RADIATION INDUCED PEROXIDE VULCANIZATION OF NATURAL RUBBER LATEX

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The mechanical properties especially the after-ageing properties of both radiation vulcanized natural rubber latex (RVNRL) and peroxide vulcanized natural rubber latex (PVNRL) are inferior when compared to sulphur prevulcanized natural rubber latex (SVNRL). Accordingly, a new method *viz.* radiation induced peroxide vulcanization (RIPV) was proposed to improve the properties of latex vulcanized by radiation process. This paper deals with the effect of radiation induced vulcanization by peroxide on the mechanical properties of NR latex film. Here, n-butyl acrylate (n-BA) was used as sensitizer and t-butyl hydroperoxide (t-BHPO) as co-vulcanizing agent during irradiation. It was found that the addition of t-BHPO is a more practical method to reduce the vulcanization dose required for natural rubber latex. The FT-IR spectra showed that RIPV contained more C-C crosslinks than RVNRL and PVNRL. Since the RIPV was performed in room temperature, the thermal oxidation of polymer chain was less compared to PVNRL and accordingly the samples retained their strength even after thermal ageing. Solvent diffusion studies showed that mole per cent uptake of RIPV was the lowest indicating comparatively tight crosslinks.

Key words: Ageing studies, FT-IR, Mechanical properties, Radiation vulcanization

INTRODUCTION

Natural rubber latex (NRL) is the material of choice for the manufacture of products such as gloves, condoms *etc.* owing to its high strength, elasticity, comfort in use, good barrier properties and 'green image' (Chaudhari *et al*., 2005). The virgin natural rubber (NR) is a sticky and non-elastic material. The crosslinking of NR molecules *via* vulcanization process causes changes in the physical properties whereby NR becomes heat stable and elastic. Natural rubber gains unique properties by crosslinking reactions which can be achieved through different routes, namely sulphur, peroxide and radiation vulcanizations. Among these vulcanization techniques, sulphur vulcanization provides products with superior tensile strength compared to radiation/peroxide vulcanization. Sulphur vulcanization is still adopted in the curing of rubber products used in food and medical industry. The accelerators used in sulphur cure system may cause formation of nitrosamines in products. This poses a potential danger to human health and safety (Craciun *et al*., 2016).

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