ABSTRACT

Clathrate hydrates have been used in a variety of industrial fields not only as a large energy sources but also as a target medium for various technologies using its physicochemical characteristics. In particular, refrigeration system using properties of clathrate hydrate is expected to be used to replace chlorofluorocarbons (CFCs) which is well known for destroying the ozone layer and causes global warming. In order to check the feasibility of the refrigeration system, experiments to obtain the information of phase equilibrium, cage occupancy and heat of dissociation of clathrate hydrates are a prerequisite. In the present study, phase equilibrium for \( \text{CH}_4 + \text{tetrahydrofuran (THF)} + \text{water} \), \( \text{CO}_2 + \text{THF} + \text{water} \), \( \text{CH}_4 + \text{cyclopentane (CP)} + \text{water} \) and \( \text{CO}_2 + \text{CP} + \text{water} \) binary clathrate hydrate systems were investigated from various temperature and pressures using both a high-pressure equilibrium viewing cell and a magnetic-driving \( p-T \) system. Raman measurement was carried out for the occupation of the guest molecules in the hydrate matrix. The heat of dissociation of binary clathrate hydrate was calculated by Clausius-Clapeyron equation.

Keywords: phase equilibrium, tetrahydrofuran, cyclopentane