

## MECHANICAL AND DYNAMIC MECHANICAL PROPERTIES OF TYRE TREAD CAP COMPOUNDS BASED ON NR/BR/SBR TRIBLENDS

N.R. Manoj, Golak B. Nando, P.K. Mohamed and T.D. Varkey

Manoj, N.R., Nando, G.B., Mohamed, P.K. and Varkey, T.D. (1994). Mechanical and dynamic mechanical properties of tyre tread cap compounds based on NR/BR/SBR triblends. *Indian Journal of Natural Rubber Research*, 7 (1) : 9-16.

This paper deals with the effect of proportion of styrene-butadiene rubber (SBR) on the static and dynamic mechanical properties of NR/BR/SBR triblends. Attempts have also been made to optimise the accelerator-sulphur system for the blends. The effect of incorporation of a higher structure black with the triblend was also studied. Introducing styrene-butadiene rubber into the mix containing a blend of NR/BR improved static, dynamic as well as age resistance properties. A proportion of 15 phr of SBR was found to impart the best balance of technical properties. Semi-efficient vulcanization system with a sulphur to accelerator ratio of 2:1.2 gave the best balance of technical properties and dynamic mechanical properties for the triblend containing 15 phr SBR. Increased structure of the carbon black in the mix increased loss modulus but improved flex fatigue properties and abrasion resistance of the triblend.

Key words: Natural rubber, NR/BR/SBR triblend, Mechanical properties, Tyre tread compound.

N.R. Manoj and Golak B. Nando (for correspondence), Rubber Technology Centre, Indian Institute of Technology, Kharagpur - 721 302, India; P.K. Mohamed and T.D. Varkey, Apollo Tyres Ltd., Perambra, Kerala - 680 689, India.

### INTRODUCTION

Performance of a pneumatic tyre is influenced by its design, compound, construction and interaction between its components (Bennett *et al.* 1975, Lechtenboehmer *et al.*, 1990). It is also affected by other external conditions such as load, road, driving skill and climate (Baker and Wallace, 1986). Such a composite is unique in its nature and many technological developments are judged from its applicability in tyres.

Tread is one of the most important components of the pneumatic tyre which is normally constructed using a single compound or a combination of a cap and a base compound. The cap which comes in contact

with the road surface calls for high wear resistance, low heat build up, low rolling resistance, good tearing, chunking and chipping resistance and adequate traction. A blend of natural rubber (NR) and polybutadiene rubber (BR) is commonly used for the tread cap of heavy duty truck tyres because of its better wear and groove crack resistance (Mullins, 1977). But the disadvantage is its poor road holding or traction characteristics. In order to improve the traction characteristics of tread cap compound based on NR and BR blends with an overall improvement in performance characteristics, styrene-butadiene rubber (SBR) can be incorporated in small proportions. The present study deals with the effect of SBR proportion on the static