

Clathrate Hydrates of Hydrate Inhibitors

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Clathrate Hydrates, which are also known as gas hydrates, are nonstoichiometric crystalline inclusion compounds where gas molecules of suitable size are incorporated in hydrogen-bonded water cages. Those naturally occurring in deep sea or permafrost region have been considered as a potential source of methane gas, but gas hydrates in offshore flowlines have been a serious concern in the oil and gas industry because their sudden and rapid formation can cause blockages leading to costly production stoppage and complex remediation works. The conventional and the most widely used method to avoid hydrate formation in flowlines transporting hydrocarbons is the overdosed injection of thermodynamic hydrate inhibitors such as methanol and ethylene glycol, to shift the hydrate equilibrium curve outside the flowline operating conditions. Methanol and ammonia are the quintessential antifreeze, which have been considered not to form a gas hydrate for a long time. In this symposium, we discuss how those inhibitors can be included in the hydrate cages as a guest molecule and what the effect on hydrate-based gas storage is.