Viscosity and Density of CuO Nanolubricant

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This paper presents liquid kinematic viscosity and density measurements of a synthetic polyolester based copper (II) oxide (CuO) nanoparticle dispersion (nanolubricant) at atmospheric pressure for a temperature range from approximately 288 K to 318 K. The polyolester was a commercially available chiller lubricant. The CuO particles were approximately 30 nm-diameter, spherical, and well dispersed. Viscosity and density measurements were made for the pure base lubricant along with three nanolubricants with differing nanoparticle mass fractions (2.9 %, 5.6 % and 39.2 %). The viscosity and the density were shown to increase with respect to increasing nanoparticle mass fraction. Correlations of the viscosity and the density are presented as a function of temperature and nanoparticle concentration. The measurements are important for the design of nanolubricants for heat transfer and flow applications.