

The evaluation of Molybdenum disulphide (MoS₂) as an additive in vegetable oils

ABSTRACT

This paper explores the use of Molybdenum disulphide (MoS₂) as potential additive be added to the vegetable oils. The purpose of adding MoS₂ into the vegetable oil is to enhance the lubricant properties in terms of providing lower coefficient of friction and wear. This study aims to measure the coefficient of friction at different loads with different concentration of MoS₂ between the coconut oil, castor oil and Empty Fruit Bunch Bio-Oil (EFB Bio-oil). The wear scars are also observed at the optimum concentration of each vegetable oils based on the weight loss on the ball bearing after the friction test. The test was conducted by using the four-ball test machine at 75°C under constant speed of 600 RPM for 60 minutes at four different normal loads 100N, 200N, 300N and 400N. The addition of MoS₂ of 1.5, 3.0, 4.5 and 6.0wt% concentration in coconut oil, castor oil and EFB bio-oil is able to improve the performance of vegetable oil in reducing the coefficient of friction and wear rather than by using pure vegetable oils with 0wt% of MoS₂ as increase in load. EFB bio-oils shows that increase in load at 200N the sliding time starts to reduce, results in increase the coefficient of friction at the optimum concentration of 1.5wt% of MoS₂. However, coconut oil has ability to operate for 60 minutes at optimum concentrations of 4.5wt% of MoS₂. Due to the limitation of castor oil properties and EFB bio-oil, addition of MoS₂ was able to provide lubricant film at a short sliding time as the load was increased. Hence, coconut oil shows better tribological performance and sliding time as increase in load at optimum concentrations of 4.5wt% of MoS₂ compared to castor oil and EFB bio-oil.