Influence of NaCl on the formation and dissociation kinetics of HFC-125a hydrate

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Among various applications of gas hydrates, hydrate-based desalination has been studied as a promising technology with higher efficiency than conventional methods because it could easily handle highly concentrated solutions using a phase transition. However, appropriate guest molecules should be selected to form at milder conditions to have economic advantages. In this study, the kinetic behavior of HFC-125a hydrate was examined for optimizing the hydrate-based desalination process using HFC-125a. Three-phase (H-Lw-V) equilibria of HFC-125a hydrate in the presence of NaCl (0, 3.5, and 8 wt%) were measured to verify the influence of NaCl on the thermodynamic stability of HFC-125a hydrate. The gas uptakes during hydrate formation were measured to observe formation behavior of HFC-125a hydrates in salt solutions. In addition, the dissociation behavior of HFC-125a + NaCl hydrates were examined by collecting PXRD patterns with decreasing the temperature stepwise. The collected PXRD patterns were analyzed using a Rietveld method. The experimental results demonstrated that the presence of NaCl retarded the formation rate, but accelerated the dissociation rate of HFC-125a hydrate.