



7th INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

Academic

“CLEANER PRODUCTION FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS”

Recovery of Heavy Metals from Waste Printed Circuit Boards through Microbiological Leaching, Using Consortia of Acidophilic Chemolithotrophic Bacteria

MEJÍA RODRÍGUEZ, B. J. ^a, BOSSIO CERPA, L. V. ^a, ALBIS ARRIETA, A. R. ^{a*}, BARROS MARTÍNEZ, A. M. ^b, MEDINA BUELVAS, A.M. ^b

a. Universidad del Atlántico, Barranquilla

b. Universidad Libre Seccional Barranquilla, Barranquilla

**Corresponding author, albertoalbis@uniatlantico.edu.co*

Abstract

An alternative to reduce environmental impact and cost in the extraction of metals from electronic waste is the use of bacterial leaching processes. In this work, the recovery of heavy metals from wasted printed circuits boards (WPCBs) of desktop computers through bacterial leaching processes has been investigated. Consortia of chemolithotrophic acidophilic bacteria were obtained from acid water and rocks from a local mining action, and from microorganisms isolated from WPCBs. We used X-ray fluorescence spectroscopy to quantify the amount of metals present in WPCBs before, during and after exposure with the isolated bacterial study consortia. Growth conditions of the microorganisms were studied, metal leaching rate present in the WPCBs by these consortia was determined under different conditions of pH, temperature and agitation in several bioassays. This study demonstrated the bioleaching of toxic metals such as lead, nickel and chromium, as well as other metals such as iron, calcium, zinc, manganese, copper, osmium, tantalum, platinum, and gold.

Keywords: Bioleaching, heavy metals, chemolithotrophic bacteria, printed circuit boards (PCB), adaptation