SYNTHESIS OF PAPAIN NANOPARTICLES USING E-BEAM AND GAMMA IRRADIATION: A RADIATION CHEMISTRY APPROACH

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The use of irradiation for the development of advanced materials and devices at nano or micro scale has been detailed over the years. Advantages of this technique include the possibility to apply the irradiation inside the final package, no considerable temperature increase, and the possibility to combine simultaneous features along the process, depending upon the irradiation source. In this work we report the use of irradiation, gamma and e-beam sources, for the development of nanostructured protein based drug carriers, as an alternative technique for controlled protein crosslinking. In a more specific way, the aim is to develop papain nanoparticles by the use of distinct radiation sources on a radiation chemistry point of view. On this account Papain was solubilized in phosphate buffer and submitted to irradiation at 10 kGy as a function of ethanol concentration. Optimized concentrations were selected for evaluation of the dose effect, with irradiation doses ranging from 2.5-10kGy. Particle size changes were monitored by DLS. Fluorescence measurements were applied in order to verify bityrosine formation. Nanoparticles were achieved in the range of 5 to 11nm approximately, depending upon ethanol concentration and irradiation dose. Fluorescence experiments revealed an increase in bityrosine formation highlighting the nanoparticle formation in both cases. Thus both irradiation sources was suitable for the synthesis of papain nanoparticles to be applied for biotechnological purposes.

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