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ANALYSIS OF BIODIESEL PRODUCTION FROM KARANJA OIL AND ITS QUALITY CHECK

Sunil Dhingra
Assistant professor, Mechanical Engineering Department, UIET, Kurukshetra University, Kurukshetra, Haryana, India-136118

ABSTRACT

The non-edible oils are used for so many years for the production of biodiesel. The present work deals with ethanolysis of karanja oil through trans-esterification process. Magnetic stirrer and water bath are used for production of biodiesel. It has been observed that various physical and chemical properties are within the range of ASTM standards of biodiesel.

KEYWORDS: *Karanja biodiesel, Trans-esterification, Magnetic stirrer*

The alternate fuels for diesel engines are in demand now a day's. Various researchers (Anubhaya et al. 2013, Azcan & Danisman, A. 2007, Bouaid et al. 2007, El Boulifi et al. 2010, Hameed et al. 2009, Kaieda et al. 2001) used trans-esterification process for the production of biodiesel. The procedure of the biodiesel production is discussed in detail. A magnetic stirrer is used for the production of biodiesel. The specifications of the magnetic stirrer are mentioned in table 1. The magnetic stirrer uses a rotating magnetic field to cause a magnetic capsule (or stir bar) immersed in a solution to spin at high speed, thus stirring the solution. A digital tachometer is used to measure rpm of the stirrer. The magnetic capsules are usually Teflon coated to prevent contamination of the solution.

Table 1: Specifications of magnetic stirrer

S. No.	Specifications	Values/Range
1.	Maximum stirring volume	0-2000 ml
2.	Stirring speed range	0-1250 rpm
3.	Top plate size	135 mm×135 mm
4.	Panel material	Steel
5.	Temperature	Rt. to 100° C
6.	Accuracy	±1°C
7.	Stirring bar's dimensions	30 (L)×Dia.7mm
8.	Power requirements	220 VAC/50Hz
9.	Dimensions	230×180×120
10.	Weight	2.7 kg

Figure 1: Water bath

Kranja biodiesel is produced by trans-esterification process using a magnetic stirrer. Initially ethanol and catalyst (KOH) are properly mixed in a reaction vessel using magnetic stirrer. Karanja oil and mixture of ethanol & KOH are charged into another vessel and are mixed using the same magnetic stirrer. The time period of mixing of oil-ethanol-KOH solution is noted as mixing time. A digital stop watch is used to measure the time. The oil-ethanol-KOH solution is then placed in a water bath at a particular temperature till two layers of biodiesel and glycerol were formed. The water bath temperature is controlled with the help of a 1500 watt electric heater. The condenser space is provided in the water bath to evaporate ethanol left during the reaction. The water bath used is shown in figure 1. The reaction products i.e biodiesel and glycerol are finally separated using separating funnel. The time of separation is called settling time. Settling time added to mixing time gives the reaction time. The comparison chart of phsio-chemical properties of karanja oil, its produced biodiesel, high speed diesel and ASTM standards is drawn in order to check the quality of the karanja biodiesel. All the properties of karanja biodiesel are found to be closer to high speed diesel and ASTM standards of biodiesel

CONCLUSION

Karanja bidiesel is successfully obtained from trans-esterification process by the use of magnetic stirrer with capsule and a water bath.

Table 1: Comparison chart of karanja oil and its produced biodiesel with high speed diesel and American standards of biodiesel

Property	karanja		HSD	Standards
	Oil	Biodiesel		ASTM (6751- 02)
Kinematic viscosity (mm^2/s)	27.85	4.37	2.60	1.9 - 6.0
Calorific value (kJ/kg)	41000	42133	42000	39000 – 43000
Cetane number	56	48	50	47
Density (kg/m^3)	870	883	850	850 – 879
Cloud point (˚C)	4	14.6	8.5	5-12
Pour point (˚C)	3.8	5.1	4	3-5
Flash Point (˚C)	205	126	68	130
Specific gravity	0.925	0.90	0.90	0.85 - 0.94
Iodine value	86	105	-	85 – 115
Saponification value	194	176	-	180 – 185
Moisture content (wt. %)	0.09	.06	-	0.05 % max.

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