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### Thermodynamic and kinetic hydrate inhibition performance of MEG solution and its synergistic inhibition with PVCap

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Hydrate formation characteristics has been investigated with synthetic natural gas at different mono-ethylene glycol (MEG) concentrations by measuring hydrate onset time and subcooling temperature. MEG is well known thermodynamic hydrate inhibitor (THI), however there have been little works studying its effect on hydrate formation kinetics. In this paper, we report the hydrate onset is delayed and crystal growth is suppressed significantly at the MEG concentration of 30.0 wt%. We also investigate the hydrate formation in the presence of both MEG and PVCap. The addition of 0.2wt% PVCap to the 20wt% MEG solution, however, delays the hydrate onset time substantially and the hydrate fraction was less than 0.19. The torque changes were negligible during the hydrate formation, suggesting the homogeneous dispersion of hydrate particles in liquid phase. The well-dispersed hydrate particles do not agglomerate or deposit under stirring. Moreover, by adding 0.2wt% PVCap to the 30wt% MEG solution, no hydrate formation was observed for at least 24 hrs. These results suggest that mixing of MEG with small amount of PVCap in under-inhibited condition will induce the synergistic inhibition of hydrate by delaying the hydrate onset time as well as preventing the agglomeration and deposition of hydrate particles. These results suggest that it might be feasible to incorporate the kinetic inhibition performance of MEG into current hydrate inhibition strategy to manage the hydrate risk.

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