

Charge Transfer Phenomenon appearing in ionic clathrate hydrate

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In this study, we investigated the interaction between the nonionic guest molecule (NIGM) and charged host matrix surrounding the NIGM in ionic clathrate hydrate. Unlike non-ionic clathrate hydrates stabilized solely by van der Waals interaction, ionic clathrate hydrates are greatly affected by ionic interaction between a cationic or anionic guest and the surrounding host lattice balanced by counter ions. For the H₂ as the NIGM, the charge transfer phenomenon from ionic host lattice to non-ionic guest molecule was observed through a close comparison of the magnetic and spectroscopic patterns of non-ionic tetrahydrofuran (THF) + H₂ and ionic tetramethyl-ammonium hydroxide (Me₄NOH) + H₂ clathrate hydrates. The present findings on the magnetic property of non-ionic guest molecules in ionic hydrate might provide important information on the unrevealed nature of host-guest interaction in ionic hydrate systems. The charge transfer occurring between ionic host and non-ionic guest molecules will open up interesting application fields for ionized hydrate complex and activated secondary guest molecules.