Accepted Manuscript

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PII: S0167-7322(18)30092-8

DOI: doi:10.1016/j.molliq.2018.02.076

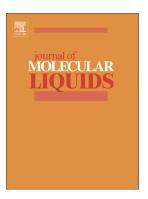
Reference: MOLLIQ 8718

To appear in: Journal of Molecular Liquids

Received date: 6 January 2018
Revised date: 12 February 2018
Accepted date: 17 February 2018

Please cite this article as: S. Dhanavel, N. Manivannan, N. Mathivanan, Vinod Kumar Gupta, V. Narayanan, A. Stephen, Preparation and characterization of cross-linked chitosan/palladium nanocomposites for catalytic and antibacterial activity. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:10.1016/j.molliq.2018.02.076

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Preparation and characterization of cross-linked chitosan/palladium nanocomposites for catalytic and antibacterial activity

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Abstract

Simple chemical reduction method has been used to synthesize the chitosan supported palladium nanoparticles. The prepared samples were analyzed using various characterizations. 4 - nitrophenol (4-NP) is a toxic water pollutant. The catalytic hydrogenation of recalcitrant pollutant by sodium borohydride is the prime model reaction that can be easily analyzed using the spectroscopic techniques. The catalytic performance of the synthesized chitosan/Pd nanocomposites with different weight percentages of palladium, for 4-nitrophenol reduction was also investigated. On increasing the palladium concentration, the catalytic activity towards conversion of highly toxic 4-nitrophenol to eco-friendly 4-aminophenol and antibacterial activity against human pathogens is increased due to non-agglomerative nature of mono-dispersed palladium nanoparticles. The kinetic rate constant during the catalytic performance was found to be 1.95×10^{-3} , 2.41×10^{-3} and 4.01×10^{-3} s⁻¹ for CS/Pd-5%, CS/Pd-10% and CS/Pd-15% respectively. The nanocomposites exhibited superior antibacterial efficacy against both Gram negative and Gram positive bacteria. The in vitro minimum inhibitory concentration of the compound against human pathogens was determined. Further, the nanocomposite is screened for hemolytic activity and it proved that the chitosan stabilized Pd NPs are non-toxic on RBCs cells up to the concentration of 25 μ g/ml among tested concentration.

Keywords: Chitosan/Pd composites; reduction of nitrophenol; anti-bacterial activity

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