



EMISSION TEST ON HONDA GENERATOR ENGINE USING ETHANOL AS ALTERNATE FUEL

S.Nakkeeran,S.Dhinakaran, Anoop Johny
and Dr. D.Vijayaganapathy
Department of Mechanical Engineering,
Saveetha School of Engineering,
Saveetha Institute of Medical and Technical Sciences,
Chennai 600 076, Tamil Nadu, India

April 28, 2018

Abstract

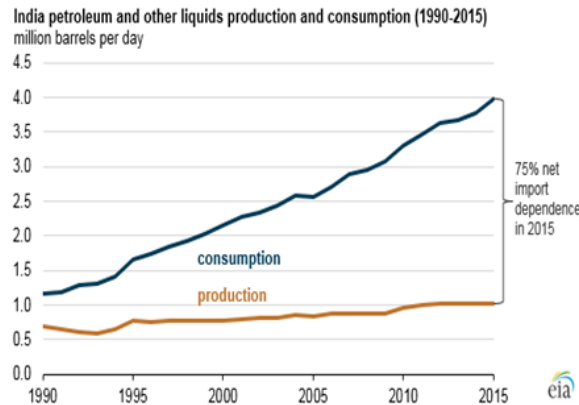
The main objective of this project is to search out the impact of ethyl alcohol in IC engines since Ethanol possesses characteristic properties that have positive influence on engine performance further as exhaust emissions. In recent years ethyl alcohol has emerged as most significant various resources for liquid fuel and has generated a good deal of analysis interest in ethyl alcohol fermentation. Analysis on up ethyl alcohol production has been fast for each ecological and economic reason, primarily for its use as an alternate to crude based mostly fuels. This paper mainly focuses on the levels of emission produced by the engine when using petrol and ethanol as fuel. Study relies on technical further as quantitative information offered from completely different researches.

1 INTRODUCTION

Vehicular emissions considerably influence the composition of the atmosphere and have a robust impact on temperature change. The utilization of different fuels has been promoted within the EU as a live to decrease greenhouse gases (GHG) emissions and conjointly to satisfy what at the time was a growing demand of energy for transport use. Biofuels are seen as a live to cut back emissions of GHGs from road transport as a result of they were thought-about dioxide neutral fuels. The EU has set a tenth renewable energy demand for the transport sector, to be complied with by 2020 (2009/28/EC). In 2010, the utilization of renewable energy by the transport sector was four.70%, ninety one of that was lined by biofuels. Within the US, the Environmental Protection Agency (EPA) has enforced a series of initiatives to push the introduction of renewable fuels, with a target of 136 billion liters of renewable fuel to be blending with gasoline by 2022. So far, plant product is that the main renewable fuel used for transportation within the US. Mixing mandates exist in fifty two countries round the world having such needs. China incorporates a biofuels mandate of 100% by 2020. India, expects to hide two hundredth of its fuel demand with plant product by 2017. Brazil, Where ever plant product has been employed in completely different fuel blends since the mid-70s mandates that two hundredth of the gasoline demand must be provided by plant product by 2022. This target has already been reached.

INDIAS OIL CONSUMPTION & PRODUCTION

When intermingled with gasoline to be used as a vehicle fuel, plant product can give some emissions advantages over gasoline counting on vehicle sort, engine activity, and mix level. Like standard fuels, the employment and storage of plant product blends may end up in emissions of regulated pollutants, venomous chemicals, and greenhouse gases (GHGs). However, in comparison to gasoline, the employment of high-level plant product blends, like E85, typically end in lower emissions levels.



INDIAN ENERGY SCENERIO & SIGNIFICANCE OF BIOFUELS

India ranks sixth in terms of energy demand accounting to three.6% of total international energy demand. Whereas the energy demand is anticipated to grow at four.8% a year, an oversized a part of Indias population, principally within the geographic area, doesnt have even access there. Bharat is that the second most thickly settled country with chop-chop urbanizing economy; our dependence on oil import can increase staggeringly within the close to future. In 2003-04 Bharat that is seventieth import dependent for meeting its crude demand, spent 18.36 billion bucks (Rs. 84,236) cores on commercialism quite ninety million a lot of crude. it’s foretold that if Bharat continues at this rate, we might be intense five.6 million barrel of oil /day by 2030, out of that quite ninety four are going to be met through oil imports .The greatest increase in energy demand happens within the transportation sector were quite ninety fifth of the demand is met by fossil fuels that contributes to environmental impairment to a important level. In fact, exaggerated environmental degradation do inform that our ways in which to fulfill energy demand ought to be designed as a component of property development additionally securing future provide of energy supplys needs not solely existing fuel resources that be utilized economically as potential however additionally energy source employed in this equipment should be varied .

ALTERNATE FUELS:

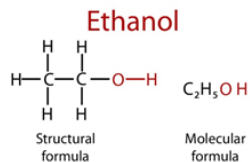
There are also known as non-conventional or advanced fuels.

As a result of advancing science, plant product might presently be economically factory-made from previously unused resources like agricultural residue and biological science waste materials. These are materials or substances that can be used as fuels, other than conventional fuels. Some renowned different fuels square measure bio diesel, alcohol, with chemicals hold on electricity, hydrogen, non-fossil gas, non-fossil gas, edible fat & biomass.

WHY ALTERNATE FUELS?

In this century, it's believed that crude oil and gasoline product can become terribly scarce .Day-to-day, fuel economy of engines is obtaining improved and can still improve. However, monumental increase in variety of vehicles has started dictating the demand for fuel. With hyperbolic use and depletion of fossil fuels, different fuel technology can become a lot of common within the returning decades. As a result of the high price of fossil fuel merchandise, energy security, emission issues some developing countries try to use alternate fuels for his or her vehicles.

ETHANOL:



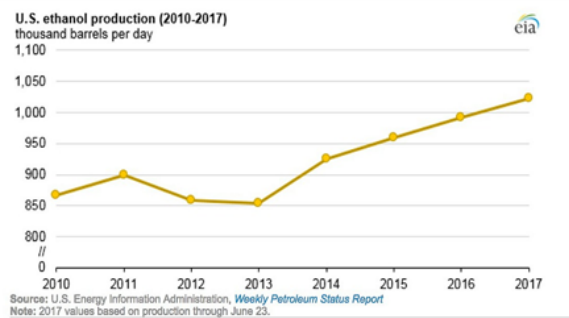
Ethanol is also called as ethyl alcohol. This is a chemical compound with simple formula $\text{CH}_3-\text{CH}_2-\text{OH}$. And also abbreviated as ETOH. Ethanol is a volatile, flammable, colourless liquid with a slight characteristic odour. It is a psychoactive substance and is the principal type of alcohol found in alcoholic drinks. Ethanol is Associate in nursing alcohol-based fuel made of corn, wheat, barley, trees, grass, etc. It is renewable as a result of it comes from fermentation crops. Ethanol lowers carbon monoxide gas emissions. Since alcohol is made of a good type of flora, it's terribly torrential and with depleting crude oil reserves, may be a promising different.

ALCOHOL AS A FUEL

Liquid fuels square measure most well-liked for IC engines as a result of their straightforward to store and have moderately sensible hot worth. The most different is that the alcohol. Alcohols square

measure enticing alternate fuels as a result of them will be obtained from each natural and made sources. Methyl alcohol and plant product square measure 2 varieties of alcohols that appears most promising.

ETHANOL PRODUCTION (2010-2017)



ETHANOL PRODUCTION PROCESS

Historically made of corn and different starch sources or from natural sugars by fermentation with Common sources embrace rice, potato, cassava and corn and different grains. Manufacturing method was terribly energy-intensive, however is currently less thus in most recent plants, owing to advances in distillation technology. Ethanol is commercially made victimization either a wet mill or dry mill method. Wet edge involves separating the grain kernel into its part components (germ, fiber, protein, and starch) before fermentation. The dry mill method is that the method wherever the complete grain kernel is ground into flour.

ALTERNATE FUEL USED IN GENERATORS

A fermentation alcohol generator is analogous in most ways that to alternative generators, aside from the actual fact that they use fermentation alcohol fuel rather than alternative fuel varieties. This one little reality, however, makes a world of distinction owing to the environment-friendly nature of fermentation alcohol fuel.

i) Compared to fuel, fermentation alcohol fuel could be a natural resource, thus you may not contribute to the oil shortage that some countries square measure currently at the brink of. ii) Other than that, fermentation alcohol fuel burns cleaner than fuel and helps cut back the number of carbon contaminants within the air. This

way, you'll be able to rest assured that because it generates electricity, it won't harness venomous materials into the air, which may then hurt your surroundings. iii) Using Associate in nursing fermentation alcohol generator running on Associate in Nursing E85 fermentation alcohol fuel mix may additionally qualify you for a few edges and tax incentives offered by the govt... And if you manufacture your own fermentation alcohol fuel, your generator won't run out beneath load and can therefore last longer.

WORKING PRINCIPLE OF ETHANOL GENERATOR

Instead of burning fuel to convert it into energy, grain alcohol generators burn grain alcohol fuel. Grain alcohol fuel is created by intermixture grain alcohol and fuel to supply a mix that may contain either a lot of grain alcohol or a lot of fuel. E85, the upper mix of grain alcohol fuel, contains a lot of grain alcohol at eighty fifth than fuel at 15 August 1945. The lower mix, however, conjointly referred to as E10, is created from solely 100% of grain alcohol. The upper the grain alcohol content, the cleaner the fuel is.

However, there is a unit some special necessities for engines before they will safely use higher blends of grain alcohol fuel. Majority of generators currently will run solely on E10.

There also are some sorts of generators that profit a lot of with the employment of grain alcohol fuel. As an example, transportable generators, emergency generators, and standby generators, that aren't unendingly used and don't need an outsized quantity of fuel, can use grain alcohol higher than industrial, industrial, or marine sorts of generators.

2 LITERATURE REVIEW

V. Srinivasan et al., (2014), this study concern with the utilization of alternate fuels for cars. Since the cars are the most source of transportation, its usage will increase day by day. Thereby it's necessary to spot a less expensive fuel for it. The presently existing and wide used fuel named fuel additionally referred to as hydrocarbon. The value of this fuel day by day will increase and additionally it'll be exhausted in future once some years. Another drawback presently victimization fuels are the exhaust. The exhaust consists

of Nitrogen, CO, CO₂, Sox, lead and different particulates that result in air pollution and adverse have an effect on masses. Thus it's vital to elect alternate fuels that are cheaper and less waste material to setting.

DR. PORAG KALITA, (2016) this paper deals with fermentation of alcohol as a gas mix has helped to scale back dependence on oil import and harmful transport emission. As a result of the economic process impact still as dominant the auto exhaust emission, the auto corporations area unit introducing Multipurpose Fuel contrivance (MPFI) and gas Direct Injection (GDI) severally. However, introducing fermentation alcohol as various automobile fuel (E10, E85).

Hakan Bayraktar observed the effects of ethanol addition to gasoline on an IC Engine performance and exhaust emissions, experimentally and theoretically. Experimental applications have been carried out with the blends containing 1.5, 3, 4.5, 6, 7.5, 9, 10.5 and 12 vol% ethanol. Results obtained from both theoretical and experimental studies are compared graphically. Experimental results have shown that among the various blends, the blend of 7.5% ethanol was the most suitable one from the engine performance and CO emissions points of view.

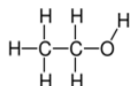
Alan C. Hansen in their review paper presented a review on the properties and specifications of ethanol blended with diesel fuel. Special emphasis is placed on the factors critical to the potential commercial use of these blends. These factors include blend properties such as stability, viscosity and lubricity, safety and materials compatibility. The effect of the fuel on engine performance, durability and emissions are also considered. The formulation of additives to correct certain key properties and maintain blend stability is suggested as a critical factor in ensuring fuel compatibility with engines.

Wei-Dong conducted the study to experimentally investigate the engine performance and pollutant emission of a commercial SI engine using ethanolgasoline blended fuels with various blended rates (0%, 5%, 10%, 20%, 30%). Results showed that with increasing the ethanol content, the heating value of the blended fuels is decreased, while the octane number of the blended fuels increases. It was also found that with increasing the ethanol content, the Reid vapor pressure of the blended fuels initially increases to a maxi-

mum at 10% ethanol addition, and then decreases. Finally, it was noted that Nox emission depends on the engine operating condition rather than the ethanol content

ETHANOL AND ITS CHARACTERISTICS:

Ethanol, conjointly known as alcohol, ethyl radical alcohol, and drinking alcohol, could be a substance, an easy alcohol with the statement C_2H_5OH . Its formula will be written conjointly as CH_3CH_2OH or C_2H_5OH (an alkyl radical coupled to a group group), and is usually abbreviated as EtOH. Fermentation alcohol could be a volatile, flammable, colorless liquid with a small characteristic odor. It's a mind-altering drug and is that the principal sort of alcohol found in alcoholic drinks. Ethanol is of course made by the fermentation of sugars by yeasts or via organic compound processes, and is most typically consumed as a well-liked narcotic. It conjointly has medical applications as associate degree antiseptic and disinfectant.



CHEMICAL FORMULA

Ethanol could be a 2-carbon alcohol. Its formula is CH_3CH_2OH . Another notation is CH_3CH_2OH , that indicates that the carbon of a alkyl radical (CH_3) is hooked up to the carbon of a chemical group (CH_2), that is hooked up to the O of a group (OH). It's a constitutional compound of dimethyl ether.

Grain alcohol is usually abbreviated as EtOH, victimization the common chemistry notation of representing the alkyl radical (C_2H_5) with Et.

PHYSICAL PROPERTIES

Ethanol's chemical group is in an exceedingly position to participate in part bonding, rendering it extra viscous and fewer volatile than less polar organic compounds of comparable relative molecular mass, like fuel. Ethanol is slightly additional refractive than water, having a index of refraction of one.36242 (at $\lambda=589.3$ nm and eighteen.35 °C or sixty five.03 °F).[49] The triple purpose for alcohol is one hundred fifty K at a pressure of 4.3×10^4 Pa.

Ethanol is also a volatile, colorless liquid that contains atiny low odor. It burns with a smokeless blue flame that's not incessantly visible in ancient light-weight. The physical properties of alcohol

stem primarily from the presence of its radical and to boot the shortness of its carbon chain.

Most alcoholic beverages are a lot of or less acidic: wine hydrogen ion concentration = 3.3-3.7, brewage hydrogen ion concentration ~ four. Boiling purpose of plant product is 173.3 °F (78.5 °C). At temperature, plant material could also be a transparent, colorless, volatile liquid with a characteristic odor. Once diluted, it's somewhat sweet, but targeted alcohol contains a sturdy, burning vogue. plant material is extremely soluble in water and organic solvents, but poorly soluble in fats and oils. Density of plant material at sixty eight °F (20 °C) is zero.789 g/mL. Pure plant material is neutral (pH ~7)

HONDA GENERATOR SPECIFICATION TABLE

Engine make and model	HONDA
Engine type	Twin Cylinder
Starting system	Recoil starter
Fuel tank capacity	0.95

Ignition	TCI Electronic
Frequency (Hz)	50
Maximum power	2400 VA
Fuel cock type	Plunger type

3 TESTING AND RESULTS

1) DENSITY AND CALORIFIC VALUE OF TEST BLENDS:

Blend	Density	CV (MJ/Kg)
E-85	700.42	35.25
Petrol	780	42.25

2) TEST RESULTS (PETROL):

Parameter	Regulation Limit	Actual
CO (% by Volume)	4.5	1.02
HC (PPM)	4200	1100

3) TEST RESULTS (ETHANOL):

Parameter	Regulation Limit	Actual
CO (% by Vol)	3.2	0.80
HC (PPM)	2140	109



4 CONCLUSION

Thus the results we got by conducting the experiment has proved that emission levels of CO from the engine are much lower when ethanol is used than when petrol is used. Ethanol helps in clean and complete combustion as it provides oxygen during combustion and emissions of HC are also lowered when ethanol is used. It is not only the price reduction by Ethanol that matters but also the millions of liters of petrol that we save for future.

Although the potential for the production of alcohol can which will that may create it commercially offered as another to fuel is nevertheless to be absolutely accomplished this piece of analysis suggests that its application will cut back the present environmental degradation caused by the emission of harmful exhaust gas'

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