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# THERMAL SCIENCE

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### COMBUSTION AND EMISSION CHARACTERISTICS OF DIESEL ENGINE FUELLED WITH RICE BRAN OIL METHYL ESTER AND ITS DIESEL BLENDS

#### ABSTRACT

There has been a worldwide interest in searching for alternatives to petroleum-derived fuels due to their depletion as well as due to the concern for the environment. Vegetable oils have capability to solve this problem because they are renewable and lead to reduction in environmental pollution. The direct use of vegetable oils as a diesel engine fuel is possible but not preferable because of their extremely higher viscosity, strong tendency to polymerize and bad cold start properties. On the other hand, Biodiesels, which are derived from vegetable oils, have been recently recognized as a potential alternative to diesel oil. This study deals with the analysis of rice bran oil methyl ester (RBME) as a diesel fuel. RBME is derived through the transesterification process, in which the rice bran oil reacts with methanol in the presence of KOH. The properties of RBME thus obtained are comparable with ASTM biodiesel standards. Tests are conducted on a 4.4 kW, single-cylinder, naturally aspirated, direct-injection air-cooled stationary diesel engine to evaluate the feasibility of RBME and its diesel blends as alternate fuels. The ignition delay and peak heat release for RBME and its diesel blends are found to be lower than that of diesel and the ignition delay decreases with increase in RBME in the blend. Maximum heat release is found to occur earlier for RBME and its diesel blends than diesel. As the amount of RBME in the blend increases the HC, CO, and soot concentrations in the exhaust decreased when compared to mineral diesel. The NOx emissions of the RBME and its diesel blends are noted to be slightly higher than that of diesel.

#### KEYWORDS

diesel engine, biodiesel, performance, emission, combustion, rice bran methyl ester

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