

Accepted Manuscript

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PII: S0959-6526(18)32172-3

DOI: [10.1016/j.jclepro.2018.07.182](https://doi.org/10.1016/j.jclepro.2018.07.182)

Reference: JCLP 13636

To appear in: *Journal of Cleaner Production*

Received Date: 2 February 2018

Revised Date: 16 July 2018

Accepted Date: 17 July 2018

Please cite this article as: Liu X, Bai X, Dong L, Liang J, Jin Y, Wei Y, Li Y, Huang S, Qu J, Composting enhances the removal of lead ions in aqueous solution by spent mushroom substrate: Biosorption and precipitation, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.07.182.

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Composting enhances the removal of lead ions in aqueous solution by spent mushroom substrate: biosorption and precipitation

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Abstract

This study aims to elucidate the effects of composting on spent mushroom substrate (SMS) in lead ions removal by comparing the physicochemical properties of composted spent mushroom substrate (CSMS) with composted cow dung (CCD) and SMS. The effect of experimental factors (pH, contact time, dosage and initial concentration) on lead ions removal was determined by batch experiments.

Composting elevated the pH value (7.80), cation exchange capacity (CEC, 77.02 cmol/kg) and hydrophilicity, resulting in a higher removal efficiency for lead ions of CSMS than that of SMS. The increased proportion of aromatic hydrocarbon and carboxyl was propitious to lead ions removal via their response to pH variation.

Biosorption and precipitation were the overriding mechanisms involved in the lead ions removal by CSMS. Our results present a simple and energy-efficient method to enhance the ability of SMS to remove heavy metals.

Key words: spent mushroom substrate (SMS); composting; biosorption; cow dung;

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