HIGH PRESSURE PHASE BEHAVIOR OF [BRAZILIAN] PETROLEUM FRACTIONS IN CARBON DIOXIDE

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The identification of liquid-liquid and three-phase regions in carbon dioxide and petroleum mixtures has a key role in the petroleum industry. In this work, the phase behavior of a [Brazilian] crude oil and carbon dioxide mixtures has been studied. This works intends to establish a methodology to understand the phase behavior of carbon dioxide and crude oil mixtures, based on pseudo-binary interaction of carbon dioxide and petroleum fractions. Four petroleum fractions were obtained by distillation of a crude oil sample. These fractions were properly characterized by density and bubble point measurements, in addition to chromatography. Phase equilibrium data were measured for mixtures of carbon dioxide and each fraction with a static synthetic method, from 20 to 80 °C. Density and bubble point data indicated that fractions properties are very close to four normal-alkanes properties (from octane to octacosane). The pure compound critical properties were then tuned to these data with a Peng-Robinson equation-of-state (PREOS) to represent the fractions properties. Carbon dioxide mixed with the two lightest fractions presented only vapor-liquid transitions. Mixture with the other fractions showed liquid-liquid and three-phase regions. The PREOS has been successful employed to fit experimental data and to obtain binary interaction coefficients, used to model the carbon dioxide and oil mixture. The developed methodology proved to be efficient, as it provided a stepwise understanding of carbon dioxide and petroleum phase behavior through the interaction of the former with oil fractions.

Keywords: phase behavior, high pressure, petroleum, carbon dioxide.

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