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KARNATAKA STATE BIOFUEL DEVELOPMENT BOARD

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"COMMERCIALIZATION OF BIODIESEL PRODUCTION FROM NON-EDIBLE OIL SEEDS USING MIXED BASE CATALYST AND PERFORMANCE STUDY ON CI ENGINE"

MASTER OF TECHNOLOGY

In

THERMAL POWER ENGINEERING

Submittedby

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ABSTRACT

The increasing industrialization and motorization of the world has led to a steep rise for the demand of petroleum-based fuels. Petroleum-based fuels are obtained from limited reserves. These finite reserves are highly concentrated in certain regions of the world. Therefore, those countries not having these resources are facing energy/foreign exchange crisis, mainly due to the import of crude petroleum. Hence, it is necessary to look for alternative fuels which can be produced from resources available locally within the country such as alcohol, biodiesel, vegetable oils etc.

Biodiesel is a fatty acid alkyl ester which is renewable, biodegradable and non toxic fuel which can be derived from any edible & non edible oil by transesterification process. One of the popularly used non edible biodiesel in India is simarouba, karanja and Mahua oil methyl ester . In the present investigation, simarouba, karanja and Mahua oil based methyl ester (biodiesel) is produced by using mixture of Sodium hydroxide and Disodium ortho Phospahte, a mixed base catalyst by transesterification process. The properties of SOME thus obtained are comparable with ASTM biodiesel standards. The produced SOME, KOME and MOME is blended with petro-diesel were tested for their use as a substitute fuel for petro-diesel engine.

Experiments were conducted for Injection pressure (IP) of 200bar, keeping compression ratio (CR) of 17:1 as constant to study the performance and emission characteristics of a TAF-1, Kirloskar make, direct injection, Four Stroke single cylinder petro-diesel engine using blends of (Simarouba Biodiesel-B10, B20, B30 and B100, Karanja Biodiesel: B10, B20, B30, B40, B50 and Mauha Biodiesel: B15, B25, B35, B45, B100) respectively. Thus acquired data were analyzed for various parameters such as brake thermal efficiency, brake specific fuel consumption; exhaust gas temperature, Carbon monoxide (CO), hydrocarbon (HC), carbon dioxide (CO_2) and nitrous oxide (NOx) emissions against varying Load. Engine performance test showed that brake thermal efficiency for 30% biodiesel blend was found to be 8% lower than petro-diesel in case of 200bar IP. Emission characteristics of CO, HC and CO_2 were found lower with all biodiesel blends and oxides of nitrogen were slightly higher for all biodiesel blends at rated load as compared to petro-diesel.