

# Characterization of natural rubber from new Brazilian clones to use in nanocomposites

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Natural rubber is one of the most important elastomers widely used in industrial and technological areas [1]. Embrapa Agricultural Instrumentation and Agronomic Institute (IAC) have been conducting a Brazilian *Hevea* breeding program with emphasis on the development of new clones more appropriated to the soil and climate of the non-traditional regions of Brazil in which near tropical climatic conditions prevail [2].

The aim of this work is to evaluate the performance and quality of the natural rubber from these new clones to use in nanocomposite materials. Polymer nanocomposites represent a new alternative to conventionally filled polymer. Because of their nanometer size filler dispersion, nanocomposites markedly exhibit improved properties when compared to pure polymers or their traditional composites [3]. In this work, technological properties such as Wallace plasticity ( $P_o$ ), plasticity retention index (PRI), dry rubber content (DRC), Mooney viscosity ( $V_R$ ), ash and nitrogen percentages, and acetic extract have been investigated. The samples, latex and natural rubber from five new IAC 400 series clones (IAC 405, IAC 406, IAC 410, IAC 413, IAC 420 and RRIM 600), were naturally coagulated in the field and chemically coagulated using acetic acid. The characterization followed the Brazilian Standard - ABNT (NBR/11597/1997).

The results obtained indicated that the natural rubber from the new Brazilian clones have good quality and performance, comparable with the Malaysian clone, RRIM 600. A strong influence of the coagulation type on the properties of the clones was also observed. Samples coagulated using acetic acid have shown Wallace plasticity and Mooney viscosity higher than those naturally coagulated. For the acetic extract and ash content, the opposite was observed-samples naturally coagulated showed higher values than those coagulated using acetic acid. It was not observed a systematic effect of coagulation type on the PRI and nitrogen content. All samples naturally coagulated presented PRI index above the minimum standardized by NBR, except the IAC 406 and IAC 420 clones, which coagulated with acetic acid.

DRC represents the content of dry rubber in the latex, whose composition is more than 90% of poly (cis-1,4-isoprene). The highest DRC was obtained for IAC 406 clone (31%) and the lowest for the IAC 405 (19%).

A high linear correlation ( $r = 0.98$  and  $r = 0.99$ ) was obtained for  $P_o$  and  $V_R$  for both, samples naturally and chemically coagulated. IAC 406 and IAC 405 clones showed the highest and the lowest  $P_o$  and  $V_R$ , respectively. The high values obtained for  $P_o$  and  $V_R$  indicate that the rubbers studied should be considered as hard rubbers.

**Keywords:** Technological properties, latex, PRI, DRC.

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