



Preparation and characterization of chitosan/hyaluronic acid/itaconic acid hydrogel composite to remove manganese in aqueous solution

Betül Taşdelen^{a,*}, Deniz İzlen Çifçi^b, Süreyya Meriç^b

^aBiomedical Engineering Department, Çorlu Engineering Faculty, Tekirdağ Namik Kemal University, No: 13, 59860 Çorlu-Tekirdağ, Turkey, Tel. +90 282 2502348; Fax: +90 282 2509924; email: btasdelen@nku.edu.tr

^bEnvironmental Engineering Department, Çorlu Engineering Faculty, Tekirdağ Namik Kemal University, No: 13, 59860 Çorlu-Tekirdağ, Turkey, emails: dicifci@nku.edu.tr (D.İ. Çifçi), smeric@nku.edu.tr (S. Meriç)

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ABSTRACT

In this work, new hydrogel composites composed of chitosan (CS)/hyaluronic acid (HA)/itaconic acid (IA) were synthesized by gamma radiation. Triple combination was prepared using gamma rays (25 kGy) at ambient temperature through simultaneous free radical polymerization and crosslinking. The swelling and diffusion properties of the hydrogels were investigated before submission to the adsorption experiment for removal of manganese (Mn) in aqueous solutions. The equilibrium mass percentage swelling of CS/HA hydrogels increased from 2,400 to 7,786 as the addition of IA in the CS/HA formulation. Fourier transform infrared and scanning electron microscopy were used for the surface characterization and chemical structure of the hydrogels. Mn uptake and release properties of the newly prepared composites improved with the including IA in the gel formulation of the CS/HA hydrogels. Adsorption capacity of Mn increased from 15.46 to 18.23 mg/g with the inclusion of IA in the formulation of CS/HA. It was found that adsorption capacities of Mn by both gels were competitive with some of the CS based composites used in Mn adsorption studies.

Keywords: Adsorption; Chitosan; Gamma radiation; Hyaluronic acid; Hydrogel; Itaconic acid; Manganese

* Corresponding author.