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The Emergence of Industrialization and The Importance of Renewable Fuel Named Bio-Diesel

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Abstract:

As the momentum has been shifted to the industrialized modernization, the usage of own vehicles particularly the use of cars and two wheelers have been increased in a tremendous speed. Due the heavy usage of these private vehicles, the pollution is taking the pivotal role in the weather. Due to this, we the faculty of chemistry need to take the onus on our shoulders to safeguard the society in such a way, where the people cand use their own vehicles and at the same time they can do no harm to the nature. This is where Bio-Diesel will come in to play. Bio-Diesel is diesel firewood that made from the vegetable oils, animal fats, or recycled restaurant lards. In addition to the above mentioned information, it's safe, decomposable, and it produces less air pollutants when compared to that of petroleum-based diesel.

The Development and the Research in specific field of biofuels in total and Bio-Diesel in particular are not the new things and not new activities in the current fast-paced world. Though, they expanded their motion since the last two or three decades due to the emerging swelling financial problems and the environmental awareness particularly about the usage of petroleum derived remainder gasses. In this research article, the past research about Bio-Diesel and research studies that will be dealing with the production of Bio-Diesel from various and different bioresources investigated and will be discussed in a detailed way. The core motto is to present the latest research that can literally help the needy findings and innovations in the scientific and industrial communities related to Bio-Diesel.

Keywords: Bio-Diesel, FAME, industrialization, biodegradable, biofuel

Introduction:

In the period of the last four decades, research and development accomplishments have permitted to develop some of the decomposable fuels particularly bio-diesel. The current society and the entire world need to reduce the omission of green house gases very rapidly. In order to decrease these gases in a rapid pace, we need something miracle that needs to happen very fast and the name of the miracle is Bio-Diesel. Without any doubt one can easily say that it is only Bio-Diesel which has the ability to save the world from the so called dangerous greenhouse gases. The best thing about it is that, Bio-Diesel is affordable to everyone.

Bio-Diesel is one kind of a fuel which is defined as the renewable fuel that can be derivatized from the natural oil sources like vegetable oil, decomposed or used waste cooking oil and not to forget the animal fats. If we pose the question, What is the most copious renewable and recyclable resource on the Blue Planet? The answer is undoubtedly Biomass. Therefore, transforming biomass into Bio-Diesel is a auspicious method to replace the fossil diesel without affecting the dynamic necessity for energy.

In this fast paced world, Chemically, Bio-Diesel is a FAME which means Fatty Acid Methyl Ester. Bio-Diesel is produced by a chemical Trans-Esterification method. Properties of the Bio-Diesel hinge on mostly on the nature of its raw material on top of the skills related to the bio- conversion process. Hitherto, usually when compared to that of the conventional fossil diesel, the Bio-Diesel has the much better combustion quality attributable to the higher cetane number (The cetane number is 45-65).

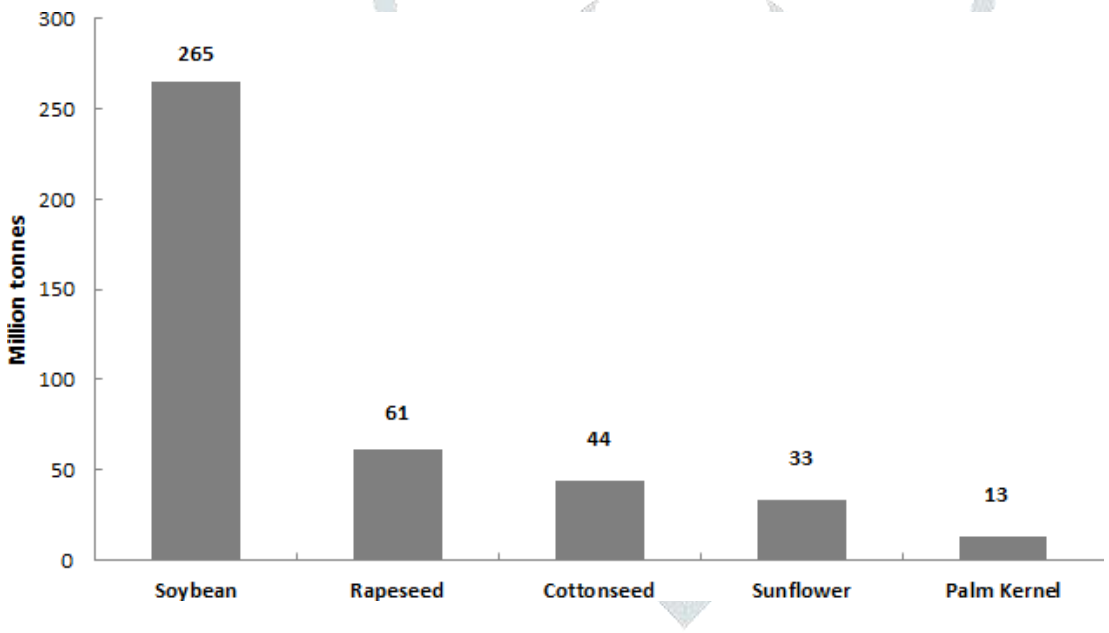
Nevertheless, the Bio-Diesel has difficult viscosity (the viscosity is 3.5-5.5 centistokes at the temperature of 40°C) when compared to the petroleum-originated Diesel (the viscosity is 2-3.5 cSt at 40°C), that makes it a little tough to use directly in a conventional diesel engine. In order to lower the oil viscosity, the use of alcohol (primarily methanol) in Trans-Esterification stage was proven to be a competent solution. The only matter that we have is that, the castoff alcohol has to be recyclable and renewable in order to produce a cent percent and pure renewable Bio-Diesel.

It can be formed domestically from the renewable resources and can be used in many of the Diesel engines especially in the newer ones. Other than Nitrogen oxides, it releases less air pollutants when compared to that of the other fossil diesel. It releases fewer greenhouse gas emanations (e.g., B20 has the ability to reduce CO2 by 15%). It is biodegradable and more over it is non-toxic.

All over the world, the production of Bio-Diesel has become the most planned importance in many of the countries. This is because of the two major reasons.

1. To establish the oil independence.
2. To reduce CO2 emissions.

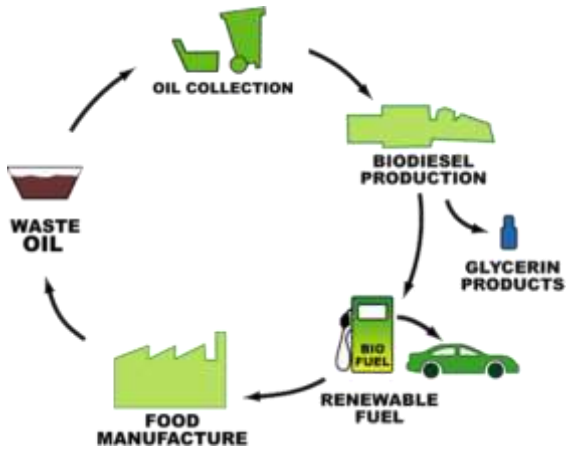
There are many ways to produce Bio-Diesel throughout the world. Out of which the two important processes are, the production which goes from soybeans and rapeseed in the United States of America is one, and the other is to extract the Bio-Diesel by using the Jatropha plants which is mostly taking place in the Asian countries. Brazil, Jamaica, Honduras Panama are the countries which are very rich in planting Jatropha.



Worldwide production of major oil seeds to produce Bio-Diesel.

The characteristics of Bio-Diesel:

The physical and the chemical properties of biodiesel are almost similar to that of the fossil diesel fuel when we compare them together. The most significant properties for biodiesel are the cetane number, the heat of combustion, oxidative stability, viscosity, the cold flow properties and lubricity. As we know that the cetane number can indicate the ignition quality of a particular fuel that has the ability to increase with the number of Carbons and can decrease with the number of unsaturated Carbon bounds.



By using the heat of combustion, we can measure whether the Bio-Diesel is suitable in a diesel engine or not. If the carbon chain length increases, then the heat of combustion also increases. Using the lipids which are extracted from the heterotrophic microalgae in the presence of H2SO4 in methanol, many have got a biodiesel with the combustion heat of 35.4 MJ/L which is in the range of Diesel Fuel (36-38 MJ/L). The viscosity of Bio-Diesel can be increased.

Chemical Extraction:

Bio-Diesel is a procedure which founded on placing the grounded oilseeds in contact with a solvent that permits oil dissolution. Efficiency of the process rests on the oil seed preparation, temperature, mode of the operation and the solvent nature. Realistically, the solvent choice depends on the two main considerations:

1. Solubility of the oil
2. The related utilization cost.

On the other side of the coin, the trouble to extract the oil from the cells, due to a slow diffusion process, requires a pre-treatment stage of the raw feedstock to aid the diffusion. Generally, the used solvents for oil extraction which includes "n-hexane", "white spirit", "Tri-Chloro-Ethylene (C_2HCl_3 or $ClCH=CCl_2$)", Carbon Sulfide (CS2) and some other bio-solvents. Presently, Hexane (C6H12) is widely used as the solvent for the extraction of vegetable oil. Altogether, in an overall basis, there are mainly three methods practiced for the process of chemical oil extraction.

1. Immersion
2. Percolation
3. Mixed immersion-percolation.

Actually, many of the extractors run in a unremitting flow, where the so called solid particles that are, pretreated oleaginous biomass, are positioned on a pierced base forming, a bed that interchanges all over the unit while the liquid that is pure or mixed solvent, that flows through the bed in one of the two different modes mentioned here:

1. Percolation
2. Immersion

In case of immersion, liquid will be set aside on the top of the bed and every extraction phase is swamped with a slow-flowing bath of miscella (whether it might be oil or it can be a mixture of solvent). As for percolation, liquid is sprayed onto the bed surface at a rate which is low enough to avoid bed flooding. In some of the chemical extraction actions, the two modes might be combined together as well. Another process of producing Bio-Diesel has emerged on to the world stage by using microbial oil seed and algal biomass.

Bioresources for the production of Bio-Diesel:

In a world, where we are running in a race along with the machines, we must use our own or private vehicles in order to save our time and safeguard many. Simultaneously we must remember that we should not do any wrong with the nature as everyone knows how brutal the nature could be if it gets angry on human beings and how destructive it could be in the forms of famines, droughts, cyclones and unseasoned rains. We need to minimize the pollutants and by doing so we can contain the pollution subsequently. On the other side the coin, we should limit the usage of fossil diesel as it can harm the nature in a brutal way by releasing the greenhouse gases in excessive amount. For that reason, we have some resources from which we can extract the renewable biodiesel. Out of which the extraction from *Jatropha Carcus* is a significant one to be noted.

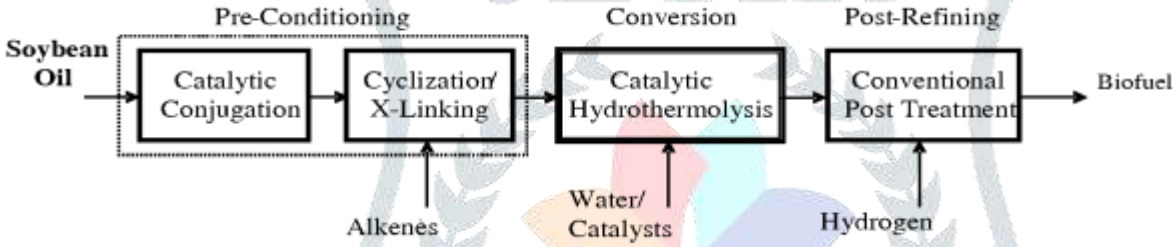
Jatropha Curcas:

In our neighbor nation China, the Jatropha Curcas oil was chosen as the best Bio-Diesel feedstock for their non-edible oil content. On or around 40% of the oil content is present in Jatropha seeds. The yield production will be about 1600 kg/ha. Out of many procedures, without any hesitation, the Jatropha seeds are regarded as the most potential oil resources for extracting the renewable Bio-Diesel. The plants of Jatropha seeds have the better chance to grow in the marginal lands with very speedy growth and a relaxed propagation.

Even in the non-cooperative places like arid, semi-arid and tropical regions also, the Jatropha plants can grow in a rapid pace with minimum of protection. Jatropha plants or seeds is the best way to extract Bio-Diesel as it has been referred by many scientists all over the world.

A new discovery has provided an energy efficient procedure for the preparation of FAME (Fatty Acid Methyl Ester simply called Bio-Diesel) from sun dried whole seed capsules of *Jatropha Curcas* integrated with value addition of seed shells, de-oiled cake and crude glycerol co-product stream. Not to forget, it is Potassium Hydroxide (KOH) which is acted as the catalyst in the entire process of Trans-Esterification.

After Jatropha Curcas, soya beans have taken up the second stage in the center to be used by the scientists to extract Bio-Diesel. Soya beans can grow in arid conditions as well.



Environmental Benefits & Economic Advantages:

When compared to the other fossil diesel fuels, Bio-Diesels are very much in favor of environment. In addition to the above, it has become friendly with the economic situation of the middle class people. Because of its biodegradable nature, Bio-Diesel is regarded as the eco-friendly fuel. It reduces the emission of carbon monoxide, hydrocarbons, PAHs i.e. Polycyclic Aromatic Hydrocarbon compounds and Nitrited Polycyclic Aromatic Hydro- Carbon compounds (n-PAHS). It is indeed true that, the biodiesel's combustion without help from anything can reduce 90% of unburned Hydrocarbons and at least 75 to 90% of Poly Aromatic Hydrocarbons.

Conclusion:

Even though, we are living in a world where everything is superfast which includes the pollution too. In a world like this, if we have to breathe in the fresh oxygen, then the science industries should step in to it in a large number and get Bio-Diesel to be extracted in higher quantities.

The governments of the states, and the governments at the centers of respective countries should focus on this area and keep an eye on this all the way to make Bio-Diesel as the part of daily life of the common people, by doing so they are inculcating nature free fuel to the lives of financially unstable families.

Finally, renewable and recyclable bioresources conversion into Bio-Diesel continues as a striking pathway for the clean energy. And, ever since developing the technology for cost-effective motor fuel production is not yet completely effective at bulky scale, scientific Research and Development endeavors must be continued to spread this decisive goal, both for economic benefits of the people and environmental reasons.

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