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Production and Performance Characteristics of a Diesel Engine with Chicken Waste-Based Bio Diesel

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Abstract: *There is a rapid increase in the pollution level as the global demand for fossil fuels increases. Burning fossil fuels leads to the release of greenhouse gas and other toxic pollutants into the environment, and that level has reached the limit. For the last few decades, scientists worldwide have been looking for a safe, eco-friendly alternative energy source. One of the prime alternative forms of energy is green bio diesel, the bio-fuels such as alcohols and biodiesel have been proposed as alternatives to Internal Combustion Engine diesel fuel because of their bio degradability and non-toxicity. These fuels have received wide attention because they significantly reduce exhaust emissions and the overall life cycle emissions of carbon dioxide (CO_2) when they burnt as fuel this paper represents the extraction and performance characteristics of biodiesel from chicken waste. Chicken waste is the source of solid waste that is usually not utilized. The present work is the production of the biodiesel from utilizing chicken waste by using transesterification reaction, methyl alcohol and glycerol as catalyst. hear tested for different properties (density, viscosity, calorific valve, flash and fire point) for chicken waste oil. The effect of biofuel in the performance characteristics examined in diesel engine. Performance parameters like break power, break thermal efficiency, break fuel consumption will be calculated with different blends and exhaust emissions like carbon dioxide, NOx, Sulphur dioxide, smoke and particulate matters.*

Key words: *Bio diesel, transesterification, performance parameter, Chicken waste oil.*

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I. Introduction:

In recent years, the petroleum prices increasing rapidly and increasing threat to the environment from exit emission and global warming. The researchers are seeking alternative fuel sources. Biodiesel is a fuel compressed of mono alkyl esters of long chain fatty acids derived from vegetable or animal fats. Biodiesel is made by transesterification process. This process converts vegetable and animal fact in to esterified oil. Chicken west is a bi product of poultry production. It includes blood and offal and contain about 11% of fat. India is the 5th position in the production of broiler meat in the world. India produced 1000MT broiler meat in 2014. During the year the production of boiler meat was nearly 100000MT. a large amount of waste will be disposed. Disposed of the chicken waste to the environment causes pollution and harmful to human health.

Research has been going on the different ways of how the waste can be used to get maximum results. This chicken waste can be used to produce a very use full biodiesel from coming days. In 1 kg of chicken nearly 30% of waste is extracted. The 30% of waste will be no use and will be dumped underground.

Bio fuels are the major contributors of energy source and they are the alternative fuels for fossil fuels chicken feather meal was used for the production of biodiesel. The processed chicken feather consists of fat content and was used to make biodiesel.

Experiment was conduct by using waste chicken fat biodiesel as a alternative fuel by the transesterification process by blending it in different ranges. The fuel consumption test of a constant speed i.c engine was carried to evaluate for performance of the engine on both diesel fuel and chicken biodiesel blends.

In this present study, chicken waste fat oil is considered as a potential alternative fuel for an unmodified diesel engine because it has high oil content for biodiesel production using trans desertification process with the additives like methyl alcohol and glycerol.

Main aim of this study is to investigate the engine performance, of a diesel engine fueled chicken waste fat oil and its diesel blends compared to those of standard diesel.

II. Extrction Of Oil From Chicken Waste:

Extraction of oil is done by two processes, Boiling process and Gravity separation process. The oil boiling need heat energy, gravity separation is a very slow process. After the oil extraction the raw oil is converted to Biodiesel.

Following steps involved in Extraction of Oil from chicken waste:

1. Collection of chicken waste from poultry farms.
2. Boiling Process
3. Separation Process

Collection of chicken waste from poultry farms:

Chicken waste was collected from nearby poultry farms. All different type of waste is collected for the extraction process.

Boiling Process:

Boiling of all the type of chicken waste Boiling of all type waste is done, taking 1kg of chicken waste in a vessel (chicken intestine, chicken skin with feather and offal), to 1kg of waste in the vessel 2-3liters of water is added and kept on gas for 30min.There are many difficulties faced by boiling of all the waste. The oil extraction from the boiling of all the waste is very difficult. Boiling of all the waste forms lots of impurities and it's very difficult to separate. Boiling of all the waste only little amount of oil is obtained at the top. A small droplet of oil is obtained with lots of impurities.

Separation Process:

The oil formed at boiling process it is formed at the top of the mixture (water, skin) separation of oil from water to get pure oil After cooling the mixture is poured in to a medium clean container such that the skin should be remain in the large container and only the water and oil mixture should be poured into another container. Then the oil layer will be formed at the top and can be removed easily by oil injection

III. Production Of Chicken Waste Oil:

Biodiesel Production Procedure The biodiesel fuel used in this study is produced from transesterification of chicken waste fat oil. The chicken waste collected was cleaned by washing it in water and it is heated up to 1200C to lose all its moisture content and was strained which in turn filtered it. After filtration process purified chicken oil was obtained steps are shown in figure 1.

3.1.1 PROPERTIES OF CHICKEN WEST OIL:

PROPERTIE	VALUE
Density (Kg/M3)	0.87
Calorific Value (Kj/Kg)	39830
Flash Point (O^c)	170
Fire Point (O^c)	180

3.1.2 PROPERTIES OF COMMERCIAL DIESEL:

PROPERTIE	VALUE
Density (Kg/M3)	0.83
Calorific Value (Kj/Kg)	4200
Flash Point (O^c)	72
Fire Point (O^c)	80

IV. Experimental Setup:

A Single Cylinder Four Stroke Diesel Engine Was Used to Perform the Test. It Main Parameters Are

1. B.P
2. S.F.C
3. F.C
4. Break Thermal Efficiency

4.1.1 Measurement of break power:

Break Power Was Calculated by Speed of The Engine Divided By 60000

$BP = \frac{2\pi N(W-S)((D+d)/2)9.81}{60{,}000}$……k. w

Where, N = rpm of the engine,
w = dead weight added to hanger,
S = spring balance reading in kg,
D=diameter of brake drum in m =0.33
d= diameter of rope in m =0.02

4.1.2 Measurement of fuel consumption:

Fuel Tank Is Attached to A Burette. The Valve at The Bottom of The Tank Is Closed When Fuel Consumption Rate Is to Be Measured So That Fuel Is Consumed Only from The Burette. The Time Taken For 10ml Of Fuel Consumption Is Recorded to Measure the Fuel Consumption Rate. Specific Fuel Consumption Was Calculated by Fuel Consumption Divided by The Rated Power Output of The Engine.

$m_{fc} = \frac{X\times0.82\times3600}{1000\times T}$……kg/hr

Where, X = burette reading in cc
0.82 = density of diesel in gram / cc
T = time taken in seconds.

$s_{fc} = \frac{mfc}{BP}$……Kg/KW hr

4.1.3 Measurement of break thermal efficiency:

Break Thermal Efficiency Was Calculated by Break Power Divided by Fuel Consumption.

$\eta_{bth} = \frac{BP\times3600}{m_{fc}\times cv}\times 100$……%

Where, CV = calorific value of diesel = 42500 KJ / kg,
BP = Brake Power

4.2 Specification of test engine:

parameters	specifications
Engine	Four stroke single cylinder
Make	Kirloskar
Power	5HP
Number of cylinders	One

Speed	1500 rev/min
Bore	85 mm
Stroke length	110 mm
Compression ratio	17:1
Working length	Four strokes
Method of colling	Water cooled
Method of ignition	Compression ignition
Dynamometer	Eddy current

V. Conclusions

Biodiesel made through a chemical process called transesterification whereby the glycerine is separated from the fat or vegetable oil. The process leaves behind two products- methyl esters (the chemical name for biodiesel) and glycerine (a valuable product usually sold to be used in soap and other product) Biodiesel can be process from any type of vegetable oils and animal fat. Food grade vegetable oils such as soyabean, canola, palm oil, sunflower oil and peanut can be used to produce biodiesel. Biodiesel can also be processed from animal fats such as lard, tallow, chicken fat, fish oils and used cooking oils from restaurants. The direct use of vegetable oils in fuel engine is problematic due to high viscosity and low volatility; they do not burn completely and form deposits in the fuel injectors of diesel engines. So, biodiesels produced from vegetable oils appear to be a potential alternative source to petro-diesel. Biodiesel reduces nearly all form of air pollutions. The present work basically focusing on how to Extraction of oil from Chicken waste, here discuss on process of extractions of oil is done by two process, Boiling process and Gravity separation process, in the further experimental work will be done by using the chicken waste oil and all the performance and emissions parameters be found.

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