Question 1: What are the benefits of alumina treating in sulfuric acid alkylation and HF alkylation? Has this technology been proven commercially?

CHRISTIAN ARNOUX (Valero)

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- Typically, all alkylation units treat the effluent to remove free acid and/or contaminants
- Fluorides and Sulfates are the typical contaminates removed from HF and Sulfuric acid units, respectively
- Activated alumina is commonly used in HF service
- Caustic treating is common in sulfuric acid units but dry treating using alumina is also used

LIZA PACHECO (STRATCO)

In the sulfuric acid alkylation process, droplets of acid are found in the effluent stream from the reactor. These droplets, which are formed primarily from the alkylation chemistry itself and the formation of intermediates, are small and stable and cannot be removed by gravity settling and / or coalescing alone. Traditionally, a caustic/alkaline water system has been used to remove the acidic droplets from the effluent stream through neutralization. Consequently, the water that is introduced in this section travels to the reaction section where it will dilute the acid and increase corrosion. When activated alumina is used, the acid droplets are removed by the chemical reaction of the acid with the activated alumina. No water is introduced into the system which will be beneficial due to the decrease of acid consumption and corrosion in the treating and reaction sections. Refiners have reported longer Contactor™ tube bundle life when operating a dry system using alumina compared to the caustic/ alkaline water effluent treating system where water is introduced into the process and recycles back to the reaction zone. While several STRATCO® alkylation units have operated with dry alumina treating for many years, only in the last few years has this been part of the standard STRATCO® alkylation offering. As part of this transition, DuPont has made a commitment to research for continuous improvements to this process.

KURT DETRICK and TROY SMALL (UOP)

Alumina and promoted alumina products are commonly used in HF alkylation to remove organic fluorides from the propane and butane product streams. The benefits of using alumina to remove organic fluorides from the product streams include prevention of corrosion in downstream fractionation towers, prevention of catalyst deactivation in downstream catalytic units (such as Butamer) and making the propane safe for in-home use (such as in stoves and heaters). While both alumina and promoted alumina, products have been commercially proven, the industry trend is towards promoted alumina products, which generally have a higher fluoride capacity than non-promoted alumina products.

Alumina treating in sulfuric alkylation units is not common.

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