



## Comparison of the adsorptive action of hydrotalcite, *Moringa oleifera* and activated carbon in the treatment of landfill leachate

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### ABSTRACT

Landfill leachate is formed by organic and inorganic toxic compounds. It has high salt concentration and pathogenic organisms that can cause environmental harm. Hydrotalcite, activated carbon and *Moringa oleifera* seeds have been used for the adsorption of contaminants and the purification of water. In the present study, landfill leachate was submitted to physicochemical and microbiological analysis before and after treatment with these adsorbents. The characterization of the leachate revealed a small number of heterotrophic bacteria and fungi. Total coliforms and *Escherichia coli* reached mean values of 17,900 and 890 NMP/100 mL, respectively. The physicochemical analysis indicated high conductivity, color, turbidity, chemical oxygen demand (COD), biochemical oxygen demand in 5 d, ammonia, boron, sodium and chlorides. Treatment with hydrotalcite produced the best results regarding the improvement in these variables, but led to an increase in pH. Reused hydrotalcite (Hr) provided reasonable results, but with less efficiency than hydrotalcite. Moreover, Hr failed to remove boron and aluminum and magnesium levels increased. In addition, 4% activated carbon (AC4%) obtained better results regarding color and COD, but failed to remove boron and ammonia efficiently and 1% activated carbon achieved similar results to AC4%, but with lower degrees of removal. *M. oleifera* seed and extract achieved unsatisfactory results. All adsorbents, except *M. oleifera* extract, decreased the amount of heterotrophic bacteria approximately 10-fold. Total coliforms and *E. coli* did not resist the treatments. None of the adsorbents removed sodium, chloride or the toxicity of the leachate.

**Keywords:** Landfill leachate; Boron adsorption; Hydrotalcite; *Moringa oleifera*; Activated carbon

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