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On 18th & 19th March

Organized by

Sri Krishna College of Engineering & Technology, Kuniamuthur, Coimbatore-641008, Tamilnadu, India

Extraction of Biofuel from Chicken Waste

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ABSTRACT: In a vaguely degraded society where conventional fossil fuels are completely used. It is obvious that we have the urge and necessity to find an alternative fuel.

Our conceptual attribute towards our project is extracting biofuel from chicken wastages.

Waste chicken fat is harmful for human health due to fat contain in the chicken. So there is large amount of chicken fat is waste so we can use that chicken fat for production of chicken fat based biofuel. After production it is necessary to check various chemical properties of biofuel to check that properties are within limit or not.

A comparative study is made between a properties of a fuel extracted with that of biodieselstandards (ASTM) based upon the cased studies and literature survey that we are been collecting. Various thermal properties are been found out and tabulated is conjuncture to fossil fuel diesel.

I. INTRODUCTION

Alternative fuel is any material or substance, other than petroleum, which is consumed to provide energy to power an engine. Alternative fuels are bio-diesel, ethanol, chemically stored electricity, hydrogen, methanol, Natural gas, wood and vegetable oil.

The increase in industrialization and materialization of the world led to step rise in the demand of petroleum products. Petroleum based fuels are extracted from earth crust and hence their reserve is limited and are irreplaceable. With our present known reserves and the growing rate of fuel consumption, it is feared that they will be exhausted soon.

These finite resources of petroleum are highly concentrated in certain regions of the world and have given rise to frequent disruption and uncertainties in its supply and price as well.

According to the estimate of the oil and gas journal, crude oil production is exited to reach a peak somewhere between 2010 and 2015 and from then it is eventually going to decrease. With this, crude oil will be expensive progressively until it becomes

Unaffordable while enforcing pressure on the import bill and increasing the import bill dully.

Thus need to look at other options as far as energy need is concerned.

II. PROBLEM OBJECTIVE

Automobile is a major contribution to air pollution in most of the industrialized nations according to the survey conducted in the present atmosphere.

The air we breathe is proven to be unhealthy, the various emission from the automobile exhaust like CO, HC, NOX, particulate matters, SOOT etc., are highly harmful for human health, apart from that, animals and plants are also facing a negative impact by emission caused by automobiles.

Automobile exhaust emission has also actively participation in increasing global warming. Emission from the diesel engine can be classified in the same categories.

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S.NO	CONSTITUTE	DISEASE
1	Carbon monoxide(CO)	Heart/blood circulation problems
2	Hydrocarbons(HC)	Lung disease
3	Nitrogen oxides(NO _x)	Asthma/Bronchitis
4	Lead (Pb)	Blood Cancer
5	Suspended Particulate Matter(P.M.)	Asthma/Bronchitis

III. EFFECT OF EXHAUST CONSTITUTE

CHICKEN OIL PREPARATION PROCESS:

- Remove all fat deposits from inside the body cavity of an uncooked chicken.
 - Cut the pieces of fat into smaller chunks
 - Place the fat chunks in a medium saucepan or frying pan
 - Fill the pan with water to a level that just covers the chunks of fat.
 - Cover the fat pan and place it over medium heat.
 - Heat the fat in the covered pan for 10 to 15 minutes over medium heat.
 - Uncover the pan and continue the heating process at the same heat level until all the water cooks off.
 - Continue to cook the fat uncovered for 10 to 15 additional minutes after the water has boiled off.
 - Remove the pan from the heat once the fat chunks have liquefied and the fat has darkened.
- Now the chicken oil is separated from the boiled fat.

INGREDIENTS:

- Chicken waste oil
- Methanol
- Potassium hydroxide or sodium hydroxide
- Water + lye
- Deionized water
- Isopropyl alcohol
- Calcium Chloride
- Phenolphthalein

EXPERIMENTAL PROCEDURE:

TITRATION:

The aim of titration is to identify whether this oil can be used as an alternative fuel or not.

For titration process deionized water and lye (caustic soda) were taken in the burette.

In conical flask a mixture of isopropyl and the chicken oil were taken.

For the purpose of indication 4 drops of phenolphthalein is used.

From the result of titration the free fatty acid content is determined, from this the amount of lye required to neutralize the free fatty acid is also determined.

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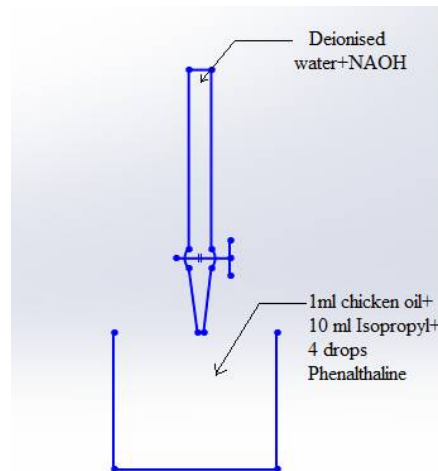
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TITRATION CALCULATION:

Chicken oil = 1ml

Isopropyl = 10ml

Phenalthaline = 4 drops

Deionized water + NAOH = 0.2g for 500ml water

Normality = 0.01N

The free fatty acid level is neutralized by 2.4 ml of deionized water & NAOH

For 2.4 ml water = 9.6×10^{-4} g NAOH

FINDING NORMALITY OF CHICKEN OIL:

$$V_1 N_1 = V_2 N_2$$

V_1 - volume of oil in 1ml

N_1 - normality of oil

V_2 - volume of water and NAOH

N_2 - normality of NAOH

$$V_1 N_1 = V_2 N_2$$

$$1 * N_1 = 2.4 * 0.01$$

$$N_1 = 0.024N$$

CALCULATION OF NAOH FOR 500 ML OF OIL:

1ml (NAOH & water) = 0.4 g NAOH

For 2.4 ML (NAOH & water) = 0.96 NAOH

Initially 2.5g of NAOH is required to dissolve 500 ml of oil

NAOH for 500 ml oil = 2.5 + 0.48

NAOH for 500 ml oil = 2.98 g

2.98 g NAOH used to neutralize fresh oil

BLENDING:

By the process of blending we can obtain the biofuel blend from the chicken oil.

First step in the blending process is to reduce the free fatty acid content in the chicken oil to below 1%.

To reduce the free fatty acid content lye such as NAOH or KOH were used.

In blending process chicken oil, methanol, KOH or NaOH were mixed.

The mixed blend contains biofuel and glycerine so the mixed blend is kept undisturbed for a day to get the biofuel separated at the top from glycerine.

The sulphur content of diesel is 500ppm whereas that of bioethanol and ester is 0 and 15 ppm respectively. This lower sulphur content is another factor enhancing the use of fuel blends in diesel engine.

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CLEANING:

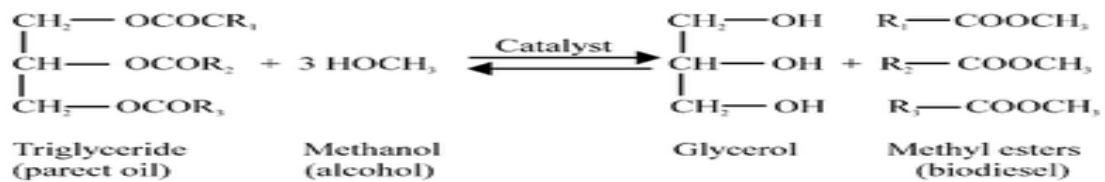
The obtained biofuel blend contains some impurities so cleaning process must be carried out to get the pure biofuel.

For the cleaning purpose deionized water is added with the biofuel blend.

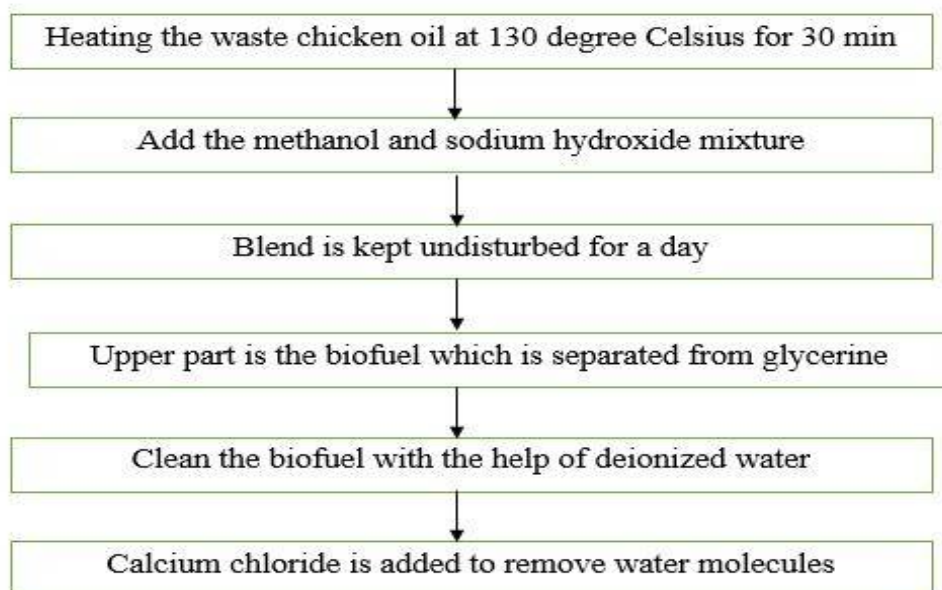
For final cleaning process the biofuel is heated to get a pure one or calcium chloride is added to to remove water molecules and the calcium chloride is removed by filtering the oil with cotton piece.

Now for the final extraction of biofuel an additive (Magnesium) is added to the blend oil.

REACTION



IV. FLOWCHART



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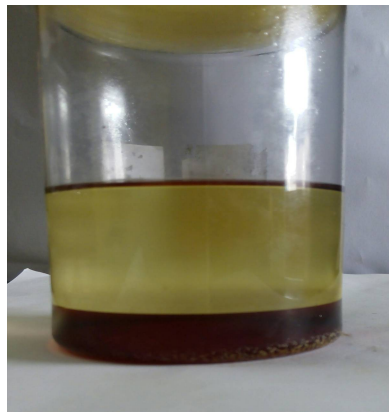
PICTURES CHICKEN FAT



EXTRACTED OIL



BIOFUEL AND GLYCERINE



CLEANING

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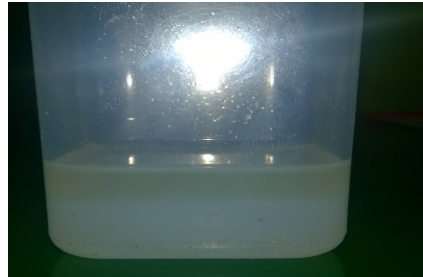
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PROPERTIES

FLASH AND FIRE POINT TEST:

Flash and fire point test of chicken biofuel using open cup apparatus.

- Flash point: 50°C
- Fire point: 55°C

GAS CHROMATOGRAPHY RESULT:

Fatty acid composition of extracted chicken oil was analyzed according to the official method of AOAC 996.06 (1996) by gas chromatography equipped with a capillary column (SP2560) (100 m × 0.25 mm × 0.20 μm) and a flame ionization detector.

s.no	Fatty acid	Concentration (%)
1	Impurities	4.402
2	Palmiticacid(c16:0)	0.648
3	Stearic acid (c18:0)	4.478
4	Oleic acid(c18:1)	21.452
5	Linoleic acid(c18:2)	63.840
6	Linolenic acid(c18:3)	5.053
7	Behenicacid(c22:0)	0.123

THERMAL PROPERTIES RESULT:

S.NO	PROPERTIES	CHICKEN BIOFUEL
1	Density	0.869g/cm ³
2	Carbon residue	2.146
3	Viscosity	4.56CP
4	Fatty acid value	0.4573

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CHNS TEST RESULT:

S.NO	ELEMENTS	CHICKEN BIOFUEL(%)
1	Carbon	64.14
2	Nitrogen	0.31
3	Sulphur	0.03
4	Hydrogen	13.99

COMPARATIVE STUDY

S.NO	Properties/ Elements	Chicken Biofuel	Biodiesel
1	Density (g/cm ³)	0.869	0.88
2	Carbon Residue	2.146%	0.05%
3	Viscosity (cp)	4.56	1.9 - 6.0
4	Acid Value	0.4573	0.5
5	Carbon %	64.14	77
6	Sulphur %	0.03	0.05
7	Hydrogen %	13.99	12

Thus from the comparative study is done when we come to the inference that the obtained values are within the standards and these values are resembling the properties of biodiesel (ASTM Standards).

V. CONCLUSION

From the above study we conclude that we have extracted oil from chicken waste and we added alkaline catalyst to reduce FFA level to less than 1%. By this process the final biofuel is extracted. After the biofuel is being extracted the thermal properties, Gas chromatography results, CHNS test results are found to be within the limits of biodiesel limits except carbon and carbon residue value. The carbon residue value is high. This can be reduced by cleaning the biofuel until the soap content and other impurities are fully removed. Some more other properties are still needed to be find out. Thus our biofuel may be alternative in this energy crisis provided.

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