

Inhibition Effects of Hydrophobic Ionic Liquids on Methane Hydrate Formation

이동영, 고우진, 서용원[†]

울산과학기술원

(ywseo@unist.ac.kr[†])

Injection of kinetic hydrate inhibitors (KHIs) is a well-known method to avoid pipeline plugging by gas hydrate formation in oil and gas industry. Hydrophilic ionic liquids (ILs) have been known to act as KHIs and most studies have focused on the hydrophilicity of inhibitors which can form hydrogen bonds with water molecules. However, we selected hydrophobic ILs to emphasize that the hydrophobicity should also be considered as an important factor in the kinetic inhibition effect. In order to examine the inhibition effect of the hydrophobic ILs, a high-pressure autoclave was used to measure the onset temperature (T_{onset}) of methane hydrate in the presence of ILs during the temperature-lowering process. The growth patterns of CH₄ hydrate were observed using in-situ Raman spectroscopy to verify the inhibition mechanism of hydrophobic ILs. Performance measurements of hydrophobic ILs using two different methods indicated that the hydrophobicity is an essential factor that needs to be considered in selecting potential inhibitors. The fundamental research considering the hydrophobicity of ILs will provide a better understanding of KHIs and will be useful for flow assurance.