

Application of gamma irradiation for incorporation of rubber powder in the formulations of acrylonitrile–butadiene rubber (NBR)

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Polymeric materials do not decompose easily, disposal of waste polymers is a major environmental problem of global character. Recycling is an economical alternative and environmentally recommended for polymers consumed and discarded by society. [1]

As regards the rubber in object, its natural decomposition is much slower due to their highly crosslinked, in three-dimensional networks, structures which makes it an infusible and insoluble material [2]. Moreover, these three dimensional structures entails several problems for their recovery and reprocessing.

The aim of this paper was to study the behavior of NBR rubber recycle. It was used rubber powder from industry. The powder was irradiated in master-batch composition and used directly in classical formulations for rubber vulcanization. The master-batch processed was irradiated at doses of 50, 100 and 150kGy in ^{60}Co source at 5 kGy s^{-1} rate, at room temperature. Gamma radiation created active sites during devulcanization that promoted further integration of the rubber powder in formulations for commercial use. The processes were compared and their products were characterized by analytical methods of the physical properties such as tensile strength and elongation. The greatest change in the properties of polymeric materials by exposure to ionizing radiation resulted mainly of two main reactions occurring in the polymer molecule: chains scission (degradation) and crosslinking. Although these two processes occur simultaneously in all the polymers, the predominance of one or other effect depends mainly of the chemical structure of each polymer, and the irradiation conditions [3]. In the results was observed the behavior of nitrile rubber under different doses and radiation improvement of the mechanical properties.

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