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"EFFECTS OF NON-RUBBER SUBSTANCES ON THE PROPERTIES ON NATURAL RUBBER"

by

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ABSTRACT

The effect of non-rubber constituents present in natural rubber (NR) on the properties of raw and vulcanised NR was investigated. Proteins and lipids were both separately and removed from NR samples by enzyme deproteinisation using papain and by solvent extraction using 2/1 mixture of chloroform/ethanol respectively and the properties determined. The results obtained showed quite conclusively that non-rubber substances including lipids, proteins and other compounds of unknown nature e.g. amino acids have effect on the properties of raw NR, its vulcanisation process and the properties of the resulting vulcanisates. Lipid extracts were found to contain natural antioxidants, which are effective in protecting raw rubber against thermal oxidative degradation, and chemical species which are responsible for storage crosslinking reactions in NR. Lipids also show platicising effect for raw NR, and help increase the rate of vulcanisation. Proteins appear to make raw NR more scorchy but otherwise show no effect on the raw rubber properties nor vulcanisation characteristics. Proteins or lipids have relatively little effect on stress-strain and dynamic properties of the NR vulcanisates but when both were excluded from the rubber, significant deterioration in physical properties of the vulcanisates result. The effect of non-rubber materials on the vulcanisate properties is thought to be through their vulcanisation. Transition metals present in NR e.g. Cu, Fe, Mn do not seem to have adverse effect on thermal degradation of the rubber, at least when present in their naturally-occurring concentrations. At higher concentration, Cu appears to be the most harmful of the three metals.