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Effect of palm-sesame biodiesel fuels with alcoholic and nanoparticle additives on tribological characteristics of lubricating oil by four ball tribotester (Article) [\(Open Access\)](#)

Mujtaba, M.A.^{a,b} , Kalam, M.A.^a , Masjuki, H.H.^{a,c}, Soudagar, M.E.M.^d, Khan, H.M.^e, Fayaz, H.^f, Farooq, M.^b, Gul, M.^{a,g}, Ahmed, W.^h, Ahmad, M.ⁱ, Munir, M.ⁱ, Yaqoob, H.^j, Samuel, O.D.^k, Razzaq, L.^b

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^aCenter for Energy Science, Department of Mechanical Engineering, University of Malaya, Kuala Lumpur, 50603, Malaysia

^bDepartment of Mechanical Engineering, University of Engineering and Technology, New Campus, Lahore, Pakistan

^cDepartment of Mechanical Engineering, Faculty of Engineering, IIUM, Kuala Lumpur, 50728, Malaysia

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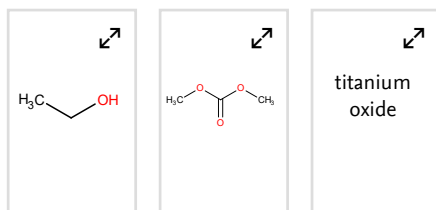
Abstract

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Dilution of engine oil with unburned fuels alters its lubricity and tribological properties. In this research paper, SAE-40 lubricating oil samples were contaminated with known percentages (5%) of fuels (diesel, palm-sesame biodiesel blend (B30), B30 + ethanol, B30 + dimethyl carbonate, B30 + carbon nanotubes and, B30 + titanium oxide). The effect of all these fuels on wear and frictional characteristics of lubricating oil was determined by using a 4-ball tribotester and wear types on worn surfaces were analyzed by using SEM. Lubricating oil diluted with B10 (commercial diesel) showed highest COF (42.95%) with severe abrasive and adhesive wear than mineral lubricant among other fuels. Lubricating oil diluted with palm-sesame biodiesel (B30 blend) with alcoholic additives showed comparatively less COF, less wear scar diameter and polishing wear due to presence of ester molecules. Lub + B30 + Eth exhibited increment in COF value (35.81%) compared to SAE-40 mineral lubricant. While lubricating oil contaminated with B30 with nanoparticles showed least frictional characteristics with abrasive wear. Lub + B30 + TiO₂ showed least increment in COF value (13.78%) among all other contaminated fuels compared to SAE-40 mineral lubricant. It is concluded that nanoparticles in biodiesel blends (B30) helps in reducing degradation of lubricants than alcoholic fuel additives and commercial diesel. © 2021

Chemistry database information ⓘ

Substances



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Alcoholic additives

Four ball

Lubricant degradation

Nanoparticles

Palm-sesame biodiesel

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Mujtaba, M.A. , Masjuki, H.H. , Kalam, M.A.
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