Chromium (VI) biosorption properties of multiple resistant bacteria isolated from industrial sewerage

Authors: Ganiyu Oladunjoye Oyetibo, Matthew Olusoji Ilori, Oluwafemi Sunday Obayori, Olukayode Oladipo Amund

Abstract

Chromium (VI) [Cr (VI)] biosorption by four resistant autochthonous bacterial strains was investigated to determine their potential for use in sustainable marine water-pollution control. Maximum exchange between Cr (VI) ions and protons on the cells surfaces were at 30–35 °C, pH 2.0 and 350–450 mg/L. The bacterial strains effectively removed 79.0–90.5 % Cr (VI) ions from solution. Furthermore, 85.3–93.0 % of Cr (VI) ions were regenerated from the biomasses, and 83.4–91.7 % of the metal was adsorbed when the biomasses was reused. Langmuir isotherm performed better than Freundlich isotherm, depicting that Cr (VI) affinity was in the sequence *Rhodococcus* sp. AL03Ni > *Burkholderia cepacia* AL96Co > *Corynebacterium kutscheri* FL108Hg > *Pseudomonas aeruginosa* CA207Ni. Biosorption isotherms confirmed that *Rhodococcus* sp. AL03Ni was a better biosorbent with a maximum uptake of 107.46 mg of Cr (VI) per g (dry weight) of biomass. The results highlight the high potential of the organisms for bacteria-based detoxification of Cr (VI) via biosorption.

Keywords: Biosorption, Industrial wastewater, Heavy metal, Chromium (VI), Resistant bacteria

DOI: https://doi.org/10.1007/s10661-013-3066-x

Journal of Environmental Monitoring and Assessment

Published by: Springer Netherlands, on 2013/8/1