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Abstract

Rising demand for transportation fuels and petrochemicals as well as the rising supply of heavy residue of crude oil have resulted in a renewed interest in the processing of heavy residue to generate useful lighter fuels and chemicals. Nonconventional feeds such as vacuum residue and heavy oils have shown high potential as alternate sources for the production of high-value transportation fuels, as these are abundantly available. These feeds are of low quality because of the presence of impurities like Conradson carbon residue (CCR), asphaltenes, sulfur, nitrogen, and heavy metals.

Several process technologies have been developed to upgrade these feeds, which can be broadly divided into carbon rejection and hydrogen addition processes. Carbon rejection processes mainly are visbreaking, steam cracking, fluid catalytic cracking, and coking, while hydrogen addition processes are hydrocracking, fixed-bed catalytic hydroconversion, ebullated catalytic bed, slurry bed catalytic hydroconversion, hydrovisbreaking, and hydropyrolysis.

Though coking, resid fluidized catalytic cracking (RFCC), and hydrocracking are the major commercial residue upgrading processes, slurry-phase hydrocracking is gaining popularity among refiners. PEP Report 228, *Refinery Residue Updating* (June 2000) covered the above-mentioned processes. In this report, we cover slurry-phase hydrocracking technology for upgrading vacuum residue and the production economics thereof. The main advantage of the slurry-based process is that it can process a variety of feedstocks from refinery residue with more than 90% conversion. Also, as dispersed catalyst is used in the reactor, it is not prone to plugging from coke.

In this design, we have presented our understanding of the process technology and production economics of the following slurry-phase hydrocracking technologies:

- Honeywell UOP's Uniflex™
- KBR's Veba Combi Cracker (VCC™)
- ENI's slurry technology (EST)

We also describe our understanding of other slurry-phase hydrocracking technologies, such as the Chevron Lummus Global (CLG) LC-SLURRY process.

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