

EMISSION AND PERFORMANCE CHARACTERISTICS OF JATROPHA ETHYL ESTER BLENDS WITH DIESEL FUEL IN A C.I. ENGINE

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ABSTRACT

A technique to produce biodiesel from crude *Jatropha curcas* seed oil having high free fatty acids (7% FFA) has been developed. The two step process was carried out to produce biodiesel from crude *Jatropha curcas* oil. The pretreatment process was carried out to reduce the free fatty acid content by ($\leq 2\%$) acid catalyzed esterification. The optimum reaction conditions for esterification were reported to be 5% H_2SO_4 , 20% ethanol and 1 hr reaction time at temperature of $65^\circ C$. The pretreatment process reduced the free fatty acid of oil from 7% to 1.85%. In second process, alkali catalysed transesterification of pretreated oil was carried and the effects of the varying concentrations of KOH and ethanol: oil ratios on percent ester recovery were investigated. The optimum reaction conditions for transesterification were reported to be 3% KOH (w/v of oil) and 30% (v/v) ethanol: oil ratio and reaction time 2 hrs at $65^\circ C$. The maximum percent recovery of ethyl ester was reported to be 60.33%. After that the experimental work has been carried out to analyze the emission and performance characteristics of a single cylinder 3.73 kW, compression ignition engine fuelled with *Jatropha* ethyl ester blends with diesel fuel at an compression ratio of 16.5:1. The fuel samples were prepared by blending *jatropha* ethyl ester with diesel in the composition of 0:100, 10:90, 20:80, 30:70 and 40:60%. The performance parameters evaluated were break thermal efficiency, break specific energy consumption (BSEC), exhaust gas temperature and the emissions measured were carbon monoxide (CO) and oxides of nitrogen (NO_x).

KEYWORDS : Diesel Engine, Engine Performance, Exhausts Emissions, Free Fatty Acid, *Jatropha Curcas* Oil, *Jatropha* Ethyl Ester, Tranesterification, KOH.