

EPR Study of Radiation-Induced Radicals in Chitosan

Maha Anwar Ali* and Maghraby, A.^{‡**}

*Biophysics department – Faculty of Science – Cairo University – Giza – P.O. Box: 12613-Egypt.

**Radiation dosimetry department – National Inst. of Standards (NIS) – Giza- P.O.Box: 136 – Egypt.

Abstract

Chitosan is the second most abundant polysaccharide of plant origin, which possesses so many applications in several fields, such as medical, industrial, or environmental applications. In the present study, the effects of ionizing radiation of Cs-137 and Co-60 from 4.95 to 743.14 Gy and from 1 to 30 kGy, respectively, on some chitosan characteristics were studied. The effects of gamma-irradiations were evaluated by observing the main differences in chitosan samples of different origins before and after treatment, using various techniques. Such effects were evaluated using electron paramagnetic resonance (EPR), and infra-red (IR) spectroscopy. Results showed that gamma irradiation may lead to a degradation effect due to the break of glycosidic bonds. EPR results suggest biodosimetric applications of chitosan. The combined application of EPR- and IR spectroscopy is a powerful tool for determining structural modification of chitosan samples exposed to gamma-irradiation. The relationship between the radiation dose and the EPR signal amplitude of chitosan was found to be linear over the studied dose range, which enables the estimation of radiation dose delivered to chitosan either industrially for the purpose of quality assurance or accidentally.

Keywords: EPR – ESR – Radiation – Chitosan – Biodosimeter – IR spectroscopy

[‡]Corresponding Author, maghrabism@yahoo.com

NIS- Tersa st. 12211 – Haram - Giza – P.O. Box: 136 – Egypt

Tel.: +2-0124509723 – Fax: +2-023867451