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Abstract

Terephthalic acid (TPA) and dimethyl-terephthalate are used as raw materials in the production of polyesters. Terephthalic acid is produced in two forms:

- The technical grade—99.9 wt% TPA with up to 400ppm 4-CBA
- The polymer grade—99.99 wt% TPA with less than 25ppm 4-CBA

World consumption of terephthalic acid has grown at an average annual rate of more than 6%, driven by great demand for textile fibers and polyethylene terephthalate (PET) bottles. Fast population growth, combined with the replacement of cotton as textile raw material, has spurred high 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 terephthalic acid 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.

The focus of this report is a techno-economic evaluation of the BP process for purified terephthalic acid production. A conceptual design and preliminary economics for the BP PTA process has been developed. A discussion of the current status of the PTA 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 PTA technology.

The process economics include estimated capital costs and production costs—variable cost, plant cash cost, plant gate cost, and net production cost. A brief market overview summarizes the global supply and demand end-use market and demand drivers.

The process economics developed in this review is based on the US Gulf Coast and is presented in English units. However, we include with this review an iPEP Navigator interactive Excel attachment, which allows our clients to convert the economics to other major global regions in English or metric units.To use the iPEP Navigator file, open it in Excel AND click on the Display iPEP Interface button. The economics will be automatically updated with the selection of a unit and a region in the list boxes.

Contents

Tables

Figures

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