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Abstract

In this study on alternate fuels of IC engines which used as gasoline and diesel fuels are hydrogen, acetylene, natural gas, ethanol & bio-fuels. Moreover, the cleanest fuel in the planet is hydrogen, having gas phase of 14% lighter than air. Also the high ignition limit of hydrogen fuel, extends the parts of design in internal combustion engines. On the other hand, natural gas containing (80-90%) of methane which used in both petrol and diesel engines, which improves the combustion, ignition & performance. A fuel cell which produces electricity by combining hydrogen fuel and oxygen from air via electrodes and ion conducting electrolytes. The potential to convert chemical energy to electrical energy without delay, giving much better conversion efficiencies than any traditional methods like thermo- mechanical device. Therefore, extracting much more electricity from same amount of fuel, they are also pollution free and having quieter operation due to no mechanical components. Diesel action charges severe pollution containing nitrogen oxide, carbon monoxide and many other particulate matter. In this section we will discuss about natural gas, gasoline, hydrogen, ethanol, biodiesel & many others energy productive elements related alternative fuels on various reduction energy consumption & emission that have examined.

Keywords- *internal combustion engines, hydrogen, bio-diesel, natural gas, ethanol.*

Introduction

The combustion of fuel in combustion chamber or cylinder with mixer of air is known as Internal Combustion Engine. First, commercial engines was created around 1859 by Elenne Lenoire. At that time environmental related issues were not considered or at low level not alarming, in recent times it is a major cause since pollution , climate change, health related issues are more concerned these days. In a developing country like India, where automobiles becoming necessity of daily life & engines are the integral part of it. Due to some alarming issues rising over the past few decades, which needs a urgent development of alternate fuels over engines. As we have discussed earlier, that fossil fuels are the conventional source of energy & mainly composed of carbon. When this

carbons gets mixed with air it causes a direct impact on our health and environment accordingly. On 29th Nov 2001, Govt of India took a decision, which will include lower fuel costs, cleaner exhaust emission, sustainable development resources.

In first phase 5% ethanol blended gasoline will be introduced to some of the states like Tamil Nadu, Haryana, Punjab and some part of Eastern states. In 1992 BIS standards amended the law of adding ethanol to petrol & in further research it will get evaluated weather emission performance of methanol, through Indian Institute of Petroleum(IIP). Nowadays Govt of India has showed interest in electric cars and have supported fuel cell technologies with national laboratories, universities, to increase suitable components & to make strengthen production also manufacturing fuel cells in India. Research based development of hydrogen powered bikes prepared for commercialization. Other projects using solar power and water for production of hydrogen in photo-catalytic method in plant near Tamil Nadu. Recently a huge amount of auto rickshaw and some private cars have acquired CNG as automobile fuel. Moreover, it shows quite benefits over conventional fuels. In fact solar & wind power plant has been stored in industrial belt of country side. Although, in India one of the world's largest solar-voltaic cells are situated, which is estimated around 350,000 sun photovoltaic systems.

Discussion

In the recent study, it remarked also that there are various alternate which are available in natural resources which has been discussed above. The fuels which has less carbon based composition and having much more efficiency than traditional petroleum & diesel engines. Here are some of the fuels which are future of engines like, natural gas, ethanol, methanol, hydrogen, butanol others.

Methanol

In 1930 methanol was first introduced in market as alternate fuel of gasoline for high performance engine. Also, it is known as wood alcohol which is tasteless, colorless & poisonous. Manufacturing cost of methanol is half of petroleum, however the powers are equal, it has less exhaust emission. Methanol will evaporate faster due to which lower boiling point & works as advantageous to engine also. Easy chemical structure with less emission, higher combustion is SI engines, high compression ratio with direct injection used as turbocharged medium duty engines which could replace diesel engines. The fuel itself is more economically attractive, environmental friendly, it is considers to be conventional fossil

fuels fully. In recent times methanol is used as alternative fuels for Internal combustion engines for environmental concerns rising among countries. Among all other fuels with fine applicants, with lot of benefits for conventional non renewable conventional sources like it may used in shortage period of gasoline fuel supply, enhance atmospheric changes, maintains sustainable development of resources among alternate fuel of petroleum and diesel engines vehicles.

Ethanol

Ethanol based fuels are composed from organic material from fermentation processes. In recent study it suggested that ethanol have high ignition temperature, lower freezing point, higher octane number which leads to among the most reliable fuel available now. It was also first introduced in 1930s and from the year 1970s some of the gulf countries have blended ethanol with 5% bio-ethanol due to rising oil crisis. Currently, some of the countries which are relying on ethanol mostly are Brazil, Canada,U.S, India. In 2014, Brazil was the most ethanol producer country around the global output, it has around 23.47 billion litre which 25% total around the world. Some of the European nations produces only 6% of total output of ethanol, due to prices of gasoline & diesel with rising regulation emission, which re becoming more stringent. So, ethanol could have got more attention towards renewable source of energy in recent times.

Butanol

Butanol is a four-carbon particle liquor (C_4H_9OH) that might be utilized in non-altered sparkle start motors.It is miscible with most solvents , dissolve in water also creating a utilizable non renewable energy sources, related to bio-butanol delivered from biomass. Each bio-butanol and petrobutanol have the indistinguishable substance properties. Butanol quit like gas due to the more drawn out hydrocarbon chain, lower oxygen content and better warming estimation of butanol contrasted with methanol and ethanol besides, butanol, as a promising fuel applicant, has pulled in more consideration as of late. Butanol has various advantages than methanol and ethanol and contains high resilience to water tainting which allows the utilization of the current appropriation pipelines as of late, the fuel oil stands out through a couple analysts as mixing gas in SI motor.

Natural gas

Natural fuel gas is an alternative fuel used as in replace of diesel-fueled. It is a mixture of various other hydrocarbon molecules such as methane, butane, propane and many other , it can be blended as well air to form homogeneous mixture for combustion in cylinder to reduce emission from exhaust. Compared to other alternative fuels, these have more desire-able advantages over relatively decreased capital cost, low emission. This natural gas can also be used in diesel engines due to its higher compression ratio & high octane number. In recent decades there are shortage of power and environmental rising concerns has led to increasing attention towards natural fuels for alternative purpose use. Natural gas induced in intake manifold and directly blended with clean air in cylinder forming homogeneous mixture which is then ignited by spark plug directly functioning efficient combustion. In comparison with diesel fuels, CI engines working with CNG has lower nitrogenous emission & particulate.

Bio-diesel

This is a fatty acid based efficient alternative fuel which is 100% clean and sustainable. The advantages of alternative fuels are it is safe for use and also provides the same amount of performance and engine durability. The emission and smoke is less means non-toxic, than petroleum or diesel fuels. The composition of fuel is basically of reacting vegetable with alcohols, where potassium and sodium hydroxide is added to reduce oxygen content as well as viscosity of oil. The density related to all other fossil fuels & conventional fuel sources which include aldehydes, phenol, alcohols etc. The bio-diesel fuel is stored in for long period due to its content of sulphur and no hydrocarbons are included in that emission of combustible substances present in fuel which will harm for living & non-living animals. Furthermore the octane number of bio-fuels are higher due to sulphur content and improves the combustion performance.

Ammonia

Ammonia based alternate fuel is simple modification fuel system. In this system the pressurized tank stores the fuel blend into tank with a leak proof re-fueling system. Ammonia is a polarized gasoline long chain carbon molecule, where as gasoline is non-polarized one. The reducing solubility of ammonia in gasoline can be enhanced by cross-linker which mixes the solubility under the situation. The other alternative fuel like ethanol and methanol which are alcohols are both polarized and non-polarized. The solubility of ammonia in ethyl alcohols are one of the main composites of alternative fuels used in internal combustion engines. The liquid solubility in pure ethanol is higher due to higher polarity and shorter carbon chain.

The efficiency and performance of ammonia based fuels are compared with other non-conventional fuels . The blended fuels of ammonia-gasoline is injected in combustion chamber which releases huge amount of power & brake mean effective pressure. The major drawbacks of ammonia is complex board decomposition mechanism which breaks metal amine compounds and releases as hydrogen and nitrogen The initial ammonia gasoline fuel blend requires less amount of new mechanism which to be utilized. Therefore, the blend complex can be used in commercial alternative energy sources for limited span of time.

Hydrogen

Hydrogen will play an important role in maintaining sustainability in future which may produce unlimited quantities of renewable resources. In some of the IC engines pure hydrogen combined with natural gas has been used, it isn't a primary fuel with all benefits of cleaner air, clean water, better fitness. It has a excellent property of fuel for automobiles. The fuel directly with not much distinctive used fuel, experiment shows that IC engines shows performance, without delay. There are such drawbacks that hydrogen elements are 3 times more energy per pound fuel, it gives only one tenth density when it is in liquid form and also it varies, with compressed fuel. The significant amount of energy transfer which needs a large tanks also the supply enhances the power efficiency, air quality. The crucial era enabling potential to revolutionize way of providing alternatives sources of energies in near future.

Serial no	Fuel	Emissions in kg CO2/kWh	Emissions in kg CO2/GJ
1	Wood	0.37	109.7
2	peat	0.35	107.2
3	Lignite	0.37	101.2
4	Lusatia	0.41	113
5	Centra Germany	0.37	105
6	Rhineland	0.40	113
7	Hard coal	0.34	94.2
8	Fuel Oil	0.3	77.3
9	Diesel	0.28	75
10	Crude Oil	0.25	73
11	Kerosene	0.26	71
12	Gasoline	0.25	69.3
13	Refinery gas	0.24	67.1

14	LPG	0.23	64.4
15	Natural Gas	0.2	55.2

LPG

The natural gas known as Liquefied Petroleum Gas is refined and processed through the crude oil after refining, it is most commonly used in daily life. The application of LPG is used in today's IC engine cars cooking, heating etc. The ethane group which has an alternative name known as propane used in vehicles. The boiling temperature of both the propane and ethane is about -45 and -126.5 respectively. The main criteria which separates them is the increasing pressure which simultaneously decreases the pressure. The components of natural gas recovered from various hydrocarbons like, ethane, butane, propane etc. The refining crude oil which is mentioned above are the main sources of liquefied petroleum gas which are extracted from desirable hydrocarbon petroleum compounds. The oil fields and refinery are the secondary renewable sources. The various advantages of LPG can be stated as

- 1. The cost of petrol is 80% , whereas LPG with half of price providing better mileage.*
- 2. The octane number which shows the burning criteria are more effectively possible.*
- 3. The storage and transportation are more advantageous due to low cost transportation the petrol or gasoline.*
- 4. It saves the vehicles maintenance cost.*

Similarly disadvantages are also stated as-

In recent years experience and emission benefits from the use of LPG is successful fuel to its benefits also it is conventional source of fuel. The household applications are basically nowadays more acceptable due to its mobility. The introduction of fuel rising safety issue, storage problems needs proper attention & precaution. However, in the initial stages of introduction of this fuel, issues like safety, storage & handling, extreme volatility of the fuel, etc. needs proper attention & caution.

Conclusion

The major source of Green House Gases emission are gasoline & diesel. The combustion of bio-fuels itself regarded as Carbon-monoxide neutral. However, hydrogen as the cleanest source of burning characteristics & efficient performance. There are some difficulty to quench and has low density, which reduces the power output of the engine. Currently, blended ethanol of 5-10% is used in gasoline in USA to run with high efficiency & performance. Similarly, bio-diesel is 5-20% blended into gasoline by compression volume diesel ignition engines. Bio-diesel are methyl or ethyl esters which are derived by vegetable wastes, animal fats. Major drawbacks are it increases flame speed, which simultaneously reduces maximum torque. For the reason, there important contribution of alternative fuel in future is dependent. Also, it is seen that natural gas is suitable for economical for SI engines, due to its compression ratio & high knocking resistance. Cleanest natural fuel, having high compression ratio, more reduction in emission leads to eliminate all other engines. On other hand, ethanol burns clear produces less carbon-monoxide, nitrogenous substances, due to low diffusivity and ignition problems it HC increases. Hydrogen fueled engines are high speed due to high mass energy density. Every fuel has its advantages & dis-advantages for use in IC engines. The emission & performance for this purpose is been carried out to obtain a better improved alternative fuel engines.

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