

A REVIEW AN EXPERIMENTAL APPROACH TO IMPROVE PERFORMANCE CHARACTERISTICS OF C.I. ENGINE BY USING NANO PARTICLE IN BIODIESEL AS ADDITIVE

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ABSTRACT

Due to depletion of fossil fuel and enhancement with no. Of diesel vehicle, so development of alternate renewable fuel is very important. AS crude oil & petroleum products are difficult to find and also costly in terms of searching and producing. AS the development of fuel engines is improved vastly, but due to large amount of demand of fuel need to focus on it. Also it is required due to pollution occurred by exhaust of gasoline engines. The another reason is that the large amount of crude oil is important from those countries where these are found out in plenty amount. Biodiesel is first fuel which fulfil all the requirement needed for US Clean Air Act. It provides reduction in HC which remain unburnt , CO & particulate matter. It also remove amount of sulphur content. It is renewable, Biodegradable & toxic less, It is made chemically with the help of alcohol and vegetable oil with acid as catalyst.

Keywords— Nano particle, Biodiesel, Diesel Engine, Efficiency;

INTRODUCTION

the experiment performed on peanut oil to search as an alternative fuel vegetable oil and due to depletion of fossil fuel and enhancement in the number of diesel vehicle, So development of alternative renewable fuel is very important. There are many biomass source exist which can be utilised as a source of energy for the development of agriculture, industrial and transport area due to high amount of energy demand. The requirement of diesel as a fuel is so high, even agriculture and industrial areas are so much dependent on it.

It is known that crude oil and petroleum product are in limited amount and very difficult to search and produce. As the development of fuel engines is improved, but due to large amount of demand of fuel need to focus on it. Also it is required due to pollution occurred because of exhaust of gasoline engines.

STATISTICAL REPORT OF BIODIESEL

As the report of NBA(National Biodiesel board), 0.5 million gallon selling of biodiesel was in 1999, the 2 million gallon in 2000, 5 million gallons in 2001, 15 million gallon in 2002 and forecasted 25 million gallon in 2003, 35 million gallons in 2006, It can be used as a fuel in diesel engines and no modification is necessary up to 20%.

Biodiesel fulfils all the requirement of US clean air Act. It provides significant reduction of hydrocarbon which are unburnt, lower the CO and particulate matter. Biodiesel substantially lowers the solid carbon part of particulate matter. It lowers the CO₂ up to 78% on a life cycle basis.

Biodiesel are produced by Rapeseed (UK), Sunflower (Italy), Soyabean (USA, Brazil) etc and non edible oil like Mahua, Jatropha, Pongamia in India. Approximate 100 biodiesel production plants are open in the world.

BIODIESEL SCENARIO IN THE WORLD

School diesel buses are also main source for pollution which is responsible for health issues of children. By using biodiesel, these problems can be controlled. In 1991, the district school buses of Medford, New Jersey utilised biodiesel as a fuel. In 2002, Olympia and Illinois school district buses used biodiesel, also in Clark country, Nevada school district etc due to this, three big auto car companies developed new generation of vehicles. As the efficiency of diesel engine is 30% more than gasoline engines. So this concept is also applicable in case of power production or better fuel economy with respect to CO₂ emission. Currently Diesel engines are short, compact, smooth combustion and effective. That's why more attractive to auto manufacturers.

Energy scenario of biodiesel in India

The rise up of demand of energy in India is so much high. The demand of energy increased from 35 MMTE to 380 MMTE at present. The consumption of petroleum products was increased from 3.5 MMT in 1950-51 through 17.9 MMT in 1970, 84.3 MMT in 1997-98 to 120 MMT at present and expected to be 234 MMT in 2019-20. The import cost of petroleum products in 2005 was 175000 crore respectively. Also It is observed the increment of 46% in a year between 2004-05 to 2005-06 in import of petroleum products and India has imported 70% of its total demand, which is very high and costly too, out of which, highly used in transport sector. Mainly High Speed Diesel (HSD) is used in transport sector approximate 80%. The demand was 52 MMT in 2007, 67 MMT in 2011-12. As the availability of petroleum products are fixed. So that's why It is needed to be in search for renewable fuel. So biodiesel is best alternative fuel made from edible, non edible vegetable oil etc.

ALTERNATIVE FUELS FOR DIESEL ENGINE

The selection of alternative fuels for CI-engines include the following factors

- It must recycle again and its availability must be high.
- It must contain high specific content of energy.
- It must be transported easily and stored.
- It must not pollute environment.
- It must be handled safely.

The various alternative fuels for compression ignition engines are as follows:

Alcohols:

Alcohol is a well known source of renewable energy which can replace the petroleum products up to certain range. There are two main alcohols are as following -:

Ethanol:

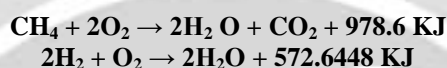
Ethanol is type of fuel which is available in liquid form and may be used as a replacement for petrol or diesel. The engines which are modified now may be suitable for use of 95% (in the form of hydrous) ethanol. Also 100% ethanol in anhydrous form which is mixed with dry petrol to make gasohol and it can be also produced by mixing 90% petrol with 10% anhydrous ethanol. Ethanol generates more power up to 10% comparatively due to good property of combustion. It contains lower mass, CV and density compared to petrol. When ethanol is utilised as an additive due to which the octane rating of mixture is increased like Anhydrous ethanol is well known Octane fuel. The other advantage of this is that It may be made by sources which are renewable.

Methanol:

Methanol also contain properties of increasing the value of octane no. similarly to Ethanol but it must be mixed with petrol which is unleaded. The problem with methanol is to be toxicity of it and due to some property like solubility, quality etc the mixing of it with diesel is not possible . There is no requirement of modification up to 10% in SI engines. It contains heat value in between 15.5×10^6 to 17.7×10^6 which is $3/4^{\text{th}}$ of ethanol and $1/2$ of petrol. It provides more output due to high speed of flame, clean burning and excellent anti knock properties. The exhaust emission products like amount of CO, Hydrocarbons remains unburnt and different oxides of nitrogen are lower of methanol and its blend with petrol compared to petrol.

Bio-Gas:

Biogas is made by the process of fermentation of organic materials by eliminating the presence of air or oxygen using microorganism bacteria and splitting the input material into mid products like alcohol and fatty acids and then finally to CH_4 , CO_2 and water. This method is known as anaerobic fermentation. The composition of biogas production is as following : CH_4 50-60% , CO_2 30-40%, H_2 5-10%, N_2 4-6%, O_2 1-2% and H_2S as in traces. When CH_4 and H_2 combines together with O_2 provides energy in the form of heat.



As CO_2 does not contribute into generation of heat energy and even it is also undesirable in the process of burning. The generation of energy in the form of heat due to methane is 36475 KJ/m^3 and due to hydrogen is 11711 KJ/m^3 . Biogas can't be stored at low pressure. It is more useful as economically if utilised as space heating, water heating or cooking etc.

Methane:

Methane contains calorific value high and it is a clear gas. It may be utilised as site wise and mines. At high temperature and high pressure natural gas which is 95% transformed into methanol with catalyst treatment. It is compressible and useful in some vehicles such as tractor, trucks forklift type etc. A large size of tank is required for storage or transportation purpose for single gallon of petrol such as at 115 bar of pressure the dimension of tank is .45 m diameter and 1.45 m height.

Liquefied Petroleum Gas:

There is high amount of butane released for column top during petroleum refining and in other process of refining. These gases are compressible and liquefiable at atmospheric pressure. Natural gas also contain butane, propane etc and may be separated and eliminated. It is valuable fuel for domestic and mobile application. Higher volume of gas may be storable at high pressure into cylinder of steel.

Vegetable Oils:

It can be of following types like edible and non edible oil. The consumption of edible oil in is more than production of it so it is needed to focus on either more production of edible oil or use of non edible oil to make renewable fuel for CI engines. These oils are useful to prepare biodiesel by process of trans esterification .

LITERATURE REVIEW**Mamat et al. [1].**

It indicates that biodiesel could make utilized Likewise a supplanting from claiming diesel. In this test diethyl ether will be watched with b 30 and b 40 Likewise An 2% Also 6% on the foundation for volume done ASTM D7467 standard methods. Those test effects would compared with guidelines What's more Outcomes indicate that those best aspects might have been to B30DE6 the place the DEE serves clinched alongside decreasing viscosity, thickness Toward 3. 6% Also corrosive quality Eventually Tom's perusing 57% contrasted with palm biodiesel. For palm biodiesel there may be decrement for measure for vitality.

2. Behcet et al. [2].

He led tests on a four stroke, solitary cylinder, diesel motor with diesel Also distinctive blends for Biodiesel during fluctuating preheating temperature. The results for emanation test would watched. Those BSEC for Bldend 20 will be base with 600C preheating and the gas temperature for debilitate gas will be greatest the place Similarly as immaculate diesel need least smoke thickness.

3. Rodrigues et al. [3].

They contemplated transesterification about soybean oil with biodiesel Toward the utilization from claiming CaO strong build impetus. Those response instrument might have been examined and the differentiate effects of the molar proportion for methanol will oil, response temperature, impostor proportion about impetus on oil What's more water content were investigated. It indicates that those proportion for 12:1 from claiming methanol and oil, including 8% CaO Similarly as a catalyst, 650C temperature Also 2. 03% content about water is best for result, and the biodiesel yield surpassed 95% toward 3 h. Those impetus lifetime might have been longer over that about calcined $K_2CO_3/c-Al_2O_3$ Also KF/c- Al_2O_3 impetuses. CaO need property from claiming animation considerably after 20 rounds for cycle and the biodiesel yield then afterward 1. 5 h need not been influenced because of repeatness from claiming cycle.

4. Leung et al. [4].

It reviewed the distinctive technique for bringing down free greasy acids in the crude oil Furthermore refinement for rough biodiesel which need aid utilized within the business. They likewise demonstrated those new methodology for preparation about biodiesel. Those non reactant methanol is best for little time response. This methodology will be unabated should control waste cooking oil Also fat for creature.

5. Saidur et al. [5].

Biodiesel may be arranged from soyabean unrefined petroleum which might have been produced by a system for basic catalysed transesterification. Those paramount properties of bio diesel might have been compared for a diesel and biodiesel both would utilized as fuel in layering ignition loop motor. It execution emanation and burning properties for motor were analysed. The burning phases for biodiesel may be comparable Actually prior burning occur In more level motor those top barrel weight Furthermore top rate about weight may be increment and the top heat is uprooted. Throughout pre blend burning period the place higher to biodiesel those rate for crest weight Also heat discharged may be least. Crest weight variety for barrel at secondary load motor is comparative the BSFC might have been easier for biodiesel. Its diminishment is destructive for debilitate gasses thereabouts it camwood make utilized Concerning illustration An alternauve fuel.

6. Kumar et al. [6].

For this, the PAHs , BaPeq, utilization about fuel, effectiveness from claiming vitality and Pm might have been watched with generator Likewise different sorts about fuel test : P0 , P10, P20, P30, P50, P75 Also P100. Those element for emanation increments as palm oil biodiesel rate expands. The content from claiming PM emanation lowers down with increments On substance from claiming palm oil. Palm oil biodiesel may be best biodiesel Furthermore it may be best for ci engines.

7. Atabani et al. [7].

They investigations those different analysis conveyed around bio diesel in the reality and their yield qualities. *Jatropha curcas* (Ratanjyot), *Pongamia pinnata* (Karanj), *calophyllum inophyllum* (Nagchampa), *Hevca brasiliensis* (Rubber) and so on are non eatable oil Eventually Tom's perusing which bio diesel may be produced. Biodiesel camwood make mix in whatever proportion for example, such that diesel and there will be no adjustment oblige dependent upon exactly mix rate.

8. Alkabbashi et al. [8].

They aggravated an arrangement on get raw petroleum based palm oil Toward esterification proecess. It will be conveyed crazy Eventually Tom's perusing Comprehending temperatue of 600C and period 60 minute, 10:1

proportion of methanol What's more oil Furthermore amount of impetus by 1. 4 (%wt). Those test led would as: thickness from claiming POB toward room temperature may be 0. 8498 kg L-1, surface pressure In stp for 26. 96 mn m-1, with Huh-Mason revision for 0. 1 Furthermore At last spare greasy liver rate of 0. 12% (equivalent with corrosive quality about 0. 26 mg KOH g-1).

9. melody et al. [9].

They investigated the soyabean based biodiesel execution As far as force Furthermore fuel cosset. The exchange-off association might have been plain "around those nox What's more smoke thickness though the diesel motor is stacked with separate kind of mix for fuel.

10. Dubey et al. [10].

He utilized the jatropha biodiesel for turpentine with dispense with the utilization about fossil fuel fully. Jatropha biodiesel (methyl ester) and turpentine oil may be a fuel compared with diesel because of which it may be esteem with be utilized within diesel motor. Those investigations might have been performed around kirloskar diesel motor usnig methyl ester with turpentine oil blends (dual fuel blends) Furthermore customary diesel. Duel mix fills are best fuel As far as those execution What's more emanation dissection. At that point B50 brings about diminishment for brake warm effectiveness or NOx, HC, co What's more smoke individually same time co2 discharges build 10. 7%.

11.Nalgundwar et al. [11].

They concentrated on mix for two bio diesel may be made Furthermore Different tests are performed on diesel motor. Those comes about for mix about D90PB5JB5 shown the ascend for 4. 65 % for BP contrasted with diesel Furthermore also BSFC for this lessened. Higher biodiesel blends indicates increase of 15% over BTE. There may be in diminishment clinched alongside co emanation dissection Also exactly augment for nox emanation.

12. silva et al. [12].

He assessed how the variety of the feedstock, rate of mix Also transesterification transform influences nox discharges. By thinking about those effects for turkey's test the ethyl mix hold least nox debilitate emanation Also palm ethyl ester blends indicates the best qualities. Also when at elements are considered, B20 from soybean methyl ester need those base outflows of nox.

13. Ghaly et al. [13].

They news person the devepoment of new biodiesel creation procedures need been expanded because of require about nontoxic Furthermore reused fuel.

14. Theansuwan Furthermore Triratanasirichai et al [14].

It uncovers that biodiesel aggravated Toward transesterification procedure show indistinguishable properties.

15. lawrence et al. [15].

It indicates that prickly poppy methyl ester (PPME) may be utilized Likewise a mix in ci engines. The effects for test would upgrade Previously, BTE, BP nd decrement for SFC for PPME and its blends for diesel.

16. Shaafi et al. [16].

It explore those burning motor execution What's more property of a barrel Regularly aspirated air cooled ,constant speed, compression, ignition loop motor fuelled with changed mix b 20, diesel Soyabean bio diesel, ethanol mix for alumina as nano added substance. Those bring about shortages will be compared with flawless diesel. With acquire stable suspension the nano particles are blended for biodiesel mix by utilizing ultrasonicator. The qualities of b 20, D80SBD15E45 + alumina fuel mix may be changed because of those blending of soyabean biodiesel and the consolidation about alumina nano additives. The measured qualities is compared for slick diesel. Throughout the burning those barrel weight discharge heat. Those discharge high temperature rate may be higher clinched alongside D80SBD15E4S1+ alumina fuel mix. Those temperature for debilitated gasses turns into low on account

D80SBD15E4S1+ alumina fuel mix which demonstrates the higher temperature Throughout prevailing because of higher warm effectiveness. Because of that's only the tip of the iceberg O2 substance in soyabean bio diesels Furthermore because of beneficial blending of nano particles diminish co Furthermore UBHC through there might have been An little expansion for nox toward full load conition.

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