COMPARATIVE ANALYSIS OF REMOVAL OF HEAVY METAL IONS AND ORGANIC RESIDUES IN INDUSTRIAL WASTEWATER BY USING ABSORBENT MATTER (BIOCHAR) AND/OR CO-AGULANT SURFACTANTS (CATIONIC SURFACTANTS)

Submitted By

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Master in Environmental Sciences, Institute of Environmental Studies and Research, Ain Shams University, 2011

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
In
Environmental Sciences

Department of Environmental Basic Sciences
Institute of Environmental Studies and Research
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APPROVAL SHEET

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Abstract

With the rapid industrialization and civilization, different contaminants are released to wastewater including heavy metals, and organic pollutants, which they have serious harms to human health. There is serious need for finding suitable methods for purification wastewater. In this work, corncob biochar was used as a solid adsorbent for removal of Pb, Ni, Zn, Cd ions and 4-nitrophenol from industrial wastewater through batch techniques. The influences of biochar dose, pH, concentration of pollutants, and contact time with biochar on removal percentages were investigated. Optimum removal of Pb, Ni, Zn and Cd ions was achieved at biosorbent dose (2 g/L), pH 6.5 and contact time (90 min.).

Optimum removal of 4- nitro phenol was achieved at bio-sorbent dose (2 g/L), pH 6.5 and contact time (90 min). Kinetic studies and isotherms were applied to experimental data of biosorption of metals and 4-nitrophenol. As fixed bed column adsorption of metals and 4-nitrophenol was applied to simulate industrial application. Results of this study confirmed that corncob biochar can be beneficially used for treating wastewater containing Pb, Ni, Zn, Cd ions and organic residues.

Key words

Adsorption, Biochar, Water pollutants, Biosorbent, 4- nitrophenol.

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