Processes comparison for nickel and chrome removal from urban landfill leachate

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Received 2 March 2012; Accepted 5 June 2012

\textbf{ABSTRACT}

This study aims to examine the feasibility of chemical, physical and biological processes on municipal landfills leachates, to mainly evaluate Nickel (Ni) and Chrome (Cr) removal. Flocculation/coagulation methods were investigated on laboratory scale, by dosing ferric chloride (FeCl\textsubscript{3}) and aluminium polychloride to three leachates, at a natural pH of 8. The oxidation treatment with sodium permanganate (NaMnO\textsubscript{4}), applied on the leachate with higher metals content, defined an increment of Ni (from 9 to 50\%) and Cr (from 31 to 80\%) removals, compared with the previous chemical treatments. Further, the metals biosorption capacity on the biomass flocs was investigated in a pilot scale membrane bioreactor, previously tested on laboratory scale. The different percentages of added leachate showed efficiencies up to 93\% for Cr and 58\% for Ni, defining the different removal roles of the adsorption and of the membrane layer effect.

\textit{Keywords:} Landfill leachate; Nickel; Chrome; Coagulation-flocculation; Adsorption; MBR