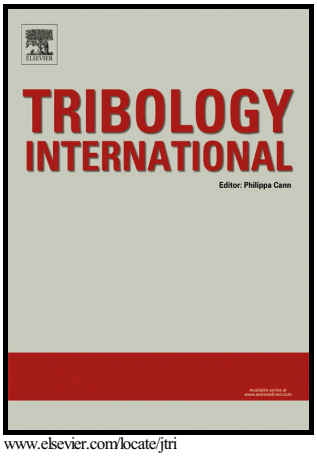

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Two phosphonium cation-based ionic liquids used as lubricant additive. Part II: Tribofilm analysis and friction torque loss in cylindrical roller thrust bearings at constant temperature

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Abstract

Two phosphonium cation-based ionic liquids (ILs): $[P_{66614}][(iC8)_2PO_2]$ (IL1) and $[P_{66614}][BEHP]$ (IL2) were used as an additive to a mineral oil at 0.5 and 1.0 wt%. All IL-containing mixtures and the base oil were tested using a cylindrical roller thrust bearings test configuration. Friction and torque tests were performed and different analytical techniques were used for wear evaluation. The results showed that: IL-containing mixtures decreased friction in comparison with the neat base oil; IL2 performed better than IL1 as antifriction and antiwear additive; and chemical reaction of the ILs with the surface was found related to the tribological behaviour.

Keywords: ionic liquid, additive, rolling bearing, friction torque

1. Introduction

Ionic liquids (ILs) can be defined as thermally stable molten salts composed of anions and cations that melt below 100 °C. Their combination of properties such as ashless character, non-flammability, non-volatility, high thermo-oxidative stability, and controlled miscibility with organic compounds is responsible for their growing number of applications, mainly in chemical synthesis and extraction processes, but also in lubrication [1, 2, 3, 4]. The study of their potential application in lubrication began

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