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ORGANIC ANALYSIS OF BIODIESEL OBTAINED FROM DIFFERENT VEGETABLE OILS

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ABSTRACT :

Research was done for the organic analysis of biodiesel obtained from different vegetable oils. It was observed that biodiesel obtained from different vegetable oils show almost similar results and the prepared biodiesel is economically and environmental very useful for our society. So, it can be preferred to the market diesel for use. From our opinion we concluded that biodiesel is the best diesel used in our everyday life.

Keyword :

Sodium Hydroxide Lye ,Transesterification, Biodiesel, Phenopthalein Test, Hydrolysis, Glycerin, Ethanol

INTRODUCTION :

Biodiesel is an eco-friendly alternative diesel fuel prepared from domestic renewable resources i.e, vegetable oil (edible or non-edible and animal fats).These natural oils and fats are mainly made up of methanol or ethanol in the presence of catalyst derived diesel and are called "Biodiesel". The process is called transesterification.The reaction is slow, so a potassium methoxide or ethoxide catalyst is used to speed up the reaction. Glycerin is also obtained as a byproduct but in a considerable quantity

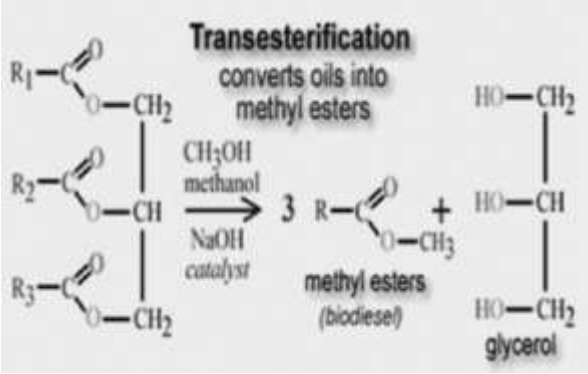

Figure : Conversion of oil into biodiesel and glycerine.

The composition of different vegetable oils in triglycerides(Fat)are:

SAMPLES	SATURATED FATTY ACID			MONO UNSATURATED FATTY ACID	POLY UNSATURATED FATTY ACID	
	Myristic Acid	Palmitic Acid	Stearic Acid	Oleic Acid	Linoleic Acid	α-Linolenic Acid
SOYABEAN OIL	-	10%	4%	23%	51%	7-10%
RICE BRAN OIL	0.6%	21.5%	2.9%	38.4%	34.4%	2.2%
SUNFLOWER OIL	-	5%	6%	30%	59%	-

MATERIALS AND METHODS

(1)Synthesis of biodiesel from three different types of oils namely Soyabean Vegetable Oil,Sunflower Vegetable oil, Rice Bran Vegetable Oil.

(2) Organic analysis of biodiesel obtained from above listed vegetable oils.

APPARATUS REQUIRED

Measuring Cylinder , Separating Funnel,Shaker, Test Tubes , Analytical Balance , Glass , Round Bottomed Flask

METHODOLOGY

0.35 g of finely grounded anhydrous sodium hydroxide was added to 20 ml of pure (99%) methanol in a 250 ml Erlenmeyer flask containing a magnetic stirrer bar and the flask was put on the magnetic stirrer plate for vigorous stirring until all the NaOH was dissolved. This flask now contained sodium methoxide. 100 ml of 100 % pure (unused) vegetable oil was warmed upto about 40 degree centigrade to increase the rate of reaction, the this oil was poured into the methoxide solution while continually stirring. At first the mixture was cloudy but soon it was separated into two layers. It was then stirred for 15-30 minutes.

The content was transferred into a 250 ml separating funnel and allowed to stand for 1 hour. The mixture was separated into two different layers, the lower layer was glycerol and the upper layer was the methyl ester (biodiesel).Then the stop cork of the separating funnel was opened and the glycerol was allowed to drain in a beaker make sure not to get any biodiesel mixed in the glycerol.

ANALYSIS OF BIODIESELS

1 .Preliminary Tests of biodiesels obtained from different oil samples was done which are shown below in table 1 :

PARAMETERS	SOYABEAN OIL	RICE BRAN OIL	SUNFLOWER OIL
Physical state	LIQUID	LIQUID	LIQUID
Odour	FRUITY	FRUITY	FRUITY
Colour	DARK GOLDEN	LIGHT YELLOW	LIGHT GOLDEN
Solubility in water	SLIGHTLY SOLUBLE	INSOLUBLE	PARTIALLY SOLUBLE

Table-1

2 . Test of Aromaticity of biodiesels obtained from all the three oil samples was done which are shown below in table 2 :

SAMPLES	OBSERVATION	INFERENCE
SOYABEAN OIL	BURNED WITH NON-SOOTY FLAME	NON-AROMATIC
RICE BRAN OIL	BURNED WITH NON-SOOTY FLAME	NON-AROMATIC
SUNFLOWER OIL	BURNED WITH NON-SOOTY FLAME	NON-AROMATIC

Table-2

3 . Test of Unsaturation of biodiesels obtained from all three oil samples was done which are shown below in table 3:

SAMPLES	OBSERVATION	INFERENCE
SOYABEAN OIL	COLOUR OF $KMnO_4$ DISAPPEARED	UNSATURATED
RICE BRAN OIL	COLOUR OF $KMnO_4$ DISAPPEARED	UNSATURATED
SUNFLOWER OIL	COLOUR OF $KMnO_4$ DISAPPEARED	UNSATURATED

Table-3

4 . Detection Of Elements of all biodiesels obtained from all three oil samples was done which are shown in table 4:

SAMPLES	OBSERVATION	INFERENCE
SOYABEAN OIL		NITROGEN ABSENT
		SULPHUR ABSENT
		HALOGENS ABSENT
RICE BRAN OIL		NITROGEN ABSENT
		SULPHUR ABSENT
		HALOGENS ABSENT
SUNFLOWER OIL		NITROGEN ABSENT
		SULPHUR ABSENT
		HALOGENS ABSENT

Table-4

Experiment	Observation	Inference
1.Test for Hydrocarbons and ethers **Iodine test:**0.2 g of sample was dissolved in 5 ml benzene and 5ml of very dilute solution of iodine prepared in benzene was added to it, then shaken well	No Brown colouration was obtained	Hydrocarbon and ether were absent
2.Test for Carboxylic group **Sodium bicarbonate test:** A little amount of sample was added to about 5 ml sodium bicarbonate solution	No Effervescence was observed	Carboxylic group absent in all the samples
3. Test for Aldehyde group **Fehling's test:** Equal volume of fehling's A and fehling's B solution was mixed and a small amount of organic compound was added and then boiled for sometime.	No red coloured precipitate was observed	Aldehyde group was absent in all the samples
4. Test for Ketonic groupSodium **Nitroprusside test:** 1ml of the sample was treated with freshly prepared solution of sodium nitroprusside followed by excess of NaOH solution	No wine red colouration was observed	Ketonic group wasabsent in all the samples
5. Test for Alcoholic group **Sodium test:** 3-4 ml of the sample was taken and a small piece of sodium metal was added	No Brisk effervescencewas observed	Alcoholic group was absent

6.Test for Phenolic group **Aniline test:** A little (2:3) aniline was dissolved in dil.HCL, cooled in ice water and aq. Solution of $NaNO_2$ was added to it dropwise. Then sample predissolved in NaOH solution to it	No precipitate formed	Phenolic group was absent in all the Samples
7.Test for Esters **Hydroxamic acid test :** 1 ml of $NH_2OH.HCL$solution and 4-5 drops of saturated alcoholic solution of KOH was taken in a test tube The mixture was heated to boil,then cooled and acidified with dilute HCL, 1drop of $FeCl_3$ solution was added to it **Phenolpthalein test:**A little amount of sample was dissolved in 3-4 ml of alcohol and 2-3 drops of dil. NaOH solution was added followed by 1 drop of phenolphthalein	Voilet colouration was observedPink colour was obtained which disappeared on heating	Ester group was present in all the three samplesEster group was present in all the three samples
8. Test for CarbohydrateIgnition test: The sample was heated over a flame after keeping it on a metal spatula	No charring smell of burnt sugar was observed in all the samples	Carbohydrate was absent in all the three samples

5. Detection of functional groups of all the biodiesels obtained from all three samples was done which are shown in table 5:

RESULTS & DISCUSSION

Results Obtained From Organic Analysis

During the organic analysis, for the identification of the functional groups present in the taken biodiesel samples , preparation of derivative i.e,"Acid Hydrolysis" was taken place. The derivative prepared from all the biodiesel samples confirmed that all the three samples contain ester group i.e, it shows the hydrolysed derivative of ester (Biodiesel).

From the various organic analysis,we can say that biodiesels are usually non-aromatic & unsaturated compounds. They don't contain sulphur, nitrogen and any halogen.

Besides biodiesel glycerol is also obtained during the process but, yes in a considerable quantity which can be further used in food and cosmetic industry.

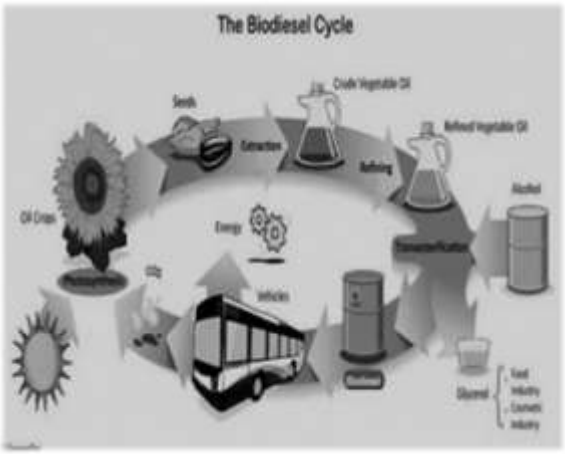

Figure-The Biodiesel Cycle

CONCLUSION

The Biodiesel was prepared from different vegetable oils & tested it on different organic parameters such as aromaticity, unsaturation, element detection, functional group analysis and it was confirmed by preparing its derivative. The entire test we have performed with extreme accuracy and offcourse with

much precaution. Our result does support to the theoretical result to a great extent. Our observation suggests that the physical characteristics of biodiesel from the listed three vegetable oils are almost similar and these characteristics depend upon the method of preparation of biodiesel from the vegetable oils and the recorded result shows the similar properties. To

wholesome we can say that biodiesel is economically and environmentally very useful for our society. It is one of the most important renewable energy sources for transportation and household uses.

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