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EFFECTS OF GAMMA RADIATION IN POLYCARBONATE

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The polycarbonate is an amorphous polymer prepared by interfacial polymerization reaction between bisphenol A and phosgene. This polymer is used in fabrication of medical supplies and can be sterilized by gamma rays. DURELON is a national polycarbonate. When DURELON of molecular weight 22,000 g/mol is irradiated by gamma rays (^{60}Co source, dose range 0-650 kGy) occur the main chain scission without crosslinking and the organic compounds formation which are responsible for yellowness. The transmittance decreased with dose increased because the chromophoric groups absorbed light. On the other hand the transmittance increased after irradiation indicating the reactive species are released from polymeric matrix traps slowly. The $G(s) = 1.5$ (number of main chain scissions per 100 ev) was calculated from molecular weight obtained by viscosimetric measurements. The infrared (FT-IR) spectra of this irradiated polymer showed the main chain scissions in carbonate groups ($\nu_{\text{C=O}} 1771.70 \text{ cm}^{-1}$). The NMR spectra showed the peaks position with $\delta 1.67$ (methyl group) and $\delta 7.13$ (aromatic ring) did not change after 250 kGy. Though several polymeric degradation mechanisms was proposed for polycarbonate in the literature only phenoxy and phenyl radicals recombination is acceptable mechanism for DURELON.

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