Solubilities of Carbon Dioxide, Methane and Ethane in Gas Hydrate Containing Electrolyte Solution

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Phase equilibria involving gas hydrates are of importance in such applications as natural gas recovery and carbon dioxide sequestration. Three-phase equilibria containing gas hydrates have been studied extensively. However, studies on two-phase equilibria are very limited for salt-free systems and no studies are known for salt containing systems. A new indirect method was developed in this study and applied for measurements of gas solubilities of carbon dioxide, methane and ethane in aqueous solutions containing gas hydrates with and without sodium chloride. Effects of temperature, pressure and salt concentrations on the solubility of carbon dioxide, methane and ethane in aqueous phase were investigated. Solubilities were found to increase for these gases as temperature increases and as pressure decreases in the range up to 15 MPa, above which pressure the solubility of carbon dioxide remained or slightly increased. Methane and ethane showed salting-out effect whereas carbon dioxide showed salting-in effect.