

Time-dependant NMR analysis of phase transformation of sH clathrate hydrate

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In previous study, we suggested new sH clathrate hydrate formers which have high-water solubility and thermodynamic advantages. Homogeneous gas hydrate phase can be made by using highly water soluble formers, which makes many things possible such as in-situ experiment, kinetic phase behavior analysis and single crystal experiment, which have been treated as impossible or very difficult tasks. In this study, we analyzed phase transformation on hemethyleneimine and methyl-substituted piperidine sH clathrate hydrate using NMR spectra. Also, we examined methylcyclohexane sH clathrate hydrate to compare the tendency of phase transformation. At the initial stage of hexamethyleneimine sH clathrate hydrate, sII phase appeared first and then the phase converted to sH phase. This phenomenon results from unique structure and cage combination of sII phases. This result can assist understanding of kinetic behavior of sH clathrate hydrate and natural gas hydrate phase composition.