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## **Question 17: How does alkylate contribute to gasoline blend pool sulfur? With pending Tier III regulations, what steps are you taking to understand and control this contribution?**

**Kurt Detrick (UOP)**

The feed to an HF Alkylation unit typically contains about 10 – 20 wppm of Sulfur. Nearly all of the sulfur in the HF Alky feed makes ASO, which mostly stays in the acid phase in the reactor. This ASO is removed from the acid in the Acid Regeneration (or Rerun) column and so most of the sulfur typically is rejected from the unit in the ASO product stream. However, during normal operation of the unit, as much as 20% of the sulfur in the feed to an HF Alkylation unit can wind up in the alkylate, so if the feed to the HF Alkylation unit increases above the typical 10 – 20 wppm, the amount of sulfur in the alkylate will increase. Also, the following things can cause more than 20% of the sulfur in the HF Alky feed to wind up in the alkylate product:

- Acid carryover from the Settler. Incomplete settling of acid in the settler (due to high velocities or emulsion) can cause acid to be carried over with the hydrocarbon feed to the main fractionator. This will allow the ASO to go to the bottom of the main fractionator with the alkylate and will cause higher sulfur concentration in the alkylate.
- ASO leaving the top of the Acid Regenerator or Rerun column. In some unit configurations, if the Acid Regenerator or Rerun column is over-stripping, flooding, or otherwise operating in a way that causes ASO to go out the top of the column, this ASO (with the associated sulfur) can get into the main fractionator and then it will wind up in the alkylate.
- Internal Regeneration. When internal regeneration (regeneration of the acid in the Iso stripper or main fractionator) is done, all of the sulfur in the feed will wind up in the alkylate. Some units have stopped the use of internal regeneration for this reason.

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