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# Alternative Source of Petrol – 1

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**ABSTRACT : Day by day the prices of Petrol are increasing tremendously. If the consumption of petrol increases then we will be able to save our Natural resources. Petroleum popularly known as “Black Gold” or “Liquid Gold”, is very important for the overall industrialization & development of our economy and commercialisation. Also measured the intensity of correlation or the degree of Linear relationship between different variable (Parameters) which gives bad effect to the single resources variable (Consumption of Petrol).**

**Different Stages of Paper includes Theoretical explanation of concept (Published in Nagpur University), Mathematical Implementation and change’s required (BMSCE, Bangalore), Discussion on First changes (27% - France International), Problem that our country will face after 20 years (Ready to publish), Discussion of Second changes and Combination of above all.**

## I. INTRODUCTION

Petroleum is oily, flammable, thick dark brown or greenish liquid that occurs naturally in deposits, usually beneath the surface of the earth; it is also called as crude oil Petroleum. Petrol (commonly known as gasoline in North America) is a petroleum derived liquid mixture consisting primarily of hydrocarbons, used as fuel in internal combustion engines.

Day by day the prices of petrol are increasing tremendously. While transportation, sometime the vehicle is overloaded or underloaded in both the cases only vehicle owner will suffer and in both the cases. Consumption of the petrol increases that will give bad effect to the pocket of vehicle owner.

*A. Alternatives to petroleum-based vehicle fuels*

1. Alternative fuels used in standard or modified internal combustion engines (*i.e.* biofuels or combustion hydrogen).

2. Propulsion systems not based on internal combustion, such as those based on electricity (for example, all-electric or hybrid vehicles), compressed air, or fuel cells (*i.e.* hydrogen fuel cells).

Currently, cars can be classified into the following groups:

1. Internal combustion engine cars, which may use

2. Petrol, fuel and/or biofuels (e.g. alcohol, biodiesel and biobutanol)

3. Compressed natural gas used by natural gas vehicles

4. Hydrogen in hydrogen vehicles.

5. Advanced technology cars such as hybrid vehicles which use petroleum and/or biofuels, albeit far more efficiently.

6. Plug-in hybrids that can store and use externally produced electricity in addition to petroleum.

7. Electric cars.

Fossil fuels have become the dominant energy resource for the modern world; alcohol has been used as a fuel throughout history. The first four aliphatic alcohols (methanol, ethanol, propanol, and butanol) are of interest as fuels because they can be synthesized biologically, and they have characteristics which allow them to be used in current engines. One advantage shared by all four alcohols is octane rating. Biobutanol has the advantage that its energy density is closer to gasoline than the other alcohols (while still retaining over 25% higher octane rating) - however, these advantages are outweighed by disadvantages (compared to ethanol and methanol) concerning production for instance generally speaking, the chemical formula for alcohol fuel is $C_nH_{2n+1}OH$.

Alcohol fuels are usually of biological origin rather than petroleum sources. When obtained from biological sources, they are known as bioalcohols (*e.g.* bioethanol). However, ethanol that is derived from petroleum should not be considered safe for consumption as this alcohol contains about 5% methanol and may cause blindness or death. This mixture can not be purified by simple distillation, as it forms an azeotropic mixture.

Petroleum is often considered the lifeblood of nearly all other industry. For its high energy content (are shown in above Table) and ease of use, petroleum remains as the primary energy source.

**Table 1: Energy Density of different Fossil Fuels.**

| *Fuel* | *Energy Density* |
|---|---|
| Petroleum or Crude oil | 45 MJ/KG |
| Coal | 24 MJ/KG |
| Natural Gas | 34 - 38 MJ/$m^3$ |

**Notes:** Similar to Methanol/Ethanol. Isopropyl Alcohol is simply rubbing alcohol.

**Methanol and Ethanol.** Methanol and Ethanol can both be derived from fossil fuels or from biomass. Ethanol is produced through fermentation of sugars and methanol from synthesis gas.

As a fuel methanol and ethanol both have advantages and disadvantages over fuels such as petrol and diesel. In spark ignition engines both alcohols can run at a much higher Exhaust gas recirculation rates and with higher compression ratios. Both alcohols have a high octane rating, with ethanol at 109 (which equates to 99.5 AKI) and methanol at 109 RON, 89 MON (which equates to 99 AKI). Ordinary European petrol is typically 95 RON, 85 MON, equal to 90 AKI. Note that AKI refers to 'Anti-Knock Index' which averages the RON and MON ratings (RON+MON)/2, and is used on U.S. gas station pumps. As a compression ignition engine fuel, both alcohols create very little particulates, but their low cetane number means that an ignition improver like glycol must be mixed into the fuel with approx. 5%.

With SI engines alcohols have the potential to reduce NOx, CO, HC and particulates. A test with E85 fueled Chevrolet Luminas showed that NMHC went down by 20-22%, NOx by 25-32% and CO by 12-24% compared to reformulated gasoline. Toxic emissions of benzene and 1,3 Butadiene also decreased while aldehyde emissions increased (acetaldehyde in particular).

Tailpipe emissions of $CO_2$ also decrease due to the lower carbon-to-hydrogen ratio of these alcohols, and the improved engine efficiency.

One liter of Ethanol contain 21.1 MJ, a liter of Methanol 15.8 MJ and a liter of gasoline approximately 32.6 MJ. In other words, for the same energy content as one liter or one gallon of gasoline, one needs 1.6 liters/gallons of ethanol and 2.1 liters/gallons of methanol. Although actual fuel consumption doesn't increase as much as energy content numbers indicate.

Methanol combustion is:

$$2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O + Heat$$

Ethanol combustion is:

$$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O + Heat$$

**Butanol and Propanol**

Propanol and butanol are considerably less toxic and less volatile than methanol. In particular, butanol has a high flashpoint of 35 °C, which is a benefit for fire safety, but may be a difficulty for starting engines in cold weather.

**Butanol combustion is:**

$$C_4H_9OH + 6O_2 \rightarrow 4CO_2 + 5H_2O + Heat$$

The 3-carbon alcohol, propanol ($C_3H_7OH$), is not used as a direct fuel source for petrol engines that often (unlike ethanol, methanol and butanol), with most being directed into use as a solvent.

Acetic acid, unlike ethanol, is biologically produced from simple sugars without the production of carbon dioxide:

$$C_6H_{12}O_6 \rightarrow 2CH_3CH_2OH + 2CO_2$$

(Biological production of ethanol)

$$C_6H_{12}O_6 \rightarrow 3CH_3COOH$$

(Biological production of acetic acid)

It is ensured that more energy from the biomass will end up as liquid fuels rather than excess heat/electricity.

$$3CH_3COOH + 6H_2 \rightarrow 3CH_3CH_2OH + 3H_2O$$

(Hydrogenation of acetic acid)

$$C_6H_{12}O_6 \text{ (from cellulose)} + 6H_2 \text{ (from lignin)} \rightarrow 3CH_3CH_2OH + 3H_2O$$

(Overall reaction)

Ethanol, an alcohol fuel, is an important fuel for the operation of internal combustion engines that are used in cars, trucks, and other kinds of machinery. Methyl alcohol has the lowest combustion energy of all the fuels listed. However, it also has the lowest stoichiometric or chemically correct air-fuel ratio. Therefore, an engine burning methyl alcohol would produce the most power. It also is possible to take advantage of the higher octane ratings of methyl (and ethyl) alcohol and increase the engine compression ratio. This would increase the efficiency of converting the potential combustion energy to power. Alcohol burn more completely, thus increases combustion efficiency.

Butyl alcohol is the least likely to cause starting difficulties or problems during warm-up. All of the alcohol is soluble in water, but butyl alcohol is relatively insoluble compared to methyl and ethyl alcohol. Less engine power is produced as the water content of an alcohol increases.

**Table 2: Characteristics of chemically pure fuels.**

| | *Chemical Formula* | *Chemical weight (lb/mole)* | *Specific gravity* | *Boiling point (C)* | *Latent heat (Btu/lb)* | *Combustion on energy (Btu/lb)* | *Vapour pressure @ 100F* | *Solubility part in 100 parts H2O* | *Stoichiometric air-fuel ratio* |
|---|---|---|---|---|---|---|---|---|---|
| Methyl alcohol | $CH_3OH$ | 32 | 0.79 | 65 | 503 | 10,260 | 4.6 | INFINITE | 6.5 |
| Ethyl alcohol | $CH_3CH_2(OH)$ | 46.1 | 0.79 | 78 | 396 | 13,160 | 2.2 | INFINITE | 9 |
| Butyl alcohol | $C_2H_5CH_2CH_2(OH)$ | 74.1 | 0.81 | 117 | 186 | 15,770 | 0.3 | 9 | 11.2 |
| Octane | $C_8H_{18}$ | 114 | 0.7 | 210 | 155 | 20,750 | 1.72 | INSOLUBLE | 15.2 |
| Hexa-decane | $C_{16}H_{34}$ | 240 | 0.79 | 287 | – | 20,320 | 3.46 | INSOLUBLE | 15 |

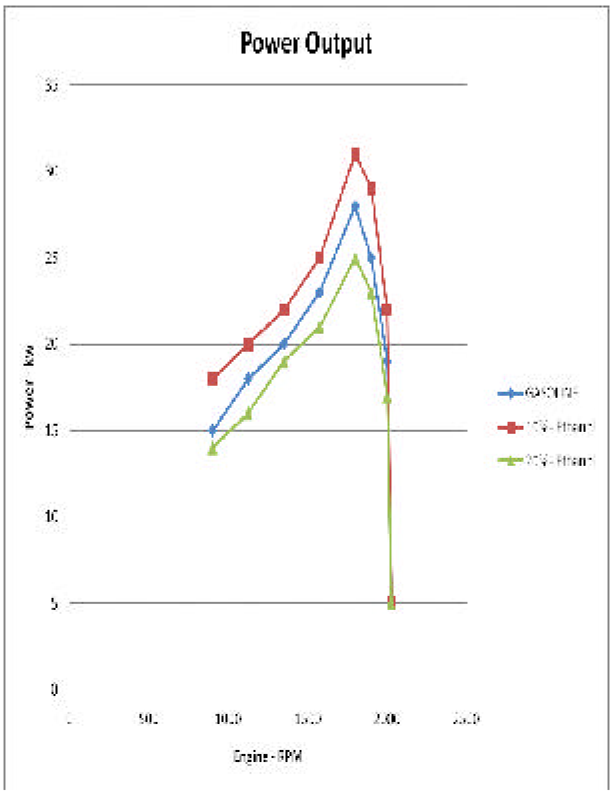
*To convert to metrics, use the following conversion factors: 1 pound = 45 kilogram; 1 degree F = degrees C-32*5/9

## RESULT

Gasoline Engine full throttle power output using Ethanol fuel blends

| *Engine RPM* | *GASOLINE* | *10% Ethanol* | *20% Ethanol* |
|---|---|---|---|
| 900 | 15 | 18 | 14 |
| 1125 | 18 | 20 | 16 |
| 1350 | 20 | 22 | 19 |
| 1575 | 23 | 25 | 21 |
| 1800 | 28 | 31 | 25 |
| 1900 | 25 | 29 | 23 |
| 2000 | 19 | 22 | 17 |
| 2025 | 5 | 5 | 5 |

Representing above data in Graphical form

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