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Energies Open Access
Volume 13, Issue 13, July 2020, Article number 3375

Effect of additivized biodiesel blends on diesel engine performance, emission, tribological characteristics, and lubricant tribology (Article) (Open Access)

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Abstract

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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 TiO2 and DMC. B30 + TiO2 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 + TiO2 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 + TiO2 fuel blend showed better lubricity and a significant improvement in engine characteristics. © 2020 by the authors.

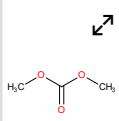
SciVal Topic Prominence

Topic: Fuel Tests | Diesel Engines | Exhaust Emission

Prominence percentile: 99.884

Chemistry database information

Substances



titanium oxide

titanium dioxide

Author keywords

Cited by 2 documents

Study of diesel engine characteristics by adding nanosized zinc oxide and diethyl ether additives in Mahua biodiesel–diesel fuel blend
Soudagar, M.E.M. , Banapurmath, N.R. , Afzal, A.
(2020) Scientific Reports

Enhancement in combustion, performance, and emission characteristics of a diesel engine fueled with Ce-ZnO nanoparticle additive added to soybean biodiesel blends
Hussain, F. , Soudagar, M.E.M. , Afzal, A.
(2020) Energies

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Mujtaba, M.A. , Kalam, M.A. , Masjuki, H.H.
(2020) Fuel

Enhancement in combustion, performance, and emission characteristics of a diesel engine fueled with Ce-ZnO nanoparticle

Engine characteristics | Four-ball tribo tester | High frequeny reciprocating rig | Nanoparticle additives | Palm-sesame biodiesel | Tribological characteristics

Indexed keywords

Engineering controlled terms: Biodiesel | Brakes | Diesel engines | Friction | Oxide minerals | Palm oil | Titanium dioxide | Tribology

Engineering uncontrolled terms: Brake specific fuel consumption | Brake thermal efficiency | Coefficient of frictions | Diesel engine performance | Dimethyl carbonate | Titanium dioxides (TiO2) | Tribological characteristics | Tribological properties

Engineering main heading: Fuel additives

Funding details

Funding sponsor	Funding number	Acronym
Universiti Malaya	5-1/HRD/UESTPI (Batch-VI)/4954/2018/HEC,FP142-2019A	UM

Funding text

Funding: The authors take the opportunity to thank the UNIVERSITY OF MALAYA for the financial support under research grant FP142-2019A under the FRGS from the University of Malaya, Kuala Lumpur, Malaysia, and HEC ISLAMABAD, PAKISTAN for supporting the research under Grant No. 5-1/HRD/UESTPI (Batch-VI)/4954/2018/HEC.

ISSN: 19961073
Source Type: Journal
Original language: English
DOI: 10.3390/en13133375
Document Type: Article
Publisher: MDPI AG

References (46)

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1 Rizwanul Fattah, I.M., Ong, H.C., Mahlia, T.M.I., Mofijur, M., Silitonga, A.S., Rahman, S.M.A., Ahmad, A.
State of the Art of Catalysts for Biodiesel Production (Open Access)

(2020) *Frontiers in Energy Research*, 8, art. no. 101. Cited 4 times.
http://www.frontiersin.org/Energy_Research/
doi: 10.3389/fenrg.2020.00101

View at Publisher

2 Ong, H.C., Milano, J., Silitonga, A.S., Hassan, M.H., Shamsuddin, A.H., Wang, C.-T., Indra Mahlia, T.M., (...), Sutrisno, J.
Biodiesel production from Calophyllum inophyllum-Ceiba pentandra oil mixture: Optimization and characterization

(2019) *Journal of Cleaner Production*, 219, pp. 183-198. Cited 58 times.
https://www.journals.elsevier.com/journal-of-cleaner-production
doi: 10.1016/j.jclepro.2019.02.048

View at Publisher

additive added to soybean biodiesel blends
Hussain, F. , Soudagar, M.E.M. , Afzal, A.
(2020) Energies

Ultrasound-assisted process optimization and tribological characteristics of biodiesel from palm-sesame oil via response surface methodology and extreme learning machine - Cuckoo search
Mujtaba, M.A. , Masjuki, H.H. , Kalam, M.A.
(2020) Renewable Energy

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3 Silitonga, A.S., Shamsuddin, A.H., Mahlia, T.M.I., Milano, J., Kusumo, F., Siswantoro, J., Dharma, S., (...), Ong, H.C.

Biodiesel synthesis from Ceiba pentandra oil by microwave irradiation-assisted transesterification: ELM modeling and optimization

(2020) *Renewable Energy*, 146, pp. 1278-1291. Cited 52 times.
http://www.journals.elsevier.com/renewable-and-sustainable-energy-reviews/
doi: 10.1016/j.renene.2019.07.065

View at Publisher

4 Ong, H.C., Masjuki, H.H., Mahlia, T.M.I., Silitonga, A.S., Chong, W.T., Yusaf, T.

Engine performance and emissions using Jatropha curcas, Ceiba pentandra and Calophyllum inophyllum biodiesel in a CI diesel engine

(2014) *Energy*, 69, pp. 427-445. Cited 161 times.
www.elsevier.com/inca/publications/store/4/8/3/
doi: 10.1016/j.energy.2014.03.035

View at Publisher

5 Gad, M.S., Jayaraj, S.

A comparative study on the effect of nano-additives on the performance and emissions of a diesel engine run on Jatropha biodiesel

(2020) *Fuel*, 267, art. no. 117168. Cited 11 times.
http://www.journals.elsevier.com/fuel/
doi: 10.1016/j.fuel.2020.117168

View at Publisher

6 Mahlia, T.M.I., Syazmi, Z.A.H.S., Mofijur, M., Abas, A.E.P., Bilad, M.R., Ong, H.C., Silitonga, A.S.

Patent landscape review on biodiesel production: Technology updates

(2020) *Renewable and Sustainable Energy Reviews*, 118, art. no. 109526. Cited 53 times.
https://www.journals.elsevier.com/renewable-and-sustainable-energy-reviews
doi: 10.1016/j.rser.2019.109526

View at Publisher

7 Silitonga, A.S., Masjuki, H.H., Mahlia, T.M.I., Ong, H.C., Chong, W.T., Boosroh, M.H.

Overview properties of biodiesel diesel blends from edible and non-edible feedstock

(2013) *Renewable and Sustainable Energy Reviews*, 22, pp. 346-360. Cited 167 times.
doi: 10.1016/j.rser.2013.01.055

View at Publisher

8 Imtenan, S., Masjuki, H.H., Varman, M., Rizwanul Fattah, I.M., Sajjad, H., Arbab, M.I.

Effect of n-butanol and diethyl ether as oxygenated additives on combustion-emission-performance characteristics of a multiple cylinder diesel engine fuelled with diesel-jatropha biodiesel blend

(2015) *Energy Conversion and Management*, 94, pp. 84-94. Cited 111 times.
doi: 10.1016/j.enconman.2015.01.047

View at Publisher

9 Rizwanul Fattah, I.M., Masjuki, H.H., Kalam, M.A., Wakil, M.A., Ashraful, A.M., Shahir, S.A.

Experimental investigation of performance and regulated emissions of a diesel engine with Calophyllum inophyllum biodiesel blends accompanied by oxidation inhibitors

(2014) *Energy Conversion and Management*, 83, pp. 232-240. Cited 117 times.
doi: 10.1016/j.enconman.2014.03.069

View at Publisher

10 Latiff, R.
(2020) *Malaysia to Implement B30 Biodiesel Mandate in Transport Sector before 2025*
Sarkar, H., Ed.; REUTERS: Putrajaya, Malaysia

11 Elisha, O., Fauzi, A., Anggraini, E.
Analysis of Production and Consumption of Palm-Oil Based Biofuel using System Dynamics Model: Case of Indonesia
(2019) *Int. J. Sci. Eng. Technol*, 6.
[CrossRef]

12 Coca, N.
(2020) *As Palm Oil for Biofuel Rises in Southeast Asia, Tropical Ecosystems Shrink*
Chinadialogue China: Beijing, China

13 Rizwanul Fattah, I.M., Masjuki, H.H., Kalam, M.A., Mofijur, M., Abedin, M.J.
Effect of antioxidant on the performance and emission characteristics of a diesel engine fueled with palm biodiesel blends

(2014) *Energy Conversion and Management*, 79, pp. 265-272. Cited 187 times.
doi: 10.1016/j.enconman.2013.12.024

View at Publisher

14 Mujtaba, M.A., Muk Cho, H., Masjuki, H.H., Kalam, M.A., Ong, H.C., Gul, M., Harith, M.H., (...), Yusoff, M.N.A.M.
Critical review on sesame seed oil and its methyl ester on cold flow and oxidation stability (Open Access)

(2020) *Energy Reports*, 6, pp. 40-54. Cited 9 times.
http://www.journals.elsevier.com/energy-reports/
doi: 10.1016/j.egyr.2019.11.160

View at Publisher

15 Mujtaba, M.A., Masjuki, H.H., Kalam, M.A., Ong, H.C., Gul, M., Farooq, M., Soudagar, M.E.M., (...), Yusoff, M.N.A.M.
Ultrasound-assisted process optimization and tribological characteristics of biodiesel from palm-sesame oil via response surface methodology and extreme learning machine - Cuckoo search

(2020) *Renewable Energy*, 158, pp. 202-214. Cited 4 times.
http://www.journals.elsevier.com/renewable-and-sustainable-energy-reviews/
doi: 10.1016/j.renene.2020.05.158

View at Publisher

16 Gul, M., Masjuki, H.H., Kalam, M.A., Zulkifli, N.W.M., Mujtaba, M.A.
A Review: Role of Fatty Acids Composition in Characterizing Potential Feedstock for Sustainable Green Lubricants by Advance Transesterification Process and its Global as Well as Pakistani Prospective

(2020) *Bioenergy Research*, 13 (1). Cited 6 times.
http://www.springer.com/life+sci/plant+sciences/journal/12155
doi: 10.1007/s12155-019-10040-7

View at Publisher

17 Lapuerta, M., García-Contreras, R., Agudelo, J.R.
Lubricity of ethanol-biodiesel-diesel fuel blends

(2010) *Energy and Fuels*, 24 (2), pp. 1374-1379. Cited 40 times.
doi: 10.1021/ef901082k

View at Publisher

18 Liaquat, A.M., Masjuki, H.H., Kalam, M.A., Rizwanul Fattah, I.M.
Impact of biodiesel blend on injector deposit formation

(2014) *Energy*, 72, pp. 813-823. Cited 39 times.
www.elsevier.com/inca/publications/store/4/8/3/
doi: 10.1016/j.energy.2014.06.006

View at Publisher

19 Dhar, A., Agarwal, A.K.
Experimental investigations of effect of Karanja biodiesel on tribological properties of lubricating oil in a compression ignition engine

(2014) *Fuel*, 130, pp. 112-119. Cited 25 times.
doi: 10.1016/j.fuel.2014.03.066

View at Publisher

20 Arumugam, S., Sriram, G.
Preliminary Study of Nano- and Microscale TiO_2 Additives on Tribological Behavior of Chemically Modified Rapeseed Oil

(2013) *Tribology Transactions*, 56 (5), pp. 797-805. Cited 37 times.
doi: 10.1080/10402004.2013.792977

View at Publisher

21 Agarwal, A.K.
Lubricating oil tribology of a biodiesel-fuelled compression ignition engine

(2003) *Proceedings of the Spring Technical Conference of the ASME Internal Combustion Engine Division*, pp. 751-765. Cited 2 times.
ISBN: 0791836789; 978-079183678-1
doi: 10.1115/ICES2003-0609

View at Publisher

22 Gul, M., Zulkifli, N.W.M., Masjuki, H.H., Kalam, M.A., Mujtaba, M.A., Harith, M.H., Syahir, A.Z., (...), Bari Farooq, A.
Effect of TMP-based-cottonseed oil-biolubricant blends on tribological behavior of cylinder liner-piston ring combinations

(2020) *Fuel*, 278, art. no. 118242.
http://www.journals.elsevier.com/fuel/
doi: 10.1016/j.fuel.2020.118242

View at Publisher

23 Maleque, M.A., Masjuki, H.H., Haseeb, A.S.M.A.
Effect of mechanical factors on tribological properties of palm oil methyl ester blended lubricant

(2000) *Wear*, 239 (1), pp. 117-125. Cited 123 times.
doi: 10.1016/S0043-1648(00)00319-7

View at Publisher

24 Sulek, M.W., Kulczycki, A., Malysa, A.
Assessment of lubricity of compositions of fuel oil with biocomponents derived from rape-seed

(2010) *Wear*, 268 (1), pp. 104-108. Cited 61 times.
doi: 10.1016/j.wear.2009.07.004

View at Publisher

25 Singh, Y., Singla, A., Upadhyay, A., Singh, A.K.
Sustainability of Moringa-oil–based biodiesel blended lubricant

(2017) *Energy Sources, Part A: Recovery, Utilization and Environmental Effects*, 39 (3), pp. 313-319. Cited 12 times.
http://www.tandf.co.uk/journals/titles/15567036.asp
doi: 10.1080/15567036.2016.1179360

View at Publisher

26 Arumugam, S., Sriram, G.
Effect of Bio-Lubricant and Biodiesel-Contaminated Lubricant on Tribological Behavior of Cylinder Liner-Piston Ring Combination

(2012) *Tribology Transactions*, 55 (4), pp. 438-445. Cited 58 times.
doi: 10.1080/10402004.2012.667517

View at Publisher

27 Mofijur, M., Kusumo, F., Rizwanul Fattah, I.M., Mahmudul, H.M., Rasul, M.G., Shamsuddin, A.H., Mahlia, T.M.I.
Resource recovery from waste coffee grounds using ultrasonic-assisted technology for bioenergy production (Open Access)

(2020) *Energies*, 13 (7), art. no. 1770. Cited 3 times.
https://www.mdpi.com/1996-1073/13/7/1770
doi: 10.3390/en13071770

View at Publisher

28 Mofijur, M., Masjuki, H.H., Kalam, M.A., Atabani, A.E., Fattah, I.M.R., Mobarak, H.M.
Comparative evaluation of performance and emission characteristics of Moringa oleifera and Palm oil based biodiesel in a diesel engine

(2014) *Industrial Crops and Products*, 53, pp. 78-84. Cited 137 times.
doi: 10.1016/j.indcrop.2013.12.011

View at Publisher

29 Murcak, A., Haşımoğlu, C., Çevik, I., Karabektas, M., Ergen, G.
Effects of ethanol-diesel blends to performance of a DI diesel engine for different injection timings

(2013) *Fuel*, 109, pp. 582-587. Cited 34 times.
http://www.journals.elsevier.com/fuel/
doi: 10.1016/j.fuel.2013.03.014

View at Publisher

30 Imtenan, S., Masjuki, H.H., Varman, M., Rizwanul Fattah, I.M.
Evaluation of n-butanol as an oxygenated additive to improve combustion-emission-performance characteristics of a diesel engine fuelled with a diesel-calophyllum inophyllum biodiesel blend

(2015) *RSC Advances*, 5 (22), pp. 17160-17170. Cited 29 times.
http://pubs.rsc.org/en/journals/journalissues
doi: 10.1039/c4ra15474f

View at Publisher

31 Nadeem, M., Rangkuti, C., Anuar, K., Haq, M.R.U., Tan, I.B., Shah, S.S.
Diesel engine performance and emission evaluation using emulsified fuels stabilized by conventional and gemini surfactants

(2006) *Fuel*, 85 (14-15), pp. 2111-2119. Cited 179 times.
doi: 10.1016/j.fuel.2006.03.013

View at Publisher

32 Khalife, E., Tabatabaei, M., Demirbas, A., Aghbashlo, M.

Impacts of additives on performance and emission characteristics of diesel engines during steady state operation

(2017) *Progress in Energy and Combustion Science*, 59, pp. 32-78. Cited 140 times.
doi: 10.1016/j.pecs.2016.10.001

View at Publisher

33 Imtenan, S., Varman, M., Masjuki, H.H., Kalam, M.A., Sajjad, H., Arbab, M.I., Rizwanul Fattah, I.M.

Impact of low temperature combustion attaining strategies on diesel engine emissions for diesel and biodiesels: A review

(2014) *Energy Conversion and Management*, 80, pp. 329-356. Cited 134 times.
doi: 10.1016/j.enconman.2014.01.020

View at Publisher

34 Anbarasu, A., Karthikeyan, A.

Performance and Emission Characteristics of a Diesel Engine Using Cerium Oxide Nanoparticle Blended Biodiesel Emulsion Fuel

(2016) *Journal of Energy Engineering*, 142 (1), art. no. 04015009. Cited 35 times.
doi: 10.1061/(ASCE)EY.1943-7897.0000270

View at Publisher

35 Örs, I., Sarıkoç, S., Atabani, A.E., Ünalan, S., Akansu, S.O.

The effects on performance, combustion and emission characteristics of DICI engine fuelled with TiO_2 nanoparticles addition in diesel/biodiesel/n-butanol blends

(2018) *Fuel*, 234, pp. 177-188. Cited 44 times.
http://www.journals.elsevier.com/fuel/
doi: 10.1016/j.fuel.2018.07.024

View at Publisher

36 D'Silva, R., Binu, K.G., Bhat, T.

Performance and Emission Characteristics of a C.I. Engine Fuelled with Diesel and TiO_2 Nanoparticles as Fuel Additive

(2015) *Materials Today: Proceedings*, 2 (4-5), pp. 3728-3735. Cited 51 times.
http://www.journals.elsevier.com/materials-today-proceedings/
doi: 10.1016/j.matpr.2015.07.162

View at Publisher

37 Devarajan, Y.

Experimental evaluation of combustion, emission and performance of research diesel engine fuelled di-methyl- carbonate and biodiesel blends

(2019) *Atmospheric Pollution Research*, 10 (3), pp. 795-801. Cited 47 times.
http://www.atmospolres.com/accesstext.html
doi: 10.1016/j.apr.2018.12.007

View at Publisher

38 Saxena, V., Kumar, N., Saxena, V.K.

Multi-objective optimization of modified nanofluid fuel blends at different TiO_2 nanoparticle concentration in diesel engine: Experimental assessment and modeling

(2019) *Applied Energy*, 248, pp. 330-353. Cited 13 times.
https://www.journals.elsevier.com/applied-energy
doi: 10.1016/j.apenergy.2019.04.091

View at Publisher

39 Prabu, A., Anand, R.B.

Emission control strategy by adding alumina and cerium oxide nano particle in biodiesel

(2016) *Journal of the Energy Institute*, 89 (3), pp. 366-372. Cited 57 times.
http://www.journals.elsevier.com/journal-of-the-energy-institute
doi: 10.1016/j.joei.2015.03.003

View at Publisher

40 Hoseini, S.S., Najafi, G., Ghobadian, B., Ebadi, M.T., Mamat, R., Yusaf, T.

Biodiesels from three feedstock: The effect of graphene oxide (GO) nanoparticles diesel engine parameters fuelled with biodiesel (Open Access)

(2020) *Renewable Energy*, 145, pp. 190-201. Cited 10 times.
http://www.journals.elsevier.com/renewable-and-sustainable-energy-reviews/
doi: 10.1016/j.renene.2019.06.020

View at Publisher

41 Anand, R., Kannan, G.R., Nagarajan, S., Velmathi, S.

Performance emission and combustion characteristics of a diesel engine fueled with biodiesel produced from waste cooking oil

(2010) *SAE Technical Papers*. Cited 29 times.
http://papers.sae.org/
doi: 10.4271/2010-01-0478

View at Publisher

42 Pan, M., Qian, W., Zheng, Z., Huang, R., Zhou, X., Huang, H., Li, M.

The potential of dimethyl carbonate (DMC) as an alternative fuel for compression ignition engines with different EGR rates

(2019) *Fuel*, 257, art. no. 115920. Cited 9 times.
http://www.journals.elsevier.com/fuel/
doi: 10.1016/j.fuel.2019.115920

View at Publisher

43 Kalam, M.A., Masjuki, H.H.

Testing palm biodiesel and NPAA additives to control NO_x and CO while improving efficiency in diesel engines

(2008) *Biomass and Bioenergy*, 32 (12), pp. 1116-1122. Cited 77 times.
doi: 10.1016/j.biombioe.2008.02.009

View at Publisher

44 Atmanli, A.

Comparative analyses of diesel-waste oil biodiesel and propanol, n-butanol or 1-pentanol blends in a diesel engine

(2016) *Fuel*, 176, pp. 209-215. Cited 158 times.
http://www.journals.elsevier.com/fuel/
doi: 10.1016/j.fuel.2016.02.076

View at Publisher

45 Konishi, T., Klaus, E.E., Duda, J.L.

Wear characteristics of aluminum-silicon alloy under lubricated sliding conditions

(1996) *Tribology Transactions*, 39 (4), pp. 811-818. Cited 36 times.
doi: 10.1080/10402009608983599

View at Publisher

46 Habibullah, M., Masjuki, H.H., Kalam, M.A., Zulkifli, N.W.M., Masum, B.M., Arslan, A., Gulzar, M.

Friction and wear characteristics of Calophyllum inophyllum biodiesel

(2015) *Industrial Crops and Products*, 76, pp. 188-197. Cited 36 times.
www.elsevier.com/inca/publications/store/5/2/2/8/2/5
doi: 10.1016/j.indcrop.2015.05.042

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