

Hydrate-Containing Phase Equilibria for Mixed Guests of Nitric Oxide and Carbon Dioxide.

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Carbon dioxide capture and storage (CCS) is one of the most important technologies to prevent global warming caused by carbon dioxide. Captured CO₂ streams from flue gas may include impurities such as nitrogen, water, sulfur dioxide, nitric oxide, oxygen, argon, methane, and hydrogen sulfide. Impurities in the CO₂ streams have significant impact on thermodynamic and transport properties, for example, corrosion rate and hydrate formation condition can be different from pure CO₂. For such reasons, it is required to have accurate information about the effect of impurities on thermodynamic properties of CO₂ in order to develop proper CCS processes. There have been very little studies about the effect of nitric oxide as compared with other impurities such as nitrogen, methane and water. In this study, Hydrate-containing phase equilibria of nitric oxide was experimentally determined in liquid-hydrate-vapor (Lw-H-V) three phase line at the pressure ranging from 10 to 14 MPa. Isobaric dissolution temperatures of formed hydrates were measured and reported for predetermined loading compositions. The measurement result shows that the hydrate-containing phase line of nitric oxide is shifted to lower temperature at the same pressure due to reaction of nitric oxide with water.