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# The Alterations in High Density Polyethylene Properties with Gamma Irradiation

M. F. Zaki<sup>a\*</sup>, Y. H. Elshaer<sup>b</sup>, Doaa. H. Taha<sup>c</sup>

<sup>a</sup>Experimental Nuclear Physics Department, Nuclear Research Center, Atomic Energy Authority, P.O. 13759 Abu Zaabal, Cairo, Egypt

<sup>b</sup>Reactor Physics Department, Nuclear Research Center, Atomic Energy Authority (AEA), Cairo, Egypt

<sup>c</sup>Physics Department, University College for Girls, Ain Shams University, Cairo, Egypt

\*Corresponding author: Tel.: +201002718565. moha1016@yahoo.com

## Abstract

In the present investigation, high density polyethylene (HDPE) polymer has been used to study the alterations in its properties under gamma-irradiation. Physico-chemical properties have been investigated with different spectroscopy techniques, Fourier Transform Infrared spectroscopy (FTIR), X-ray diffraction (XRD), biocompatibility properties, as well as, mechanical properties change. The FT-IR analysis shows the formation of new band at  $1716\text{ cm}^{-1}$  that is attributed to the oxidation of irradiated polymer chains, which is due to the formation of carbonyl groups (C=O). XRD patterns show that a decrease in the crystallite size and increase in the Full Width at Half Maximum (FWHM). This means that the crystallinity of irradiated samples is decreased with increase in gamma dose. The contact angle measurements show an increase in the surface free energy as the gamma irradiation increases. The measurements of mechanical properties of irradiated HDPE samples were discussed.

**Keywords:** HDPE; gamma irradiations; FTIR spectroscopy; X-ray diffraction; Biocompatibility parameters; mechanical properties.

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