Gasoline-1

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Abstract

Petroleum popularly known as "Black Gold" or "Liquid Gold" is very important for the overall industrialization & development of our economy. I have also measured the intensity of correlation or the degree of linear relationship between different variable (Parameters) which give bad effect to the single resource variable (Consumption of Petrol).

Purpose – The main aim of my paper is to reduce the consumption of petrol by mixing it with Ethanol

Approach –I want to increase the average of the vehicle by mixing it with Bio-fuels in support of this I have already presented 5 papers in International conferences & my Paper has been already published in International Journal of Emerging Technology with ISSN No. 0975-8364. The second part of the same is under process.

Petrol (commonly known as gasoline in North America) is petroleum derived liquid mixture consisting primarily of hydrocarbons, used as fuel in internal combustion engines. The term *gasoline* is the common usage within the oil industry, even within non-American companies.

There are some important differences in the combustion characteristics of alcohols and hydrocarbons. Alcohols have higher flame speeds and extended flammability limits. Also, alcohols produce a great number of product moles per mole of fuel burnt, therefore, higher pressure are achieved.

Introduction to alcohols

The alcohols are fuels of the family of the OXYGENATES. As is known to all, the alcohol molecule has one or more oxygen, which contributes to the combustion. The alcohols are named accordingly to the basic molecules of hydrocarbon which derives from them: Methanol (CH3 OH); Ethanol (C2H5OH); Propanol (C3H7OH); Butanol (C4H9OH). Theoretically, any of the organic molecules of the alcohol family can be used as a fuel. The list is somehow more extensive; however, only two of the alcohols are technically and economically suitable as fuels for internal combustion engines. These alcohols are those of the simplest molecular structure, i.e., Methanol and Ethanol.

It is not the purpose of this paper to discuss the production of the alcohols, however, it can be said that:

A. Methanol is produced by a variety of process, the most common are as follows: Distillation of wood; Distillation of coal; Natural gas and petroleum gas.

B. Ethanol is produced mainly from biomass transformation, or bioconversion. It can also be produced by synthesis from petroleum or mineral coal.

Economic reasons dictate, however, the process which can produce the alcohol at the minimum cost. Each country around the world has found the best compromise in the production of an alternative fuel to replace petrol. Of special significance, especially for countries with large areas of land like former USSR, USA, CHINA and BRAZIL, is the method of production of ethanol from bio-mass conversion. In this process, it can be said that solar energy is stored in the plants by the photosynthesis process. Ethanol from a bio-conversion is therefore "solar energy into a liquid state".

Proportions of alcohol mix with petrol

The alcohols mix in all proportions with water due to the polar nature of OH group. Low volatility is indicated by high boiling point and high flash point. Alcohols burn with no luminous flame and produce almost no soot, especially methanol. The tendency to produce soot increases with molecular weight. Therefore, methanol produces less soot than ethanol.

Combustion of alcohol in presence of air can be initiated by an intensive source of localized energy, such as a flame or a spark and also, the mixture can be ignited by application of energy by means of heat and pressure, such as happens in the compression stroke of a piston engine. The energy of the mixture reaches a level sufficient for ignition to take place after a brief period of delay called ignition delay, or induction time, between the sudden heating of the mixture and the onset of ignition (formation of a flame front which propagates at high speed throughout the whole mixture). The high latent heat of vaporization of alcohols cools the air entering the combustion chamber of the engine, thereby increasing the air density and mass flow. This leads to increased volumetric efficiency and reduced compression temperatures. Together with the low level of combustion temperature, these effects also improve the thermal efficiency by 10%.

The higher flame speed, giving earlier energy release in the power stroke, results in a power increase of 11% at normal conditions and up to 20% at the higher levels of a compression ratio (14:1). Blending ethanol with gasoline at 0.1x%, the power rises to about 0.1%. Power continues to rise steadily as the mixture is enriched to an equivalence ratio of about 1:4. Because of the low proportion of carbon in alcohols, soot formation does not occur and therefore alcohols burn with low luminosity and therefore low radiation. In conjunction with lower flame temperature, about 10% less heat is lost to the engine coolant. The lower flame temperature of alcohols results in much lower NOx (Nitrogen Oxides) emissions. The wider flammability limits of alcohols permit smooth engine operation even at very lean mixtures. But aldehyde emissions are noticeably higher. For ethanol, emissions are acetaldehydes and for methanol, emissions are of formaldehydes. Increasing compression ratio from 9 to 14, aldehyde emissions can be reduced by 50%, to level compared to that for gasoline. An addition of 10% water reduces aldehyde emissions by 40% and NOx by 50%. Addition of 10% water in the alcohol can be tolerated without loss of thermal efficiency.

Uses of power alcohol

Complete combustion of power alcohol and the polluting emissions of CO, hydrocarbon, particulates are reduced largely.

- Use of ethyl alcohol in petrol reduces our dependence on foreign countries for petrol and saves foreign considerably.
- Ethyl alcohol has good antiknocking property and its octane number is 90, while the octane number of petrol is about is 65. Therefore, addition of ethyl alcohol increases the octane number of petrol.
- Alcohol has property of absorbing any traces of water if present in petrol.
- If specially designed engine with higher compression ratio is used, then disadvantage of lower Calorific value of ethyl alcohol can be overcome.

- Ethyl alcohol contains 'O' atoms, which helps for complete combustion of power alcohol and the polluting emissions of CO, hydrocarbon, particulates are reduced largely.
  - Use of ethyl alcohol in petrol reduces our dependence on foreign countries for petrol and saves foreign considerably.
  - **Power alcohol is cheaper than petrol.**

Faults of power alcohol

- Ethyl alcohol has calorific value 7000cal/gm much lower than calorific value of petrol 11500cal/gm. Use of power alcohol reduces power output upto 35%.

- Ethyl alcohol has high surface tension and its atomization, especially at lower temperature, is difficult causing starting trouble.

- Ethyl alcohol may undergo oxidation reaction to form acetic acid, which corrodes engine parts.

- As ethyl alcohol contains 'O' atoms, the amount of air require for complete combustion of power alcohol is lesser and therefore carburetor and engine need to be modified, when only ethyl alcohol is used as fuel.

> When ethyl alcohol is used as fuel in internal combustion engine, it is called as "power alcohol". Generally ethyl alcohol is used as its 5-25% mixture with petrol this combination produced Power Alcohol.

Energy Content – Petrol's energy content is about 45 megajoules per kilogram (MJ / Kg). Volumetric energy density of some fuels compared to petrol:

Fuel Type	BTU / imp.gal	BTU/U.S.gal	RON
Gasoline	125,000	104,000	87 - 98
LPG	95,475	79,500	110
diesel fuel oil	138,690	115,480	
residential fuel oil	149,690	124,640	
ethanol	84,400	70,300	
methanol	62,800	52,300	
Gasohol (10% ethanol + 90% petrol)	120,900	100,700	

What is Ethanol?

Ethanol is a clean-burning, high-octane motor fuel that is produced from renewable sources. At its most basic, ethanol is grain alcohol, produced from crops such as corn. Because it is domestically produced, ethanol helps reduce America's dependence upon foreign sources of energy.

Unblended 100% ethanol is not used as a motor fuel; instead, a percentage of ethanol is combined with unleaded gasoline. The most common blends are:

(a) E10 - 10% ethanol and 90% unleaded gasoline

E10 is approved for use in any make or model of vehicle sold in the U.S. Many automakers recommend its use because of its high performance, clean-burning characteristics. Today more than 75% of America's gasoline contained some ethanol, most as this E10 blend.

(b) E85 - 85% ethanol and 15% unleaded gasoline

E85 is an alternative fuel for use in flexible fuel vehicles (FFVs). There are currently more than 8.5 million FFVs on America's roads today, and automakers are rolling out more each year. In conjunction with more flexible fuel vehicles, more E85 pumps are being installed across the country. When E85 is not available, these FFVs can operate on straight gasoline or any ethanol blend up to 85%.

It is important to note that it does not take a special vehicle to run on "ethanol". All vehicles are "ethanol vehicles" and can use up to 10% ethanol with no modifications to the engine. Often people confuse E85 for "ethanol", believing incorrectly that not all vehicles are ethanol-compatible.

(c) Mid-range blends of ethanol: between E10 and E85

ACE is leading efforts to attend to any technical or regulatory hurdles to using ethanol blends above 10%, such as E20, E30, or E40. If these higher percentages of ethanol could be used in standard automobiles, the U.S. could use a dramatically higher amount of renewable fuel, thus significantly decreasing our dependence on petroleum.

(d) New research ("Optimal Ethanol Blend-Level Investigation," released 12/5/07) shows that mid-range ethanol blends can in some cases provide better fuel economy than regular unleaded gasoline - even in standard, non-flex-fuel vehicles. Previous assumptions that ethanol's lower energy content directly correlates with lower fuel economy were found to be incorrect. Instead, the research suggests there is an "optimal blend level" of ethanol and gasoline (most likely E20 or E30) at which vehicles will get better mileage than predicted based on the fuel's per-gallon Btu content

ACE has also collaborated on research to examine the impact of using higher blends of ethanol in standard automobiles. A non flex-fuel 2001 Chevrolet Tahoe, which had traveled more than 100,000 miles almost exclusively on E85, was donated to research and was torn down to examine the fuel's impact on the engine components.
Ethanol is the key to reduce our country's trade deficit in crude oil, a figure that has been steadily increasing: $27 billion in 1987 up to $100 billion in 2002. The U.S. Commerce Department estimates that each $1 billion of trade deficit costs the U.S. 19,100 jobs.

Energy Independence Facts:

•The U.S. imports about two-thirds of its oil, and some experts predict our dependence upon foreign crude could climb to 70% in the years to come.

•For every barrel of ethanol produced (1 barrel = 42 gallons), 1.2 barrels of petroleum are displaced at the refinery. (Information Resources Inc.)

•In addition to importing record amounts of oil, the U.S. has also been importing record amounts of finished gasoline: 37 million gallons per day. (Energy Information Administration)

•U.S. fuel consumption increased from 12 billion gallons per year in 1970, to 160 billion gallons in 2002. (Federal Highway Administration)

Benefits of Ethanol

•Ethanol blends are likely to reduce carbon monoxide emissions in vehicles by between 10% - 30%, depending upon the combustion technology. (U.S. EPA)

•The American Lung Association of Metropolitan Chicago credits ethanol-blended fuel with reducing smog-forming emissions by 25% since 1990.

•The use of 10% ethanol blends reduces greenhouse gas emissions by 12-19% compared to conventional gasoline. (Argonne National Lab)

•In 2004, ethanol use in the U.S. reduced CO2-equivalent greenhouse gas emissions by approximately 7 million tons, equal to removing the emissions of more than 1 million cars from the road. (Argonne National Lab)

•Research shows a 35-46% reduction in greenhouse gas emissions and a 50-60% reduction in fossil energy use due to the use of ethanol as a motor fuel. (Argonne National Lab)

•Ethanol contains 35% oxygen, making it burn more cleanly and completely than gasoline.

•E85 has the highest oxygen content of any fuel available, making it burn even more cleanly and even more completely than any other fuel.

•E85 contains 80% fewer gum-forming compounds than gasoline.

•Ethanol is highly biodegradable, making it safer for the environment.

Conclusion

The percentage of mixing Methyl alcohol & Ethanol alcohol is fixed 20% (Power Alcohol). If the percentage of power alcohol is

- Less we are not able to take the above Benefit.

- More then also harmful to engine & environment.

Butyl alcohol can be mixed with diesel fuel in virtually any concentration. It does not separate as water is added or as the temperature is decreased. Ethanol (commonly called "Alcohol") has assumed a very important place in the world's economy

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