## Question 47: What success have you had with installing stabilizer feed chloride treaters in reducing the salt formation and frequency of water washes?

**Erik Myers** (Valero)

The use of promoted alumina versus zeolite in the liquid chloride treating has several issues. For aromatics operations a Zeolite chloride treater should be selected to protect the downstream aromatics solvent from organic and inorganic chloride. Organic chlorides are not picked up by alumina treating. In gasoline treating the use of promoted alumina is acceptable to Valero.

Since Zeolite chloride treating picks up organic and inorganic chlorides the zeolite beds spend faster which makes the use of zeolite relatively expensive. Organic chlorides decompose at reboiler temperatures (>250 Deg F) in the stabilizer reboiler circuit which is why HCl can be found in the off gas of a stabilizer tower downstream of an alumina chloride treater. Organic chloride can be formed from olefins generated at high temperatures in the Reforming reactors which is a simple equilibrium dependant on operating pressure and temperature in the last Reforming reactor. If a zeolite treater is used in front of the stabilizer column, Valero would expect little to no chloride corrosion or salt deposition and has achieved this at one refinery. Valero allows both the use of promoted alumina or zeolite based chloride treating on the liquid stream entering the stabilizer column. A process design detail often overlooked is that the liquid chloride treater should be installed inside the product separator’s liquid control valve (cold, high pressure, 100% liquid phase) so the treating is liquid phase not two phases. There is no advantage to installing the chloride treater in the hot position on the stabilizer liquid feed unless metal oxides are being used for chloride control.

**Michael Windham** (UOP).

UOP MOLSIV® sorbent PCL-100 is a molecular sieve designed for inorganic (HCl) and organic chloride removal from liquid hydrocarbon streams. It provides higher dynamic Chloride capacity than conventional doped alumina and metal oxide chemi-sorbents.

UOP PCL-100 will provide longer performance life than doped alumina's or metal oxide chemisorbents. As a molecular sieve, PCL-100 uses the entire particle for adsorption. Its unique structure combined with low coke formation, allows a higher rate of total chloride (inorganic and organic) removal and greater utilization of the sorbent bed. The end result is a higher breakthrough chloride capacity than conventional chemisorbents. True molecular sieve adsorption provides sharp mass transfer zones and removal to ultra-low concentrations of HCl and organic chlorides.

**Brad Palmer** (ConocoPhillips)

Stabilizer feed chloride treaters have been successfully installed and operated but not for reducing salt formation in the stabilizer. We do not operate our chloride traps as ammonium chloride salt filters; if they are performing this function, it is a side benefit. The best ammonium chloride prevention techniques are those that prevent nitrogen breakthrough to the Reformer, including robust naphtha hydrotreating, robust naphtha stripping, NHT catalyst change out before Si poisoning eliminates the denitrification activity, frequent Reformer feed nitrogen analyses and low-level nitrogen detection.

Chloride treaters have been installed on the stabilizer feed to reduce the amount of HCl and organic chlorides in order to reduce/prevent corrosion in the Stabilizer and downstream systems. HCl in the Stabilizer overhead vapor or liquid ends up being routed to Sat Gas units which are normally wet. Organic chlorides break down in the stabilizer reboiler and/or other downstream reboilers to produce HCl. The first wet points in downstream units are the most likely areas to corrode. Corrosion can potentially result in significant process safety incidents, especially in Sat Gas Units. Chloride treaters have been installed for corrosion prevention/reduction; hence, an improvement in process safety.

**Jamie Chisamore** (Johnson Matthey Catalysts)

Stabilizer feed chloride treaters can be an effective way to tackle salt formation problems that create the need for frequent water washes in the stabilizer tower. These beds tend to be quite large due to the volume of the feed stream and the liquid hourly space velocities required to overcome the diffusion limitations of treating a liquid stream. With this being said, the rate reductions often required to conduct water washes of the stabilizer tower may justify installing these chloride treaters.

Johnson Matthey Catalysts has a European refining customer that installed lead/lag chloride treaters at the inlet of their stabilizer column more than 10 years ago and has been able to eliminate the need for water washes between turnarounds. This particular customer had severe salt fouling in their stabilizer column that was requiring a water wash every two months. Prior to installing the beds they had worked to lower the nitrogen levels in the reformer feed naphtha, but were still unable to control the salt formation. They then began to work with the licensor of their unit who suggested using feed chloride treaters. They installed **PURASPECJM** TM 6250 and were able to eliminate the need for water washes between their two year turnaround periods.

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