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## **Question 84: What is your experience with cleaning multi-upcoming trays in aromatics extraction service? What cleaning methods are most effective?**

### **QUINTANA (Valero Energy Corporation)**

While we do have some multiple upcomer trays installed in one of our extraction units. We haven't really had to clean them as yet, but we have used various methods to clean the conventional rain deck extractor trays in our other units. As such, we do believe that those methods should be similarly successful with MU trays. Generally, we first would steam out the extractor from the bottom and then follow that up with a hot condensate wash from the top down. That tends to loosen all the bulk foulants, breaking them into smaller pieces, washing them down to the bottom of the extractor and flushing them out. However if your trays are very heavily fouled and if you've had a lot of dissolved oxygen in your feed, you would not only get the corrosion issues in the solvent, but you'll have a lot of foulants that will accumulate on the extractor trays. If they have been very heavily fouled, then that steam-out and condensate wash may not quite be enough. The alternative is then to perform a chemical cleaning step usually with citric acid. Some people have looked at mineral acids, but we try to avoid those because of the concern with possibly attacking the metal and making the holes on the extractor trays larger. If they get larger, you're going to affect tray efficiency and you'll see a falloff in performance.

### **METKA (Sunoco, Inc.)**

The Sunoco extraction units have different tray designs, including multi-upcomer trays. The removal of trays for cleaning and access can be an involved task that can consume considerable time during an outage. We have successfully used several methods of cleaning depending on the desired results. Steam and condensate has been used to remove water soluble deposits and light fouling, as Javier noted. We have also used citric acid and inhibited hydrochloric acid successfully for scale removal. It should be noted that all acid-wash operations need to be closely monitored and carefully planned, and that the tray-hole diameters should be confirmed to ensure reliable post-startup operation.

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