

Phase Equilibrium Studies of Three-component CO₂-N₂-Water Involving Gas Hydrate

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Phase equilibria of CO₂+N₂+water provides an important information for design of carbon capture and storage. Reliable experimental data for 3 phase(liquid water + hydrate + vapor) equilibrium for water, CO₂ and N₂ had been reported using indirect method^{*1}. In this study, 4 phase equilibrium(liquid water + liquid CO₂ + hydrate + vapor) for CO₂+N₂+water and 2 phase equilibrium(liquid CO₂ + hydrate) of CO₂ rich phase ($m_{\text{water}} < 1.0^{-2}$) were measured by observing the phase boundary of predetermined composition system containing gas hydrate. 4 phase equilibrium lines in PT space were measured for given compositions. 2 phase equilibrium of CO₂ rich phase were measured for given pressures (60, 100, 150 bar). The experimental data were compared with calculated result by CSMGem ^{*2}.

- [1]Kim, Y.S., B. D. Lim, et al. (2008) "Solubilities of Carbon Dioxide, Methane, and Ethane in Sodium Chloride Solution Containing Gas Hydrate." *J. Chem & Eng Data* **53**(6):1351-4
[2]Sloan, E. D. and C. A. Koh (2008). Clathrate hydrates of natural gases. Boca Raton, FL, CRC Press.