

# Wear preventive and friction of trans-esterified waste cooking oil enhanced zinc dialkyl dithiophosphate (ZDDP)

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Utilization of the vegetable oil and animal fats in industrial application as lubricants has drawn attention from researchers and practitioners. Improper disposal of waste cooking oil is considered to affect the environment. The purpose of this work is to study: (i) tribological properties of trans-esterified waste cooking oil (tWCO) as lubricant base oil, and (ii) the effect of ZDDP anti-wear additives to the friction and wear trans-esterified waste cooking oil. trans-esterification of the waste cooking oil was performed by using ethanol and potassium hydroxide (KOH). To improve the anti-wear properties of the product, ZDDP was added at different concentration in the range of 0.5-2.0 wt %. Physical properties of trans-esterified product were measured according to related standard and Four-ball method was employed to investigate the friction and wear. The product possesses viscosity of 38.6 cP, flash point of 205°C, thermal conductivity of 0.131 W/mK, and acid number of 1.96 mgKOH/g. ZDDP significantly improve the tribological properties of the tWCO base oil. The lowest friction coefficient obtained was 0.0630 when the base-oil was enhanced with 2.0 wt.% ZDDP. While the lowest wear obtained from 1.5 wt.% addition of ZDDP.

Topics

[Biofuels](#), [Thermal conductivity](#), [Tribology](#), [Esterification](#)

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