Indian Journal of Natural Rubber Research, 6 (1&2) : 63-70, 1993

MODIFIED NATURAL RUBBER AS A TYRE CORD - RUBBER BONDING AGENT

A. K. Mukherjee, S. H. O. Egboh, Barun K. Samui, Arup K. Chandra and R. Mukhopadhyay

Mukherjee, A. K., Egboh, S. H. O., Samui, B. K., Chandra, A. K. and Mukhopadhyay, R. (1993). Modified natural rubber as a tyre cord - rubber bonding agent. *Indian Journal of Natural Rubber Research*, 6 (1&2) : 63-70.

Natural rubber grafted with glycidyl methacrylate (GMA) in toluene, is attempted for bonding both polyamide and polyester tyre cords to rubber. Effect of total dose of γ-irradiation and concentration of GMA on grafting is discussed. Grafting of NR with GMA reduces thermal stability. However, initial decomposition temperature is well above the normal curing temperature (> 200°C). Adhesion is increased by approximately 40 per cent with nylon-6 and 50 per cent with polyester and nylon - 66.

Key words : Natural rubber, Nylon, Polyester, Glycidyl methacrylate, Grafting efficiency, Adhesion.

A. K. Mukherjee and S. H. O. Egboh, Department of Textile Technology, Indian Institute of Technology, New Delhi - 110 016, India; Barun K. Samui, Arup K. Chandra and R. Mukhopadhyay (for correspondence), R & D Centre, J. K. Industries Limited, Jaykaygram, Tyre Factory - 313 342, Rajasthan, India.

INTRODUCTION

Tyre is a composite material in which the reinforcing textile provides the stress-bearing characteristics while rubber serves as the binder and protect the textile from hostile environment. Synthetic fibres, especially nylon and polyester, in cord form are excellent textile materials for such applications and are used widely. Unfortunately, the differences between the inherent polarity of such textiles and rubber cause difficulties in obtaining good adhesion between the two and in ensuring high interfacial bond strength, crucial to develop good performance characteristics. Resorcinol-formaldehyde latex (RFL) or isocynate based compounds have been in use industrially for a long time for attaining improved adhesion between nylon and rubber or polyester and rubber respectively. Such intermediate materials introduce two interfaces-rubber-adhesive and adhesive-cord in place of one (Lechtenbochmer *et al.*, 1990; Skolnik, 1974). Efforts, however, continued to develop new bonding agents. Polyester cords have been coated with acrylates followed by radiation-curing thus improving adhesion between cord and rubber (Gyenilla and Laforce, 1985). Use of isocyanates, diisocynates, blocked isocyanates, peroxides or ethylene ureas as a first coating on tyre cords followed by dipping in conventional RFL has also been reported (Toray Industries Inc., 1985; Teijin Ltd., 1984 a&b; Ueno Keiji, 1986).

Presented in the International Natural Rubber Conference, 5-8 February 1992, Bangalore, India.