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Synthesis of novel mixed matrix scaffolds and adsorption of copper ions of wastewater

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ABSTRACT

Mixed matrix scaffolds were synthesized by uniformly distribution of ion exchange resins (H^+ form Amberjet, ID 780 μm) into the stereo-structural chitosan matrix and then used for the removal of copper ions from wastewater. Specifically, Amberjet particles suspended in a 1 wt% of viscous chitosan solution were filled with cylindrical aluminum containers to prepare chitosan mixed matrix scaffolds through the freeze-gelation process. The internal surface area of mixed matrix scaffolds is 78 m^2/g. The adsorption processes were performed by chelate copper ions of wastewater onto the amine functional groups ($–NH_2$) exposure on the external and porous stereo-structural surfaces of chitosan matrix as well as the sulfonate functional groups on the outer surface of ion exchange resins, respectively. Results of a low initial copper ion concentration of 5 mg Cu^{2+}/L were used to study the adsorption capacities as well as adsorption kinetics experimentally. The kinetic experimental data correlated well with the second order adsorption model, suggesting that the rate limiting step of mixed matrix scaffolds may be the chemical adsorption.

Keywords: Adsorption; Chitosan; Mixed matrix scaffolds; Adsorbent

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