Influence of argon and nitrous oxide on the synthesis of PVP nanogels prepared by gamma radiation

Reference	Presenter	Authors (Institution)	Abstract
02-020	Tatiana Santana Balogh	Balogh, T.S. (Instituto de Pesquisas Energéticas e Nucleares); Kadlubowski, S. (Lodz University of Technology); Bonturim, E. (Universidade Presbiteriana Mackenzie); Lugao, A.B. (IPEN); Varca, G.H.(Instituto de Pesquisas Energéticas e Nucleares);	Nanogels are innovative systems with great potential for use in chemotherapy, disease diagnosis, release of bioactive substances, vaccines, cell culture systems, biocatalysis, in the generation of bioactive scaffolds in regenerative medicine among other applications. The definition of this material can be directly derived from the definition of polymeric gel, that is, a two-component system consisting of a permanent three-dimensional network of linked polymer chains and solvent molecules filling the pores of this network. Its internal structure is similar to that of hydrogels however presents particle size range varying from 0 to 100 nm leading to several advantages. Nanogel production methods involve intramolecular crosslinking that can be achieved using ionizing radiation. This method avoids the addition of any additives allowing the reaction to be carried out in a pure polymer-solvent system and the production of nanogels for biomedical applications free from monomer and crosslinking agents or surfactants. In this work influence of argon and nitrous oxide on the formation of nanogels by gamma irradiation has been evaluated. The samples were prepared in duplicate in multipurpose cobalt-60 gamma irradiator using a 25 mM PVP solution. Samples were irradiated in argon and nitrous oxide conditions with doses from 1 kGy up to 25 kGy with 10 kGy/h dose rate. These samples were morphologically characterized using Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM) as well as the pristine PVP solution. The mean particle size of the samples and the polydispersity index was performed in equipment Zetasizer Nano ZS - Malvern® and the determination of radius of gyration and molecular weight was performed in equipment Heleos - Wyatt®. It was observed in the conditions evaluated that saturation with argon or nitrous oxide promoted similar results except for 25 kGy dose. At this dose larger mean particle size and radius of gyration were observed in the sample saturated with nitrous oxide.

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