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Effect of Temperature on Yields of Methyl Esters Used In Blends of Biodiesel Extracted From Mahua Oil

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Abstract:
As the population is increasing continuously and thereby the vehicles are also increasing so to overcome problems of more consumption of fossil fuels and more emissions of unburnthydrocarbons,carbon mono oxide and particulate matter, there is a need of alternative fuels that will reduce the consumption of fossil fuels and harmful emissions. Here we are making observations on blending of esterified biodiesel into pure diesel. Due to having more demand for edible oil in food industries, we are using one of the non-edible oils, and that is mahuaoil.Diesel engines highly dominate agricultural machinery and commercial transportation because great efficiency because it has great efficiency and ease of operation .the production of an automotive vehicle is increasing at the high rate because of the rapid industrialization the economy of India and China is growing very fast and the same time. At the same time, this growth is affecting the environment badly.india, and china is the hub for fossil oil consumption, and this consumption contributes to global warming.

Introduction:

Globel energy crises, environmental pollution,globel warming are those main problems for which every country is looking for an alternative solution. Use of Diesel oil in vehicles is one of those main problems, so it is necessary to replace diesel oil with some alternative fuel that is why many research program has shown the results of biodiesel blending in pure diesel.

Non-edible oils like mahua,jatrophakaranja, neem, simaroubaetc are those main resources which will be helpful in biodiesel production .this paper consists of the information about results observed during blending of mahua biodiesel and effects of this on performance parameters like BTE,BSFC and emissions in a diesel engine. Renewable energy is an alternate for fossil fuel .plant oil is renewable. It can be produced easily in a rural area so that it may be used as a good alternative to diesel oil. Today it has little importance, but shortly, it can be significant just as other fossil fuels.

Transesterification:

To obtain methyl esters from non-edible oils generally, we have for methodstransesterification,blending,emulsion and pyrolysis.Transesterification is mostly used,in this process triglyceride and alcohol are reacted in the presence of catalyst .amount of alcohol and catalyst,time,pressure,FFA and amount of water are those main responsible factors on which the process of transesterification depends.

Triglyceride +methanol = glycerol + methyl ester

In the transesterification process, methanol and ethanol are most common, but methanol is mostly used for its low cost and physiological advantages with triglyceride.

Materials used:

- mahua oil (madhucaindica)

Generally,mahua oil is obtained from the kernel of mahua tree available in rural areas; this tree has 60-70 feet height in its appearance. Each tree produces around 20-40 kg seeds per year. Mahua tree has astringent leaves and used in embrocation. Its flowers are used in processing distilled liquors. We are more excited when we see the results in the direction tested with edible oils. Still, in India, there is a high demand of edible oils for various purposes, so we are in need of making this alternative by using non-edible oil like jatrophaoil,neemoil,mahua etc. when we evaluate the performance of CI engine with this kind of choice,we find an increment in responsible factors for good efficiency.

Maducaindica is a botanical name of mahua .we got madhucaindica oil from the trees of two major species namely madhucalatifolia and Madhucalongifolia .these can be founded semi-arid,tropical and subtropical areas in altitude up to1200-1300 meter .these trees have 1 to 5 tiny seeds .the material fallen from the tree is picked. The rind is removed by hand and seed is decorticated by beating with stones.

- ***REFINEDGRADE:***

The oil that we will be getting should be properly cleaned from rancidity. We also judge it by the absence after keeping the filtered sample at 50-degree centigrade for 24 hours madhucaindica oil has calorific value approximate 88-90 percent of diesel of weight and 95-96 percent by volume.

APPLICATION:

A. Oil

It can be used in the making of soap .we can also use it in edible purpose by tribal people. Due to having high FFA, it is limited for edible purpose.

POTENTIAL OF MAHUA OIL

A. Advantages

The advantages of vegetable oil as fuel for a diesel enginecan be seen as-

- These are non-conventional energy resources.
- We can cope up with the rise in demand for fuel.
- Due to having a friendly character with the environment, these can be used widely as an alternative
- Emissions are less in comparison with pure diesel.
- Large heat approximate 80- 90 percent of diesel can be obtained.
- These oils are non-toxic and are biodegradable
- These have no harm to earth soil and water.

B. Disadvantages

- The viscosity of the oil is more, so these are difficult to spray at the time of combustion.
- Due to having a nature of more viscosity, this oil clogs the fuel line and filters because of gum and waxes.These have a poor characterincold starting and misfiringdue to high viscosity and poor volatility**.**

Table:MadhucaIndica Oil properties

S.No	Property	Refined	Raw 1	Raw 2
1	Moisture &insolubleImpurities, % by mass	0.10	0.35	.50m
2	Colour in ¼ in the cell on the Lovibond scale (+5R)	10	55	55
3	Refractive index at 40^0 C	1.456	--	1.46
4	Specific Gravity at $90/30^0$ C	0.86	--	0.87
5	Saponification value	188-198	187-197	187-197
6	Iodine value	58-71	58-71	58-71
7	Unsaponifiable matter, %by max	3	4	4
8	Acid value max	0.5	21	Above 20
9	Titre (0^0 C) Min	41	41	41
10	Flash point (PMC)	255	105	105

Temperature effect:

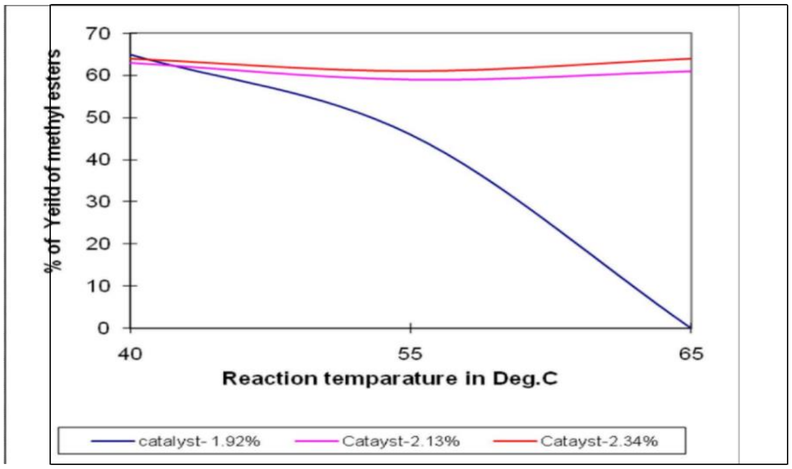

Fig 1

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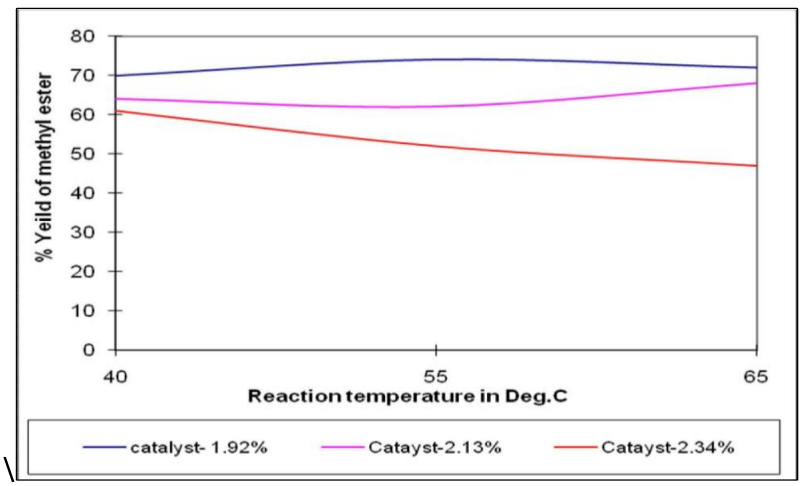

Fig 2

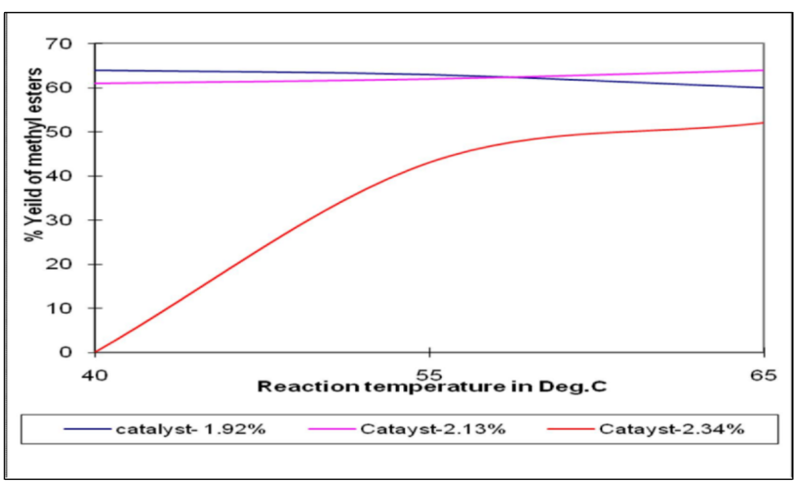

Fig 3

Result and discussion:

Fig. 1 is showing the variation in the percentage of the yields of methyl esters with the reaction temperature for the different amount of catalyst for a methanol molar ratio of 5:1

In this figure, we have seen the variation in the percentage of yields of methyl esters with reaction temperature and also the amount of catalyst is different, and the molar ratio is taken as 5:1.

We can see that yield of methyl ester will decrease on increasing the reaction temperature and will have a zero value at 65-degree centigrade.Different lines are drawn for an additional amount of catalyst, and thus the variation of percentage yield of the methyl ester with reaction temperature is shown.
Fig. 2 shows, the variation in the yields of methyl esters with reaction temperature at different amounts of catalyst at a molar ratio of 6:1

In this figure we also see the variation of methyl ester yield with reaction temperature at a molar ratio of 6:1.for different catalyst amount here we can see that percentage of yield does not vary more with temperature, and this variation is slower at a molar ratio of 6:1.

In fig 3 that is shown below we also see some variation parameters except the molar ratio which is taken as 8:1.here we can see that the methyl ester yield is increasing with an increment of temperature .so here a different scene can be seen at a molar ratio of 8:1.

Conclusion:

Temperature values must be chosen in such a way that the higher end is less than the boiling point of methanol (70°C), and the lower end is around room temperature. The yield, as well as the reaction rate increases with temperature.

In this work, the impact of various parameters on the yield of methyl esters is studied. As mentioned earlier, the parameters chosen were the amount of catalyst, the molar ratio of methanol and oil and the reaction temperature. By keeping one parameter constant, the effects of the other two parameters were studied. To optimize the parameter values, a total of 27 experiments were needed. The quantity of oil chosen was 200 ml for a batch. The three catalyst amounts considered for this work are stoichiometric, 110% stoichiometric, and 90% of stoichiometric weight by volume of oil. For methanol, the standard molar ratio of methanol and vegetable oil havetaken 4.5:1, 6:1 and 9:1. The three temperatures chosen are 40°C, 55°C, and 65°C. It was observed that about 90% conversion of oil to ester was complete within 30 minutes after which the reaction rate decreased. The duration of reaction time was taken as two hours to ensure a complete reaction, and the time for the responses was standardized as two hours for all thesamples.

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