A thermodynamic correlation of gas hydrate phase equilibria for inhibited systems

사정훈†
동아대학교
(jhsa@dau.ac.kr†)

Predicting gas hydrate phase equilibria is particularly important when designing and operating hydrate-based applications including H_2 storage, CO_2 separation, and water treatment processes as well as flow assurance of oil/gas production systems. Based on the fundamental principle of ice freezing point depression, a new thermodynamic correlation estimating gas hydrate phase equilibria for systems containing inhibitors (e.g., methanol, ethylene glycol, and inorganic salts) was developed. This correlation is universal as it can be applied to structure I/II hydrates, organic/inorganic inhibitors, and a wide range of temperature/pressure conditions with a superior accuracy over conventional prediction tools. In addition, we demonstrated that hydrate phase equilibria can be readily predicted by simply measuring the ice freezing point of an aqueous solution containing inhibitors. Limitations of this new correlation and remaining challenges to further improve its prediction accuracy are also discussed.