

PERFORMANCE IMPROVEMENT AND EMISSION CONTROL IN DIESEL ENGINE USING FISH OIL

G.JAYARAM¹, S.VENKATESH²

*Under Graduate Student , Department of Automobile Engineering,
Saveetha School of Engineering, Saveetha University ,Chennai*

Email Id: ssvenkivenkatesh@gmail.com

ABSTRACT

A stretched out trial ponder is led to assess and think about the utilization of different Diesel fuel supplements at mix proportions of 20/80, in a standard, completely instrumented, four stroke, coordinate infusion (DI) motor. All the more particularly, a high assortment of fish oil in different causes are tried as supplements, i.e. angle oil and their comparing methyl esters. The arrangement of tests are directed utilizing each of the above fuel mixes, with the motor working at a speed of 1200 rpm and at a medium and high load. In each test, volumetric fuel utilization, fumes smokiness and fumes managed gas outflows, for example, nitrogen oxides (NO_x), carbon monoxide (CO) and aggregate unburned hydrocarbons (HC) are measured. From the main estimation, particular fuel utilization and brake warm effectiveness are registered. The distinctions in the deliberate execution and fumes emanation parameters from the pattern operation of the motor, i.e. when working with perfect Diesel fuel, are resolved and thought about. This examination is stretched out between the utilization of the fish oil mixes. Hypothetical parts of Diesel motor burning, joined with the generally varying physical and concoction properties of these Diesel fuel supplements against the typical Diesel fuel, are utilized to help the right understanding of the watched motor conduct.

Keywords: Diesel-Biodiesel mixes, Performance, Combustion attributes.

1.INTRODUCTION:

These days, angling is one of our most critical enterprises which dependably make a decent attempt to build the creation of fisheries. Morocco is situated in northwest Africa. It is verged on the north by the Mediterranean Sea, on the south by Mauritania, on the east by Algeria and on the west by the Atlantic Ocean. Morocco is the principal world maker of sardines called "Sardina pilchardus" and is additionally the second biggest provider of fish in Africa after Nigeria [1]. This riches has prompted an expanded improvement of creation, change and safeguarding of fish ventures which produce a lot of waste, A level of the aggregate catch of fish is confined as preparing scraps, for example, heads, blades, skin, casings, trimmings and viscera. More total use is accomplished by transformation of scraps into fishmeal and angle oils. For sure, the amounts of fish squander are assessed at a few hundred thousand tons of waste for each year [2], while tests demonstrated that fish oil recuperated from fishmeal deposit differs significantly between a mass division of 1.4% and 40.1% relying upon the species, tissue and season [3]. Consequently, it is valuable to demand the significance of treatment and recuperation of fish waste to stay away from any impact on the earth when all is said in done and on

human wellbeing specifically. Actually, numerous current examinations have been keen on the valorization of fish-squander. The one that has gotten the best consideration is the combination of a biofuel that meets the security of supply criteria: reaction to nearby improvement needs guaranteeing the lessening of the creation of CO₂, the fundamental ozone harming substance emanations. Biofuel is an option fuel for diesel motors. It can be utilized as a part of unadulterated shape (B100) or might be mixed with oil diesel at any fixation in most infusion pump diesel motors [4– 8].The biodiesel yield runs in the vicinity of 80 and 95 wt% relying upon the quality and the immaculateness of the oil [9]. Research in this field is overseen keeping in mind the end goal to enhance the way toward changing over vegetable oil or creature fat into biodiesel. That is normally created by various procedures. Transesterification response is the most widely recognized strategy in the creation of biodiesel. A few analysts showed that the physical properties of biodiesel from angle squander oils, including thickness and sharpness, are substantially higher than general diesel [9] which causes issues in execution and NO_x in the burning of diesel motors [6,10]. It was noticed that the corrosive esteem stamped variety between various clusters of fish (viscera, skin and muscle), and diverse sort of fish

[3]. Besides, it was discovered that because of the high corrosive estimation of salmon oil, antacid catalyzed transesterification was not a successful technique for creating biodiesel from salmon oil [11], which demonstrates that the received procedure requires change [8]. Also, different scientists demonstrated that creature fat and additionally vegetable oil have a higher warming quality like that of the customary diesel, yet the issue is their acidity which is better than those of diesel [12]. The biodiesel delivered from angle oil had a higher warming quality contrasted with those of creature fat or vegetable oil [13]. It is likewise noticed that the oil or fat utilized as a part of the transesterification by essential catalysis ought to contain under 0.5% free unsaturated fat (FFA) [14]. It has been realized that, when the FFA level surpasses 0.5%, the cleanser arrangement happens and restrains the partition between the biodiesel and glycerol, and declines the yield of the last item. Thusly, the immediate transesterification by fundamental catalysis of this oil isn't relevant. The pretreatment of this oil to evacuate the FFA and the water is typically required. In this paper, corrosive catalyzed esterification and base catalyzed transesterification were utilized, separately, to diminish the higher FFA substance of waste fish oil and to deliver biodiesel individually. At first, the esterification response was performed to explore the impact of different response parameters on the diminishment of free unsaturated fat substance in squander angle oil. Methanol/oil proportion, impetus sum, response temperature and time were enhanced to decide the ideal conditions in the pretreatment step which gave the most reduced corrosive esteem. At that point, the second step, base catalyzed transesterification in which oil responds with methanol within the sight of an antacid impetus (KOH) to shape ester and glycerol, is performed.

2.MATERIALS AND METHODS:

A twin chamber 4-stroke water-cooled coordinate infusion diesel motor with a dislodging volume of 1670cc, pressure proportion 18.5:1, creating 21 kW at 2000 rpm with a dynamometer was utilized for the present research work. The particulars of the motor are recorded in Table The motor is fitted with traditional fuel infusion framework, which has a 5 gap spout of 0.262mm isolated at 146 degrees, slanted at a point of 60 degrees to the chamber hub.. The injector opening weight prescribed by the producer was 250 bar. The Bosch fuel pump which is fitted on the motor empowers the programmed control of the motor speed. The ignition chamber is hemispherical fit as a fiddle with the overhead valve plan worked by push poles. An arrangement was made to mount a piezoelectric weight transducer flush with the chamber head surface keeping in mind the end goal to gauge barrel weight. The infusion arrangement of the motor was intermittently cleaned

and adjusted as suggested by the maker. The determinations of the test motor known.

TEST ENGINE

2.1Fuel Properties and test fuels :

Unrefined fish oil was brought from Mangalore, Karnataka, India, sifted to evacuate the debasements and afterward transesterified by the above said strategy. The fish oil methyl ester contained no suspended issue however had a bothersome odor impossible to miss to angle oil. The shading was straightforward, light yellow. The physical qualities of fish oil methyl ester are nearer to diesel oil. The fuel properties were tried in Bangalore Test House Bangalore, India. Upgraded comes about for the generation of biodiesel from the oils are appeared in Table 1.

TABLE 1: PROPERTIES OF TEST FUEL

Property	Diesel	Fish oil biodiesel
Density (kg/m ³)	849	878
Specific gravity	0.850	0.879
Kinematic viscosity at 40°C (Cst)	3.0	4.0
Fire point (°C)	64	175
Flash point (°C)	58	175
Calorific value (KJ/kg)	42750	41342

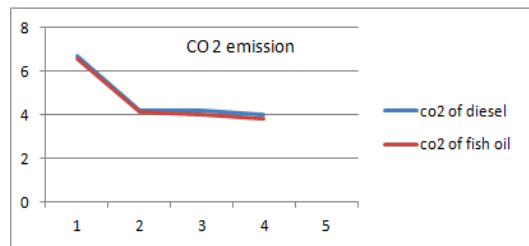
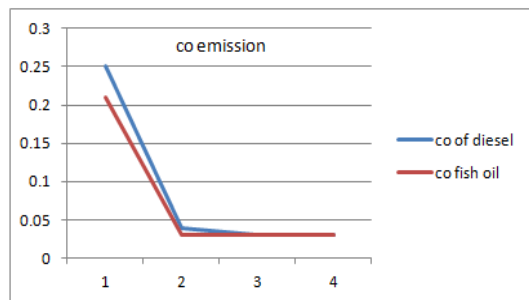
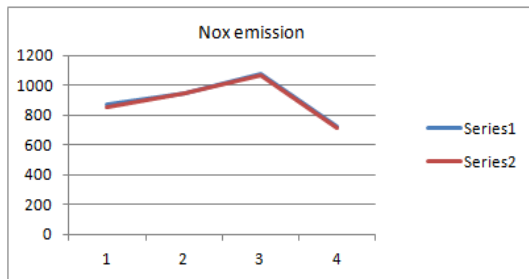
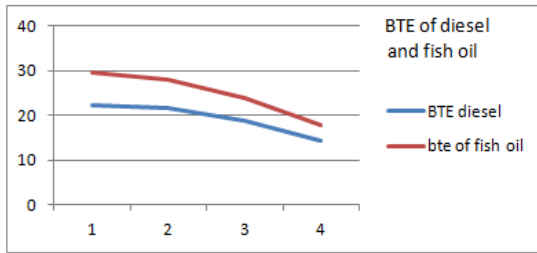
For exploratory examinations, biodiesel got from angle oil was blended with diesel in extents 80% by volume and fish oil 1 as an added substance was included as 20% by volume individually to the mixes.

3.EMISSION ANALYSIS USING bio diesel (fish oil)

A. PERFORMANCE ANALYSIS USING OPTIMUM BLEND WITH IGNITION IMPROVEMENT

The experiments are conducted on the four stroke twin cylinder water cooled diesel engine at constant speed (1200 rpm) with varying loads. From the plot it is observed as the BP increases there is a considerable increase in the Brake thermal efficiency (BTE). The increment in brake thermal efficiency is due to better combustion since the adding ignition improver decreases the viscosity. The variation of Mechanical efficiency with Brake Power. From the plot it is observed optimum blend and various blends slightly increases at full load conditions. The variation of volumetric efficiency with Brake Power From the plot it is observed that the optimum blend contains 75.95% at full load condition, but after adding the ignition improver blends there is a slight variation as compared to optimum blends. From the plot of variation of Brake Specific Fuel Consumption with Brake Power it is observed that as the load increases the fuel consumption decreases, the minimum fuel consumption. The BSFC of after adding ignition improver of Bio-diesel is slightly

increases as compared with optimum fish at full load condition. The variation of Indicated Specific Fuel Consumption with Brake Power. The variation of Air-Fuel Ratio with Brake Power From the plot it is observed that decreases compare with optimum blend at full load condition. As load increases more power is to be developed by the engine to compensate the load. The only way to increase the more power development is to inject the more amount of fuel into the cylinder which tends to reduce the air fuel ratio.



4. RESULTS AND DISCUSSIONS:

Emission control in diesel engine using fish oil with diesel fuel are experimentally investigated. The results of study maybe summarized as follows:

- fish based biodiesels can be directly used in diesel engines without any modifications.
- The performance is found to be slightly reduced while brake specific fuel consumption is increased when using biodiesels.
- Compared with conventional diesel, exhaust emissions of CO and CO₂ are reduced while NO_x emissions are increased with biodiesel and its blends with diesel.

- The abundant resources availability and environmental friendly emissions are recognized as strength of biodiesels leading them to potential candidates as alternative fuels.
- Further investigations to explore the knowledge of combustibility of biodiesel as fuel is needed for the better optimization.

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