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Authors: Cláudia Regina Klauck, Alexandre Giacobbo, Erlon Diego Lorenz de Oliveira, Luciano Basso da Silva, Marco Antônio Siqueira Rodrigues



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Evaluation of acute toxicity, cytotoxicity and genotoxicity of landfill leachate treated by biological lagoon and advanced oxidation processes

Cláudia Regina Klauck*, Alexandre Giacobbo, Erlon Diego Lorenz de Oliveira,

Luciano Basso da Silva, Marco Antônio Siqueira Rodrigues.

Universidade Feevale, Laboratório Aquário. Campus II ERS-239, 2755, Novo Hamburgo, RS, Brazil.

*Corresponding author: Cláudia Regina Klauck. crklauck@gmail.com. Universidade Feevale.

Laboratório Aquário. Campus II ERS-239, 2755, Novo Hamburgo, RS, Brazil.

Abstract

The production of domestic waste is increasing so much that waste disposal has become a serious problem in terms concern for the hazard to the human and environment. In Brazil, landfill is the most common method of municipal solid waste disposal. The present study aims to evaluate the efficiency of different advanced oxidation processes (ozonization (alkaline pH), electrochemical oxidation + ozonation (alkaline pH) and photo-electrochemical oxidation) and biological system as a treatment of leachate to remove acute-cyto-genotoxicity of municipal landfills. Toxicity assays were performed on *Allium cepa*, assessing root growth (acute toxicity), cell division (cytotoxicity), and chromosomal aberrations (genotoxicity). Results indicate high acute toxicity, cytotoxicity and genotoxicity of the raw leachate at nearly all collection times. The biological treatment proved to be inefficient in the improvement of physicochemical properties and in the reduction of genotoxicity. In general, all the advanced oxidation processes presented greater removal for physicochemical parameters as well as a reduction of the genotoxic potential. However, only the treatment with electrochemical oxidation + ozonation provided an effluent with physicochemical properties that are in line with the

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