

Structural Identification and Cage Occupancy of N₂O-encaged Structure I and II Clathrate Hydrates

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Clathrate hydrates have an issue of enormous significance because of the physical and chemical properties that can be used in a variety of industries as well as sustainable energy resource. N₂O molecules can form N₂O loaded clathrate hydrates, which is expected to handle or store N₂O safely, one of global warming gases, 298 times stronger than CO₂. In this study, we used three types hydrate sample, pure N₂O hydrate, N₂O-THF 2 mol % hydrate and N₂O-THF 5.56 mol % hydrate. It is well known that pure N₂O hydrate form structure I (sI) hydrate, and N₂O-THF 5.56 mol % hydrate form structure II (sII) hydrates. However, N₂O-THF 2 mol % hydrate form both sI and sII hydrate. Raman spectroscopy was used to identify a structure and analyze the distribution of guest molecules in the N₂O clathrate hydrates in agreement with XRD measurements.