



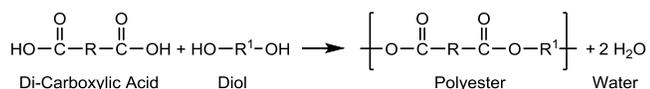
TECH 2019S6: Specialty Polyesters

Specialty Polyesters is one in a series of reports published as part of Nexant's 2019 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

The polyester resin family is arguably one of the more dynamic resin families due to the rich chemistry afforded, and ongoing efforts by producers to better tailor their materials to customer's needs. In the past decade, this resin family has witnessed the successful introduction of a new type of polyester – Eastman's TRITAN resins – designed to penetrate a variety of clarity applications.

Polyesters are a family of materials made from a dicarboxylic acid and an alcohol with two or more hydroxy functionalities. The alternating reaction of a carboxylic acid and a hydroxy group, called a condensation reaction, yields a polyester:



Homopolymer PET is made from terephthalic acid (TPA or PTA) or dimethylterephthalate (DMT) and ethylene glycol (EG or MEG) as monomers. Polyesters with different properties can be made by substituting other dicarboxylic acids or diols for PTA and/or glycol respectively, or by using other monomers altogether. **This report covers a number of specialty polyesters, including PETG, PTT, Copolyester (i.e., Tritan™) and a thermoplastic elastomeric polyester generically referred to as Copolyester Elastomer (COPE).** PET and PBT are covered in separate TECH reports; PETG, PTT and Copolyester were selected for coverage as they are the largest volume materials of the remaining polyesters noted above with dynamic markets. COPE is covered due to its interesting properties and ongoing growth opportunities.

DuPont is currently the sole producer (including its Chinese partner) of PTT, while Eastman is the sole producer of Copolyester (Tritan™). While Eastman was the first to introduce PETG, there are now a number of suppliers globally of this material, although Eastman is by far the largest. For the Copolyester Elastomers, DuPont, Eastman, Celanese (Ticona), TOYOBO, and DSM are the leading producers globally of this material.

Commercial Technologies

The Specialty Polyesters are produced through either an esterification or trans-esterification reaction followed by polycondensation – much the same as PET is made from PTA or DMT respectively. The process equipment used to produce most of the specialty polyesters is much the same as used for PET. Indeed, several specialty polyester producers utilize older, refurbished PET lines to make one or more specialty polyesters.

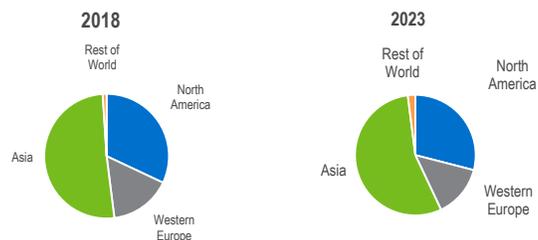
Process Economics

Economics developed in this report include:

- **PETG** – Analysis for the United States, Western Europe, and Coastal China
- **Copolyester (TRITAN)** – United States
- **PTT** – United States and China
- **COPE** – United States, Western Europe and Coastal China
- **Specialty Monomers** – Two key specialty monomers were modeled for the United States, and product transferred at cash cost plus depreciation plus 10 percent Return on Capital Employed (ROCE) plus freight and packaging (where applicable)

Commercial Overview

Key end-use markets, applications and market trends are reviewed for the four specialty polyesters covered. Estimates of total demand of specialty polyesters by polymer type and by geographic region are provided for 2018 and 2023. A list of global producers is also provided.





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