

Thermodynamic and kinetic characteristics of SF₆ + N₂ hydrates for hydrate-based SF₆ separation

고결, 서용원[†]
울산과학기술원

(ywseo@unist.ac.kr[†])

In this study, the feasibility of gas hydrate-based sulfur hexafluoride (SF₆) separation was investigated with a primary focus on its thermodynamic, kinetic and structural properties. The three-phase equilibria (hydrate (H)-liquid water (L_W)-vapor (V)) of SF₆ (50%, 80%, and 90%) + N₂ hydrates were measured to determine thermodynamically stable regions of the corresponding gas hydrates. Furthermore, to examine the dissociation behavior of SF₆+N₂ hydrates, the heat of dissociation of SF₆+N₂ hydrates was measured through differential scanning calorimeter (DSC). The pressure-composition diagram at 275.15 K was also obtained to estimate the separation efficiency of SF₆. In addition, the vapor composition change and the gas uptakes during hydrate formation were measured to observe the rate of hydrate formation. Finally, the structure of SF₆+N₂ hydrates was identified as sII via powder X-ray diffraction (PXRD). These experimental results obtained in this study are expected to provide useful background for gas hydrate-based SF₆ separation.