Ternary Vapor–Liquid Equilibrium Measurements and Modeling of Ethylene Glycol (1) + Water (2) + Methane (3) Systems at 6 and 12.5 MPa - DTU Orbit (17/10/2018)

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Novel technologies in the field of subsea gasprocessing include the development of natural gas dehydration facilities, which may operate at high pressure due to their proximity to reservoirs. For the qualification and design of these processing units, ternary vapor–liquid equilibrium data are required to validate the thermodynamic models used in the design process. For this purpose, 16 new ternary data points were measured for ethylene glycol (1) + water (2) + methane (3) at 6.0 and 12.5 MPa with temperatures ranging from 288 to 323 K and glycol content above 90 wt %. Glycol in gas ($y_1$), water in gas ($y_2$), and methane solubility ($x_3$) were measured with relative experimental uncertainties ($u_r(x) = u(x)/|x|$) below 12%, depending on the type of data. The Cubic-Plus-Association (CPA) equation of state was used to model the data. Literature pure component and binary interaction parameters were used. It was found that the model provides a good qualitative description of the experimental data for $y_1$ and $y_2$, while a significant over-prediction occurs for $x_3$. The modeling errors for CPA ranged between 5–40% average absolute relative deviation.

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