

Grease Formulation from Palm Oil Industry Wastes

Hayder A. Abdulbari¹, Nizam Zuhan²

¹Center of Excellence for Advanced Research in Fluid Flow, Universiti Malaysia Pahang (Kampus Gambang), Lebuhraya Tun Razak, 26300 Gambang, Pahang, Malaysia

²Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang (Kampus Gambang), Lebuhraya Tun Razak, 26300 Gambang, Pahang, Malaysia

ABSTRACT

The treatment and disposal of petroleum-based lubricant waste presents serious challenges to the grease production industry due to its environmental impact. The use of vegetable-oil-based lubricant can solve such issues. In this study, an experimental grease formulation composed of spent bleaching earth (SBE) as the thickener, waste cooking oil (WCO) as the base oil and fumed silica (FS) as the additive is presented. The properties of the different grease formulations, such as the thermal stability, decomposition temperature, penetration, corrosivity on a copper strip, drop point, and friction coefficient, were evaluated using standard methods, and the grease formulations with and without the additive were compared. The results showed that the grease without FS required a high percentage of SBE (up to 80% w/w), while the addition of FS reduced the amount of SBE but increased the amount of the base oil used. The addition of FS increased the penetration number of the grease by 1 NLGI standard unit, caused the grease to be slightly corrosive, eliminated the drop point, and increased the decomposition temperature. The average the friction coefficient of the formulated grease was 0.095 without FS and 0.11 with FS. Taken together, all of the results show that SBE and WCO can be used to formulate grease and that FS can increase the performance of formulated grease.

KEYWORDS: Grease; Tribology; Vegetable oil; Thermal stability; Corrosion