

Pectin-based hydrogels and its ferrite nanocomposites for removal of nitro compounds

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ABSTRACT

Pectin (acrylic acid-co-acrylamide) (PAA) hydrogel in various formulations was prepared by gamma irradiation and used for preparation of magnetic responsive hydrogels. In situ formation of different metal nanoparticles (Cu and Co) individually and bimetallic clusters inside the hydrogels and magnetic ones were prepared. These prepared nanocomposites were characterized using thermogravimetric analysis, X-ray diffraction analysis and scanning electron microscopy. Transmission electron microscopy confirmed that Co, Cu and magnetic-(Co/Cu) nanoparticles sizes are about 31.25, 50 and 62.5 nm, respectively. The utilization of nanocomposites as a catalyst for the reduction of 2-nitrophenols (2-NP) with very high efficiency was reported. The experimental parameters that affect reduction rates, such as the type of catalyst, NaBH₄ and 2-NP concentration were investigated. The reduction rate constants at different temperatures of 22°C, 36°C and 58°C and activation parameters were calculated. It was found that (PAA)-Cu nanocomposite expressed the greatest reduction ability for 2-NP while (PAA)-Co nanocomposite has low reduction ability.

Keywords: Acrylic acid; Pectin; TEM; Nanoparticles; Nitrophenols

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