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Chromium removal by newly developed microbial consortia supported on wood husk

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ABSTRACT

The resistance of microbial consortia to environmental challenges offers great stability to its members. In this work, biofilms of heavy-metal resistant microbial consortia supported on wood husk were studied for Cr(VI) removal. The theoretical biofilm adhesion of microorganisms on the support was studied using Extended Derjaguin–Landau–Verwey–Overbeek. The theoretical results were confirmed by scanning electron microscopy visualization. Batch experiments were conducted to investigate the biosorption of Cr(VI) from aqueous solutions onto microbial cells. The yeast–yeast consortia showed an antagonistic relationship reducing the chromium removal efficiency, while a synergetic action was noted between bacterial and yeast strains. Compared to the pure yeast culture, the microbial consortia demonstrated greater efficiency for chromium remediation. It allowed the reduction of the treatment time by 20%, signifying a complementary interaction among microbial strains. In the open system, the Cr(VI) elimination of the pure culture of *Wickerhamomyces anomalus* was compared to that obtained with *W. anomalus* – bacteria consortia. The best performance was obtained by *W. anomalus* – *Bacillus* sp. consortium. It was able to eliminate 97% of the Cr(VI) at an initial concentration of 50 $mg \cdot L^{-1}$. Our results demonstrate that the employment of microbial consortia is advantageous in the chromium removal from contaminated environments.

Keywords: Chromium; Biofilm; Consortium; Biosorption; Wood husk

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