Spectroscopic analysis for ionic hydrate and water system

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Although the quaternary ammonium salt hydrates have recently been applied to gas separation and storage with the expectation of small co-guest occupancy in empty cages, most research has been oriented to macroscopic approaches based on hydrate phase equilibria and process variables. Accordingly, in the present study we report a structural transition accompanying the occurrence of more than two coexisting clathrate hydrate phases in a mixed ionic hydrate system. The structure transition of ionic clathrate hydrate was investigated by Differential scanning calorimetry (DSC), Thermogravimetric analysis (TGA), and solid-state NMR spectroscopy. In addition, structure patterns of ionic hydrate with water system identified from NMR spectroscopy were confirmed by using powder X-ray diffraction (PXRD). Investigating the structural characteristics is essential for applying Me4NOH as fuel cells and other energy devices.