Identification of Structural and Tuning Patterns of tert-Butyl Alcohol (TBA) Hydrate and Its Application to Methane Gas Transportation

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Tertiary butyl alcohol is a monohydroxyl alcohol with hydrophobic group. It can be fully miscible with water at any concentration, but does not form a clathrate hydrate by itself. But, pressurization of methane gas change this system to clathrate hydrate which containing both TBA and gas molecule. In this study, complex structural behavior was identified using spectroscopic tools, such as solid state- NMR, Raman and PXRD. Also, tuning patterns and critical guest concentration are observed at low TBA concentration. Additionally, methane gas storage capacity was obtained via direct release experiments. It shows higher value than that of THF-CH_4 hydrate.