

Impact of diesel-biodiesel-hexanol tri-fuel blends on the combustion and exhaust emissions characteristics of a diesel engine

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Abstract.

The purpose of this study is to investigate the impact of diesel-biodiesel-hexanol trifuel blends on combustion and exhaust emissions characteristics of a diesel engine. The presence of a hexanol (C₆H₁₃OH) in tri-fuel blends helps to increase the oxygen content in combustion phase. The experimental tests were performed with YANMAR TF120M single-cylinder, directinjection diesel engine. The results of tri-fuel blends were investigated and compared with diesel fuel (DF) and neat biodiesel (B100). The engine was run at varying engine loads 0%, 25%, 50%, 75%, and 100% at constant engine speed 1800 rpm. DF and palm oil methyl-ester (POME) were dispersed in 5%, 10%, and 15% hexanol, which were formed as tri-fuel blends. The blending process of tri-fuel blends used ultrasonic emulsifier with cycle 0.5 and an amplitude of 70%, within 2 minutes. Compared to DF, the results reveal the in-cylinder pressure of B100, HE5, HE10, and HE15, were reduced by 2.23%, 1.95%, 2.19%, and 2.00%, respectively at 50% engine load. Furthermore, the heat release rate at 50% engine load for HE15 was increased by 6.42%, gives the highest combustion efficiency. CO, CO₂ and NO_x emissions were decreased by 7.06%, 12.20%, and 22.85% for HE15 at 75% engine load. This study concluded that HE15 fuel blend shows positive impacts in combustion and emissions characteristics of a diesel engine.