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Light Hydrocarbon and Light Naphtha Utilization

Process Economics Program Report 297

September 2016 **ihs.com**

PEP Report 297

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Abstract

Light hydrocarbon and light naphtha refer to various hydrocarbon streams in the C_5–C_7 range. These streams originate from a variety of sources in the refinery, ranging from atmospheric distillation to gas plants from various refinery reactors. These hydrocarbon streams may be used to produce chemicals or may be utilized for fuel applications. In a modern refinery, it is imperative to upgrade many of the available light hydrocarbons to heavier components with higher octanes in order to meet the quality specifications on the gasoline pool. Constantly tightening environmental regulations enacted worldwide have prompted the development of sophisticated upgrading technologies in recent years.

With the above in perspective, we present in this report a review and technoeconomic analysis of some of the processes utilizing light hydrocarbons and light naphtha in a refinery setup. The processes analyzed in this report include alkylation and dimerization of olefinic fluidized catalytic cracking (FCC) C_4 stream, and isomerization of C_7 paraffinic stream. The emphasis is on modern emerging technologies such as solid acid catalyst for alkylation and metal-oxide catalyst for isomerization technology extended to C_7 hydrocarbons. The processing capacity for the alkylation and dimerization processes is 10,940 BSD (barrels per stream day) of feed. The isomerization process aimed at the narrow C_7 cut has smaller capacity, processing 3,670 BSD of feed.

The production economics assessment in this report is based on a US Gulf Coast location. However, an iPEP Navigator module (an excel-based computer costing model offered by IHS Chemical) is attached with this report to allow a quick calculation of the process economics for three other major regions—Germany, Japan, and China. For every process, the module also allows production economics to be reported in English or metric units in each region.

The technological and economic assessment of the processes is the independent interpretation by the IHS Chemical Process Economics Program (PEP) of the companies' commercial processes based on information presented in open literature, such as patents or technical articles, and may not reflect in whole or in part the actual plant configuration. We do however believe that they are sufficiently representative of the processes and process economics within the range of accuracy necessary for economic evaluations of the conceptual process designs.

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