Question 72 What feed contaminants can lead to metal corrosion in both sulfuric acid and HF alkylation units? What operating conditions promote corrosion? What do you do to reduce corrosion and/or remove contaminants?

GRUBB (Chevron USA, Inc.) I've consulted Gary Ash, the Pascagoula local expert, and Steve Mather, who is the corporate expert. They relayed to me that acid is still the biggest problem and not really necessarily the contaminants; but where the feed contaminants come in, they can make the acid more corrosive. They pointed out that water is the worst and that it could get less than a 92% acid strength, it's dramatically more corrosive. Also, alcohols can also increase the corrosive nature of the acid. Some of the things that we do to minimize acid corrosion is we always control the temperature to less than 100°F maximum. We control the velocity by using long radius elbows in the design and then we do careful consideration of throttling valves and flow orifices. We avoid dead legs in the pipes and we use the correct metallurgy wherever determined.

KAISER (Delek Refining Ltd.) The important point that Rick brought up is that it's the things that spend your acid that are going to make the unit suffer more corrosion. There are a number of different contaminants that I believe you all are aware of, and there are references out there on rough guidelines for what they ought to be. The follow-up to that is you need to pay attention to what your acid strength is doing. You need to monitor your acid strength. In the case of an HF unit, monitor the water content of the acid. Sampling your acid circulation for strength three to seven times a week is not uncommon as is using online acid analyzers that can tell you continuously where you are. For HF operations, monitor your acid regeneration; look at how much polymer you're making. You have to realize that a lot of the feed contaminants that come in and can spend your acid will change the boiling point of that ASO. So you need to adjust your regeneration operations accordingly and make sure you maintain good acid strength and good soluble oil rejection. One of the other things that can help out in an HF unit is that the color of the polymer itself can give you an indication of what the contaminant type is. For sulfuric units, maintaining a good effluent wash section and maintaining it hot enough—120°F or hotter—are recommended, as well as keeping up the caustic strength. If you have a caustic effluent treating or are using good high strength sulfuric acid in the effluent treating, this is also important for minimizing corrosion on the downstream deisobutanizers. The other thing that you ought to do is develop a very good inspection program for your unit. Make sure you're watching the critical areas of piping, your critical pieces of equipment that you know are going to be prone to corrosion. Also include in that dead legs and small bore piping and bleeders that hang off the bottom of pipes. Those are all very common areas to have corrosion in your units. Even if you do maintain good acid quality, those are the places that low- strength acid or water will settle out and generate problems for you. There are a couple of NACE papers in the open literature that you can have access to. NACE paper 04645, "The Effect of Operating Conditions on Corrosion in HF Alkylation Units," and NACE 07570, "The Top Ten Corrosion Issues Affecting HF Alkylation Units" contain good references for metal corrosion in HF alkylation units (with some applicable items for sulfuric units).

Print as PDF:

Tags

Alkylation

Corrosion

HF Alkylation (HF Alky)

Operability

Sulphuric Alkylation

Year

2008

Submitter

Licensor

Operator