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COMPATIBILITY STUDY ON CALOPHYLLUM INOPHYLLUM METHYL ESTER BIODIESEL AS ALTERNATIVE FUEL FOR IC ENGINES

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Abstract

Researchers have been working on alternative and practical solutions for more than a decade in light of the depletion of traditional fuels and environmental pollution. The objective of the present work is to analyze the suitability of *Calophyllum inophyllum* (CI) seed oil for IC engines based on thermal performance and emission characteristics. The oil is extracted mechanically from *Calophyllum inophyllum* seed and processed using the trans-esterification method. The processed oil is blended with conventional diesel at various volume concentrations of 5%, 10%, 15%, 20%, 25%, and 30% respectively. Additionally, 2% of CaO nanoparticles are added as a catalyst to absorb the toxic gases. The investigation is carried out in a single-cylinder diesel engine under various loading conditions to estimate the Brake-specific fuel consumption (BSFC), brake thermal efficiency (BTE), and mechanical efficiency (ME). The levels of carbon monoxide (CO), unburned hydrocarbon (UHC), smoke opacity (SO), and NO_x emissions are evaluated. The final results proved an optimized volume concentration of 25% blend oil, where the BTE is achieved 94% of diesel fuel. Also, the BSFC, UHC, CO, and SO are 5.8%, 28.5%, 68.5%, and 37.77% more respectively. The addition of CaO has reduced 17.6% of the NO_x levels and the same is causing oxidation issues. The scope of this study is to improve the thermal efficiency concern with the combustion parameters using a computerized test rig and practically monitor the engine performance.

Key words: biodiesel, *Calophyllum inophyllum*, emission, performance, properties

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