

ABSTRACT

An overview on biodiesel as an alternate for diesel fuel and introducing a provide sample for Iran condition

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Biodiesel fuels have been the focus of much discussion and research as of late. This focus has been brought by continued environmental and energy dependency concerns. The history of biodiesel is more political and economical than technological. Biodiesel is a diesel substitute made from organic stock such as soybean , rapeseed , sunflower and animal tallow. The oils from these sources are put through a process called ‘ Transesterification ‘. In this process the three fatty acid groups trihydric alcohol glycerol are replaced with three methyl alcohol groups. It purifies the oil , removing the fatty particles that cause coking and other problem in a diesel engine. Biodiesel contains no nitrogen and typically contains low sulfur. It contain oxygen which accounts for its slightly lower heating value and characteristically low CO , CO₂ and PM emission and caused to reduce greenhouse gasses.

The first time in Iran in order to study of using biodiesel in a CI engine rapeseed methyl ester (RME) was used. It made by transesterification of rape oil with methyl alcohol in presence of KOH as catalyst and in medium_high temperature method. High performance liquid gas chromatography (HPLC) shows that %91.6 of oil was converted during the reaction . Fuel tests were done at laboratory of Shazand oil refinery company in Arak .

Different blends of RME and diesel fuel was made and used in a one cylinder DI engine that made by Sane Co. in Tabrize in order to compare performance characteristics. Motor was coupled with a Froud absorption dynamometer DPX model. The short-term engine performance test based on SAE-1349 and brake power, torque, fuel consumption, brake specific fuel consumption, thermal power and thermal brake efficiency were measured. Tests indicated that brake power and torque of net RME are %21.94 and %22.47 lower than conventional diesel fuel in Iran respectively. Lower fuel delivery by fuel system because of highest viscosity of net RME cause to reduced fuel consumption and also thermal power related to diesel fuel by %29.43 and %34.23 respectively . The performance of blend with 25% RME was similar to net diesel. Now two researches are doing about optimization of process method to reduce total costs and emissions of RME.

Key Words : Biodiesel , Renewable fuel , Fuel property

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Compare of diesel fuel and RME properties [Tested by author]

<u>Fuel Property</u>	<u>Diesel</u>	<u>RME</u>
Specific Gravity @ 15°C , gr/cm³	0.850	0.882
Kin. Viscosity @ 40°C , Cst.	4.1	4.7
Distillation Range , °C	160-380	235-410
Heating Value , Mj/kg	42.3	39.0
Cetane number	50.5	58.8
Flash Point , °C	60	162
Cloud Point , °C	0	-3
Pour Point , °C	-3	-7
Sulfur Content , wt%	0.08	0.008
Ash , wt%	0.01	0.005
Conradson Index , wt%	0.025	0.02
Acidity , Mg KOH/ gr	0.04	0.1
Water Content , ppm	114	442