Reducing and stabilizing the viscosity of natural rubber by using sugars: interference of the Maillard reaction between proteins and sugars

An elucidating the reduction and stabilization of solid natural rubber (NR) viscosity by using sugars. Various amounts of glucose, fructose, sucrose, and maltose were incorporated into fresh NR (FNR), deproteinized NR (DPNR), and synthetic polyisoprene (IR) latexes. The results revealed that all sugars cannot decrease the Mooney viscosity of FNR, while only monosaccharides, that is, glucose and fructose, can significantly decrease the Mooney viscosity of both DPNR and IR by way of a lubrication mechanism. The proteins in FNR can diminish the capability of glucose and fructose to decrease the Mooney viscosity. Furthermore, glucose was found to reduce the occurrence of storage hardening in DPNR by interacting with polar groups of phospholipids at the rubber chain ends. Measurements of browning intensity as well as analysis of Maillard reaction products together with the NR protein–glucose model compound were utilized to confirm that the reduction and stabilization of the viscosity of NR using monosaccharides were interfered by the Maillard reaction between the proteins in NR and the monosaccharides.

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Reference: