Solubility of Water in Carbon Dioxide Containing Gas Hydrate

Myoung Do Seo [S], Youngjo Kim, Jeong Won Kang and Chul Soo Lee [C]
Department of Chemical and Biological Engineering, Korea University, Seoul, Korea

For the flow assurance of carbon dioxide rich streams in disposal and storage, the solubility of water in carbon dioxide in hydrate forming conditions is a key factor. The effects of impurity gases such as nitrogen are also important. The only literature data by Song and Kobayahi are for carbon dioxide and water mixtures cited in the Sloan and Koh's recent book[*1] A new indirect method[*2] used for the measurement of carbon dioxide in water was modified and used in the present study to measure the solubility of water in carbon dioxide. In the present indirect method, equilibrium temperatures were measured for the known composition of samples. The compositions of carbon dioxide rich samples were predetermined using a syringe pump and a sampling valve. The measured conditions were up to 20 MPa at sea water temperatures. The results were analyzed by CSMGem[*1] and a lattice based equation of state.

[1] Sloan, E. D. and C. A. Koh (2008). Clathrate hydrates of natural gases. Boca Raton, FL, CRC Press.
[2] Kim, Y. S., B. D. Lim, et al. (2008). "Solubilities of Carbon Dioxide, Methane, and Ethane in Sodium Chloride Solution Containing Gas Hydrate." Journal of Chemical & Engineering Data **53**(6): 1351-1354.