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Efficient removal of Cr(VI) from water by quaternized chitin/branched polyethylenimine biosorbent with hierarchical pore structure

Xingtang Liang^{a,b}, Xiaoyu Fan^a, Runmei Li^a, Shirong Li^a, Shukun Shen^a, Daodao Hu^{a,*}

^a School of Materials Science and Engineering, Shaanxi Normal University, Xi'an 710062, China

^b School of Petroleum and Chemical Engineering, Qinzhou University, Qinzhou 535000, China

Abstract: A novel chitin-based biosorbent (QCP) was synthesized by cross-linking quaternized chitin and branched polyethylenimine with the aid of epichlorohydrin for efficient removal of Cr(VI) from water. Because it possessed both quaternary ammonium groups and amino groups as well as the hierarchical pore structure, QCP presented a maximum adsorption capacity of 387.7 mg/g according to the Langmuir isotherm at 25 °C. The biosorption of QCP achieved the equilibrium within 40 min and followed the pseudo-second-order kinetic model. QCP worked well even in the solution with high pH and high content of competing anions and, it exhibited an excellent reusability. The main Cr(VI) uptake mechanism was confirmed to be electrostatic attractions between Cr(VI) anions and quaternary ammonium groups as well as the protonated amino groups, and followed by partial reduction of Cr(VI) to Cr(III) by

* Corresponding author. E-mail: daodaohu@snnu.edu.cn. Tel.: +86-29-81530717.

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