AN INVESTIGATION ON THE INHIBITORY EFFECT OF EMIM
ETSO₄ IONIC LIQUID ON HYDRATE FORMATION

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ABSTRACT
Gas hydrates are crystalline compounds consisting of a hydrogen-bonded network of host water molecules and enclathrated guest gas molecules. Various compounds are used as inhibitors for controlling gas hydrate formation. Ionic liquids (ILs) such as 1-ethyl-3-methylimidazolium ethylsulfate (EMIM EtSO₄) as a new class of compounds, can be used as thermodynamic and kinetic hydrate inhibitors. In the present work, hydrate formation was examined in EMIM EtSO₄/THF (Tetrahydrofuran)/water system. Inhibition evaluation by visual experiments were carried out in a ball-stop apparatus equipped with a CCD camera over the range of 0.1-20 wt% EMIM EtSO₄ up to 1000 minutes. The obtained optimum concentrations of EMIM EtSO₄ as a thermodynamic as well as the kinetic inhibitor were used in an isochoric pressure reactor in EMIM EtSO₄/CH₄/water system. Results showed that EMIM EtSO₄ can act as a thermodynamic inhibitor in the range of 6-10 %wt due to its strong electrostatic charge and hydrogen bonding with water. Moreover, the low-dosage kinetic hydrate inhibition by this IL can be observed at the concentration range of 0.2-0.3 wt%. At concentration of 0.2 wt% no hydrate formation occurred even within a long-time up to 1000 minutes at 1 °C. The other aspects of this study are in progress and will be soon presented.

Keywords: Methane hydrate, kinetic inhibitors, thermodynamic inhibitors, Tetrahydrofuran, EMIM EtSO₄

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