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Mixed Feed Naphtha Steam Cracking

PEP Review 2021-04

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Abstract

With oil demand expected to reach a peak in the next couple of decades, if not sooner, the supply of feedstocks into a still-growing petrochemical industry is set to become a challenge. With the focus on crude-oil-to-chemicals, most of the new refinery-petrochemical complexes are designed to be highly integrated with the intent of maximizing chemical production. Even existing refinery and petrochemical complexes are integrating to maximize petrochemical production. Steam cracking plays a major role in the integration of the refinery with downstream petrochemicals.

This review attempts to showcase the capability of the mixed feed steam cracker and its role in a highly integrated refinery-petrochemical complex. Mixed feed steam crackers have the flexibility to crack gas and liquid feeds from multiple refinery units. Also, various vent and recycle streams from various downstream petrochemical units can be processed directly in the recovery section to improve overall product yield.

The Zhejiang refinery project is a highly integrated refinery-petrochemical complex with crude-to-chemical conversion of around 45%. In this review, IHS Markit analyzes the economics of the Zhejiang mixed feed steam cracker using information from the open literature. We present a steam cracker with design capacity of 1,475 kta polymer-grade ethylene. The unit is designed to accept fourteen different feed streams: nine streams are fed to the cracking furnaces, five streams are fed to the recovery unit. We present estimates of capital costs, operating costs, and ethylene production cost.

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