Effect of Additivized Biodiesel Blends on Diesel Engine Performance, Emission, Tribological Characteristics, and Lubricant Tribology

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ENERGIES
Volume: 13 **Issue:** 13
Article Number: 3375
DOI: 10.3390/en13133375
Published: JUL 2020
Document Type: Article
View Journal Impact

Abstract

This research work focuses on investigating the lubricity and analyzing the engine characteristics of diesel-biodiesel blends with fuel additives (titanium dioxide (TiO2) and dimethyl carbonate (DMC)) and their effect on the tribological properties of a mineral lubricant. A blend of palm-sesame oil was used to produce biodiesel using ultrasound-assisted transesterification. B30 (30% biodiesel + 70% diesel) fuel was selected as the base fuel. The additives used in the current study to prepare ternary fuel blends were TiO(2)and DMC. B30 + TiO(2)showed a significant reduction of 6.72% in the coefficient of friction (COF) compared to B30. B10 (Malaysian commercial diesel) exhibited very poor lubricity and COF among all tested fuels. Both ternary fuel blends showed a promising reduction in wear rate. All contaminated lubricant samples showed an increment in COF due to the dilution of combustible fuels. Lub + B10 (lubricant + B10) showed the highest increment of 42.29% in COF among all contaminated lubricant samples. B30 + TiO(2)showed the maximum reduction (6.76%) in brake-specific fuel consumption (BSFC). B30 + DMC showed the maximum increment (8.01%) in brake thermal efficiency (BTE). B30 + DMC exhibited a considerable decline of 32.09% and 25.4% in CO and HC emissions, respectively. The B30 + TiO(2)fuel blend showed better lubricity and a significant improvement in engine characteristics.

Keywords

Author Keywords: high frequeny reciprocating rig; palm-sesame biodiesel; nanoparticle additives; four-ball tribo tester; engine characteristics; tribological characteristics

KeyWords Plus: CALOPHYLLUM-INOPHYLLUM BIODIESEL; CEIBA-PENTANDRA OIL; N-BUTANOL; WEAR CHARACTERISTICS; TIO2 NANOPARTICLES; PALM BIODIESEL; COMBUSTION; OPTIMIZATION; BEHAVIOR; IMPACT

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Funding

Funding Agency	Grant Number
UNIVERSITY OF MALAYA under the FRGS from the University of Malaya, Kuala Lumpur, Malaysia	FP142-2019A
HEC ISLAMABAD, PAKISTAN	5-1/HRD/UESTPI (Batch-VI)/4954/2018/HEC

View funding text

Publisher

MDPI, ST ALBAN-ANLAGE 66, CH-4052 BASEL, SWITZERLAND

Categories / Classification

Research Areas: Energy & Fuels

Web of Science Categories: Energy & Fuels

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