422b Evaluation of the Phase Equilibria of Gas Condensates and Light Petroleum Fractions Using the Saft-Vr Approach

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The phase behavior and thermoynamic properties of gas condensates and petroleum fractions are important in process simulation, design and operation. These systems are unique in that the precise composition of gas condensates and petroleum fractions are undefined, being complex mixtures of paraffinic, naphthenic and aromatic compounds. Before theoretical calculations to predict or correlate thermodynamic data can be performed these fluids need to be characterized. Several methods have been proposed to characterize petroleum fractions into pseudocomponents from the available physical property information such as the density, molecular weight, viscosity and normal boiling point temperature. However these trial-and-error methods require significant time to implement, and do not have a rigorous basis. A semicontinous thermodynamics approach was proposed by Cotterman et al.[1] for polymer and petroleum systems, and later extended by Behrens and Sandler[2] to model C_{7+} fractions. In this work, we combine the semicontinous thermodynamics method with the SAFT-VR[3] equation of state to model gas condensates and petroleum fractions. In earlier work we demonstrated that simple relations for the model parameters are easily obtained[4], these are used to characterize the defined components for the systems studied, taking either molecular weight or carbon number as inputs. Good agreement is obtained for between the SAFT-VR calculations and experimental data for dew-bubble curves of several gas condensates and composition data for reservoir fluids.

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