Effect of alcoholic and nano-particles additives on tribological properties of diesel-palm-sesame-biodiesel blends

By: Mujtaba, MA (Mujtaba, M. A.) [1, 2]; Cho, HM (Cho, Haeng Muk) [3]; Masjuki, HH (Masjuki, H. H.) [1, 4]; Kalam, MA (Kalam, M. A.) [1]; Farooq, M (Farooq, M.) [2]; Soudagar, MEM (Soudagar, Manzoore Elahi M.) [1]; Gul, M (Gul, M.) [1, 5]; Ahmed, W (Ahmed, Waqar) [6]; Afzal, A (Afzal, Asif) [7, 8]; Bashir, S (Bashir, Shahid) [9]; ...More

View Web of Science ResearcherID and ORCID (provided by Clarivate)

ENERGY REPORTS

Volume: 7 **Page:** 1162-1171

DOI: 10.1016/j.egyr.2020.12.009

Published: NOV 2021

engine. Palm-sesame oil blend was used to produce biodiesel using the ultrasound-assisted technique. B30 fuel sample as a base fuel was blended with fuel additives in different proportions prior to tribological behavior analysis. The lubricity of fuel samples measured using HFRR in accordance with the standard method ASTM D6079. All tested fuels' Tribological behavior examined through worn steel balls and plates using scanning electron microscopy (SEM) to assess wear scar diameter and surface morphology. During the test run, the friction coefficient was measured directly by the HFRR tribometer system. The results exhibited that B10 (diesel) had a very poor coefficient of friction and wear scar diameter, among other tested fuels. The addition of oxygenated alcohol (ethanol) as a fuel additive in the B30 fuel sample decreased the lubricity of fuel and increased the wear and friction coefficient, among other fuel additives. B30 with DMC showed the least wear scar diameter among all tested fuels. B30 with nanoparticle TiO2 exhibited the best results with the least wear scar diameter and lowest friction coefficient among all other fuel samples. B30+DMC demonstrated significant improvement in engine performance (BTE) and carbon emissions compared to different tested samples. B30+TiO2 also showed considerable improvement in engine characteristics. (C) 2020 The Author(s). Published by Elsevier Ltd.

Keywords

Author Keywords: Lubricity; Nanoparticles; Oxygenated alcohols; HFRR; Wear and Friction; Palm-sesame biodiesel
Keywords Plus: WEAR CHARACTERISTICS; N-BUTANOL; EMISSION CHARACTERISTICS; LUBRICATION PROPERTIES; ENGINE PERFORMANCE; METHYL-ESTER; FUEL BLENDS; LUBRICITY; ETHANOL ; TIO2

Author Information

Corresponding Address: Mujtaba, M. A. (corresponding author)
Univ Malaya, Ctr Energy Sci, Dept Mech Engn, Kuala Lumpur 50603, Malaysia
Corresponding Address: Cho, Haeng Muk (corresponding author)
Kongju Natl Univ, Div Mech Engn & Automot Engn, 276 Budae Dong, Cheonan 330717, Chungnam, South Korea
Addresses:
[1] Univ Malaya, Ctr Energy Sci, Dept Mech Engn, Kuala Lumpur 50603, Malaysia
[2] Univ Engn & Technol, Dept Mech Engn, New Campus Lahore, Lahore, Pakistan
Affiliation
University of Engineering & Technology Lahore
[3] Kongju Natl Univ, Div Mech Engn & Automot Engn, 276 Budae Dong, Cheonan 330717, Chungnam, South Korea
[4] IIUM, Dept Mech Engn, Fac Engn, Kuala Lumpur 50728, Malaysia
[5] Bahauddin Zakariya Univ, Fac Engn & Technol, Dept Mech Engn, Multan 60000, Pakistan
...more addresses

E-mail Addresses: m.mujtaba@uet.edu.pk; haengmukcho@hanmail.net; kalam@um.edu.my

Categories/Classification

Research Areas: Energy & Fuels

Funding

Funding agency	Grant number	Hide All Details
National Research Foundation of Korea (NRF) - Korea government (MSIT)	NRF-2019R1A2C1010557	
Universiti Malaya	GPF018A-2019	Hide details

Appeared in source as: University of Malaya

View funding text

Document Information

Language: English
Accession Number: WOS:000701691800010
ISSN: 2352-4847

Other Information

IDS Number: UY7IA

emissions
FUEL

Mat, SC; Idroas, MY; Zainal, ZA; et al.
Performance and emissions of straight vegetable oils and its blends as a fuel in diesel engine: A review
RENEWABLE & SUSTAINABLE ENERGY REVIEWS

See all

Most Recently Cited by

Mujtaba, MA; Kalam, MA; Ong, HC; et al.
Development of empirical correlations for density and viscosity estimation of ternary biodiesel blends
RENEWABLE ENERGY

Dey, S; Reang, NM; Das, PK; et al.
Experimental investigation on combustion-performance-emission characteristics of nanoparticles added biodiesel blends and tribological behavior of contaminated lubricant in a diesel engine
ENERGY CONVERSION AND MANAGEMENT

See all

Use in Web of Science

Web of Science Usage Count

0	0
Last 180 Days	Since 2013

Learn more

This record is from:

Web of Science Core Collection

Science Citation Index Expanded (SCI-EXPANDED)

Suggest a correction

If you would like to improve the quality of the data in this record, please Suggest a correction

— See fewer data fields

Journal information

ENERGY REPORTS

ISSN: 2352-4847

Current Publisher: ELSEVIER, RADARWEG 29, 1043 NX AMSTERDAM, NETHERLANDS

Journal Impact Factor: Journal Citation Report ™

Research Areas: Energy & Fuels

Web of Science Categories: Energy & Fuels

6.87

Journal Impact Factor ™

(2020)

61 Cited References

Showing 30 of 61 View as set of results

(from Web of Science Core Collection)