Case study: North America

FOAMSTOP low catalyst impact antifoam reduced silicon by more than 60%

To resolve the persistent problem of foaming in their processing units, refiners commonly implement one or more antifoam chemistries. In delayed coker processes, traditional silicone-based antifoams have been used for many years due to their relative thermal stability. However, the fractions of these products that thermally decompose ultimately contribute silicon to the coker product streams. When these streams reach the hydrotreater, the silicon shortens the operating life of the catalyst, resulting in increased operating costs and more frequent catalyst replacements.

A North American refinery was using a standard 600,000-cSt polydimethyl siloxane to control the foam in their delayed coker. The cracked naphtha product from the coker was sent to a hydrotreater, carrying along with it silicon that was slowly poisoning the hydrotreater catalyst. The refinery was spending millions of dollars each time they had to change the catalyst early because of the silicon poisoning. Looking for an alternative antifoam solution to reduce the silicon concentrations entering the naphtha hydrotreater, the refiner reached out to Baker Hughes.

After further analysis of the problem and processing conditions, Baker Hughes recommended implementing its new **FOAMSTOP™ low catalyst impact (LCI) antifoam** to control the delayed coker foaming. Because the FOAMSTOP LCI antifoam is more thermally stable than traditional silicone chemistries, it is more persistent in the coke drum, resulting in lower silicone concentrations in the coke drum and cracked products.

Since implementation of the FOAMSTOP antifoam, the silicon carryover to cracked products has decreased significantly, reducing the silicon poisoning of downstream reactor catalyst. Figure 1 shows a comparison between the two treatments, confirming the silicon content decreased by 64% in the coker naphtha and by 73% in the NHT naphtha when using FOAMSTOP antifoam. This allowed the refiner to double the reactor bed catalyst life, delivering an annual savings of $400,000 USD.

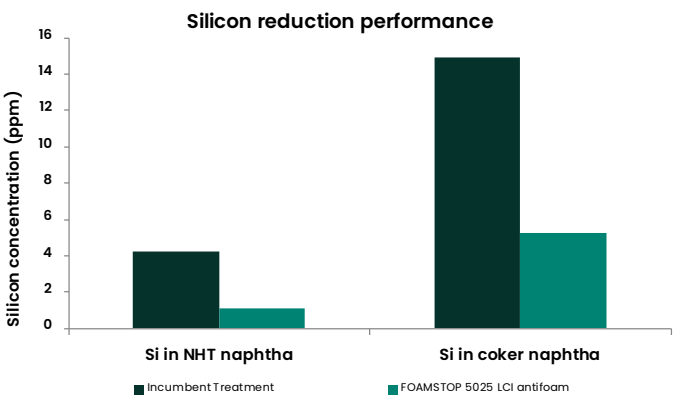

Figure 1. Silicon concentrations in the NHT naphtha and coker naphtha were reduced significantly when using FOAMSTOP LCI antifoam compared to the incumbent product.

Challenge

Incumbent antifoam product was causing silicon poisoning, forcing the refiner to spend millions of dollars to change out the catalyst in the naphtha hydrotreater.

Results

- Reduced silicon content in coker naphtha by 64% and NHT naphtha by 73%
- Doubled the reactor bed catalyst life, delivering annual savings of $400,000 USD
- Controlled foaming while reducing antifoam usage rate over incumbent product