Effect of Thermodynamic Inhibitors on the Nucleation Driving Force of Gas Hydrates

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Although it is well known that thermodynamic gas hydrate inhibitors modify the incipient formation point of gas hydrates, only few efforts have been performed to establish how this chemical compounds modify the formation kinetics of gas hydrates. For instance, Yousif et al. (1996) determined experimentally that, a small amount of methanol increases the rate and amount of forming hydrates, acting as a gas hydrates promoter!!!. Taking into account that the driving force of nucleation is crucial for establishing whether a phase may or not form, in this work, the effect of the most common thermodynamic inhibitors on the driving force of multicomponent gas hydrates is assessed from a theoretical point of view. The corresponding results obtained from three mathematical expressions are compared: the Christiansen-Sloan, the Kashchiev-Firoozabadi, and one suggested by Carreón-Calderón et al. The results show that the nucleation driving force obtained using the different expressions are in agreement with experimental observations; that is, driving force increases in the presence of small amounts of thermodynamic inhibitors, facilitating the formation and stability of gas hydrates.

References

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