Buffalo weed (*Ambrosia trifida* L. var. *trifida*) biochar for cadmium (II) and lead (II) adsorption in single and mixed system

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**ABSTRACT**

Biochars (BWBC 300, BWBC 500 and BWBC 700) derived from buffalo weed (*Ambrosia trifida* L. var. *trifida*) at different pyrolysis temperatures of 300, 500 and 700°C were investigated for the removal of Cd(II) and Pb(II) ions from aqueous solutions. The physicochemical properties of the biochars were studied using FTIR, scanning electron microscopy (SEM), X-ray diffraction, Brunauer, Emmett and Teller surface area, cation exchange capacity and energy dispersive X-ray analysis. The adsorption at solution pH = 5 could be well described by Freundlich model for Cd(II) and Pb(II) in their single and mixed system with \(R^2 \geq 0.95\). The maximum adsorption capacities of the biochar BWBC 700 from the Langmuir equation were found to be 11.63 and 333.33 mg g\(^{-1}\) for Cd(II) and Pb(II), respectively. Pseudo-second-order kinetic model was fitted well in describing the adsorption kinetics of Cd(II) and Pb(II) onto the biochar BWBC 700. About 0.02 mol L\(^{-1}\) disodium salt of EDTA was able to desorb Cd(II) and Pb(II) from the biochar BWBC 700 with an approximately 63.5% and 96.8% desorption yield, respectively. Ion exchange and surface complexation found to be the main mechanisms involved in the adsorption process. The developed biochar derived from *Ambrosia trifida* L. var. *trifida* found to be a low cost adsorbent and could be used for the effective removal of Cd(II) and Pb(II) in waste waters.

**Keywords:** Biochar; *Ambrosia trifida* L. var. *trifida*; Pyrolysis; Adsorption; Cadmium; Lead

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