

MORPHOLOGY AND ABRASION PATTERN OF THERMOPLASTIC POLYPROPYLENE— NATURAL RUBBER BLENDS

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Thermoplastic elastomers prepared by melt mixing of isotactic polypropylene (PP) and natural rubber (NR) were evaluated for abrasion resistance. The morphology of the blends and the patterns developed on the abraded surfaces of the test samples were studied using a scanning electron microscope. The morphology of the blends was found to change from that of a dispersed phase of natural rubber to that of a continuous phase when the NR : PP ratio was changed from 30 : 70 to 60 : 40. Correspondingly, a change in the mode of abrasion of the blends from abrasive type with horizontal groove patterns to frictional type with vertical ridge patterns on the abraded surface was observed for these blends. This change in the pattern of abrasion was prominent in dynamically crosslinked blends compared with the uncrosslinked ones.

Key words — Thermoplastic elastomer, Polypropylene, Natural rubber, Morphology, Abrasion, Dynamic crosslinking, Wear, Blends.

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INTRODUCTION

Thermoplastic elastomers (TPEs) are replacing polyolefins and conventional elastomers from many of their respective fields of application, since the TPEs possess the easy processing characteristics of thermoplastics and the physical properties of vulcanized elastomers (Reed, 1984). Several reviews and research papers have already appeared describing the different types of TPEs and their applications (Mullins, 1978; West and Cooper, 1978; Walker, 1979; Thorn, 1980; Brydson, 1982; Coran, 1988). TPEs prepared by physical blending of thermoplastic polyolefins and elastomers have the advantage that the desired properties can be tailored without difficulty by proper selection of the polyolefin and the elastomer components and their blend ratios. The

effects of blend ratios and dynamic crosslinking of the elastomer phase on the physical properties, rheological behaviour, dynamic mechanical properties and mode of failure under tensile and tear fracture of thermoplastics-elastomer blends have been studied by different research groups (Campbell *et al.*, 1978; Coran and Patel, 1980, 1981; Ramos-De Valle, 1982; Goettler *et al.*, 1982; Kuriakose and De, 1985a, 1985b, 1986; Kuriakose *et al.*, 1985). But only a limited number of studies have been reported on morphology-property relations of thermoplastics-elastomer blends (Danesi and Porter, 1978; Yang *et al.*, 1984; Dao, 1984). In this paper the results of studies on the morphology and abrasion pattern of thermoplastic elastomers, prepared from blends of polypropylene and natural rubber, are reported.