

## Documents

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**Tribological assessment of additive doped B30 biodiesel-diesel blend by using high frequency reciprocating rig test**  
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### Abstract

Biodiesel is auto-oxidative in nature. It can change its composition due to auto-oxidation. Therefore, it causes fluctuation in its lubrication property during application. The present study aims to assess the effect of Pyrogallol (PY), Propyl gallate (PG) and Butylated hydroxy toluene (BHT) additives on the sustainability and lubrication behaviour of B30 (30% biodiesel in diesel) blend on mild steel (MS) flat surface by using high frequency reciprocating rig (HFRR). The tests are conducted under a constant load of 75 N and frequency of 33 Hz at room temperature for 1 h with B30 (30% biodiesel in diesel) blend in the absence and presence of 600 ppm additives. The MS metal surfaces obtained after conducting HFRR tests are analysed by scanning electron microscopy (SEM), energy dispersive spectrometer (EDS), X-ray diffraction (XRD) and atomic force spectrometer (AFM). Tested fuels are characterized by Fourier transform infrared spectroscopy (FTIR). The tribological results indicate that PG doped B30 performs better lubricating performance than other tested additives for steel/steel contacts. Presence of PG causes the least weight loss (0.0003 g) with the least wear scar width (1.13 mm). The average coefficient of friction (CoF) is also observed to be minimal for PG doped B30 blend. The compounds formed on MS surface when tested with PG doped B30 show relatively less oxygen and high carbon content. The possible mechanism in enhancing lubricity of PG doped B30 blend could be attributed to the formation of relatively more stable and effective ester-based tribo-films at the contact surfaces. © 2021

### Author Keywords

Additives; Biodiesel blend; Lubricity; Tribology

### Index Keywords

Additives, Biodiesel, Diesel engines, Fourier transform infrared spectroscopy, Friction, Scanning electron microscopy, Spectrometers; Autooxidation, Bio-diesel blends, Biodiesel/diesel, Flatter surfaces, High frequency reciprocating rig, High frequency reciprocating rig tests, Lubrication /, Lubrication property, Lubricity, Propyl gallate; Tribology

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