

Nalco Water's ACRYL-EX Program Delivers Multiple Benefits with a Single Application for MMA Producer



BACKGROUND

One of the most prevalent methods to produce methyl methacrylate (MMA) is by the amidation and esterification process of acetone cyanohydrin (ACH), sulfuric acid (H_2SO_4) and methanol (CH_3OH).

During this process, the spent sulfuric acid is recovered from its waste stream and recycled back to the main production process. An MMA (methyl methacrylate) producer in Asia Pacific often experiences filter blockages in its waste tank located in the spent acid recovery section. Asphaltene components in the spent acid stream have gradually increased as a result of reduction in MMA yield.

Crude MMA containing acid impurities is purified following the extraction and purification train, and the final MMA product purity is at or above 99.95%. To avoid the polymerization of MMA during manufacturing, Hydroquinone (HQ) and Phenothiazine (PTZ) are introduced in the MMA process as inhibitor and stabilizer.

SOLUTION

After detailed technical exchanges with the producer, the ACRYL-EX dispersant was injected into the waste tank. During the first intermittent treatment, the producer witnessed a significant improvement in filter plugging and cleaning frequency. Later, the customer agreed to use a newly developed dispersant as an alternative product. This new dispersant dosage is 30-40 ppm based on the waste return flow. Two months later, this dispersant began being fed into the waste tank.

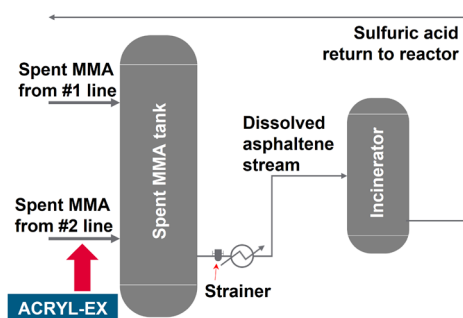


FIGURE 1: INJECTION LOCATION & PROCESS FLOW

The waste from MMA unit two is mixed with the ACRYL-EX antifoulant and is then directly introduced to the spent acid tank bottom. MMA waste from MMA unit one is introduced into the waste tank from the top and then mixed with the dispersant.

ANNUAL SAVINGS



COSTS

Maintenance and
operational savings of

\$88,000



PRODUCTIVITY

Productivity improvements of

\$53,000

VALUE DELIVERED

**\$141,000
ANNUALLY**

The main effect of adding the antifoulant is to prevent the asphaltenes in the components from plugging the filter. These waste materials are converted into inorganic materials after atomized incineration, and then supplied as the raw material to produce sulfuric acid, which is necessary for MMA production.

RESULTS

The frequency of filter plugging was gradually reduced from 6 per quarter to only 1 per quarter, as shown in Figure 2. The asphaltene liquid level of the MMA waste tank - another fouling indicator - has steadily decreased. With fewer blockages, the inflow and outflow of waste kept a balanced rate, and even the asphaltene level decreased accordingly. The producer decided to inject the new dispersant continuously due to the outstanding performance seen from this ACRYL-EX antifoulant.

CONCLUSION

Thanks to the excellent effects of the ACRYL-EX antifoulant, stable operation of the esterification process was restored. Furthermore, the antifoulant enables operation above design parameters of the MMA unit, and the yield of MMA products has also increased. The superior performance of this innovative antifoulant is well recognized by the MMA producer, and they have also reduced other hazardous chemical usages, including Hydroquinone (HQ) and Phenothiazine (PTZ). The antifoulant offering has led to smoother operation and more reliable production of the MMA process, and creates additional economic benefits for the customer.

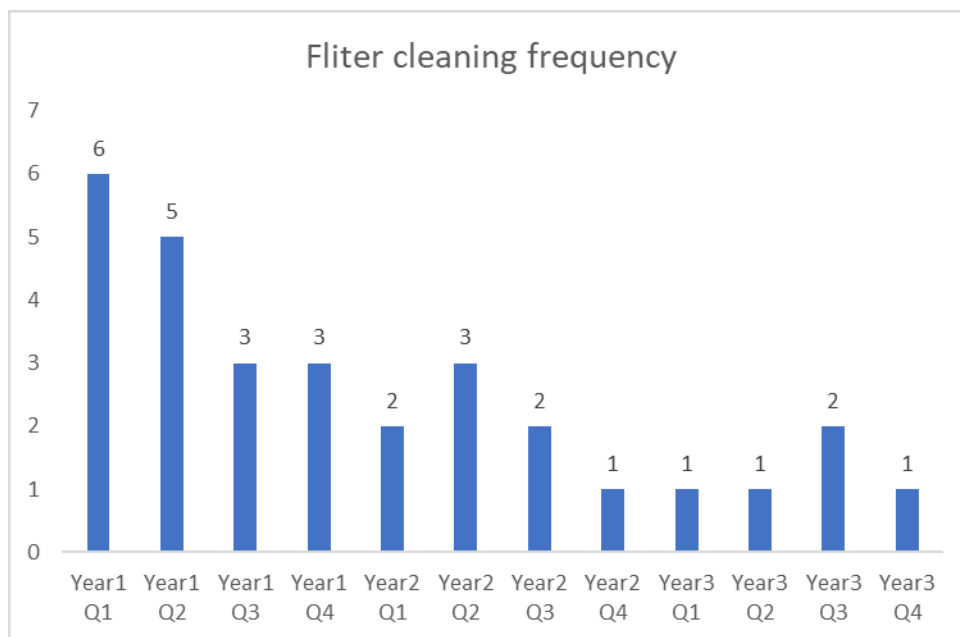


FIGURE 2: NUMBER OF FILTER CLEANINGS DUE TO PLUGGING

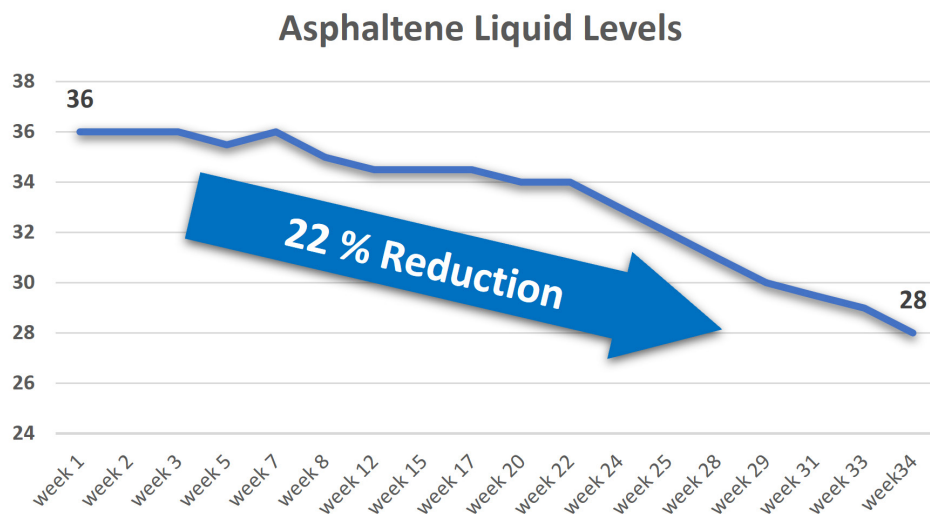


FIGURE 3: ASPHALTENE LIQUID LEVELS - LOWER LEVELS INDICATED LESS FOULING

Nalco Water, an Ecolab Company

Downstream: 11177 S. Stadium Drive, Bldg 31, • Sugar Land, TX 77478

North America: 1601 West Diehl Road • Naperville, Illinois 60563 • USA

Europe: Richtstrasse 7 • 8304 Wallisellen • Switzerland

Asia Pacific: 52 Jurong Gateway Road • #16-01 Jem Office Tower • Singapore 608550

Greater China: 18G • Lane 168 • Da Du He Road • Shanghai China • 200062

Latin America: Av. Francisco Matarazzo • n° 1350 • Sao Paulo – SP Brazil • CEP: 05001-100

Middle East and Africa: Street 1010, Near Container Terminal 3, Jebel Ali Free Zone, PO BOX 262015, Dubai UAE

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