

Effects of Low Proportion Palm Fatty Acids Methyl Ester Blends on the Performance and Combustion of Marine Diesel Engine

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Shipping activities are major contributors to air pollution at sea which mostly occur as a result of ships exhaust emissions. Stringent emission limits imposed by the International Maritime Organization (IMO) and concerns about the depletion of fossil fuel reserves have hastened the need to find new alternative fuels for marine engines. This study investigates the effects of a low proportion of palm fatty acid methyl ester (PFAME) biodiesel which is renewable and environmentally friendly fuel on marine diesel engines performance and combustion characteristics. The results revealed the use of PFAME biodiesel blends reduces the harmful gases emission CO₂ and NO_x emission up to 9.1% and 7.8%, respectively. Oxygen elements in biodiesel has contributed to increase peak in-cylinder pressure and heat release rate up to 2.7% and 4.5% respectively, thereby promoting complete combustion. Besides that, the brake specific fuel consumption raised by 18.8% at higher engine speeds. This finding suggests that a low concentration of PFAME biodiesel is suitable for use in marine diesel engines without engine modification, thereby providing a positive benefit to the environment in terms of lower emission of toxic gases.

Keywords: Palm Fatty Acids Methyl Ester, Biodiesel, Marine Diesel Engine, Engine Performance, Exhaust Emissions, Combustion Characteristics.