

Extensive examination of sonication duration impact on stability of Al₂O₃-Polyol ester nanolubricant A.

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ABSTRACT

The sonication technique is one of the effective methods to stabilize nanolubricants. This paper aims to elaborate on the sonication duration's impact on the stability of Al₂O₃-Polyol ester nanolubricants. A two-step method has been performed to prepare nanolubricants. Each sample consisted of a nanoparticle mixed with POE using a magnetic stirrer without surfactant for 30 min. All samples had the same volume concentration, namely 0.02 vol % but received different interlude sonication duration treatments for 0, 40, 60, 80, 100, and 120 min. FESEM with Energy Dispersive X-Ray was used to characterize the Al₂O₃ nanoparticle sample's morphology and element analysis. UV Visible and absolute zeta potential were used to determine Al₂O₃-POE nanolubricants stability. The findings show that the most optimal sonication impact in this study is 80-min sonication. It proofed by the highest absorbance ratio among other samples, which is 0.411, the lowest drop absorbance value, which is 58.9%, and and with a zeta potential value of 45 mV. The rheological behavior analysis shows that Al₂O₃-POE nanolubricants show Newtonian behavior.

KEYWORDS: Absorbance, Al₂O₃ nanoparticles, Al₂O₃-POE nanolubricants, UV visible, Sonication

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