

Thermal expansivity of Tetrahydrofuran clathrate hydrate with air molecules

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Air hydrates can be formed in deep ice sheets of Arctic and Antarctic regions where the high-pressure and low-temperature conditions are satisfied. These hydrates which are gathered in these regions can give us significant clue in analyzing the data. However, due to insufficient experimental data and thermodynamic modeling on air hydrates, it is hard to analyze the Arctic and Antarctic environment from air hydrates. Thus, in this work, we present new experimental data on thermal expansivity and guest molecule dynamics of Tetrahydrofuran(THF) + air clathrate hydrate by using neutron scattering method. Neutron scattering studies not only have been carried out to clarify the special role of guests in expanding the host water lattices, but have contributed to revealing the influence factors on thermal expansivity. Through this study, we attempt to address two noteworthy features related to guest inclusion: (1) The effect of guest dimension on the expansion of host water lattice; (2) The effect of thermal history on the expansion of host water lattice.