

WATER RESISTANT STARCH XANTHIDE FILLED NATURAL RUBBER

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Starch xanthide-natural rubber latex masterbatching process was studied starting from both latex concentrate and fresh field latex. Masterbatches of varying starch xanthide content were prepared. Physical properties of the compounds containing various starch xanthide loading were investigated both before and after exposure to water. The use of mercapto silane (Silane A 189) coupling agent in starch xanthide filled natural rubber was examined with the intention of reducing its water sensitivity. It was concluded that vulcanizates containing Silane A 189 have significantly improved physical properties in both dry and wet states and have substantially lower water sensitivity.

Key words : Natural rubber, Starch xanthide, Reinforcement, Coupling agent, Water resistance, Silane.

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INTRODUCTION

Use of starch as a reinforcing agent in rubber using latex masterbatching process was first introduced by Buchanan *et al.* (1968). Subsequently considerable research work using two different starch derivatives, namely zinc starch xanthate and starch xanthide, were published (Abbott *et al.*, 1973; Buchanan *et al.*, 1968 a & b, 1971 a & b; Stephens *et al.*, 1969, 1971). In the latex masterbatching process, starch is modified into starch xanthate followed by coprecipitating in latex, during which starch xanthate is converted to crosslinked starches, i.e. zinc starch xanthate and starch xanthide. Starch xanthide was reported to be a better reinforcing agent than zinc starch xanthate (Stephens *et al.*, 1971). Most research work

concerning starch - rubber masterbatches done so far, were on zinc starch xanthate in SBR, NBR and natural rubber as well as on starch xanthide in SBR and NBR. There is little information available on starch xanthide - natural rubber masterbatches.

Vulcanizate containing either zinc starch xanthate or starch xanthide was found to deteriorate in physical properties upon absorbing moisture. These included an increase in volume and reduction in tensile properties i.e. modulus, tensile strength and elongation (Buchanan *et al.*, 1968 and Stephens *et al.*, 1969). The extended substitution of hydroxyl groups on zinc starch xanthate by polyethylenimine (PEI) before coprecipitation in SBR latex was found to be capable of reducing

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