The VW Method for Predicting the Viscosity of Petroleum Fluids

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Viscosity is an important parameter in many flow processes in the petroleum industry. Traditionally, the viscosity of petroleum fluids has been determined by means of empirical correlations: either with a compositional description or with a black-oil specification. These empirical approaches are limited by the availability of experimental data to match the viscosity of oil samples. To overcome this limitation, we explore the use of the VW method, a fully predictive theory-based approach that requires no mixture viscosity measurements. The VW method is based on the kinetic theory and Enskog-Thorne's equations. It was initially developed for spherical molecules by Vesovic and Wakeham [1-2], and it has been recently extended to chain molecules [3-4]. Originally, the VW method uses the best available viscosity correlations for pure components and interpolates the mixture viscosity using a set of theory-based mixing rules. In this work, we present a set of pseudo-component models based on the viscosity of linear alkanes and demonstrate that, using these pseudo-components, the VW method is able to predict the viscosity of heavy alkane mixtures. We also prove that, unlike empirical methods, the VW method is able to reproduce the viscosity of very asymmetric mixtures. These results for asymmetric mixtures, once more, support the use of the VW method for modelling the viscosity of reservoir fluids.