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Cu²⁺ REMOVAL FROM WASTEWATERS BY USING COMPOST AS SORBENT

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Abstract

The paper aims to present the sorption properties of two sorbent substrates (composts) prepared by aerobic fermentation from vegetables waste composted with beech sawdust (BR2) and beech ash (BC1) to be used for Cu²⁺ removal from wastewaters. The composts structures and surface properties were characterised in terms of active groups (FTIR), crystallinity (XRD), morphology (SEM), topography (AFM) and specific surface and pores analysis (BET), and the changes in properties after Cu²⁺ sorption were outlined. Kinetic studies of the copper sorption were performed and the equilibrium time was determined, kinetic models have been applied to describe the sorption process. The pseudo second order kinetic model proved to be valid for both composts. The sorption parameters (pH, substrate dose, initial concentration) were optimized at the equilibrium time and the isotherms were plotted. The sorption capacities and removal efficiencies were discussed in direct relation with the structure, morphology, surface properties (specific surface, surface charge) of the composts. Langmuir and Freundlich models were used to fit the experimental data and sorption mechanisms were proposed. The Langmuir model is not able to describe the copper ions sorption on the two composts; better correlation coefficients are obtained when the Freundlich model is applied, specific for heterogeneous substrates. BR2 substrate is most likely able to support unspecific physical interactions, while parallel mechanisms also involving chemisorption are more probable for BC1. The results prove the sorption of copper ions onto compost type substrates can be used as an efficient step in the advanced wastewaters treatment.

Key words: compost, copper, sorption, wastewater, wastewoody biomass

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