Methane and Carbon Dioxide Gas Hydrates Phase Equilibria with Isopropyl Alcohol: Measurements and Comparison with a Prediction Model

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Gas hydrates are crystalline solids that have a structured water molecular framework linked together to create cages, in which guest gas molecules can be trapped. In petroleum offshore production systems, gas hydrates can be a flowing solid phase or agglomerate and being an interruption or blockage in pipelines, causing damages and preventing normal flow. Thermodynamic inhibitors such as methanol and ethylene glycol work by shifting the hydrate equilibrium curve to the left to lower the hydrate equilibrium temperature enough to keep the system out of the hydrate formation region. The motivation of this study arises from the lack of data in the literature that explores the isopropyl alcohol as a hydrate inhibitor. The purpose of this work is the experimental study of the phase equilibrium of methane and carbon dioxide hydrates with the presence of thermodynamic inhibitors, specifically isopropyl alcohol and sodium chloride. The pressure range investigated was between 2 and 26 MPa. Two different thermodynamic inhibitors were performed: isopropyl alcohol in concentrations between 5-30%wt and sodium chloride in concentrations of 5 and 10%wt, as well as their mixtures. The results were also compared with the NUEMHyd, an in-house software for the hydrate formation prediction that uses the Cubic-Plus-Association EoS.