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Technology and Costs

TECH 2019S10: *meta*-Xylene and Isophthalic Acid

***meta*-Xylene and Isophthalic Acid is one in a series of reports published as part of Nexant's 2019 Technoeconomics – Energy & Chemicals (TECH) program.**

Overview

Xylenes are C_8 aromatics with methyl groups on the benzene ring. Although there is a market for mixed xylenes, mostly as a solvent, most demand is for individual isomers, primarily *para*- and *ortho*-xylene. *meta*-Xylene (MX) is obtained solely from mixed-xylenes separation and mainly used in Isophthalic Acid (IPA) manufacture. The IPA market has grown both from expansion of the PET industry and through increasing demand for adhesives and sealants.

The IPA industry consists of a handful of players, with about nine producers in seven countries. The industry has mostly developed through the conversion of old PTA facilities and swing PTA/IPA operation.

This TECH report provides an updated overview of the technological, economic, and market aspects of MX and IPA. The following issues are addressed in this report:

- What are the major technologies for MX/IPA production? Who are the major technology holders? What are some of the developing or alternative technologies?
- How do the process economics compare across processes and different geographic regions?
- What are the major applications for MX and IPA? How does growth compare in different regions? Where is most of the supply centered? Which regions have merchant MX and IPA?

Production Technologies

MX is recovered from mixed xylenes through selective adsorption and crystallization. UOP and MGC have both commercialized a process. IPA is produced by an oxidation process that largely parallels that for making purified terephthalic acid: liquid oxidation of MX followed by hydrogenation purification step.

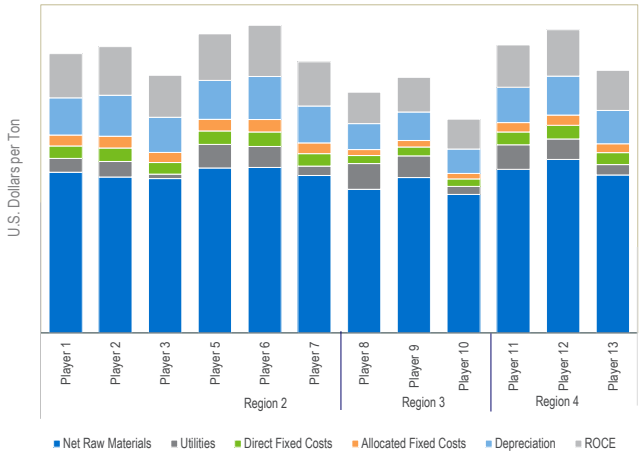
Most existing plants use this conventional processes. Routes to IPA with lower oxidation reactor conditions and without the hydrogenation step have been developed but have not been commercialized. Process technology for MX and IPA is available for license. Yet, some technology holders do not consider licensing their process at this stage.

The meta-xylene and IPA technology is mature and developments have focused on better separation and increased recovery of solvent and catalyst. Green routes efforts remain at embryonic stage.

Process Economics

Detailed cost of production estimates for various technologies are presented for USGC, Western Europe, China, and Japan locations. Estimates are developed for several production routes to MX & IPA. Sensitivity analyses on economy scale and feed pricing are also presented.

Isophthalic Acid Production Costs



Commercial Overview

IPA accounts for 83 percent of MX demand, while minor end uses include component in color pigments and dyes. Global IPA consumption was approximately 1.27 million tons in 2018, with PET bottle resin being the largest end-use. Demand is expected to grow at 4.4 percent annual to 2024, driven by increasing PET bottle resin production and UPR in China.

Recently, the IPA industry has been concerned with limited MX availability, which has constrained plant operations globally. This tightness is anticipated to be resolved in the forthcoming years. However, significant IPA capacity additions have also been announced, which, if commissioned, will put pressure on MX supply and global IPA operating rates in the forecast period.

An overview of the supply, demand, and trade of IPA on a global and regional (North America, Europe, Asia Pacific) basis is provided in this report.

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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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