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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 Calophylluminophyllum (CI) seed oil for IC engines based on thermal performance and emission characteristics. The oil is extracted mechanically from Calophylluminophyllum 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 level of carbon monoxide (CO), unburned hydrocarbon (UHC), smoke opacity (SO), and NOx 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 NOx level and the same is inducing the oxidation issues. The scope of this study is to improvise the thermal efficiency concern with the combustion parameters using a computerized test rig and practically monitor the engine performance.

Key words: biodiesel, Calophylluminophyllum, emission, performance, properties

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