

Case study: West Coast, United States

Delayed coker antifoam reduced silicon carryover, solved refinery operating problem

A US West Coast refinery using 600,000-cSt antifoam in their delayed coker was experiencing higher than desired silicon carryover in the streams exiting the main fractionator. The base case coker liquid product samples collected at identical periods in the drum cycle showed silicon levels of 20.0, 4.5, and 2.5 ppm in coker naphtha, light coker gas oil (LCGO), and heavy coker gas oil (HCGO), respectively. The silicon carryover was negatively impacting catalyst life in the downstream hydrotreaters.

Representatives from Baker Hughes collaborated with the refinery staff to review the system and then present recommendations. After a joint analysis by both parties, it was agreed that a newly developed product, **FOAMSTOP™ low catalyst impact (LCI) antifoam**, would be evaluated. Additional sets of naphtha, LCGO, and HCGO samples were collected to monitor silicon levels, using the same sampling protocol developed to generate the baseline data.

The remaining 600,000-cSt antifoam product was removed and the antifoam tank was filled with the FOAMSTOP LCI antifoam. However, some of the original antifoam remained in the storage tank, so the antifoam fed during the initial trial was a mixture of approximately 83% FOAMSTOP LCI antifoam and 17% of the 600,000-cSt antifoam. The composite antifoam feed proved that the antifoam is compatible with other antifoams offered by Baker Hughes and does not require the cleaning of any equipment or lines before application.

Following the injection of the new antifoam, the measured levels of silicon in the coker liquid products dropped considerably.

Silicon levels fell to 13.8 ppm in coker naphtha, 2.2 ppm in LCGO, and 1.2 ppm in HCGO. Figure 1 compares the silicon data for the base case with the new antifoam product and the percent reductions in silicon levels that were observed.

Using this new antifoam product, the refinery was able to reduce coker liquid product silicon levels by as much as 52%. This level of silicon reduction is expected to have a significantly positive effect on the life of downstream hydrotreater catalysts.

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

Challenges

- Silicon carryover in coker liquid streams
- Shortened catalyst life

Results

- Reduced coker liquid product silicon levels by up to 52%
- Improved refinery operations
- Extended catalyst life
- Reduced silicon carryover

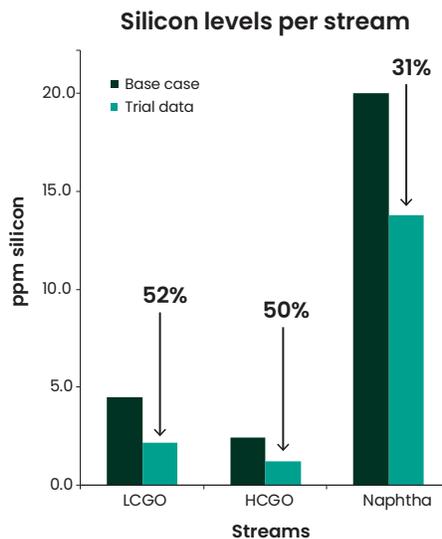


Figure 1. Silicon levels per stream comparison