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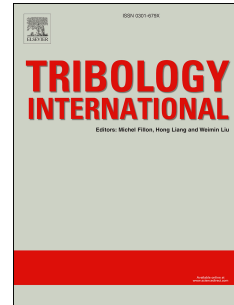
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The Tribological Performances of Super Olein as Fluid Lubricant Using Four-ball Tribotester

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Abstract

One of the major problem of using palm oil as lubricant is the sustainability towards the oxidation reaction. In this study, double fractionated palm olein (SPL) was used as lubricant while Tertiary-Butyl-Hydroquinone (TBHQ) was used as anti-oxidant agent. Four-ball tribotester was used to determine the coefficient of friction, wear scar diameter and surface roughness. The results revealed that the additional TBHQ exhibited reduction in coefficient of friction and provide a smooth surface roughness. However, it was unable to prolong the protection on the metal surface by the metallic soap film thus resulted larger wear scar diameter. The physical appearances of wear worn were also discussed in details in this study.

Keywords: Bio-lubricant; oxidation; anti-oxidant agent; tertiary-butyl-hydroquinone

1.0 Introduction

The tremendous modern technology development has resulted high demand on mineral based lubricant for the past few decades. The consumption of mineral based lubricant was showing increasing trend. In 2016 itself, record showed that people consumed about 96 million barrel per day [1]. This was enhanced by technology development especially in the construction, machining as well as in transportation industry. The problems arise on where to dispose the used oil and how to replace the remaining mineral oil resources, since it takes long periods of time to replenish the stock naturally. Mineral oil possesses the best lubricant oil characteristics, especially for engineering applications, however it promotes characteristics that give negative impact to the environment due to its non-biodegradable [2]. Besides, it also has high level of toxicity and nearly impossible to dispose [3,4]. As technology continues to be developed, the only way to overcome these problems is to find alternatives to these mineral oil resources. Many researchers were agreed that the two most reliable resources were vegetable and synthetic based oil [5]. These two oils have desired characteristics of lubricant oil but still have some limitations. Some molecules structure modification may overcome the disability of these oils to become reliable in replacing mineral oil resources [6]. Synthetic oil offers very good results in high and low temperatures, such as, its viscosity properties and resistance to oxidation. It is also able to extend engine life, provide better

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