

## **A study based on ESR, XRD and SEM of signal induced by gamma irradiation in eggshell**

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ESR (electron spin resonance), XRD (x-ray diffraction) patterns and SEM (scanning electron microscopy) of signal of the radicals induced by irradiation in calcium carbonate ( $\text{CaCO}_3$ ) obtained from eggshell was investigated. The ionizing radiation produces an electron centre  $\text{CO}_3^{3-}$ , a hole centre  $\text{CO}_3^-$  and oxygen vacancy with an electron the  $\text{CO}_2^-$  molecular ion also formed. The ESR centre with  $g_{//} = 1.9970$  and  $g_{\perp} = 2.0012$  was identified as the same found in hydroxyapatite. Additional ESR lines were detected, but they are less pronounced in intensity. The work aims to standardize the samples preparation method and the conditions of measured for practical application by the specialist in emergency dosimetry. In this regard, practical consideration of sample preparation conditions and properties such as grains size, ESR spectra, and the temperature dependence of the signal were studied in details. The peak-to-peak amplitude values of the derivative of absorption were recorded for relative dose measurements. At very low doses many sweeps were taken, resulting in a final composite spectrum. The spectrum of non irradiated reference sample was subtracted from the spectra of response represents linear behavior between 1 to 100 Gy. No dose rate dependence was observed. The morphology of the calcined eggshell presented extensive morphological change on the calcinations process. Careful analyses of the ESR spectra were presently in progress in order to undertaken and identify the radicals involved.