Spectroscopic Observation of Binary (Unsaturated Aldehyde + Methane) Hydrates

차민준, 안윤호[1], 이 흔[1,†]
강원대학교; [1]KAIST
(hlee@kaist.ac.kr[†])

In this study, we tried to introduce new structure II hydrate former in the presence of methane gas. Unsaturated aldehyde was used to form the binary hydrate systems and the crystal structure and guest distributions of binary (unsaturated aldehyde + methane) hydrates were identified through spectroscopic tools, such as powder X-ray diffraction (PXRD) and Raman spectroscopy. PXRD patterns confirmed the formation of binary (unsaturated aldehyde + methane) hydrates, and Raman results showed that the inclusion of unsaturated aldehyde and methane could be monitored in the large cages and the small cages of structure II hydrates. The conformation of unsaturated aldehyde in the large cages of structure II hydrates were also analyzed via Raman spectroscopy and the s-trans conformer was identified as the preferred conformation in the hydrate cages. In addition, the (H + Lw + Lh + V) phase equilibrium conditions of binary (unsaturated aldehyde + methane) hydrates were also tested by using conventional isochoric method.
KEYWORDS gas hydrate, unsaturated aldehyde, methane, Raman, phase equilibrium