

MECHANICAL PROPERTIES OF NATURAL RUBBER/CHLOROPRENE LATEX BLEND NANOCOMPOSITES

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Natural Rubber (NR), Chloroprene Rubber (CR) and NR/CR latex blend-based nanocomposites were prepared using layered clays. Fluorohectorite (synthetic) and Bentonite (natural) in 10 parts for 100 parts of rubber were incorporated during the pre-vulcanization stage for the production of nanocomposites. An amorphous grade of clay (English Indian clay) was also mixed with the same combination of latices for the relative comparison. The mechanical properties and X-ray diffractometric analysis of the rubber nanocomposites showed that fluorohectorite and bentonite clays improved the compatibility of NR-CR blends, resulting in enhanced mechanical properties of the nanocomposite. The presence of layered silicates led to distinct nano-level reinforcement in the latex blend composites.

Keywords: Bentonite, Blends, Fluorohectorite, Layered silicates, Nanocomposites, Natural rubber latex, Pre-vulcanization

INTRODUCTION

Layered silicates, being hydrophilic, undergoes hydration in aqueous solutions, increasing interlayer distance. Rubber lattices being fine dispersion of rubber particles in an aqueous medium can penetrate (due to hydration) in expanded regions of layered silicates (gallery space), which is considered to be an easy way of producing rubber nanocomposites. Nanocomposites of natural rubber (NR) latex can be produced through both compounding and pre-vulcanization routes (Sun and Mark, 1989; Landry *et al.*, 1993; Giannelis, 1996; Jose-Yacaman *et al.*, 1996; Wang and Pinnavaia, 1998; Bokobza, 2019; Zhao *et al.*, 2024).

Uniform distribution of nanoscale silicate layers imparts better mechanical and barrier properties to NR latex film. Methods were also reported on production of nanocomposites from latex-layered silicate dispersion after coagulation (Varghese and Karger-Kocsis, 2003). However, the slow rate of drying of the coagulated mass and subsequent processing difficulties were major disadvantages encountered during production of rubber nanocomposites through the above route. Due to the enhanced modulus and reduced barrier properties as compared to virgin rubber, it has a wide spectrum of applications. A comparatively lower level of loading and the similarities in the colloidal