used for making low cost soap.

Hevea brasilienisis (Rubber tree) which belongs to the family Euphorbiaceae is being cultivated in India since 1902 for extracting its latex. Seed kernel contains oil to the tune of about 40% by weight. Rubber seed oil is a richer source of essential fatty acids. The oil is used mostly in soap making and observed to be non-toxic. However at a broader sense, rubber seed oil at present has not attracted any major application and therefore the natural production of seeds remains unutilized [6]. Hence, the study selects rubber seed oil as a feedstock for biodiesel production.

When using biodiesel in unmodified diesel engines, one issue that must be noted is that biodiesel have different properties than conventional diesel such as higher viscosity, higher cetane number, higher specific gravity and lower heating value. These fuel properties may affect the engine performance and emissions considering that the engine was originally optimized with petrodiesel. Of all properties, specific gravity is one among the most basic and most important property because some important performance indicators such as cetane number, heating value are correlated with it. It is also a significant parameter in connection with fuel storage and transportation.

One of the major criteria for the quality of a biodiesel is its storage stability. Biodiesel denatures more quickly than fossil fuel due to the vulnerable chemical structure of fatty acid alkyl esters present in it. Due to the fact that vegetable oils possess a significant amount of fatty acids with double bond, oxidative stability was of great concern especially when storing biodiesel over an extended period of time [7]. Industrial experts recommend that biodiesel could be best used within six months of its manufacture to ensure that the quality of the fuel was maintained [8]. Therefore, an attempt is now made to investigate the stability characteristics of the biodiesel thus produced.