

Wear prevention characteristics of a palm oil-based TMP (trimethylolpropane) ester as an engine lubricant

ABSTRACT

This paper presents the experimental results carried out to evaluate wear prevention characteristics of a palm oil-based TMP (trimethylolpropane) ester using a four-ball machine for different regime of lubrication. The TMP ester is produced from palm oil, which is biodegradable and has high lubricity properties such as a higher flash point temperature and VI (viscosity index). Three different regimes of lubrications are investigated, which hydrodynamic, elasto hydrodynamic and boundary lubrications. Under these test conditions, the wear and friction characteristics of different TMP samples are measured and compared. For boundary lubrication, it is found that up to 3% addition of Palm oil-based TMP ester in OL (ordinary lubricant) decreases the maximum amount of WSD (wear scar diameter) and reduces (COF coefficient of friction) up to 30%. Highest amount of load (220 kg) carrying capacity was also found from the contamination of 3% TMP. For hydrodynamic lubrication, addition of 7% of TMP reduces the friction up to 50%. It is well known that mechanical efficiency of machinery component increases with decreasing COF. The results of this investigation will be used to develop new and efficient lubricant to substitute the petroleum-based lubricant partially for automotive engine application.

Keyword: Sliding wear; Biolubricant; Coefficient of friction; Lubrication