

## Synergistic Inhibition Effect of Amino Acid and Ionic Liquid Mixtures on Methane Hydrate Formation

서용원<sup>†</sup>, 이동영, 고우진  
울산과학기술원  
(ywse0@unist.ac.kr<sup>†</sup>)

Injection of kinetic hydrate inhibitors (KHIs) into gas and oil pipelines was one of methods to prevent plugging risks caused by gas hydrate formation. In this study, we conducted the kinetic inhibition test of amino acids and ionic liquids, which have great possibility of effectively inhibiting methane hydrate formation, and examined the influence of inhibitor mixtures on CH<sub>4</sub> hydrate formation. In order to select appropriate candidates, we firstly used the COSMO-RS software to pre-screen the interaction energy between inhibitor and water by measuring sigma ( $\sigma$ ) profile. Then, two amino acids and two ionic liquids were selected as candidates of KHIs. Moreover, both high pressure micro-differential scanning calorimeter (HP  $\mu$ -DSC) and high pressure autoclave were used to evaluate the onset temperature (Tonset) of CH<sub>4</sub> hydrate in the presence of inhibitors. Two different KHI performance measurements indicated that the newly considered mixture of glycine + [BMIM][BF<sub>4</sub>] decreased Tonset effectively. These computational and experimental results will provide a fundamental understanding of synergism for gas hydrate inhibitors and will be useful for future applicability in applied fields.