

Time-dependent gas hydrate behavior in semi-batch vessel from methane-propane mixture

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Experiments of gas hydrate formation were carried out in a semi-batch stirred vessel at constant pressure and temperature. The hydrate formation was conducted with 90.05 % methane - 9.95 % propane mixture at two different driving forces. During the hydrate formation the binary composition change in the gas phase were measured by gas chromatography. The results indicate that the molar ratio of propane in the gas phase decreased as the hydrate crystallization progressed. The amount of gas consumption in hydrate phase was also calculated by the mass balance. The composition ratio of CH₄/C₃H₈ in the hydrate phase decreased as hydrate formation progressed. Lower driving force accelerated the decrease of the composition ratio. This kind of time-dependent gas hydrate behavior allows us to understand the capturing kinetics of the guest molecules in hydrate phase. We also discussed the implications of this work on gas storage and transport via gas hydrate media.