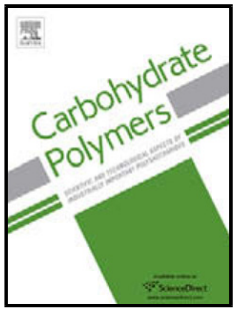

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PII: S0144-8617(17)31043-3
DOI: http://dx.doi.org/10.1016/j.carbpol.2017.09.019
Reference: CARP 12764

To appear in:

Received date: 26-5-2017
Revised date: 23-8-2017
Accepted date: 6-9-2017

Please cite this article as: Piazza, Rodolfo Debone., da Silva Nunes, Eloiza., Viali, Wesley Renato., da Silva, Sebastião William., Aragón, Fermin Herrera., Coaquira, José Antônio Huamaní., de Morais, Paulo César., Marques, Rodrigo Fernando Costa., & Jafelicci, Miguel., Magnetic nanohydrogel obtained by miniemulsion polymerization of poly(acrylic acid) grafted onto derivatized dextran.*Carbohydrate Polymers* http://dx.doi.org/10.1016/j.carbpol.2017.09.019

Magnetic nanohydrogel obtained by miniemulsion polymerization of poly(acrylic acid) grafted onto derivatized dextran

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Highlights

- Dextran was derivatized to anchor vinyl groups on backbone.
- poly(acrylic acid) was grafted onto derivatized dextran
- Iron oxide was functionalized with acrylic acid.
- Magnetic nanohydrogel was obtained by miniemulsion polymerization technique.
- Magnetic nanohydrogel show colloidal stability in physiological media.

This study describes the synthesis of magnetic nanohydrogels by miniemulsion polymerization technique. Dextran was derivatized by the glycidyl methacrylate to anchor vinyl groups on polysaccharides backbone, allowing its use as a macromonomer for miniemulsion polymerization, as confirmed by proton nuclear magnetic resonance spectroscopy (^{13}C-NMR). Magnetite nanoparticles were synthesized by coprecipitation, followed by air oxidation to maghemite. The results of X-ray diffractometry (XRD), Raman and transmission electron microscopy (TEM) analysis showed that maghemite nanoparticles were obtained with a diameter of 5.27 nm. The entrapment of iron oxide nanoparticles in a dextran nanohydrogel matrix was confirmed by thermogravimetric analysis (TGA), scanning transmission electron microscopy (STEM) and Zeta potential data. The magnetic nanohydrogels presented superparamagnetic behavior and were colloidal stable in physiological during 30 days. Our findings suggest that the synthesized magnetic nanohydrogel are potential candidates for use in drug delivery systems due to its physicochemical and magnetic properties.

Keywords: Derivatized dextran; nanohydrogels; iron oxide; miniemulsion polymerization

1. Introduction

In the last decade, the use of polymers nanoparticles (Biswas, Kumari, Lakhani, & Ghosh, 2015; Karami, Sadighian, Rostamizadeh, Parsa, & Rezaee, 2016; Lu & Park, 2013; Mandal et al., 2013; Masood, 2015; Ta, Convertine, Reyes, Stayton, & Porter, 2010) (Easo & Mohanan, 2013; Hervault & Thanh, 2014; Laurent et al., 2008; Pankhurst, Thanh, Jones, & Dobson, 2009) as platform for bioactive molecules have attracted