Abstract
Process Economics Program Report 9F
TEREPHTHALIC ACID
(August 2005)

World consumption of terephthalic acid (TPA) has grown at an average annual rate of more than 6%, driven by great demand for textile fibers and PET bottles. Fast population growth, combined with the replacement of cotton as textile raw material, has prompted brisk demand for polyester fibers in China and Southeast Asia. In North America and Europe, TPA demand has been driven mainly by applications in the bottle and container markets, where glass has been largely replaced by lightweight PET bottles.

The core technology for producing TPA has remained the same since the 1960s—crude TPA is produced by bromine-promoted catalytic oxidation of p-xylene, and purified by a hydrogenation step. However, several incremental improvements have been implemented in the TPA process over the years, covering both the main oxidation and the purification sections. In late 2000, BP announced the development of a new-generation TPA process, called “X Technology”. The new technology achieves great process simplification by using innovative methods for water recycling and improved solid-liquid separation techniques. As a result, purified terephthalic acid (PTA) can be produced at significantly lower capital and operating costs.

Another technology that has attracted renewed interest is the production of medium-quality terephthalic acid (MTA). The MTA process uses a post-oxidation system that allows for elimination of the entire purification section of the PTA process. Eastman-Lurgi and Mitsubishi Chemical are the main licensors of this technology. Despite the higher impurity levels in the MTA product when compared to PTA, several MTA producers have marketed their product as compatible with PTA for most polyester applications, including bottle resin, film and fiber.

The focus of this report is a comparative techno-economic evaluation of three processes for TPA production. We developed conceptual designs and preliminary economics for the conventional PTA process, the new-generation PTA technology, and the medium-quality (MTA) process. A discussion of the current status of the TPA industry is also presented, including product derivatives and end-use applications, global and regional supply and demand, producers, and technology licensors. In addition, we examine recent patent applications dealing with several aspects of TPA technology.
Report No. 9F

Terephthalic Acid

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