Comparison of Consumption of Super Diesel Over LPG based on Per Ton of Heat Treated Production

Mr. Sunderamoorthy[1], Adarsh M[2], Arjun C.S [3] ,Dhikil Ravindran[4]
1-Assistant Professor,
2,3,4- Student,
Department of mechanical Engineering
Hindusthan Institute of Technology,
Coimbatore

***Abstract* :- The main idea of the project is to compare the consumption of super diesel and consumption of LPG in the combustion based on per ton heat treated production. Here consumption of super diesel and LPG of various heat treatment are observed and to get a conclusion.**

INTRODUCTION

Air pollution is fast becoming a serious urban as well as global problem with the increasing population and its subsequent demands.Finding an alternative to conventional fuels would help to reduced it. Fuels, as for any other type of substance, can be assigned some physical and chemical properties (e.g. density, thermal capacity, vapour pressure, chemical formula, etc. However, most of the times, combustion properties are also assigned to fuels, in spite of the fact that these properties depend on the oxidiser (e.g. air, pure oxygen) and the actual process (e.g. the explosion limits depend on the boundary conditions for a given fuel/oxidiser pair). Fuel price, availability, risk, and so on, could also be considered fuel properties (attributes). Diesel fuel is any liquid fuel used in diesel engines, originally obtained from crude-oil distillation (petrodiesel), but alternatives are increasingly being developed for partial or total substitution of petrodiesel, such as biodiesel (from vegetal oils), and synthetic diesel (usually from a gas fuel coming from coal reforming or biomass, also named gas to liquid fuels, GTL). In all cases, diesel nowadays must be free of sulfur.LPG as a fuel for spark ignition engines, it has many of the same advantages as natural gas with the additional advantage of being easier to carry aboard the vehicle. Its major disadvantage is the limited supply, which rules out any large-scale conversion to LPG fuel

DIESEL FUEL

Diesel fuel in general is any liquid fuel used in Diesel Engines.

TYPES OF DIESEL

Diesel fuel as from its definition is the word generally used for any liquid fuel that can be used as a source of energy in diesel engines so, from here it can be of different forms, from different sources and inherently of different nature.

Some of the commonly known types of diesel are written below

PETROLEUM DIESEL/ PETRO DIESEL

Commonly known diesel which is extensively used in diesel engines of our vehicles is the one we get from the fractional distillation of petroleum or crude oil.

This contains the hydrocarbon atoms ranging from C8 – C21.

DIFFERENT NAMES OF PETRO DIESEL

To distinguish between different types of diesel fuels petro diesel is known with some specific names. These names are either due to some cultural point of view or due to some standards that define the quality of different diesel fractions.

Some of the names commonly known are…

a) Petro diesel:
Because its origin is petroleum

b) Petroleum diesel:
Because diesel has been extracted from crude oil

c) Fossil diesel:
Petro diesel is got from fossil fuels i.e. crude oil.

d) Ultra low sulfur diesel (ULSD):

e) ULSD is a standard for defining diesel fuel with substantially low sulfur contents. In 2007 all the diesel used in America & Europe was of ULSD type .

f) Diesel Engine Road Vehicle (fuel)/DERV:
In UK, diesel is commonly abbreviated as DERV standing for Diesel Engine Road Vehicle.

BIODIESEL

Biodiesel refers to a vegetable oil- or animal fat-based diesel fuel consisting of longchain alkyl (methyl, propyl or ethyl) esters. Biodiesel is typically made by chemically reacting lipids (e.g., vegetable oil, animal fat (tallow)) with an alcohol.

Biodiesel is good for your Diesel Car and Environment:

- Fewer emissions
- No contribution to Global warming
- Lubricates Engines
- Equal amount for MPG for petro diesel
- Clean Burning
- Safe
- Saves money

OTHER TYPES OF DIESEL

Other types of diesel includes

- Biomass to Liquid (BTL) diesel
- Gas to Liquid (GTL) diesel etc.

USES OF DIESEL FUELS

Diesel is very commonly used in these fields while many other uses are there as well.

1. Use as Vehicle Fuel
2. Use as Car fuel
3. Use as Generator & Ship fuel

ADVANTAGES OF DIESEL FUEL

1. *NO SPARK ENGINE*

Unlike petroleum ether and liquefied petroleum gas engines, diesel engines do not use high voltage spark ignition (spark plugs).

An engine running on diesel compresses the air inside the cylinder to high pressures and temperatures (compression ratios from 15:1 to 21:1 are common).

The diesel is generally injected directly into the cylinder near the end of the compression stroke. The high temperatures inside the cylinder cause the diesel fuel to react with the oxygen in the mix (burn or oxidize), heating and expanding the burning mixture in order to convert the thermal/pressure difference into mechanical work; i.e., to move the piston. (Glow plugs are used to assist starting the engine to preheat cylinders to reach a minimum operating temperature.) High compression ratios and throttle less operation generally result in diesel engines being more efficient than many sparkignited engines.

2. HIGH EFFICIEMCY

High compression ratios and throttle less operation generally result in diesel engines being more efficient than many spark- ignited engines.

3LOWER FLAMABILITY:

High Efficiency and lower flammability and explosivity of Diesel than gasoline are the main
reasons for military use of diesel in armoured fighting vehicles like tanks and trucks.

4. TORQUE

Engines running on diesel also provide more torque and are less likely to stall as they are controlled by a mechanical or electronic governor.

5. RUNWAY FAILURE

Since diesel engines do not require spark ignition, they can sustain operation as long as diesel
fuel is supplied.

6. ETRACTION AGENT

Poor quality (high sulfur) diesel fuel has been used as a palladium extraction agent for the
liquid-liquid extraction of this metal from nitric acid mixtures.
Such use has been proposed as a means of separating the fission product palladium from
PUREX raffinate which comes from used nuclear fuel.
In this system of solvent extraction, the hydrocarbons of the diesel act as the diluent while the
dialkyl sulfides act as the extractant. This extraction operates by a solvation mechanism

7. BETTER MILAGE THAN GASOLINE

Since diesel engine is more efficient then Gasoline engine which results better Mileage in same
quantity of fuel
.

8. HIGH HEATING VALUE:

Diesel provides high heating value as compared to gasoline.

DISADVANTAGES OF SUPER DIESEL

1) ENVIRNMENT HAZARD OF SULFUR

High levels of sulfur in diesel are harmful for the environment because they prevent the use of catalytic diesel particulate filters to control diesel particulate emissions, as well as more advanced technologies, such as nitrogen oxide (NOx) adsorbers (still under development), to reduce emissions. Moreover, sulfur in the fuel is oxidized during combustion, producing sulfur dioxide and sulfur trioxide that in presence of water rapidly convert to sulfuric acid, one of the chemical processes that result in acid rain. However, the process for lowering sulfur also reduces the lubricity of the fuel, meaning that additives must be put into the fuel to help lubricate engines. Biodiesel and biodiesel/petro diesel blends, with their higher lubricity levels, are increasingly being utilized as an alternative. The U.S. annual consumption of diesel fuel in 2006 was about 190 billion liters (42 billion imperial gallons or 50 billion US gallons).

2) MESSINESS

Diesel, with its greater viscosity than gas, is cruder and messier. It is much easier to spill and slower to evaporate once spilled, making it easy for dirt and dust to settle on it. Diesel in its usable form is generally putrid. Diesel also emits dirty black smoke when used to run an engine. This is unpleasant to breathe in and to see and can cause air pollution.

3) NOISE

Diesel engines are noisier than petrol engines. Despite substantial advances in dieselengine technology, diesel engines still remain louder as a result of the way the fuel is processed and the manner in which the fuel provides energy

4) COST

In most countries, diesel costs less than gas, but the long-term costs far outweigh the lower retail price. Diesel engines are less versatile, energetic and fuel efficient than gas engines. Because of this, they **What is LPG**

LPG stands for Liquified Petroleum Gas which consists of propane butane mixture liquified under ambient temperature and moderate pressure. It is used for standard heating and cooking purposes. LPG, or simply propane, is a flammable mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles. It is increasingly used as an aerosol propellant and a refrigerant, replacing chlorofluorocarbons in an effort to reduce damage to the ozone layer. When specifically used as a vehicle fuel it is often referred to as Autogas.

TRADE NAME

Liquefied petroleum gas has different names. Some of them are mentioned below.

- LPG (Liquefied petroleum gas)
- GPL
- LP Gas
- Auto gas

PRODUCTION

LPG is synthesized by refining petroleum or "wet" natural gas, and is usually derived from fossil fuel sources, being manufactured during the refining of crude oil, or extracted from oil or gas streams as they emerge from the ground. It was first produced in 1910 by Dr. Walter Snelling, and the first commercial products appeared in 1912. It currently provides about 3% of the energy consumed, and burns cleanly with no soot and very few sulfur require more fuel in the long run, resulting in considerably higher costs. The specialized storage required for diesel also adds to the costs. emissions, posing no ground or water pollution hazards.

Varieties of LPG bought and sold include mixes that are primarily propane, mixes that are primarily butane, and the more common, mixes including both propane C3H8 (60%) and butane C4H10 (40%), depending on the season — in winter more propane, in summer more butane.

Propylene and butylenes are usually also present in small concentration.

A powerful odorant, ethanethiol, is added so that leaks can be detected easily. The international standard is EN 589. In the United States, thiophene or amyl mercaptan Characteristics of LPG

1. LPG can be compressed in a ratio 1:270 This property enables LPG to be an ideal fuel which can be marked in portable cylinders.
2. A combustible mixture is formed only if the gas/air ratio is between 1.8% to 9% concentration.
3. LPG is odourless nad colourless. Hence Ethyl Mercaptan is added to give typical odour to HP Gas in case of leakage.
4. LPG in gaseous state is nearly twice as heavier as air and in case of leakage tends to settle down at floor level, particularly in depressions, pits, drains, etc. Therefore for safety purpose ground level ventilation is important.

LPG PROPERTIES

- LPG is in gaseous form at ambient temperature (250 C) & in liquid form under pressure.
- LPG is colorless
- LPG is heavier than air
- Liquid LPG is lighter than water
- LPG is odorless, however for detection of leakage, Ethyl Mercaptan is added as an odorant.
- LPG has a low boiling point (- 180 C)
- LPG has a narrow flammability range of 1.8% to 10% in air.
- LPG is non-toxic
- Liquid LPG can cause severe cold burns to the skin due to rapid vaporization & lowering of temperature.
- Flash point of LPG is – 400 C. The approximate minimum ignition temperature of LPG is in the range of 410 c to 580

ADVANTAGES OF LPG

Over and above fuel consumption following are the major advantage for use of LPG.

1. Portability: LPG in cylinders or Bulk can be transported easily to the locations or site.
2. Ease of Control: Flame temperatures can be controlled.
3. High Calorific Value: High Heat transfer efficiency.
4. Own Storage:LPG stored in cylinders or bulk installations provide a greater degree of product security versus piped delivery system where the customers is affected the moment supply fails.
5. Clean Combustion: While LPG burns there is complete combution, hence non-pollutant.
6. Low Maintenance: Since there is complete combustion, no carbon deposits on burners in turn low maintenance

DISADVANTAGES OF LPG

The drawbacks of LPG include

- In cold conditions, below 32 degrees Fahrenheit, starting could be a problem because of the low vapor pressure of propane at low temperatures. One gallon of LPG contains less energy than a gallon of gasoline. The driving range of a propane vehicle is about 14 percent lower than a comparable gasoline-powered vehicle. LPG is generally higher priced than other fuel alternatives such as CNG and gasoline.
- There are over 4,000 LPG refueling sites in the US, more than all of the other alternative fuels combined. Most of these stations, however, are not readily available to consumers on a 24/7 basis. This is one of the reasons why most on-road applications are bi-fuel vehicles, which burn LPG and gasoline.

USES OF LPG

In view of the above advantages, LPG is an ideal fuel for the following applications:

Domestic

LPG can be used for cooking and heating water in homes.

Commercial

- Cooking in Hotels, Cafes, Restaurants, Institutions
- Water heating - Geysers
- Bankeries/Lighting
- Air-conditioning
- Gas barbecue, Gardening,
- Swimming Pools and Clothes drying.
- Agriculture & Hotriculture Industries
- Poultries/brick making
- Flame Weeding, crop drying, waste incineration,
- Distillation and powering equipment.

INDUSTRIAL APPLICATION

- Heat Treatment in industries like metal cutting,
- Ceramic and glass, Forging, annealing, Billet
- Heating Bitumen Melting, Textile, paper,
- Construction industries and many others uses.

CONCLUSION

Based on the reviewed paper for the emissions and performance, its concluded that the LPG represents a good fuel alternative for gasoline. LPG as a alternative fuels reviewed could displace 10 per cent of current usage of oil, or bring significant reductions in CO, CO2 emissions and help to reduce harmful greenhouse gas emissions. In the next five to ten years, LPG will be more widely available and gaining market share across vehicle ranges.