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# Investigation of Canola Oil and Honge Oil Blended With Ethanol as Substitute Fuel in SI Engine

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***Abstract:*** *Combustion reaction in the internal combustion engine depends on many different variables, one of the most important factors in an efficient combustion reaction is the ability of the reactants, the fuel molecules and the oxidant molecules, to interact with each other, Most fuels used in internal combustion engines are in liquid state, like gasoline, diesel, biofuels, and since combustion occurs in the gas phase, achieving a substantially even dispersion of fuel molecules among oxidant molecules can prove difficult due to the vapor pressure of the liquid, Therefore, an efficient combustion reaction would involve providing for the fuel molecules to be substantially and evenly dispersed throughout the oxidant molecules, thereby allowing sufficient interactions between the reactants and promoting the combustion reaction. Conventional systems and methods attempt to remedy this problem by increasing the quantity of gas phase fuel molecules by increasing the temperature of the liquid fuel to increase the vapor pressure. The present invention has been developed in response to the present state and in particular, in response to the problems and needs that have not yet been fully solved by currently available conventional system. Hence we have designed a new fuel supply system where the petrol/biodiesels (having low viscosity ) is atomized using the ultrasonic sounds and allowing it to pass through the convective pre-heater where the atomized fuel is converted in to the vapor form (gaseous form) using the exhaust gases from the outlet valve of the engine ,which are at the sufficient temperatures to vaporize the bio-diesels and study of these system behavior by using bio-diesel as alternative fuel in the vapor form in the present petrol engine and to check the emission like CO, HC from the exhaust gasses of petrol engine with a 4-s petrol engine. The project's goal is to develop specific knowledge as to whether these methods will increase the efficiency and oil is an acceptable supplemental fuel.*

***Keywords:*** *Convective heat exchanger, Ethanol, Performance, Emissions, Canola oil, Honge oil.*

## I. Introduction

It is quite common nowadays to learn that every country is in the race to find suitable and affordable alternative fuel options for diesel engine as the present-day diesel fuel reserve is depleting fast. Even though the petrol vehicles are more in population, The research of alternative fuel for petrol (SI) Engines are very less In addition, the price of conventional petrol fuel is sky rocketing due to great demand, exponential increase of vehicles number on road and political turmoil. Therefore, it is an urgent need for India as well to search for an option to run Petrol engine using a fuel other than conventional and petroleum fuels. Research work on biodiesel reveals that large number of experimental studies of biodiesel, derived from various feed stocks, as fuel for engines used for transportation and or other applications have been carried out all over the world. Application of biodiesel, as a fuel in transportation vehicles, has nowadays become common in almost all oil importing nations, But when we compare population of the domestic vehicles (petrol vehicles) with transportation vehicles (Diesel vehicles), the Population of the domestic vehicles is more hence we have to concentrate and find alternative fuel for petrol vehicles also. We know that the combustion reaction in the internal combustion engine depends on many different variables, one of the most important factors in an efficient combustion reaction is the ability of the reactants, the fuel molecules and the oxidant molecules, to interact with each other, Most fuels used in internal combustion engines are in liquid state, like gasoline, diesel, bio-fuels, and since combustion occurs in the gas phase, achieving a substantially even dispersion of Bio-fuel molecules among oxidant molecules can prove difficult due to the vapor pressure of the liquid, Therefore, an efficient combustion reaction would involve providing for the Bio-fuel molecules to be substantially and evenly dispersed throughout the oxidant molecules, thereby allowing sufficient interactions between the reactants and promoting the combustion reaction. Conventional systems and methods attempt to remedy this problem by increasing the quantity of gas phase fuel molecules by increasing the temperature of the liquid fuel to increase the vapor pressure. The present invention has been developed in response to the present state and in particular, in response to the problems and needs that have not yet been fully solved by currently available conventional systems. Hence we have developed a special system where the use of biofuel in gasified form using convective heat exchanger which works as the heat recovering system. This system pre-atomize the Bio-fuel molecules and they are heated to 200-300°c from engine exhaust gases and they are vaporized and these gases are sent to inlet of the engine. Here we are using Bio-fuels as 100% Turmeric Leaf oil and blends of Methanol, Turmeric leaf oil with petrol in specially designed

system fitted with Hero Honda splendor( +) 100 cc bike. When we come to turmeric leaf oil, Turmeric leaf oil has various chemical compounds that include cineole. It is natural antiseptic. aphrodisiac, analgesic, anti-arthritic, anti-inflammatory, Turmeric leaf essential oil is viewed as a strong relaxant and balancer. It also has historical applications as an antiseptic and for skin care use against acne and facial hair in women. It has a great role in flavorings for food additives. It is one of the most important colouring materials of India. The leaf oil yield the orange-red dye. It is much used to impart a yellow colour to cloth.When we come to Methanol, Methanol can be made from a wide array of feedstocks, making it one of the most flexible chemical commodities and energy sources available today. To make methanol, you need first to create synthesis gas, which has carbon monoxide and hydrogen gas as its main components.While natural gas is most often used in the global economy, methanol has the distinct advantage of 'polygeneration' - whereby methanol can be made from any resource that can be converted first into synthesis gas. Through gasification, synthesis gas can be produced from anything that is or ever was a plant.

This includes biomass, agricultural and timber waste, solid municipal waste, and a number of other feedstock.In a typical plant, methanol production is carried out in two steps. The first step is to convert the feedstock natural gas into a synthesis gas stream consisting of CO, CO2, H2O and hydrogen. This is usually accomplished by the catalytic reforming of feed gas and steam. Partial oxidation is another possible route. The second step is the catalytic synthesis of methanol from the synthesis gas. Each of these steps can be carried out in a number of ways and various technologies offer a spectrum of possibilities which may be most suitable for any desired application.

## II. Methodology

The experiment is done on Hero Honda splendor plus 100cc bike with major modifications in the fuel supply system fitted on to the vehicle, And we have additional fittings of exhaust heat recovery system called convective heat exchanger for gasifying the atomized fuel which is coming from the fuel supply system, firstly the dimensions of the components and its properties are decided based on the vehicle design, we finally decided to take 10mm stain less steel pipes and 70mmØ ,150mm length containers. we have done connections using Tinkering works in the workshop, all the pipes are cut in the required size and the convective heat exchanger is designed and constructed.

In this system we have special fuel supply system where the fuel (Canola oil and Honge oil blended with Ethanol) is pre-atomized 5 microns using the ultrasonic atomizer in the specially designed container, and then these gases are made to pass through the convective heat exchanger to convert this in to gases phase. After all the setup is built once it is tested for leakages, sustainability and to check whether the system is working as per our requirement.

## III. Experimental Setup

**Fig-1.**SI Engine 4-STROKE with Additional Fittings

**Fig-2.** Basic setup for Emission testing

## IV. Objective

Objective of the present study is to:

- It is proposed to use Canola oil and Honge oil blended with Ethanol in the SI engine.
- The emissions like HC, CO in the exhaust gases are proposed to reduce during the combustion itself.
- To study the performance evaluation of the using Bio fuel blended with Ethanol in the SI engine.
- To analyse the exhaust emissions and measurement, reduction in the exhaust gas.

## V. Results

**1. EMISSION GRAPHS**

**1.1 Unburnt Hydro Carbon**

**1.1.1 HC Emission for 1st Gear**

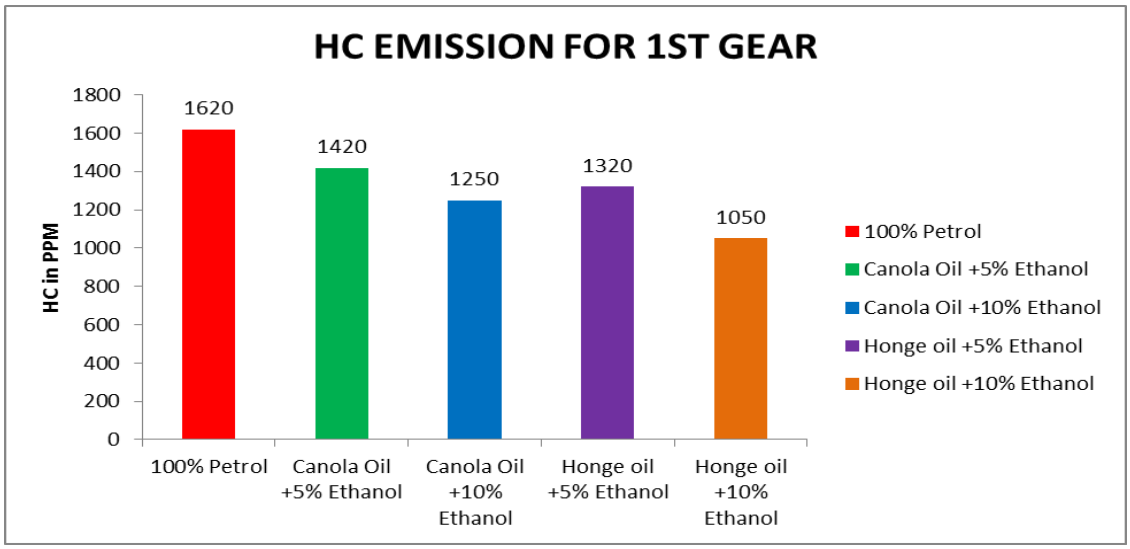


**Fig-3** shows the variations of Unburnt Hydro Carbon for Canola oil and Honge oil blended with Ethanol at First Gear

### *1.1.2 HC Emission for 2nd Gear*

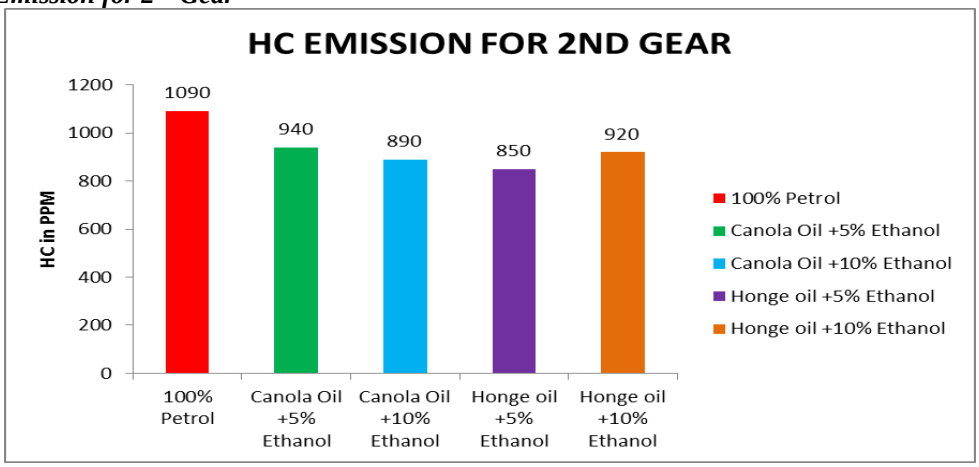


**Fig-4** shows the variations of Unburnt Hydro Carbon for Canola oil and Honge oil blended with Ethanol at Second Gear

### *1.1.3 HC Emission for 3rd Gear*

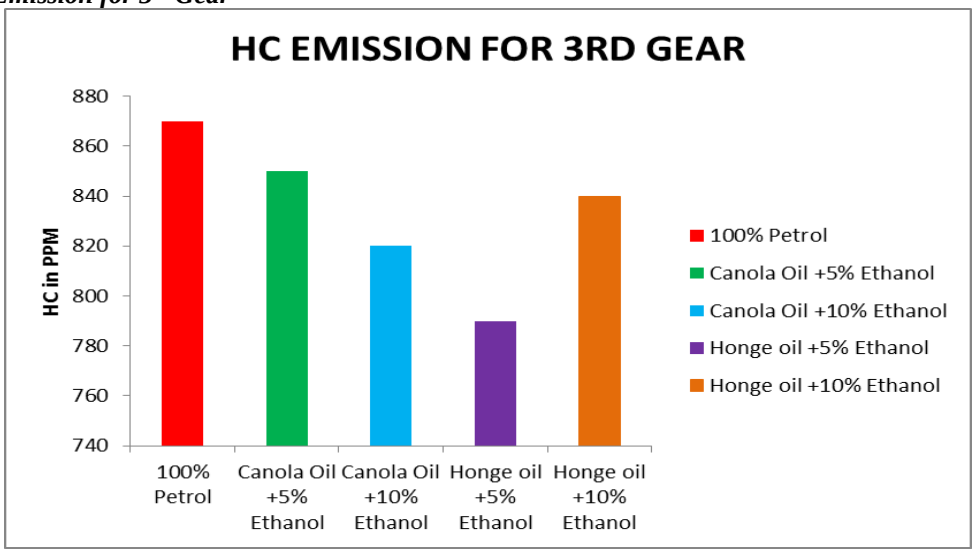


**Fig-5** shows the variations of Unburnt Hydro Carbon for Canola oil and Honge oil blended with Ethanol at Third Gear

### *1.1.4 HC Emission for 4th Gear*

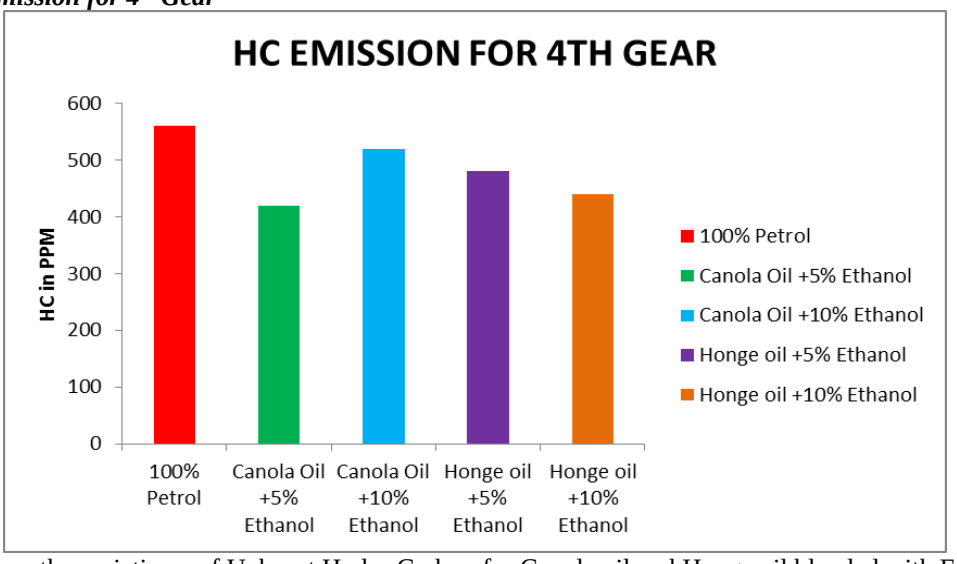


**Fig-6** shows the variations of Unburnt Hydro Carbon for Canola oil and Honge oil blended with Ethanol at Fourth Gear

**1.2 Carbon Monoxide**

***1.2.1 CO Emission for 1st Gear***

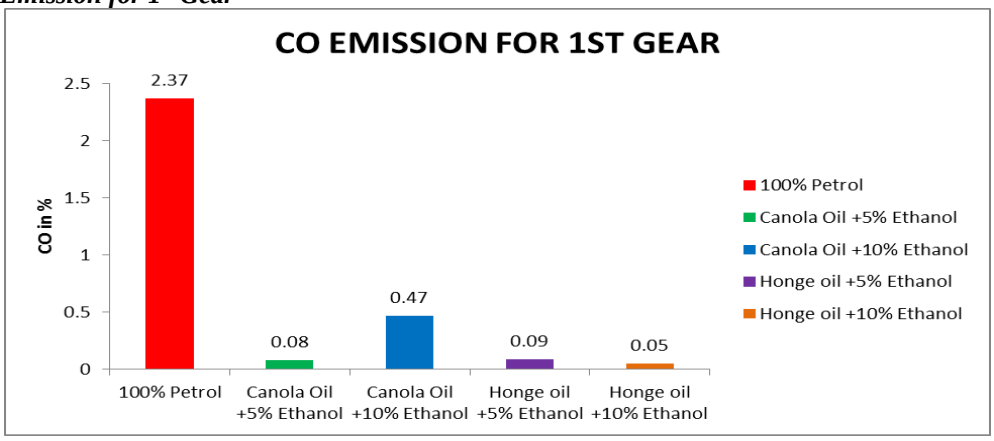


**Fig-7** shows the variations of Carbon Monoxide for Canola oil and Honge oil blended with Ethanol at First Gear

***1.2.2 CO Emission for 2nd Gear***

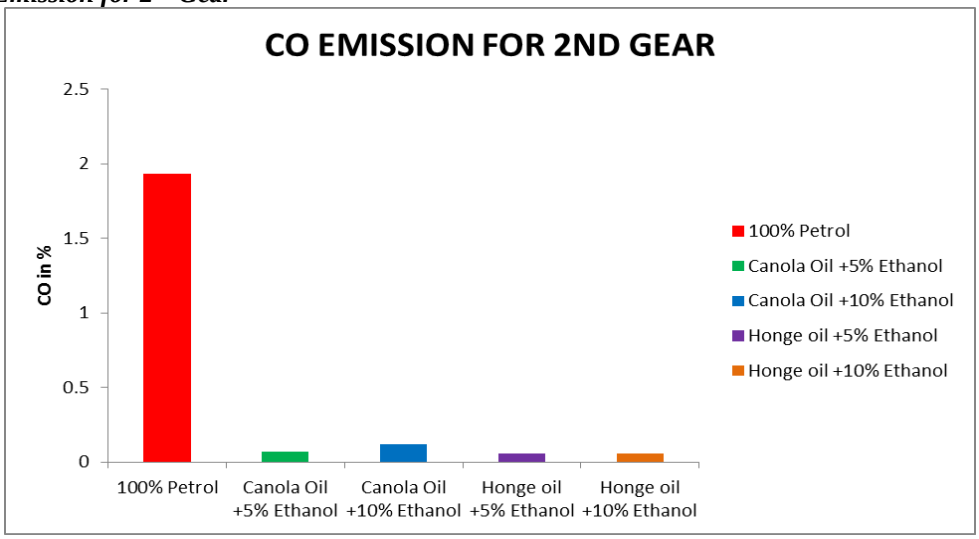


**Fig-8** shows the variations of Carbon Monoxide for Canola oil and Honge oil blended with Ethanol at Second Gear

***1.2.3 CO Emission for 3rd Gear***

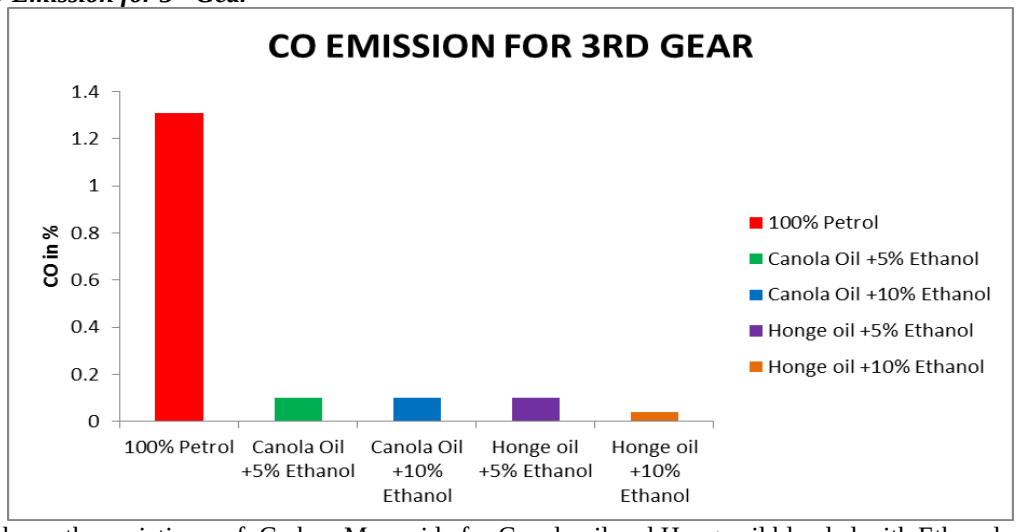


**Fig-9** shows the variations of Carbon Monoxide for Canola oil and Honge oil blended with Ethanol at Third Gear

***1.2.4 CO Emission for 4th Gear***

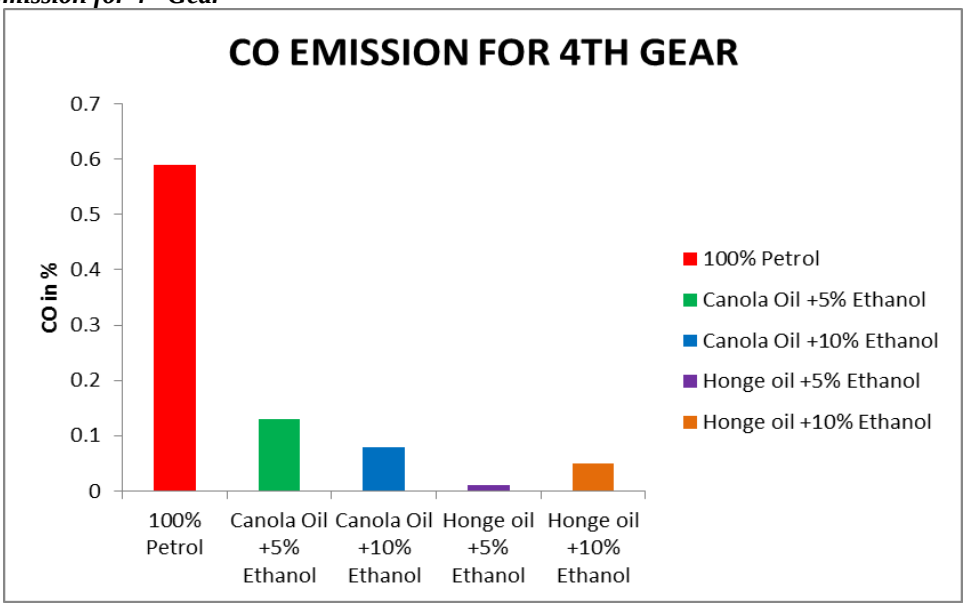


**Fig-10** shows the variations of Carbon Monoxide for Canola oil and Honge oil blended with Ethanol at Fourth Gear

## VI. Conclusion

It is observed that there is drastic reduction of harmful emissions like CO,HC by using this technique of gasifying the bio-fuels and It may be suggested that by installing these setup and using these Bio-fuel blends in the future vehicles we can reduce the harmful emissions and increase the vehicle mileage.

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