

Volume 3

# Handbook of Engineering and Specialty Thermoplastics

**Polyethers and Polyesters**

Edited by  
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# Poly(butylene terephthalate) – Synthesis, Properties, Application

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## Abstract

Synthesis, properties and application of thermoplastic polyester, poly (buthylene terephthalate) (PBT), are presented. The advantages and disadvantages of two synthetic routes – from dimethyl terephthalate (DMT) and terephthalic acid (TPA) - are given. The reaction conditions of the DMT route, as the main industrial synthetic route, are described in detail. The most frequently used catalysts are given, as well as the conditions for the solid-state postpolymerization. Physical and chemical properties of the filled and unfilled PBT grades are described. The use of different additives for various PBT formulations is described. Blending of PBT with other polymers, as a powerful route for obtaining materials with improved property/cost performances, is highlighted. A wide variety of nanoparticles, such as clays, carbon nanotubes, etc which are often used for the enhancement of physical, mechanical and thermal properties of PBT nanocomposites, are described. This chapter also emphasizes the most recent development in PBT-layered silicate nanocomposites.

**Keywords:** Poly(butylene terephthalate); thermoplastic polyesters, synthesis, properties, applications

## 5.1 Introduction and History

Poly(butylene terephthalate) (PBT), along with poly(ethylene terephthalate) (PET) (Figure 5.1), is a semicrystalline thermoplastic



**Details all the developments in Polyethers and Polyesters over the last decade and catalogs their polymerization, properties, applications, fabrication techniques, and safety aspects.**

This 3<sup>rd</sup> volume in the *Handbook of Engineering and Specialty Thermoplastics* comprehensively covers the technical research in the last decade in the area of engineering polymers known as oxygen containing main chain polymers: polyethers, polyesters, liquid crystal polyesters, poly oxides, polyacrylate, etc. As with the two previous volumes in this Handbook series, the Polyethers and Polyesters volume emphasizes the various aspects of preparation, structure, processing, morphology, properties, and applications of engineering polymers. Recent advances in the development and characterization of multi-component polymer blends and composites (macro, micro, and nano) based on engineering polymers as well as special additives are also discussed in detail. The volume is applications oriented and describes in what products and industries the polymers are best used. Sections on environmental impact and recycling conclude each chapter.

Researchers, scientists, engineers and students in the field of polymer science, polymer technology, and materials science will benefit from reading this book. As it is highly applications oriented, the book will help the user to find solutions to both fundamental and applied problems.

**Sabu Thomas** is a Professor of Polymer Science and Engineering at the School of Chemical Sciences, as well as the Director of Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, India. He received his Ph.D. in 1987 in Polymer Engineering from the Indian Institute of Technology (IIT), Kharagpur, India. He is a fellow of the Royal Society of Chemistry, London and a member of the American Chemical Society. He has been ranked no 5 in India with regard to the number of publications (most productive scientists). He also received the coveted Sukumar Maithy Award for the best polymer researcher in the country for the year 2008. The research group of Prof. Thomas has received numerous awards and honors for excellent work in polymer science and engineering.

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