
**Journal of Macromolecular Science, Part A**
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713597274

# Synthesis and Characterization of Polymides Containing Oxyalkylene Linkages

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**To cite this Article** Harris, Frank W.(1988) 'Synthesis and Characterization of Polymides Containing Oxyalkylene Linkages', Journal of Macromolecular Science, Part A, 25: 5, 871
**To link to this Article: DOI:** 10.1080/00222338808053403
**URL:** http://dx.doi.org/10.1080/00222338808053403

J. MACROMOL. SCI.—CHEM., A25(5-7), p 871 (1988)

# SYNTHESIS AND CHARACTERIZATION OF POLYMIDES CONTAINING OXYALKYLENE LINKAGES

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## ABSTRACT

As part of a program on impact/solvent resistant structural resins for potential use on commercial airplanes, a series of new polyimides containing flexibilizing ethylenedioxy units was prepared. These materials were synthesized by the reaction of aromatic dianhydrides such as 3,3′,4,4′-benzophenonetetracarboxylic dianhydride (BTDA) with diamines containing ethylene-dioxy linkages such as bis[2-(3-aminophenoxy)ethyl] ether (BAEE). The glass transition temperature ($T_g$) and crystalline melting temperature ($T_m$) of these polymers varied from 155 to 246°C and 236 to 460°C, respectively. Work concentrated on the polymer from BTDA and BAEE which had a $T_g$ of 155°C and a $T_m$ of 236°C. This polymer has been shown to be an excellent adhesive. For example, titanium-to-titanium tensile shear specimens were evaluated under a variety of test conditions and gave 25°C values of 54 MPa and 93°C values of 38 MPa. This polyimide also exhibited good resistance to hydraulic fluid but crazed upon exposure to paint stripper. Recent work has focused on the development of soluble systems that can be annealed into crystalline states. Thus, the polyimide prepared from BTDA and bis[2-(3-methyl-4-aminophenoxy)ethyl] ether can be obtained in a highly soluble amorphous form that undergoes crystallization upon heating.