On the Viscosity Behaviour on Krytox GPL102: Effect of Temperature and Pressure

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Perfluoropolyethers are a class of synthetic oils used in a variety of high-temperature lubricant and hydraulic fluid applications [1]. The physical properties of PFPEs that make them excellent lubricants at extreme conditions include their thermal and chemical stabilities and very good cold flow properties [2]. In this work the viscous behaviour of Krytox GPL102 a perfluoropolyether F-$(CF(CF_3)\text{-}CF_2\text{-}O)_n$-$CF_2CF_3$ (with an average n = 9.5 and molar mass 1720 g/mol) has been analysed. A coordinated attempt is being made by several laboratories to measure viscosities on the same sample using six different high pressure instruments: three falling body, one vibrating wire, one rotational and one capillary viscometer. This enables us to check the validity of the different calibration procedures used for measurements of viscous liquids with falling body viscometers. We provide new experimental high pressure viscosities (obtained between 273 and 373, at pressures up to 225 MPa with a maximum viscosity of 4170 mPa·s). This study also reports high-temperature, high-pressure density data from 278.15 to 398.15 K and pressures to 120 MPa. The viscosity and density data were satisfactorily fitted to empirical equations, which can be used to interpolate them within the experimental conditions investigated in this study.

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References

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