Crude Unit Chloride Salt Control (CSC)

IMPROVE RELIABILITY, FLEXIBILITY, THROUGHPUT AND PROFITABILITY

TECHNOLOGY OVERVIEW

Crude unit fractionators are susceptible to ammonium chloride and amine hydrochloride salt formation, especially when running lower overhead temperatures or operating with a cold reflux or pumparound return. When these chloride salts form, they result in severe corrosion and fouling from salts and corrosion products formed in the tower, compromising unit reliability and profitability.

CSC (Chloride Salt Control) technology is a patented, high-base strength chemistry that effectively removes and prevents salt formation. In salt removal applications, the CSC displaces any other bases from existing deposits in order to form its own salt. In salt prevention, the CSC acts as a chloride scavenger that selectively forms a salt with the chloride in place of that salt's counter ion. The salt resulting from CSC technology has multiple advantages because of its low corrosivity and excellent mobility, which allows refiners to improve reliability, maximize unit flexibility, and increase or recover throughput and profitability.

CASE STUDY: PROVEN AMINE DISPLACEMENTCHALLENGE

Challenge

Lab testing conducted with both pure salts and salt-containing deposits has confirmed the effectiveness of CSC in displacing weaker bases. While successful in the lab, field verification was also desired. One U.S. refiner experienced salt formation in the top section of their tower. The overhead temperature operated above the salt point, but the cold pumparound return led to shock condensation and associated salt and corrosion product build-up.

Confirmation

A CSC trial was implemented to determine if lab displacement results could be confirmed. During the CSC injection, cyclohexylamine, a steam neutralizer in use, was measured at higher than normal levels in the pumparound. This gave field confirmation that the CSC does displace weaker bases in refinery process systems.

CASE HISTORY: FROM CLEANING TO CONTINUOUS

Challenge

A Gulf Coast refinery began experiencing fouling issues in their atmospheric crude tower, which resulted in a reduction in crude charge rate. This tower operates with a low overhead temperature, around 200ºF, in order to maximize distillate. Ionic modeling predicted that both Monoethanolamine (MEA) hydrochloride and ammonium chloride salts were forming inside of the tower. While MEA forms a liquid salt and ammonia forms a solid salt, both are very corrosive and can lead to an accumulation of corrosion product.

Solution and Benefits

The CSC technology was selected for a trial to attempt removal of the chloride salts. Upon application, a spike in chlorides was observed in the heavy naphtha draw, indicating successful salt movement from the tower. The CSC trial recovered 25% of the crude harge rate and was considered a success at the refinery. The unit later went into turnaround. Since starting up, the CSC has been injected on a continuous basis to prevent the harmful chloride salts from forming. No evidence of increased pressure drop, which the refinery expected to see, has been observed with this continuous application in place, allowing the refinery to continue operating at a

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