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MECHANICAL PROPERTIES OF RUBBER OBTAINED BY SURFACTANT SENSITIZED COAGULATION OF FRESH NATURAL RUBBER LATEX

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Fresh natural rubber (NR) latex coagulates immediately by sensitization with suitable surfactants. When surfactants are added to latex, the surfactant anions displace a part of protein molecules and get adsorbed on the rubber particles. The surfactants retained on rubber during coagulation play a major role on the cure characteristics, mechanical properties and ageing characteristics of the recovered rubber. Better cure characteristics as revealed from a higher level of vulcanization are obtained for gum and carbon black filled compounds for NR prepared by immediate coagulation in comparison with the conventionally coagulated NR. Better mechanical properties and solvent ageing resistance are also observed. Carbon black filled vulcanizates give a higher modulus, tensile strength, hardness and significantly higher abrasion resistance as compared with conventional rubber vulcanizate. The compression set and heat build-up characteristics are comparable. The improvement in mechanical properties and solvent resistance obtained for the NR prepared by the new process is attributed to the surfactants retained in rubber, higher level of vulcanization and better dispersion of filler.

Keywords: Carbon black, Latex, Mechanical properties, Surfactant.

INTRODUCTION

NR latex is a colloidal dispersion of rubber particles in an aqueous medium obtained from latex vessels of *Hevea brasiliensis* tree. The dry rubber content of latex generally varies from about 28 to 42 per cent. In addition to rubber, latex contains non- rubber ingredients like proteins (2-2.5%), sugar (1-1.5%) resin (1-2%) and ash (0.7-0.9%). These non rubber ingredients play a major role in the colloidal stability of latex and in cure and mechanical properties of the recovered rubber. The composition of non-rubber ingredients change after latex leaves the tree and the obvious consequence of this is the coagulation of latex within a few hours of tapping. This is called spontaneous coagulation. Normally rubber is recovered from latex by a slow coagulation process after the addition of coagulants like formic acid, acetic acid, sulphamic acid *etc*. Earlier reports show that the process of spontaneous coagulation, which occurs in the absence of added coagulants, can be accelerated by addition of suitable surfactants (Van Gils, 1947; Blackley, 1997; Cockbain, 1952). The mechanism of this is believed to be due to displacement of the protective layer of proteins by added

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