VISCO – ELASTIC PROPERTIES OF ORGANOCLAY FILLED NANO CREPE RUBBER

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ABSTARCT

Hevea brasiliensis latex is used to manufacture two crepe rubber types called fractioned bleached (FB) andunfractioned unbleached (UFUB). In rubber manufacturing, conventionally, Carbon Black, $CaCO_3$ and china clay are used as fillers in rubber industry to enhance physical properties and improve the cost performance ratio, but it consumes greater amount of fillers compared to nano fillers. In this study Organoclay/OMMT was used as the nano filler. Most of the time crepe rubber is filled with fillers by melt intercalation method. Literature has indicated that OMMT's latex intercalation method is better than melt intercalation method when considering the nanoclay dispersion in the rubber matrix. Therefore, in the 1st phase, OMMT filled crepe rubber laces were produced by latex intercalation method by adding 5% OMMT dispersion into both FB and UFUB latex as 0,2,4,6 and 8 phr levels and then raw rubber properties were evaluated according to the ISO procedures. In the 2nd phase, the crepe rubber compounds were prepared for each sample and curing and physical properties were evaluated following ISO procedures. The raw rubber properties of nano crepe rubber (NCR) have been indicated reduction of PRI and Mooney viscosity when increase the clay loading level and maximum stress relaxation at 4 phr level of clay loading. Rheological behaviours of NCRs have been indicated an increased cure rate indices and maximum torques but shorter scorch times with the filler loading. Maximum hardness has achieved at the 8 phr loading level for both FB and UFUB nano crepe rubbers, they are 45.4^a and 44.8^b (IRHD) respectively. Tensile strengths of FB 6, FB 8, UFUB 6 and UFUB8 are 24.35^a, 25.38^a, 24.38^a and 24.42^a (MPa) respectively and are the maximum tensile strengths. Moduli at 100% and 300% increase dramatically compared to the gum vulcanizate as a function of clay loading up to 6 phr level for both NCR types and then reduce. Compression set has been maximized at 6 phr (FB 6–15.28% and UFUB 6–15.18%) loading level for both NCR types. Minimum abrasion volume loss has achieved in FB 6 ($132.7mm^3$) and UFUB 4 ($146.6mm^3$). In conclusion, FBNCR has performed better than UFUBNCR at 4 and 6 phr OMMT loading level because the better dispersion of OMMT in the FB crepe rubber than UFUB crepe rubber.

Key words: Natural rubber (NR), Nano crepe rubber (NCR), OMMT