Baker Hughes

Case study: Gulf Coast, United States

FOAMSTOP low catalyst impact antifoam reduced silicon carryover from coker by 78%

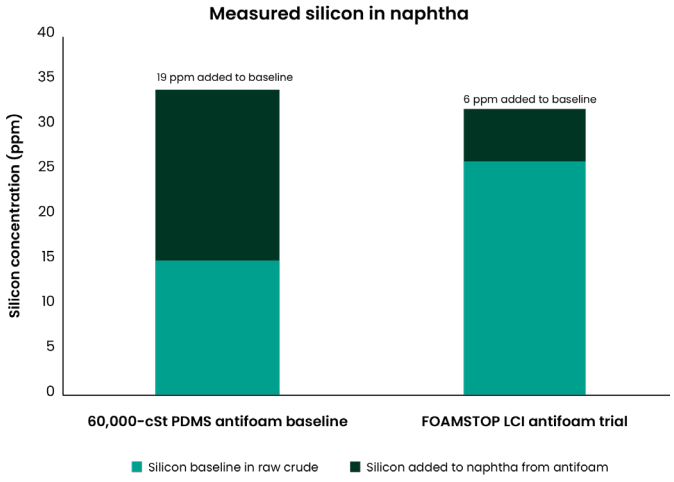
A refiner was treating their coker with a commodity 60,000-cSt polydimethylsiloxane (PDMS) antifoam that was contributing 3,500 lb (1,588 kg) of silicon per year carryover to downstream units. The refiner was experiencing an increase in the silicon content of incoming crudes, resulting in rapid contamination of their downstream catalysts. They agreed to trial **FOAMSTOP™ low catalyst impact (LCI) antifoam** to address the problem. This novel product contains a proprietary agent that is more thermally stable than conventional silicone oils. A temporary tote injection system was installed to allow feeding of the trial antifoam and provide ease of switching back to the old antifoam if needed.

FOAMSTOP antifoam from Baker Hughes was trialed over 32 coke drum cycles to compare to a previous run of 32 cycles using 60,000-cSt PDMS antifoam. Fresh feed and furnace charge rates were similar for each case. The trial run had a slightly higher charge rate, 21.3 over 19.8 MBPD, which contributed to a slightly reduced cycle time of the coker. The amount of silicon added to the drum by the antifoam was reduced by 68%, from 0.95 to 0.30 lb (0.43 to 0.14 kg) of silicon per MBPD.

Samples of coker naphtha were taken during the drum cycle for the base case and the trial case. When using the 60,000-cSt PDMS antifoam, the silicon concentration in the naphtha samples was 19 ppm Si. When using FOAMSTOP antifoam, the silicon concentration was 6 ppm, confirming that the contamination of coker naphtha with silicon was lower when using FOAMSTOP LCI antifoam.

It was estimated that FOAMSTOP LCI antifoam decreased the amount of silicon entering the naphtha stream by 2,700 lb/yr (1,225 kg/yr), a reduction of 78%. This extended the catalyst life by an estimated 81 days.

This case history is presented for illustrative purposes only, since results may vary between applications.



Challenges

- Silicon originated from antifoaming agents used in oilfield production and delayed coker foam control additives
- Silicon carryover from coker product
- Increased silicon content of incoming crude

Results

- Reduced silicon contribution to naphtha hydrotreater (NHT) catalyst contamination by 78%
- Improved thermal stability in the coke drum, reducing the silicon carryover from 36 to 18%
- Maintained antifoamer performance in a coke drum with a lower silicon injection rate
- Reduced silicon contamination to downstream catalyst by 2,700 lb/yr