Value Addition to Naphtha Cracker Feedstock by Extraction of Pure Aromatics

Naphtha cracker is the heart of any petrochemical complex. Selection of cracker feedstock is one of the most important criteria as it not only affects the yield and quality of products but also cracker furnace operation.

Keeping this in mind the preferred feedstock is low aromatic naphtha (<12% of aromatics). Aromatics are undesirable as they do not add any ethylene value due to their refractory nature and produce undesirable black oil. However, maintaining constant supply of low aromatic naphtha is not an easy task due to quality and price fluctuations in the market. On the contrary running naphtha crackers at full capacity is critical for operating all downstream plants at full capacity.

To process off spec naphtha (aromatics > 12 %), one innovative approach is to extract pure aromatics and use the dearomatized product as naphtha cracker feedstock. Although aromatic extraction technology exist for aromatic rich feedstocks with aromatic content more than 65% and naphthene content less than 2% such as reformate and hydrogenated pyrolysis gasoline(PG) whereas in case of off spec naphtha, the aromatic content is around 10-15%, and the naphthene content is more than 25%. The ratio of aromatics to naphthenes (impurities) is 15 to 20, in the conventional feedstock such as reformate while in the naphtha cracker feedstock this ratio is less than 1. This makes the process to produce pure BTX from the said off spec naphtha highly challenging and needs innovations.

Using the current technology, naphtha feed before being sent to the cracker is routed to a solvent extraction unit wherein it is contacted with polar selective solvent to extract pure aromatics. The raffinate (dearomatized naphtha) produced can then be sent to cracker as an improved feedstock due to its low (<3 wt. %) aromatic content. The aromatics rich extract stream can either be sent to any downstream ED / Solvent Extraction Unit or high purity BTX be recovered by fractionation.

The envisaged benefits of the technology are as follows:

- Feasibility of processing off grade naphtha with simultaneous production of pure aromatics
- Potential of gain in the throughput of existing naphtha cracker due to upstream recovery of aromatic compounds
- Aromatic content of dearomatised product to be used as Naphtha Cracker Feed (2 – 3%)
- Decreased coke formation in Naphtha Cracker