Indian Journal of Natural Rubber Research, 6 (1&2) : 123-130, 1993

EVALUATION OF ISOCYANATE AND BLOCKED ISOCYANATE BONDING SYSTEMS IN SELECTIVE FIBRE/ELASTOMER COMPOSITES

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Guha, A., Ghosh, A. K. and Ghosh, R. N. (1993). Evaluation of isocyanate and blocked isocyanate bonding systems in selective fibre/elastomer composite. *Indian Journal of Natural Rubber Research*, 6 (1&2) : 123-130.

This paper investigates the use of a commercially available caprolactam blocked methylenebis-(4-phenylisocyanate) along with RFL as a bonding agent for cord/fabrics made with nylon-66, polyester and aramid under different conditions, with special reference to the influence of heat and steam ageing on adhesion. An attempt has also been made to compare the present bonding agent with the conventional dipping techniques. All the dipping systems studied showed good adhesion with NR and SBR compounds. In most of the dipping systems the SBR compound had better adhesion compared to the NR compound. The blocked isocyanate/RFL adhesive system showed an appreciable drop in H-pullout adhesion compared to unblocked isocyanate and RFL system. However, peel adhesion was remarkably better for the former with both compounds in the case of nylon fabrics. No significant change in adhesion was observed by the incorporation of epoxy compounds in blocked isocyanate/RFL adhesive system. Excellent adhesion retention was observed after ageing of fibres treated with blocked isocyanate/RFL system compared to unblocked isocyanate/RFL system in both the rubber compounds.

Key words : Natural rubber, Styrene-butadiene rubber, Cord/ fabric-rubber bonding, Composites, Adhesion strength.

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INTRODUCTION

The ultimate properties of textile/rubber composites depend very much on the nature of bonding between the textile and the rubber, apart from the nature of the rubber matrix and that of the textile used (Murthy, *et al.*, 1982) Although different types of man-made fibres such as nylon, polyester and aramid have been widely used as reinforcing materials in rubber based composites, except in the case of nylon, methods of bonding between the fibre and the rubber have not been fully evolved. Various techniques have been attempted for the surface treatment of cord/fabric (Wootton, 1982). The most popular method is dipping the cord/fabric in a dope formulation, the nature of which depends upon the nature of the fibre and the rubber. In order to improve adhesion of polyester fibre to rubber a special dope formulation involving a blocked type of isocyanate along with other chemicals has been attempted to have a surface coating on the fibre itself. A stable blocked di- or polyisocyanate in suspension could be applied to the fibre surface. The stability

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