



Contribution ID: 236

Type: Poster

Synthesis and characterization of pH and temperature responsible poly(2-hydroxyethyl methacrylate-co-acrylamide) hydrogels by gamma photon irradiation. Doxorubicin release.

Tuesday, 24 October 2017 16:00 (15 minutes)

2-hydroxyethyl methacrylate/Acrylamide hydrogels were prepared by simultaneous radiation induced cross-linking copolymerization of acrylamide (AAm), 2-hydroxyethyl methacrylate (HEMA) and water mixtures at a radiation dose of 10 kGy. Hydrogels were characterized by infrared spectroscopy. Dynamic and equilibrium swelling of hydrogels in water and in buffer solutions were investigated. They were sensitive to pH and temperature. Swelling was non-Fickian and increased with increasing the acrylamide content. Temperature dependence of the equilibrium water uptake of copolymers exhibited a discontinuity around 35°C resulting from the weakening of the hydrogen bonds between the hydroxyl groups of HEMA and the amide groups of AAm. The thermodynamic and network parameters derived from swelling and mechanical measurements are compared and discussed. They exhibit a strong dependence on the AAM content in the hydrogel. The doxorubicin release was governed by copolymer composition, the absorbed dose and their self solubility in water media.

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Session Classification: Poster Session - NAT

Track Classification: Nuclear Analytical Techniques and Applications in Art, Archeology, Environment, Energy, Space and Security