RADIATION VULCANIZATION OF NATURAL RUBBER LATEX: EFFECT OF SPLIT ADDITION OF INITIATOR AND ANTIOXIDANT

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Received: 25 November 2020 Accepted: 14 December 2020

Varghese, N., Varghese, S., Nambiathodi, V. and Kurian, T. (2020). Radiation vulcanization of natural rubber latex: Effect of split addition of initiator and antioxidant. *Rubber Science*, **33**(3): 314-328.

Radiation vulcanization of natural rubber latex is a free radical assisted crosslinking reaction induced by ϒ-radiation. It is carried out using a ^{60}Co source at room temperature using n-butyl acrylate as sensitizer. The optimum radiation dose for obtaining maximum properties for RVNRL film is optimized as 15 k.Gy. The residual n-BA in the latex causes several problems in the products derived out of the latex. The split-dose addition of n-BA was proposed to overcome this difficulty. The order of addition of antioxidants also has some effect on radiation crosslinking reaction as antioxidants are free radical scavengers. Accordingly, the effect of different modes of addition of antioxidants on mechanical properties of the vulcanizates was studied. Among the different methods attempted, addition of antioxidant at mid time (M.I) and after irradiation (A.I) gave better mechanical properties and thermal stability.

Key words: Antioxidant, Natural rubber latex, Radiation vulcanization, Tensile strength

INTRODUCTION

Research on new materials technology is attracting the interest of researchers all over the world. Efforts are being made to build up materials that can confer advantageous properties. Radiation technology has emerged as one of the foremost techniques for the processing of polymer materials. It has been an area of enormous interest in the last few decades. The technique is not being used in industries due to the high cost of irradiation and low quality of the products (Makuuchi *et al*., 1984). Recently, significant progress has been made in cost reduction and quality improvement. In radiation vulcanization of natural rubber latex (RVNRL), the crosslinking of rubber particles is brought about by ϒ- radiation from a ^{60}Co source (Makuuchi, 2003).

Some of the natural rubber latex products made using sulphur vulcanization are currently being substituted by RVNRL. The residual chemicals in sulphur vulcanized products cause detrimental effects both to environment and human body. The dipped rubber goods are quite often used in contact with human body. In order to reduce the nitrosamine level, RVNRL is an ideal material in which vulcanization is effected using high energy ϒ-radiation (Minoura *et al*., 1961). Thus RVNRL provides an alternative

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