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REVIEW ON BIODIESEL PRODUCTION FROM EDIBLE OILS THROUGH DIFFERENT PROCESSES

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ABSTRACT

The biodiesels are produced for so many years from various oils available through different processes like esterification, pyrolysis etc. The current paper focus on research work of various researchers in order to find the effective method for the production of biodiesel. It is observed that trans-esterification process is the effective and most useful method in the production of biodiesel.

KEYWORDS: *Trans-esterification, Biodiesel, Edible oils*

INTRODUCTION

Energy is the most important input for the growth of every sector including industrial sector, transport services, agriculture etc. Around the world, the demand for energy is increasing continuously, specifically based on petroleum. The predicted shortage of petroleum and its products have increased the search for the substitute of petroleum derivatives. The fossil fuels are depleting day by day and there is a need to find an alternative fuel to fulfill the energy demand. Biodiesel is one of the best available sources to fulfill the growing demand of energy. It derives from animal fats, edible and non-edible oils including waste cooking oils [Dhingra et al., 2013a; Dhingra et al., 2013b; Dhingra et al., 2014a; Dhingra et al., 2014b; Dhingra et al., 2014c; Dhingra et al., 2014d; Dhingra et al., 2016a; Dhingra et al., 2016b]. Biodiesel refers to "mono alkyl esters of long chain fatty acids derived from vegetable oils or animal fats". Biodiesels are generally used in compression ignition engines by blending it with commercial diesel. The biodiesels are environment friendly also as emissions produced by CI engines running on these are lower.

James et al. (1996) studied various physical and chemical properties of methanol and ethanol for the production of biodiesel. It was reported that ethanol used in the trans-esterification was having low capita cost as it is derived from corn, barley and sorghum which are all renewable resources while methanol is derived from mineral sources.

Pereyra-Irujo et al. (2009) explored the variability in sunflower oil quality for biodiesel production depending on the environmental conditions of crops by means of fatty acid composition (which varied among and within species). One high-oleic and three traditional (high-linoleic) sunflower hybrids were analyzed for validated crop model in the preparation of biodiesel. It was observed that sunflower oil from high oleic hybrids was suitable for biodiesel production (within limits of all analyzed standards) while sunflower oil from traditional hybrids was the most suitable under the standards of Argentina and USA. Certain hybrids were suitable for biodiesel production under warm regions (Northern Argentina, Southern USA, India, China and Pakistan) according to European standards.

Porte et al. (2010) directed their research efforts for biodiesel production (40-200 litres per day) from sunflower oil by evaluating equipment optimization. The produced biodesel was then tested

in three microtractors, the principal agriculture machine used in Southern Brazil region. The results showed that the produced biodiesel was of quality comparable to Brazilian National Agency of Petroleum and it could be a good alternate fuel to diesel with a little wear on engine parts.

The three different types of biodiesel were produced by considering soybean oil, used frying oil and tallow from trans-esterification process and amidation reactions with methanol and diethyl amine respectively [Alcantara et al., 2000]. It was found that amide biodiesel enhanced the ignition properties of the petrochemical diesel fuel. Fukuda et al. (2001) proposed whole cell biocatalysts for the production of biodiesel due to high cost of lipase base catalyst in enzymatic trans-esterification. Studies of various processes for successful production of biodiesel were also done in order to scrutinize the best one. The cost of lipase production was further lowered using genetic engineering technology, such as by developing lipase with high levels of expression and/or stability towards methanol.

Rahimi et al. (2014) utilized Box-Behnken method to develop experimental design and response surface methodology was used for optimization of biodiesel production from soybean oil with methanol in the presence of KOH as catalyst. The biodiesel yield of 89 % was obtained through trans-esterification process at optimum conditions: molar ratio of methanol to oil 9:1, catalyst concentration 1.2 (wt. %) and reaction temperature 60°C. Also an improved biodiesel yield of upto 98 % was achieved at reactant residence time of 180 seconds. From the above discussions, it can be concluded that RSM is an effective tool for optimizing the trans-esterification process parameters in enhancing the biodiesel yield. Table 2.1 shows the summary of various research work related to enhancement of biodiesel yield (in increasing order) using RSM approach.

CONCLUSION

I. The constituents of biodiesel production are found to be oil, alcohol (methanol/ethanol) and a catalyst (homogeneous/heterogeneous)

II. Trans-esterification process is the effective method in the production of biodiesel

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