Bjørn Kvamme, J Pet Environ Biotechnol 2016, 7:4(Suppl)
http://dx.doi.org/10.4172/2157-7463.C1.018

Bjørn Kvamme

University of Bergen, Norway

Impact of solid surface adsorption on hydrate formation risk evaluation

Hydrocarbons being transported in pipelines will always contain some dissolved water. High pressures and low temperature involves a risk of hydrate (ice-like crystals contain up to 14% CH_4) formation. The traditional way to calculate the risk of hydrate formation and the corresponding level of water content that can be permitted before transport has been to calculate water dew-point and the checking if presence of liquid water would lead to hydrate formation at the conditions of temperatures and pressures at these conditions. Pipelines being used for hydrocarbon are, however, normally covered by rust even before they are placed out. One of the most stable iron oxide in rust is Fe_2O_3. This mineral is a very good adsorption material for water and will as such represent another route for the water to drop out from hydrocarbon mixtures. The chemical potential of water adsorbed on rust can be 3.4 kJ/mole lower than chemical potential of liquid water at relevant conditions. In this study we have examined maximum water content which can be permitted in mixtures of CH_4 and C_2H_6 when considering adsorption drop out versus drop out as liquid water. For CH_4 contacting water the tolerance limit based on liquid water drop out is found to be in the order of 26 times higher than corresponding limit based on rust adsorption, for temperature 275 K and pressures between 50 and 250 bars. Similar ratios are also found for pure C_2H_6 and a mixture of CH_4 with 20% C_2H_6. As a consequence the hydrate risk analysis needs to be revised in order to reflect the most preferred routes for water drop out from gas.

Biography

Bjørn Kvamme obtained his MSc in Chemical Engineering (1981) and PhD in Chemical Engineering (1984) from the Norwegian University of Technology and Natural Sciences. After a short period with SINTEF and two years at Bergen University College, he was appointed to full Professor in 1987 and started education of MSc and PhD in Process Technology in Telemark. He entered a position as Professor in Gas Processing at Department of Physics, University of Bergen in March 2000. He is the author/co-author of 373 publications, of which 140 are in high quality journals.

Bjorn.Kvamme@uib.no