A method to simultaneously determine reduction in PAH dissolved concentrations and bioaccessibility in carbon amended soils

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Published in: Abstract Book

Publication date: 2012

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):

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C-naphthalene (50 mg kg\(^{-1}\)) in soil. BC1 was produced at 450 °C for 16 hours and BC2 was produced at 1000 °C for 4 hours. C-naphthalene mineralisation was assessed by monitoring \(^{14}C\)-naphthalene mineralisation over 14 days in respirometric assays using indigenous microflora and compared to HPCD, CaCl\(_2\), and methanol extractions. Results showed that the 0.5% and 1.0% of BC1 and all concentrations of BC2 amendments showed significant reduction (\(p < 0.01\)) in extent of mineralisation compared to 0% BC and cumulative extractions. Linear correlation between HPDC extractability and total amount mineralised over 14 days revealed very good correlation in all concentrations of biochar amendments BC1 (\(r^2 = 0.94\), slope = 0.90, intercept = -1.34). However, fastest rate of mineralisation showed poor correlation. Additionally, the CaCl\(_2\) and methanol extractions underestimated and overestimated extent of mineralisation respectively. Bioaccessibility often describes the biodegradation endpoint. This paper shows that biochar in this study can reduce the bioaccessibility of naphthalene at high concentrations and that HPCD extraction strongly predicts the bioaccessibility of naphthalene in soils even when amended with biochar. However, the production process, feedstock and soil properties determine the capability of biochar to adsorb organic contaminants.