

Performance evaluation of *Nannochloropsis oculata*–carbon nanoparticle blend as fuel in compression ignition engine

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Abstract

In this study, multiwalled carbon nanotubes (MWCNTs) were used as a property improvers for fuel obtained from *Nannochloropsis oculata* for application in a compression ignition engine. The engine's performance was monitored in accordance with its newly induced characteristics. The fixed biodiesel ratio was blended with different proportions of MWCNTs. The nanotubes were ultrasonicated with the biodiesel in different doses of 50,75, 100 and 150 ppm, respectively, and the resulting fuels were subjected to performance tests as compared with conventional diesel-fuel in a Yanmar Model-TF120M diesel engine. It was observed that cylinder pressure and heat release rates were higher under full load condition as compared with those obtained for the diesel fuel. Furthermore, the results compared favorably for both fuels in terms of combustion, emissions and engine performance. The brake thermal efficiency of the blended fuel improved by 2.72, 2.81, 3.07 and 2.24% for BC-50, BC-75, BC-100 and BC-150 as compared with that of diesel fuel. The release of CO₂, NO_x, hydrocarbons and carbon monoxide decreased in favor of the blends. From the analysis, a dosing level of 100 ppm MWCNTs in the biofuel is recommended for best engine performance and combustion, with optimal emission reduction. © 2021 Society of Chemical Industry and John Wiley & Sons, Ltd