

Hydrate Phase Equilibrium for Water, Carbon Dioxide and Nitric Oxide System

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Hydrate phase equilibrium data for carbon dioxide containing impurities such as SO_x and NO_x that affect the carbon dioxide hydrate-forming condition are important for flow assurance in carbon dioxide capture and storage process. However, the effects of nitric oxide have not been reported up to present. In this work, hydrate phase equilibria for nitric oxide + water system and nitric oxide + carbon dioxide + water system were experimentally determined in aqueous liquid-hydrate-vapor three phase regions. Dissociation temperatures of formed hydrate were measured using the indirect method with predetermined overall composition according to the Duhem's theorem at constant pressures. Hydrate phase equilibrium data for nitric oxide + water system were first reported and these data can be used for further model development. The hydrate-forming condition for carbon dioxide + water system is shifted to lower temperature at the same pressures by the addition of nitric oxide.