

Investigation of biological destruction of benzo[a]pyrene and polycyclic aromatic hydrocarbons of biochar in soil

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd. The biological decomposition of benzo[a]pyrene in the concentrations exceeding the MAC (maximum permissible concentration) level in soils by 2, 5 and 10 times was studied in laboratory conditions. The gray forest soil samples were contaminated with benzo[a]pyrene and incubated in optimum for bacterial growth soil moisture for 30 and 60 days. The residual amount of contaminant was monitored by HPLC after extraction with acetone-cyclohexane (2:1). Soil microbial activity was evaluated by measuring basal respiration (BR) and substrate-induced respiration (SID) rates of the soil by gas chromatography. The results of the experiment showed that in 60 days the amount of benzo[a]pyrene in contaminated soils decreased; however, this time was not enough for complete decomposition of pollutant. In this case, benzo[a]pyrene has a negative effect on the BR and SIR rates. Soil contamination affected the BR rate only at high doses (10 MPC), whereas the SIR was a more sensitive indicator of the toxic effect of the pollutant and significantly reacts already at concentrations at the level of 2 MPC. The combination of PAHs isolated from biochar has a strong negative effect on the values of BR and SIR.

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