PREPARATION AND EVALUATION OF NATURAL RUBBER CARBON BLACK VULCANIZATES WITH VARYING NON-RUBBER CONSTITUENTS

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The present study attempted preparation and evaluation of natural rubber (NR) samples from NR field latex with varying non-rubber compositions, derived through four different approaches. The approaches were designed in such a way that stage wise removal of different non-rubber constituents from the rubber phase could be achieved. The study assessed the role of fragmented and non-fragmented protein components and other non-proteinaceous non-rubber components both under complete retention and partial retention within the rubber phase and its effect on various technological properties of the rubber composites. Nitrogen content of the rubber samples subjected to the four different approaches varied from 0.57 to 0.90 per cent. The preparation of NR-HAF carbon black composites with the above rubber samples and evaluation of its cure behavior and technological properties were carried out. The thermo-oxidative ageing behavior of the corresponding NR composites was also evaluated. This study showed that the content of non-rubber constituents in NR has a significant role in improving the processability, determining the cure rate and cure state of the rubber compounds and influencing technological properties of rubber vulcanizates. Most remarkably, ageing resistance of the vulcanizates improved significantly with increasing content of proteins, both in its fragmented and non-fragmented states in NR.

Keywords: Ageing, Composites, Deproteinization, Non-rubber constituents, Proteins

INTRODUCTION

Natural rubber latex contain 35-40 per cent of *cis*-polyisoprene dispersed in water and it contains about 3-4 per cent proteinaceous and 4-5 per cent non-proteinaceous non-rubber constituents partly bound to the dispersed rubber phase and partly soluble in water. The conventional approach of acid coagulation of NR latex leads to the phase separation of solid natural rubber from the aqueous serum. During this step, the serum soluble protein and other water-soluble non-rubber constituents gets separated, while the proteins and non-rubber constituents with hydrophobic behaviour gets retained within the rubber. Previous studies at Rubber Research Institute of India (RRII) (George *et al*., 2007; Joseph *et al*., 2018; Jacob *et al*., 2019) and others (Cheang *et al*., 2003; Phoon *et al*., 2003; Yamamoto *et al*.,

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