Alcohol as Future Fuel to Promote Biodiesel and Biopetrol

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ABSTRACT - Alcohol produced from renewable resources is being considered globally as the most prominent and possible substitute for fossil fuel. It is being produced by fermentation of raw materials obtained from various renewable resources like Sugarcane, Corn and Sweet Sorghum all over the world. Ethanol is mainly blended with gasoline in different ratios and commonly known as 'bio-petrol .'Government of India in the year 2003 issued the first national Biofuel policy, in order to use bio-ethanol and bio-diesel as a fuel for transport. However, certain factors hindered the successful execution of ethanol use as a transport fuel.The present paper emphasises on the production of bio fuels from non edible sources like cotton, jatropha, microalgae etc. The government of india set targets 10% bioethanol blending of petrol by 2022 and to raise it to 20% under the ethanol blending programme.

Keywords – Alcohol, Future Fuel, Biodiesel, Biopetrol.

I. INTRODUCTION

Bio-fuels are gaseous or liquid fuels produced from biomass resources used in place of, or in addition to diesel , petrol or other fossil fuels . biomass resources are the biodegradable fraction of products wastes and residues from agriculture. Bio-ethanol is a type of ethanol produced form biomass such as sugar containing material. Like. Sugar cane sugar beet sweat sorghum etc ,starch containing maternal such as corn cassava algae and cellulosic material such as bagasse word waste agriculture residues . Bio-diesel is a methyl or ethyl ester of fatty acids produced from vegetables oils both edible and non edible or animal fat . The use of bio-petrol fuel as alternative fuels in gasoline engine has been around for many years and Ethanol-petrol has the potential to be used as alternative fuel that can reduce the total CO2 emission from internal petrol engine, the changes of bio-petrol is a very complex and need further understanding for researchers due to the relevance of the increase in the petroleum price and the future environmental regulation. Bio-fuel development in India centres mainly around the cultivation and processing of Jatropha plant seeds which are very rich in oil (40%). jatropha oil can be used directly after extraction (i.e. without refining) in diesel generators and engines. Jatropha has the potential to provide economic benefits at the local level since under suitable management it has the potential to grow in dry marginal non-agricultural lands, thereby allowing villagers and farmers to leverage non-farm land for income generation. As well, increased Jatropha oil production delivers economic benefits to India on the macroeconomic or national level as it reduces the nation's fossil fuel import bill for diesel production (the main transportation fuel used in the country); minimising the expenditure of India's foreign-currency reserves for fuel allowing India to increase its growing foreign currency reserves (which can be better spent on capital expenditures for industrial inputs and production. Finally, since no food producing farmland is required for producing this bio fuel (unlike corn or sugar cane ethanol, or palm oil diesel), it is considered the most politically and morally acceptable choice among India's current bio fuel options; it has no known negative impact on the production of the massive amounts grains and other vital agriculture goods India produces to meet the food requirements of its massive population.

II. RAW MATERIALS FOR BIODIESEL

The raw materials for biodiesel production are vegetable oils, animal fats and short chain alcohols. The oils most used for worldwide biodiesel production are rapeseed (mainly in the European Union countries), soybean (Argentina and the United States of America), palm (Asian and Central American countries) and sunflower, although other oils are also used, including peanut, linseed, safflower, used vegetable oils, and also animal fats. Methanol is the most frequently used alcohol although ethanol can also be used. Since cost is the main concern in biodiesel production and trading (mainly due to oil prices), the use of non-edible vegetable oils has been studied for several years with good results. Biodiesel Production Besides its lower cost, another undeniable advantage of non-edible oils for biodiesel production lies in the fact that no foodstuffs are spent to produce fuel. Animal fats are also an interesting option, especially in countries with plenty of livestock resources. Microalgae appear to be a very

 DOI : 10.35291/2454-9150.2020.0674

important alternative for future biodiesel production due to their very high oil yield; however, it must be taken into account that only some species are useful for bio fuel production. Although the properties of oils and fats used as raw materials may differ, the properties of biodiesel must be the same, complying with the requirements set by international standards. some non edible sources are as below.

cotton

Among non-foodstuffs, cotton is the most widely traded commodity. It is produced in more than 80 countries and distributed worldwide. After the harvest, it may be traded as raw cot, for human consumption ton, fiber or seeds. In cotton mills, fiber and seeds are separated from raw cotton. Cotton fiber is processed to produce fabric and thread, for use in the textile industry. In addition, cotton oil and flour are obtained from the seed; the latter is rich in protein and is used in livestock feed and after further processing.

Microalgae

microalgae is also a non edible source for biodiesel production. High levels of CO2, water, light, nutrients and mineral salts are necessary for the growth of microalgae. Production processes take place in raceway ponds and photobiological reactors Microalgae have great potential for biodiesel production, since the oil yield (in liters per hectare) could be one to two orders of magnitude higher than that of other raw materials. Oil content is usually from 20 to 50%, although in some species it can be higher than 70%.

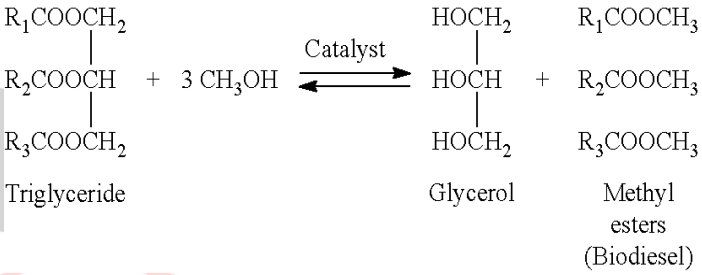
jatropha

Jatropha is a shrub that adapts well to arid environments. Jatropha curcas is the most known variety; it requires little water or additional care; therefore, it is adequate for warm regions with little fertility. Productivity may be reduced by irregular rainfall or strong winds during the flowering season. Yield depends on climate, soil, rainfall and treatment during sowing and harvesting. Jatropha plants become productive after 3 or 4 years, and their lifespan is about 50 years. Oil yield depends on the method of extraction; it is 28–32% using presses and up to 52% by solvent extraction.

III. BIODIESEL PRODUCTION

Biodiesel is produced from vegetable oils or animal fats and an alcohol, through a transesterification reaction]. This chemical reaction converts an ester (vegetable oil or animal fat) into a mixture of esters of the fatty acids that makes up the oil (or fat). Biodiesel is obtained from the purification of the mixture of fatty acid methyl esters (FAME). A catalyst is used to accelerate the reaction. According to the catalyst used, transesterification can be basic, acidic or enzymatic, the former being the most frequently used.When methanol is the alcohol used in the transesterification process, the product of the reaction is a mixture of methyl esters; similarly, if ethanol were used, the reaction product would be a mixture of ethyl esters. In both cases, glycerin will be the co-product of the reaction. Although transesterification is the most important step in biodiesel production ,additional steps are necessary to obtain a product that complies with international standards. In consequence, once the chemical reaction is completed and the two phases (mix of esters and glycerin) are separated, the mix of methyl esters must be purified to reduce the concentration of contaminants to acceptable levels. These include remnants of catalyst, water and methanol; the latter is usually mixed in excess proportion with the raw materials in order to achieve higher conversion efficiency in the transesterification reaction.

Overall reaction:



The content of free fatty acids, water and non-saponificable substances are key parameters to achieve high conversion efficiency in the transesterification reaction. The use of basic catalysts in triglycerides with high content of free fatty acids is not advisable , since part of the latter reacts with the catalyst to form soaps. In consequence, part of the catalyst is spent, and it is no longer available for transesterification.

Separation of the Reaction Products

The separation of reaction products takes place by decantation: the mixture of while most of the mono-, di-, and triglycerides will concentrate in the upper phase (FAME). Once the interphase is clearly and completely defined, the two phases may be physically separated. It must be noted that if decantation takes place due to the chemical affinities, most of the catalyst and excess alcohol will concentrate in the lower phase (glycerin), alternative.

Purification of the Reaction Products

The mixture of fatty acids methyl esters (FAME) obtained from the transesterification reaction must be purified in order to comply with established quality standards for biodiesel. Therefore, FAME must be washed, neutralized and dried.

IV. A NEW TREND FOR FUTURE ASPECT

Mixing of ethanol in petrol

Ethanol blended with petrol and diesel would act as an oxygenator, which is more sustainable, and environment

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friendly as compared to MTBE (Methyl Tertiary Butyl Ether) and ETBE (Ethyl Tertiary Butyl Ether) . Several studies conducted by various researchers also support ethanol as a more feasible and eco-friendly option for blending in both petrol and diesel as an oxygenator than the existing oxygenators in use. Since, the impact on environment of any new activity be studied thoroughly it would be essential to have a look at the studies done so far on ethanol blending into petrol and diesel as transportation fuel. As the ethanol molecule contains oxygen, it allows the engine to more completely combust the fuel, resulting occurrence of environmental pollution. Since ethanol is produced from plants .ethanol is also considered as renewable fuel. Ethanol, an anhydrous ethyl alcohol having chemical formula of C_2H_5OH, can be produced from sugarcane, maize, wheat,and from various non edible sources. Ethanol can be mixed with diesel and petrol, CO2 emission from automobiles reduces by 30%,As a result, pollution decreases. Ethanol, when mixed with petrol and diesel, serves as a great cleaning agent for car engines over a long run.

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 DOI : 10.35291/2454-9150.2020.0674