Thermal Expansivity for (2-methyl-2-propen-1-ol + Methanol or Propylene oxide + Methanol) Hydrates

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In this study, the thermal expansivity for (2-methyl-2-propen-1-ol + methanol or propylene oxide + methanol) hydrates containing water and ammonium fluoride (NH₄F) was investigated. The X-ray diffraction patterns acquired from Pohang Accelerator Laboratory were examined for analyzing the hydrate crystal structures and lattice parameters. We confirmed the formation of a cubic Fd3m hydrate for (2-methyl-2-propen-1-ol + methanol or propylene oxide + methanol) hydrate samples. The lattice parameters of for (2-methyl-2-propen-1-ol + methanol or propylene oxide + methanol) hydrates with pure water were found to be larger than those of our hydrates with water and NH₄F. In addition, the lattice parameters of hydrates encapsulating 2-methyl-2-propen-1-ol and methanol were larger than those with propylene oxide and methanol. Finally, the effects of molecular size and shape on the thermal expansivity of clathrate hydrates with water and NH₄F were confirmed.

Fig. 1. (a) The normalized lattice parameter and (b) the thermal expansion coefficient of the binary (propylene oxide + methanol)H₂O/NH₄F hydrate (■) and the binary (2-methyl-2-propen-1-ol + methanol)H₂O/NH₄F hydrate (▲)

References


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