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Konstantin von Gunten, Samrat Alam, Magdalena Hubmann, Yong Sik Ok, Kurt O. Konhauser, Daniel S. Alessi

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Modified sequential extraction for biochar and petroleum coke: metal release potential and its environmental implications

Konstantin von Gunten[1*], Md. Samrat Alam[1], Magdalena Hubmann[2], Yong Sik Ok[3], Kurt O. Konhauser[1], Daniel S. Alessi[1]

[1]Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton T6G 2E3, Canada

[2]Department of Agricultural, Food & Nutritional Science, University of Alberta, Edmonton T6G 2R3, Canada

[3]Korea Biochar Research Center & School of Natural Resources and Environmental Science, Kangwon National University, Chuncheon 24341, Korea

*Corresponding author. Contact: vongunte@ualberta.ca

Abstract

A modified Community Bureau of Reference (CBR) sequential extraction method was tested to assess the composition of untreated pyrogenic carbon (biochar) and oil sands petroleum coke. Wood biochar samples were found to contain lower concentrations of metals, but had higher fractions of easily mobilized alkaline earth and transition metals. Sewage sludge biochar was determined to be less recalcitrant and had higher total metal concentrations, with most of the metals found in the more resilient extraction fractions (oxidizable, residual). Petroleum coke was the most stable material, with a similar metal distribution pattern as the sewage sludge biochar. The applied sequential extraction method represents a suitable technique to recover metals from these materials, and is a valuable tool in understanding the metal retaining and leaching capability of various biochar types and carbonaceous petroleum coke samples.