International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Biodiese-Economics, A Healthy Product by Waste Oil & Eggshell Powder & Marble Dust

Abhishek Sharma[1], Ankit Singh[2]

[1,2] B.Tech Students, Department of Chemical Engineering, National Institute of Technology Raipur , Chhattisgarh, India

Abstract: ***By using the industrial wastes biodiesel can produce .Biodiesel production by waste oil is already exist but in india it is very costly because there is not availability of raw materials so cost is double the diesel.it is not economic. It can be used as an alternative for petro diesel for it is renewable, non toxic and biodegradable fuel. By utilizing eggshell powder and marble dust commercially synthesized lime can be effectively replaced with waste products containing lime content. Environmental hazard due to burning of lime in kilns avoided and thus an economically efficient method of soil stabilization can be carried out.***

Keywords: Biodiesel, Palm, fatty acid, oil skimming

1. Introduction

Biodiesel refers to all kinds of alternative fuels derived from vegetable oils or animal fats. The prefix bio refers to renewable and biological nature, in contrast to the traditional diesel derived from petroleum; while the diesel fuel refers to its use on diesel engines. Huge quantities of waste cooking oils and animal fats are available throughout the world, especially in the developed countries. The biodiesel advantages are that it is a renewable and biodegradable biofuel; it produces less harmful emissions to the environment than those that produce fossil fuels. Specifically the Palm biodiesel pure or mixed with diesel fuel reduces the emissions of CO2, nitrogen oxides (NOx) and particulate material

2. Raw Materials

2.1 Eggshell Powder

The use of stabilization agents like lime and bitumen proves expensive and requires an economic replacement. The eggshell primarily contains lime, calcium and protein. It has being in use as a source of lime in agriculture, which confirms that lime is present in considerable amount in eggshell.

2.2 Marble dust

The production of fine particles (<2 mm) while cutting marble is one of the major problems for the marble industry. But, the fineparticles can be easily dispersed after losing humidity, under atmospheric conditions, such as wind and rain. Thus, fine particles can cause more pollution than other forms of marble waste. Marble has very high lime (CaO) content up to 55 % by weight. This is useful in production of biofuel .transesterification of oil with methanol is arried out in presence of Cao or CaCo3 (dust) and this convert into calcium soaps.

2.3 Oil skimming from effluent water

In every plant effluent treatment process occur .in oil is coming out that oil is a waste oil it can used as raw materials of biodiesel production

2.4 Pests

Pests of early-onset (e.g. cutting caterpillars, leafcutter ants, velvety larvae, worm wire, tenebrionido of the sunflower, underground grille, weevils, black beetle, slugs, etc.) produce damage in seeds and seedlings. Slugs cause great damage to the leaves. The control is convenient with treatments of seeds or specific toxic baits.

2.5 waste from oil production industry

Every oil production unit has oil in waste with dry(exit) solid like soybean oil, sunflower oil, mustered oil industry

2.6 Grease

Waste grease from motor machine

2.7 Rapeseed or canola oil

Rapeseed is a "specie oilseed in the cruciferous family. Many of the species of this family have been cultivated since long time ago that their roots, stems, flowers and seeds are edible”

2.8 Wax

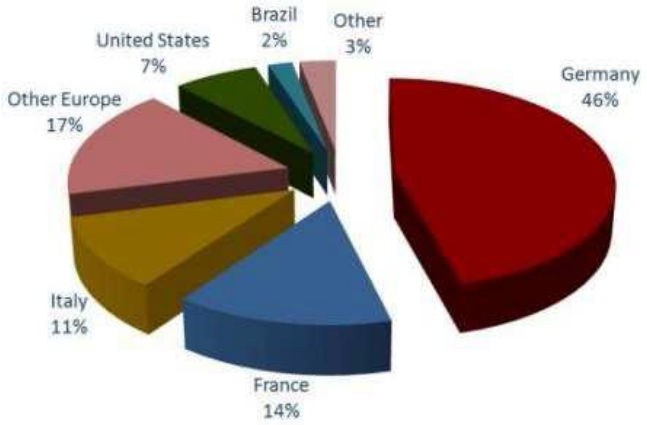
Any oily water resistant substance thathave long hydrocarbon chain ,alcohol,esters

2.9 Microalgae

Method already found production of biodiesel from microalgae

2.10 Residue of crops

After cutting crops residue part of crop can use as raw material for biodiesel. That is easily available. India has biodiesel production is 0.5% because low raw material



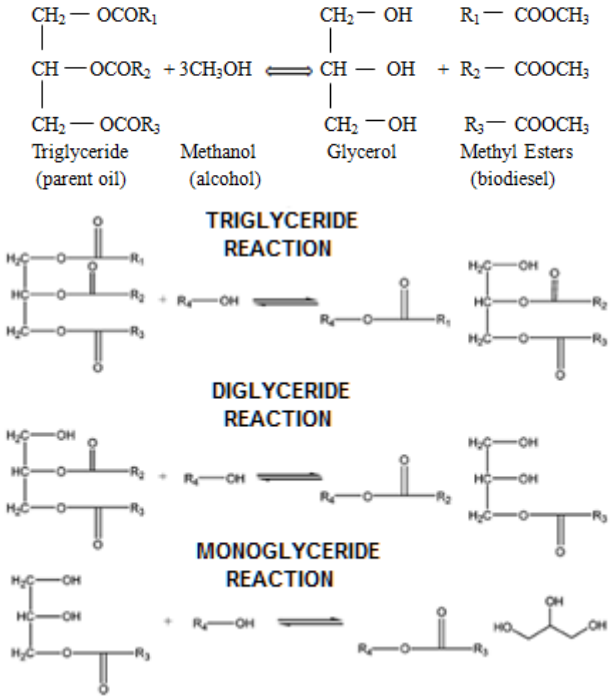
World production of biodiesel (Source: National Federation of Oil Palm Growers (FEDEPALMA)).

3. Biodiesel Production Process

Transesterification- The most common way to produce biodiesel is the transesterification method, which refers to a catalyzed chemical reaction involving vegetable oil and alcohol to yield fatty acid alkyl esters (i.e.,biodiesel) and glycerol. The reaction requires a catalyst, usually a strong base, such as sodium and potassium hydroxide or sodium methylate. A catalyst is usually used to improve thereaction rate and the yield. Since the reaction is reversible, excess alcohol is used to shift the equilibrium to the product side. Especially methanol is used as alcohol because of its low cost and its physical and chemical advantages. Methanol can quickly react with vegetable oil and NaOH can easily dissolve in it. To complete a transesterification reaction stoichiometrically, a 3:1 molar ratio of alcohol to triglycerides is necessary. In practice, the ratio needs to be higher to drive the equilibrium to a maximum ester yield The triglycerides are reacted with a suitable alcohol (Methyl,

Ethyl, or others) inthe presence of a catalyst under a controlled temperature for a given length of time. The final products are Alkyl esters and Glycerin. The Alkyl esters, having favorable properties as fuels for use in CI engines, are the main product and the Glycerin, is a byproduct. The alcohol and catalyst mixture is then charged into a closed reaction vessel and the oil is added. The reaction system is totally closed to the atmosphere to prevent the loss of alcohol, since it easily vaporizable. The reaction mixture is kept just near the boiling point of the alcohol to speed up the reaction. Excess alcohol is normally used to ensure total conversion of the oil to its esters as there is no problem of recovering of the alcohol for later use after recycling. The chemical reaction of the tri-glyceride with methyl alcohol is shown below.

Seperation-After the reaction is completed, there exists glycerol and biodiesel formation. Both have a significant amount of the excess alcohol that was used in the reaction which is in need of being recovered. The reacted mixture is sometimes neutralized at this step if the basic media that is caused by alkali hydroxide is occurred. The glycerol phase is much denser than biodiesel phase, making biodiesel to be floated. The two products can be separated by gravity using settling vessel. The glycerol is drawn off at the bottom of the settling vessel and biodiesel is drawn off at the top. The biodiesel production is given by the transesterification reaction which consists of three consecutive and reversible reactions. First, the triglyceride is converted in diacylglycerol, and running at monoglyceride and glycerin. In each reaction one mole of methyl ester is released as shown in Figure



Reference (Carlos A Guerrero F Andrés Guerrero Romero and Fabio E. Sierra (2011). Biodiesel Production from WasteCooking Oil, Biodiesel)

4. Advantages of biodiesel over Diesel

- It can extend life of your engine as it has superior lubricating properties that reduces wear of vital engine parts.
- It reduces unburnt hydrocarbons, carbonmonooxide, and particulate matter from tail pipe emissions.
- It also reduces emissions of sulphate and sulpher dioxide which are mainly responsible for acid rain.
- Particulate emissions are reduced by up to 65%, leading to reduced cancer risks of up to 94% according to tests sponsored by the Department of Energy.
- Its higher cetane rating than petrodiesel causes more rapid ignition when injected into the engine. It also has the highest energy content of any alternative fuel in its pure form (B100).
- Biodiesel is biodegradable and non-toxic

5. Some Challenges for using Biodiesel Fuel and the Proposed Solutions

- Biodiesel has higher nitrogen oxide NOx emissions than petrodiesel. The higher NOx emissions may be due to the higher cetane rating and oxygen content of the fuel, so that atmospheric nitrogen is oxidized more readily. Catalytic converters and properly tuned engines can reduce these emissions.

- While the flash point of biodiesel is higher than that of gasoline or petrodiesel, its gel point of varies depending on the ester composition. Most biodiesel has a somewhat higher gel and cloud point than petrodiesel. In addition, some additives and processing methods can lower the cloud point and pour point of the fuel itself. "Winterization" is the process of removing saturated methyl esters by cooling the fuel to cause crystallization and then separating the high melting components by filtration. The CP of biodiesel can also be reduced by using a branched-chain alcohol instead of methanol during processing. Isopropyl and 2-butyl esters of normal soybean oil crystallized 7° to 11° and 12° to 14°C lower, respectively, than the corresponding methyl esters
- Biodiesel is hydrophilic because of its oxygen content that permits hydrogen bonding of water molecules. The free water content in biodiesel and diesel fuel promotes biological growth in storage tanks, which could lead to corrosion of metals (copper, iron, steel and others) and formation of sludge and slime, thereby causing blockage of fuel filters and fuel lines, which could in turn damage vehicle fuel injection systems dry polymeric hydrogel for removal of the water content of diesel and biodiesel samples. Based on the advantages of the hydrophilicity that hydrogels present, swelling in the presence of water, it is investigated that the use of these polymeric materials for water removal from fuels. Hydrogels are three-dimensional networks of polymer chains that can adsorb and/or retain a large amount of water inside. The extent of swelling is a unique property of hydrogel particles

6. Conclusion

By using this process industry in india reduces the cost of waste disposal and also can produce biodiesel at low cost these all raw material should use. The main advantage in biodiesel usage is attributed to lesser exhaust emissions in terms of carbon monoxide, hydrocarbons and particulate matter. Use of marbal dust that dangerous for health and for land also it is most economic

References

[1] Carlos A Guerrero F . Andrés Guerrero-Romero and Fabio E. Sierra (2011). Biodiesel Production from Waste Cooking Oil, Biodiesel - Feedstocks and Processing Technologies, Dr. Margarita Stoytcheva (Ed.), ISBN: 978- 953-307-713-0, InTech, Available from: http://www.intechopen.com/books/biodiesel-feedstocks-andprocessing- technologies/biodiesel-production-from-waste-cooking-oil.

[2] Bournay L, Casanave D, Chodorge J, Delfort D Y Hillion G. (2005), *new heterogeneous process for biodiesel production: a way to improve the quality and the value of the crude glycerin produced by biodiesel plants*, France.

[3] Chen G, Meng X Y Wang Y. (2008). *Biodiesel production from waste cooking oil via alkali catalyst and its engine test*, China Architecture Design & Research Group, Beijing, China.

[4] Cujia G., Bula A. (2010). *Potencial obtención de gas de síntesis para la producción de metanol a partir de la gasificación de residuos de palma africana*. Asociación Interciencia

[5] Venezuela. Goetheer, Earl Lawrence Vi Arbeláez, M., Rivera, M. (2007). *Diseño conceptual de un proceso para la obtención de biodiesel a partir de algunos aceites vegetales colombianos.*

[6] Universidad Eafit. Medellín. Benjumea P, Benavides A Y Pashova V. (2007). *El biodiesel de aceite de higuerilla como combustible alternativo para motores diesel*, Universidad Nacional De Colombia Sede Medellín.

[7] Roelands. "COMBINING ALGAE CULTIVATION AND CO2 CAPTURE." U.S. Patent 20,140,318,000, October 30, 2014.