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# Study of biodiesel to develop maximum yield

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## ABSTRACT

***In current globalization era, there in exponential demand for fossil fuels, that's even getting worse with increasing population and urbanization. If the energy source is clean and renewable, it will reduce the environmental trouble as well. Scientists suggest for future as a current fuel because that have enlisted the properties of biodiesel prepared non-edible oils are very close to commercial diesel. A possible solution to this problem is to replace or find renewable and economically feasible fuel as an alternative source. Already a lot of work for the source which fulfills the criteria of sustainability and economically carried out. But the waste is critical issues. So, characterization and formation of biodiesel with zero waste is a prime objective.***

***Keywords:*** *Non-edible oil, Bio-diesel*

## 1. INTRODUCTION

The global energy crisis in recent years is due to a significant bottleneck in the supply of energy resources to an economy. The best option, fulfilling both criteria - the biofuel - that extracted from abundantly available biomass resources. Biodiesel is a non-toxic, Sulphur-free, biodegradable, oxygenated and environment-friendly alternate diesel source. Biodiesel fuel is made through - transesterification. This procedure includes expelling the glycerin from the non-edible oil or fat. Amid the procedure, byproducts are methyl esters and glycerin. So, to reduce and form zero waste in the process is objective. In most recent few decades, critical endeavors have been made by scientists to utilize distinctive sources demonstrated the utilization of straight non-edible oils is confined by some troublesome physical properties, especially their thickness. Because of higher thickness, the straight non-edible oil causes poor fuel atomization, fragmented ignition and carbon statement on the injector and valve seats bringing about genuine motor fouling. One possible method to overcome the problem of higher viscosity is blending of non-edible oil with diesel in proper proportion, and the other method is transesterification of oils to produce biodiesel.

**Transesterification**

This process involves removing the glycerin from the non-edible oil or fat. In which byproducts left behind includes methyl esters and glycerin. So, to reduce and form zero effluent in the process is objective.

## 2. MATERIALS AND METHODOLOGY

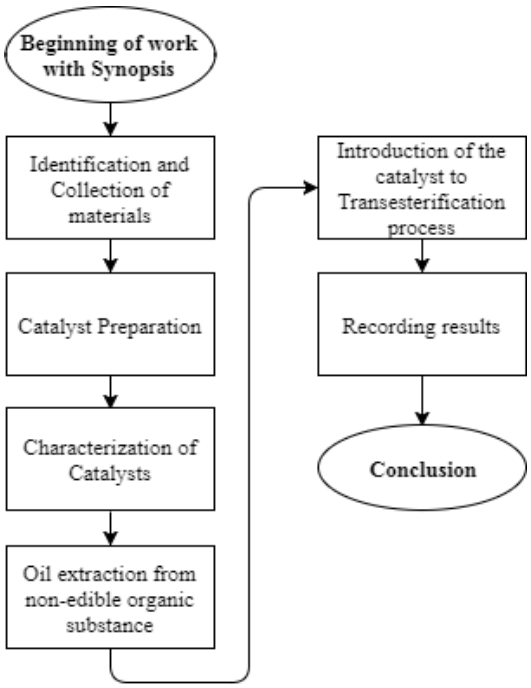



**Fig. 1: Process Flowchart [4]**

### 2.1 Step I: feedstock pre-treatment

The chicken waste pieces which is collected by locally supplied poultry waste. Heated 70-80 $^0$C for oil extraction on occasionally stirring for 2 hr. to complete liquefaction. That oil is used for the preparation of biodiesel.

### 2.2 Step II: Esterification

After extraction of oil, esterification reaction is carried out for reduction of fat by adding 10 % alcohol ($CH_3OH$) and 1% acid ($H_2SO_4$).

### 2.3 Step III: Transesterification

In natural science, transesterification is the way toward trading the natural gathering R″ of an ester with the natural gathering R′ of a liquor. These responses are frequently catalyzed by the expansion of a corrosive or base impetus. [18] The response can likewise be expert with the assistance of proteins (biocatalysts)

especially lipases. In transesterification by introducing heterogeneous catalyst and 10% alcohol reduces the wastage of prepared biodiesel so that maximum yield with zero waste can be achieved.

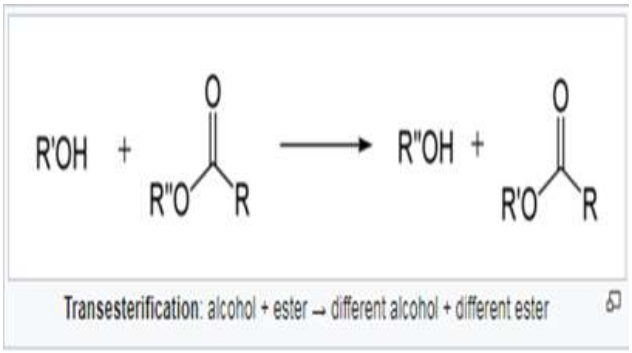



**Fig. 2: Transesterification [11]**

### 2.4 Step IV: Proportional study for maximum yield

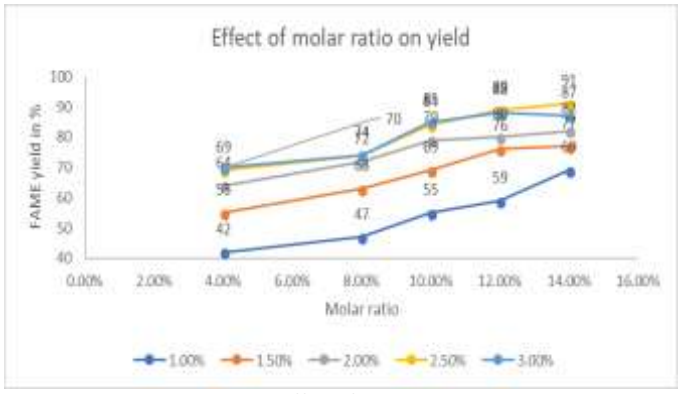
By taking a number of reactions of the sample with changing A various parameter like molar ratio, the percentage of catalyst, temperature, time, stirring.

### 2.5 Step V: Product purification

Products of the reaction include not only biodiesel, but also byproducts, catalyst, glycerol, excess alcohol, and trace amounts of water. All these byproducts must be removed to meet the standards, but the order of removal is process-dependent. The thickness of glycerol is more prominent than that of biodiesel, and this property contrast is misused to isolate the greater part of the glycerol coproduct. [5] Residual methanol is typically recovered by distillation and reused. Soaps can be removed or converted into acids. Residual water is also removed from the fuel.

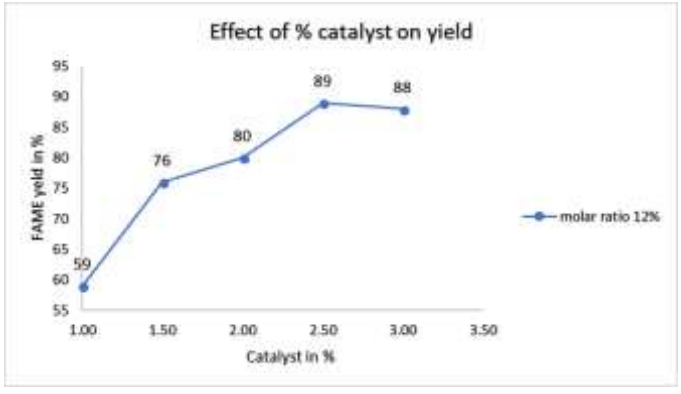
## 3. RESULT

### 3.1 Effect of molar ratio



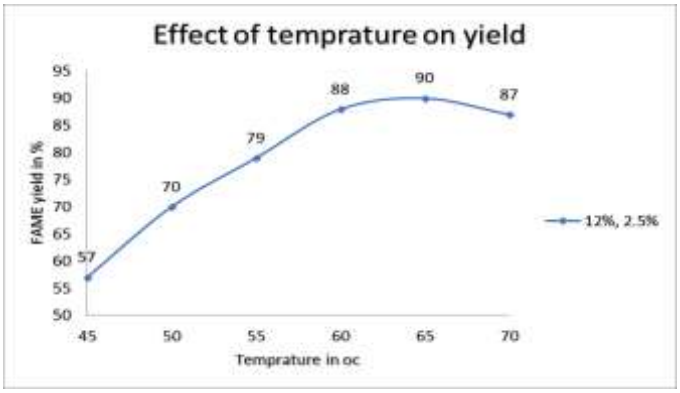

**Graph 1: Effect of molar ratio on yield**

### 3.2 Effect of % catalyst on yield



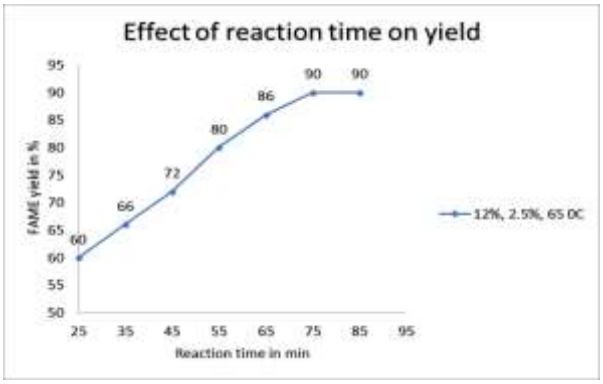

**Graph 2: Effect of % catalyst on yield**

### 3. Effect of temperature



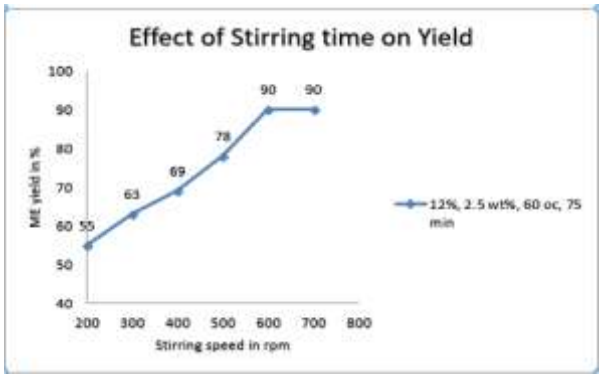

**Graph 3: Effect of Temperature on yield**

### 4. Effect of reaction time on yield




**Graph 4: Effect of reaction time on yield**

### 5. Effect of stirring time on yield




**Graph 5: Effect of Stirring time on yield**

## 4. CONCLUSION

The main objective of this work is to achieve high conversion of main product that is biodiesel and least of glycerin which is a by-product, using transesterification reaction.

The practical trials of biodiesel production will be carried out to get maximum biodiesel conversion from the respected feedstock. The factors those are responsible for high yield (catalyst percentage, alcohol to oil molar ratio, time of reaction, temperature of reaction, stirring speed of reaction etc.) will be studied separately and also Properties of prepared biodiesel (density, calorific value, viscosity, moisture, flash point, fire point etc.) because of this study we found maximum yield with zero waste

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## 5. REFERENCES


[1] BK Venkanna, C Venkataramana Reddy - "Performance, Emission and Combustion Characteristics of Direct Injection Diesel Engine Running On Calophyllum Inophyllum Linn (Honne) Oil", International Journal Agric & Biol Engineering, 26 March 2011, Vol. 4 No.1, http://www.ijabe.org

[2] Ma F, Hanna MA. Biodiesel production: a review. Bioresource Technol 1999; 70:1–15.

[3] Peterson CL, Reece DL, Hammond DL, Cruz R, Thompson JA. Comparison of ethyl and methyl esters of bio-oils as diesel fuel substitute. Proceeding of Alternate Energy Conference, ASAE1992:99-110.

[4] Masjuki HH, Kalam MA, Maleque MA, Kubo A, Nonaka T. Performance, emissions and wear characteristics of an indirect injection diesel engine using coconut oil blended fuel. In: Proc Instn Mech Engrs D 2000, vol. 215, p. 393 404.

[5] Ramadhas AS, Muraleedharan C, Jayaraj S. - Performance and emission evaluation of a diesel engine fueled with methyl esters of rubber seed oil. Renew Energy 2005;20:1–12.

[6] Wagner LE, Clark SJ, Scrock MD. Effects of soybean oil esters on the performance, lubricating oil, and wear of diesel engines. SAE 1984: paper no. 841385.

[7] Heywood JB. Internal combustion engine fundamentals. McGraw Hill; 1988. p.491-667.

[8] Ryan TW, Bagby MO. Identification of chemical changes occurring during the transient injection of selected bio-oils. SAE 1993: paper no. 930933

[9] C. Srinidhi, S. V. Channapattana, J.A. hole, A.A.Pawar, P.G.Kamble " Investigation On Performance and Emission Characteristics Of C.I. Engine Fuelled With Honne Oil Methyl Ester" International Journal of Engineering Science Invention, Volume 3 Issue, May 2014, PP.59-66.

[10] Rahul Krishnaji Bawane, SV Chanapattana, Abhay A. Pawar, " Performance Test of CI Engine fueled with Undi Oil Biodiesel under Variation in Blend Proportion, Compression Ratio & Engine Load" International Journal of Science, Engineering, and Technology Research (IJSETR), Volume 3, Issue 8, August 2014.

[11] Komal D Pawar, Sagar M Gawande, Dhiraj V Godase (April 2016) "Experimental Parametric Study of Biodiesel to Develop Economic Zero Effluent Discharge (ZED) for Diesel System" International Journal of Advanced Engineering, Management and Science (IJAEMS) [Vol-2, Issue-4, April- 2016]


 