

FOAM II

Publieke samenvatting / Public summary

Aanleiding

Liquid loading occurs when 'wet' gas wells approach their end-of-life, causing them to produce at a low metastable rate, intermittently, or to cease producing. The gain in gas production that would result from preventing or delaying liquid accumulation is significant. The Foam II project aimed to gain a better understanding of the relationship between foam characteristics and foam flow behaviour, and so improve the accuracy of foamer performance predictions in the field.

Doelstelling

The project had three objectives. 1. To investigate how foamer behaviour under different conditions in a desktop scale setup relates to their performance at continuous and batch injection in a mid-scale setup and field cases. 2. To determine how foamer performance is related to physico-chemical foamer properties, such as equilibrium and dynamic surface tension and rheology, and foamer chemistry, such as diffusion and adsorption time scale of surfactants, hydrophobic chain length, surface area occupied by surfactant molecules, surfactant type, etc. 3. To validate and improve the multiphase foam transport model with field cases so that in the future determining the deliquification potential of a foamer only requires input from desktop scale tests.

Korte omschrijving

One way to deliquefy gas wells is to use foamers. However, it is hard to predict how a foamer will perform. This project investigated three foamers: Sodium Dodecyl Sulphate (SDS), Cocamidopropyl Betaine (CAPB) and a commercial surfactant. Their

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respective performance was assessed using several experimental approaches. These varied from small scale to more application-like experiments, and included surface tension, rheology, Sparger column and flow loop tests. Each surfactant was tested at different scales and compared with the others.

Resultaat

The project described and analysed the relevant parameters to predict foamer performance. The research found that adding salt may decrease the performance of a foamer by reducing its solubility or otherwise making it less effective. It also found that thermal ageing may cause the effective foamer concentration to decrease. Generally, a solution with lower effective foamer concentration has a lower performance. Based on the response of the surfactants on the various treatments, the maximum carryover is strongly correlated to the mean quality of the foam film. This is due to the limited availability of surfactant molecules for the formation of foam. A similar trend was observed for saline and thermally aged samples. The details of foamer viscosity and the surface tension of the foamer solution seemed not to affect foamer performance in the flow loop significantly. This means that the maximum carryover should be used to predict the foam flow behaviour when a flow loop is not available. Finally, one Foam-1 suggestion for assessing foamer performance in field conditions – thermal ageing – was found not to be a suitable method to replace high temperature testing in the small-scale test

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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