

Film Properties of Prevulcanized Natural Rubber Latex Films Produced from Creamed Latex

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Pre-vulcanization of latex yields latex that is agglomerated and disseminated in an aqueous media with intra cross-linked rubber molecules. The nature of pre-vulcanized latex offers many advantages such as improved stability, simplicity in use, long shelf life, low toxicity and energy efficiency in industrial applications. With ever increasing interest on green products, creamed latex could be considered as a potential raw material than centrifuged latex as the manufacturing process involves no power requirement. Despite numerous works reported on pre-vulcanization of centrifuged latex, not much research work reported on the pre-vulcanization of creamed latex. In this research study, pre-vulcanized natural rubber creamed latex was investigated using three different types of accelerator systems. Tetramethylthiuramdisulphide, Zincdiethyldithiocarbamate and N-tert-butyl-2-benzothiazolesulfenamide were utilized as fast, ultrafast and delayed-action accelerators, respectively. For the purpose of comparison, corresponding counterparts using centrifuged latex were also prepared. Properties of the prepared pre-vulcanized latex films such as tensile properties, swell index, tear properties, acetone extract and extractable protein content were investigated and compared. This research study clearly indicates that latex films made out of pre-vulcanized creamed latex exhibit higher crosslink density as evidenced by the lower swelling index and higher tensile strength compared to the corresponding films prepared using pre-vulcanized centrifuged latex. As evidenced by the acetone extraction studies, the pre-vulcanized creamed latex equivalent has a lower level of curing agent residuals than the pre-vulcanized centrifuged latex equivalent. Further pre-vulcanized creamed latex possesses low leachable protein content. Among the candidate accelerators, Zincdiethyldithiocarbamate (ultrafast accelerator) revealed the best overall performance while the least performance was shown by N-tert-butyl-2-benzothiazolesulfenamide. As a result, it could be inferred that pre-vulcanized creamed latex with ultra-fast accelerator is suitable for small sized manufacturing industries, to ensure and energy efficient and less toxic process, hence encouraging greener rubber products.

Keywords: Accelerator, Centrifuged, Creamed latex, Pre-vulcanized