Influence of Concentration Fluctuations of Volatile Natural Gas Constituents on its Condensation Behavior

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In a previous study a model was developed to predict the condensation behavior of lean natural gas. It turned out that in terms of the dewpoint temperature the predictive capability of the model was around 1 K.

A related issue that may be of interest is how the model behaves if large variations in the concentration of volatile constituents like ethane, propane, carbon dioxide and nitrogen occur. For that purpose a model study was carried out to obtain insight in this phenomenon, using the Peng-Robinson and the Simplified-Perturbed-Hard-Chain Theory equations of state. In the course of this study the influence of concentration fluctuations of the volatile constituents on the liquid dropout was investigated.

It was found that in almost all cases an increase in concentration of the four volatile constituents will result in an increased liquid dropout. This increase in liquid dropout is mainly due to an increased presence of these components in the liquid phase. Although the Simplified-Perturbed-Hard-Chain Theory equation of state, in principle, is more appropriate to describe mixtures of species which differ appreciably in volatility, it turned out that the Peng-Robinson equation of state is a better option.