

Bioremediation and bioconversion of chromium and pentachlorophenol in tannery effluent by microorganisms

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Abstrak

Chromium sulphate Cr(III) and pentachlorophenol (PCP) widely used as tanning and biocide respectively in leather preparation are highly toxic and recalcitrant. Biosorption of chromium by *Aspergillus niger* FIST1 was evaluated, and process parameters were optimized in presence of carbon, nitrogen, carbon:nitrogen, pH, temperature, different concentration of chromium. The potency of *Acinetobacter* sp. IST3 for degradation of pentachlorophenol was determined by HPLC after formation of tetrachlorohydroquinone and chlorohydroquinone. Bioremediation of chromium and PCP were tested in bioreactors in sequential way where bacterium treated effluent subsequently treated by fungus showed reduction of chromium (82%) and PCP (85%) after 120 hrs. Biosorption of chromium was determined by transmission electron microscopy (TEM), scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDX). Recovery of chromium in tannery effluent was initially obtained by CaO:MgO (2:1) and pH adjusted to 7.0-7.6, and chromium absorbed by fungus and bacteria, was further used for tanning of the leather. Results of the study indicated that quality of the leather prepared by absorbed chromium of fungus and bacteria was better than chromium recovered by CaO:MgO determined by SEM. In view of above results 'tanning cake' was prepared which is better substitute of raw chromium used for tanning in leather mills.