

Prediction of methane hydrate equilibrium pressures in the presence of aqueous Imidazolium-based ionic liquid solutions using Electrolyte Cubic Square Well Equation of State

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Abstract

Electrolyte Cubic Square-Well Equation of State, eCSW EoS, based upon the Helmholtz free energy consists of the one non-electrolyte term and the two electrolyte terms. The non-electrolyte term is cubic square-well equation of state (CSW EoS) and the two electrolyte contributions consist of a Born energy and the mean spherical approximation terms. In this work, eCSW EoS is coupled with the van der Waals-Platteeuw model and applied to predict the hydrate dissociation pressures of the methane+ ionic liquid+ water systems. Furthermore, the adjustable parameters of the imidazolium based ionic liquid solutions calculated by using experimental data in literature. A good agreement between the results of the model with the experimental data indicates the reliability of this model to predict the hydrate equilibrium conditions.

Keywords: eCSW EoS, ionic liquid, hydrate, methane, imidazolium, van der Waals-Platteeuw model.

Research Highlights

- Computation the hydrate dissociation pressures of the methane+ ionic liquid+ water systems.
- Calculation the adjustable parameters of the imidazolium based ionic liquid solutions by using various experimental data.
- Comparing the prediction of the model with the experimental data in literature.