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Study on the Heavy Metals Removal Efficiencies of Constructed Wetlands with Different Substrates

PDF (Size: 8165KB) PP. 22-28 DOI: 10.4236/jwarp.2009.11004

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ABSTRACT

In this study constructed wetlands (CWs) were used to remove three heavy metals (Zn, Cu and Pb). The two tested substrates were made of coke and gravel, respectively. First order dynamic model was appropriate to describe removing of Zn and Cu. The experimental results showed that first dynamic removal rate constants of Zn in CWs with coke and gravel were 0.2326 h⁻¹ and 0.1222 h⁻¹, respectively. And those of Cu in CWs with coke and gravel were 0.2017 h⁻¹ and 0.3739 h⁻¹. However, removal efficiencies of Pb in the coke system and the gravel system were within 95-99%, so the first order dynamic model failed to fit the experimental data because the hydraulic resident times of Pb did not affect outlet concentration of Pb. From the removal rate constants, it is found that the coke and gravel system have different absorption efficiencies of heavy metal pollutants. Therefore, it is suggested that the removal efficiencies of heavy metals are influenced by the choice of substrates to some extent.

KEYWORDS

Subsurface Flow Constructed Wetlands, First Order Dynamic Model, Heavy Metal Pollutant, Substrate, Removal Efficiency

Cite this paper

M. CHEN, Y. TANG, X. LI and Z. YU, "Study on the Heavy Metals Removal Efficiencies of Constructed Wetlands with Different Substrates," *Journal of Water Resource and Protection*, Vol. 1 No. 1, 2009, pp. 22-28. doi: 10.4236/jwarp.2009.11004.

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