

Biodiesel As An Alternative Fuel: A Review

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ABSTRACT: The global transport directly or indirectly depends upon petroleum and its product. As per the consumption, these petroleum products will be extinct within the upcoming 100 years. This review paper focuses on the change and prospects of the vegetable oil and their substitutes. Using different additives of diesel fuel with the biodiesel oil of a 4 stroke diesel engine for evaluating the performance, combustion, and emission characteristics. This is a review of experimental study in which biodiesel blends by volume (5, 10, 15, and 20%) and its denotation B5D, B10D, B15D AND B20D, respectively. The testing of such fuel shows that the viscosity and density of the blended kerosene fuel reduced as compared to the original fuel. There is a reduction in lubrication and wear problem.

INTRODUCTION

In the past few decades, majority of fossil fuels and conventional sources of energy are utilized at a very rapid rate. Burning of fossil fuel have led to the many environmental problems such as increasing the amount of CO₂, depletion of ozone layer, greenhouse effect, etc. Therefore fossil fuel is directly responsible for causing the rise of temperature of earth and many more health related problems such as asthma, lung disease and many skin problems. Therefore biodiesel should be utilized to decrease the atmospheric

pollutions. Nowadays ethanol biodiesel is using in some countries as an alternate fuel for vehicles. In India there is vast variety of feedstocks such as bagasse, sugarcane, grains, wheat, cassava, sunflower, sugar beet etc. from which ethanol biodiesel can be produced.

RAW MATERIAL FOR BIODIESEL

Biodiesel oil can be produced using vegetable oil or creature fats. The most consumable oils utilized now a days are jatropha oil, karanja or pongamia oil, neem oil, jojoba oil, cotton seed oil,

linseed oil, orange oil, sugarcane oil and elastic seed oil.

DIRECT USE AND BLENDING

The vegetable oil can be blended straightforwardly or weakened with diesel fuel to improve the consistency to tackle the issues of direct utilization of vegetable oil in pressure start motor. Caterpillar Brazil, in 1980, utilized a 10% blend of vegetable oil to keep up all out power. A mix with 20% vegetable oil and 80% diesel fuel is likewise effectively detailed. Weakening with 25% sunflower with 75% diesel with a consistency of 4.88cst at 40°C has been examined by Ziejewski et al.

MICRO-EMULSION

The hassle of higher viscosity of vegetable oils is through micro-emulsion method with solvent including methanol, ethanol and i-butanol. Micro-emulsion are clean, stable isotropic liquids with three segment: an oil stage, a fluid stage and a surfactant. the fluid stage comprise of salt or different fixings and oil may comprises of complex blend of various hydrocarbon and olefins and in end stage can improve splash qualities by unstable vaporization of the low bubbling constituents.

PYROLYSIS

It is the procedure of transformation of one substance into another by methods for warmth or with the guide of impetus without air or oxygen .the pyrolysis of vegetable oil to create biofuels has been examined and discovered that it produce alkanes, alkenes, alkadienes, aromatics and carboxylic acids with various properties.

TRANSESTERIFICATION

It is means the chemical response that reaction that includes triglycerides and alcohol in the presence of a catalyst to form esters and glycerol. This procedure including three back to back reversible response, they are the change of triglycerides to di-glycerides, trailed by the transformation of di-glycerides to mono-glycerides. Glycerides are then changed over into glycerol, gives one ester in each progression. A catalyst is use for shorter the response rate. Methanol and ethanol are used maximum often. However, methanol is the most foremost due to its low fee and its physical and chemical advantages as polar and shorter chain alcohol. Methanol can also react with triglycerides speedy and without problems dissolved the alkali catalyst. but there's quite threat with low boiling point of

methanol therefore it have to be dealt with care.

I. CHEMICAL CHARACTERISTICS FATTY ACIDS

At excessive temperatures free fatty acids form salts with metals and as a consequence can harm the engine or garage tanks. They're associated with the iodine variety, which suggests the diploma of oil unsaturation, i.e. the presence of double bonds inside the fatty acids. Double bonds are less strong than single bonds and might react with iodine. Oil may be defined as saturated (iodine wide variety between five and fifty), monounsaturated (iodine quantity among fifty and hundred), bi-unsaturated (iodine variety between hundred and one hundred fifty) or tri-unsaturated (iodine wide variety extra than one hundred fifty). The better the iodine variety and the diploma of unsaturation of the compound, the decrease the viscosity of the oil. As the viscosity decreases the efficiency of the combustion manner increases, because of short evaporation time, quick ignition delay and occasional amount of sediments in the engine.

WAX CONTENT

Wax content material does no longer affect combustion, however can influence the precise operation of secondary elements,

which include pumps, filters, and strength supply gadgets. It varies in step with the character of the seeds and to the oil extraction temperature.

PEROXIDE VALUE

It influences the oxidation level of the oil and its degree of balance in fact, unsaturated oils are characterized, as noted, by means of the presence of double bonds among carbon atoms that are not fully saturated through hydrogen atoms. Being less stable than single bonds, they can react with oxygen, consequently be oxidized more without problems. Chemical alteration of unsaturated fat and oils, through oxygen contained in air, starts with the formation of peroxides. Peroxide price of WVO is better than in pure vegetable oils since the contact of warm oil with food reduces the oxidation stability.

II. PHYSICAL CHARACTERISTICS: DENSITY

The load consistent with unit volume of vegetable oils is greater than that of petrol-diesel about by way of 10%. That is positive for the specific strength of the gasoline. Better density determines better momentum and longer spoil-up instances of liquid droplets, as a result worst

conditions of atomization, and better amount for droplets accomplishing the combustion chamber partitions.

VISCOSITY

The excessive viscosity of vegetable oils is due to their high molar mass (600–900 g/mol). Fuel viscosity additionally affects injection timing, that's a critical component to be taken into account when WVO is utilized in compression ignition engines without any modification of the fuel injection system or method. Excessive temperatures reached during frying technique because several reactions, inclusive of polymerization, with the formation of better molecular weight compounds that growth viscosity.

CETANE NO

Cetane number is a measure of the fuel ignition postpone. It shows the conduct at ignition, therefore it affects bloodless start, combustion improvement and engine noise. The higher its price, the shorter the ignition postpone. In preferred, WVO is characterized by cetane wide variety lower than diesel oil, although a few exceptions exist. Besides no standardized analyses exist to determine the cetane variety of excessive viscosity fluids.

FLASH POINT

Its means the lowest temperature at which fuel vapors ignite inside the presence of a flame. The value depends at the pressure and is normally measured at a trendy strain of 1013 bar. The better the ash point, the higher the protection of garage, shipping and managing of the fuel. Its fee has no direct influence on the combustion efficiency or engine overall performance.

BULK MODULUS

The mass modulus of a substance estimates its protection from a uniform pressure. It is defined as the proportion of the infinitesimal weight increment to the subsequent relative lessening of volume. Together with thickness, the mass modulus of a fuel assumes a determinant job in the infusion timing. The mass modulus of vegetable oils is higher than that of petro-diesel, as confirmed by estimations performed on mixes with different oil rates at different temperatures. The higher the bulk modulus of compressibility the higher the speed of sound in the fuel.

CALORIFIC VALUE

Vegetable oils have a calorific esteem around 10–15% lower than oil diesel .the approx. worth is around 37.27 MJ/Kg. varieties in biodiesel vitality thickness is

more reliant on the feedstock utilized than the creation procedure.

CONCLUSION

Biodiesel has pulled in more extensive consideration toward option bio-fuel, which is sustainable, biodegradable, nontoxic and naturally benevolent. It is less expensive in examination with diesel fuel .its physical and compound trademark is far superior to diesel oil. High unsaturated fat substance in waste cooking oil could be diminished by pretreating waste cooking oil with corrosive impetus. Methanol is the most appropriate liquor as a result of its minimal effort and simple detachment from biofuel. Transesterification is a normally utilized technique for the generation of biofuel. The reason for this technique is to lessen the thickness of oil or fat utilizing corrosive or base impetus in the arrangement of ethanol or methanol.

Preheating the fuel includes lower CO and residue emanations and higher NO_x arrangement. High thickness of fuel includes filter stopping up and control misfortune issues; expanding WVO temperature, raising the tank or expanding the quantity of filters, can add to tackle this issue. The fumes gas temperature is higher when WVO is utilized in ICE, as

opposed to oil diesel, particularly if infusion timing is progressed.

The outcomes about the toxin emanations, CO, HC, NO_x, SO₂, CO₂ and sediment, are conflicting, particularly on the grounds that different motor advancements, estimation strategies, working conditions and fuel characteristics have been tried in the different papers. By and large, there is an expansion in the CO and HC fixations when utilizing WVO as for oil diesel and an abatement in CO₂ outflows.

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