Synergistic Effects of Gas Hydrate Inhibitors on CH_4 Hydrate

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Gas hydrates often give rise to serious problems during gas and oil transportation through pipelines. One of the most promising technologies to prevent plugging risks is injecting gas hydrate inhibitors. Gas hydrate inhibitors are classified into thermodynamic hydrate inhibitors (THIs) and kinetic hydrate inhibitors (KHIs). In this respect, we examined the potential synergism for combination of gas hydrate inhibitors. In this study, amino acids and ionic liquids which are known to function as both THI and KHI and MeOH which is a representative THI were used to verify the synergistic effect of each combination. In order to observe the synergism as THI, we measured thermodynamic stability conditions in the presence of inhibitors. In addition, powder X-ray diffraction was used to confirm the effect of inhibitors on the structural transition of CH_4 hydrate. Moreover, the induction time of hydrate formation and the heat of dissociation of CH_4 hydrate with inhibitors were measured from differential scanning calorimeter to evaluate synergistic performance as KHI. These experimental results will provide better understanding of gas hydrate inhibitors synergism for field application.