



Prediction of Gas Hydrate Dissociation Point by Using Different Equations of State and Mixing Rules in binary systems

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Abstract

In this work, the ability of different equation of states and mixing rules for prediction of hydrate formation pressure, are compared. For this purpose, by using Van der Waals–Platteeuw model for solid hydrate phase and six equation of states for calculation of fugacity of components in gas and liquid phases, the pressure of hydrate formation in different mixtures have been calculated by three different mixing rules Van der Waals, Danesh and GNQ, then by comparison of calculated results with experimental data, determined the accuracy of mixing rules and EOSs. Studied systems contain binary mixtures CH₄, C₂H₆, C₃H₈, i-C₄H₁₀, N₂, CO₂, and H₂S with water in hydrate forming conditions. The interaction parameters in each mixture have been optimized by using two phase equilibrium data () and then the optimized parameters have been used for three phase equilibrium () calculations. Comparison of the calculated pressure of hydrate forming with experimental pressure shows that for most of binary mixtures in studied temperature and pressure ranges, GNQ mixing rule with average percent of error 7% has more accuracy than three other mixing rules Van der Waals and Danesh, and among of EOSs, SRK equation of state is better than others and using from YU-LU equation of state be not suggested.

Keywords: Mixing rules, Equation of state, Gas hydrate, Three Phase equilibria, Formation Pressure.

Research Highlights

The hydrate formation conditions in different mixtures have been calculated by different mixing rules: Van der Waals, Avlonitis and GNQ.

The interaction parameters have been optimized by using two phase equilibrium data and the optimized parameters have been used for three phase equilibrium.

Different equation of state like SRK, PR, VPT, NM, SW, YU-LU are used for calculation of fugacity for two phases.