Isothermal phase equilibrium measurement through the dissociation induced by volume expansion of gas hydrate system

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Thermodynamic and kinetic characteristics of gas hydrates are definitely affected by the guest component such as CH_4, N_2, and CO_2. Actually, this approach should be based on phase behavior and guest distribution of various gas hydrates. Isochoric method (temperature search method) is usual way of measuring equilibrium conditions of hydrate system. In the case of multi-component guest gas mixtures, however, key variables (temperature or pressure) need to remain at constant as appears by phase rule. To achieve this, autoclave has a pair of sapphire window for visually observing the phase transition in the equilibrium cell. Herein lays some drawbacks; it depends on the observation of naked eye and the amount of minute crystals were kept constant at least for 8 hours. Therefore, in this work, isothermal equilibrium conditions are easily determined by new method using general equipments made up of blind cell and syringe pump, etc. At constant temperature, equilibrium pressure could be exactly recorded through the dissociation induced by volume expansion at the micro-liter level.