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Synthesis of polymeric nanogels by gamma radiation: influence of total absorbed dose

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Biomaterials have received a considerable attention over the last 30 years as a means of treating diseases and easing suffering. These materials have found applications in approximately 8000 different kinds of medical devices; even though biomaterials have had a pronounced impact in medical treatment, a need still exists to be able to design and develop better polymer, ceramic, and metal systems. Nowadays, the emergence of micro- and nanoscale science and engineering has provided new avenues for engineering materials with macromolecular and even down to molecular-scale precision, leading to diagnostic and therapeutic technologies that will revolutionize the way health care is administered. Mainly, micro and nanosystems from polymers, such as nanogels, have achieved a great attention in biomedical applications due to they have lots of advantages over conventional systems since they enhance the delivery, extend the bioactivity of the drug, show minimal side effects, demonstrate high-performance characteristics and are more economical.
Several of techniques have been described for the synthesis of nanomaterials from polymers. However, the use of ionizing radiation (γ, e-), to obtain polymeric micro and nanogels are characterized by the possibility of obtaining products with a high degree of purity, which ones are a technological novelty mainly in biomaterial manufacture and therefore in biomedical applications.
The irradiation dose influence on nanogels synthesis by gamma radiation in diluted PVP solutions at a dose ranging from 3 - 22 kGy was performed in this paper. The experiments were performed in absence of oxygen using aqueous PVP solution (0.05 –0.3 %). Crosslinking reactions were carried out at 25 ℃ in a gamma irradiation chamber with a ^{60}Co source (ISOGAMMA LLCo). The Scanning Electron Microscopy (SEM), Attenuate Total Reflection Spectroscopy (ATR), Dynamic Light Scattering (DLS), and Viscosimetry were used as characterization techniques.

Keywords: polymeric nanogels, gamma irradiation, biomaterial.

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