

Oil and gas pipelines with hydrophobic surfaces better equipped to deal with gas hydrate flow assurance issues - DTU Orbit (08/11/2017)

Oil and gas pipelines with hydrophobic surfaces better equipped to deal with gas hydrate flow assurance issues

Gas hydrate deposition can cause plugging in oil and gas pipelines with resultant flow assurance challenges. Presently, the energy industry uses chemical additives in order to manage hydrate formation, however these chemicals are expensive and may be associated with safety and environmental concerns. Here we show the effect of a hydrophobically coated surface on hydrate formation in the presence of an antifreeze protein type I (AFP I) and a biodegradable synthetic polymer (LuvicapBio) in a high pressure crystallizer setup. The hydrophobic surface increased the hydrate induction time and reduced the hydrate growth significantly in pure deionized water (control). Furthermore, in the presence of 0.02 wt% of LuvicapBio or 0.014 wt% AFP I in the hydrophobic coated crystallizer; the hydrate growth was reduced to almost the same level as obtained with 0.20 wt% of LuvicapBio in a stainless steel crystallizer. This indicates that 10 to 14 times less KHI is needed in the presence of a hydrophobically coated surface. These experimental studies suggest that the use of hydrophobic surfaces or pipelines could serve as an alternative or additional flow assurance approach for gas hydration mitigation and management.

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