

Phase Equilibrium of Ternary CH₄-N₂-CO₂ Mixed Hydrates

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Natural gas hydrates have attracted the attention of many researchers in energy and environmental fields as well as petroleum industry because of recovering a huge amount of CH₄ stored in the deep gas hydrate deposits. In particular, the swapping mechanism, the replacement of CH₄ hydrate with the sequestration of flue gas N₂+CO₂, has investigated into the actual application in recent years. However, the phase equilibrium data of ternary CH₄-N₂-CO₂ mixed hydrate is essential to the swapping mechanism, but not yet available. In the present study, the feed gas molar ratio of N₂ to CO₂ of 8:2 will be fixed according to conventional flue gas type of power plant. This hydrate system cannot form structure II at all composition, because the binary mixed N₂-CO₂ hydrate was known to form structure I at compositions above 0.2 mole fraction of CO₂. Gas chromatography would be introduced to hydrate phase compositions of the ternary mixed hydrates measured at the corresponding vapor phase compositions.