**Application of activated biochars for reduction of ecotoxicity in different soils contaminated by PAHs**

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Hard coal is a main energy source in Poland and there are many coke plants producing this kind of fuel. Production of the hard coal is strongly connected with polycyclic aromatic hydrocarbons (PAHs) emission to the environment. Polycyclic aromatic hydrocarbons are compounds that may adversely affect the health of humans and other living organisms. Moreover, PAHs could enter to the soil provoking toxic effects also for soil dwelling organisms. One possibility to remediate soils that are contaminated by PAHs is to bind and immobilize them with biochar. The aim of this study was to reduce the ecotoxicity of PAH contaminated soils by adding biochar pyrolysed from willow. To improve the biochar porous structure and binding capacity it was subjected to a range of activations by microwaves (in a microwave reactor under an atmosphere of superheated steam) and the activation in the quartz fluidized bed reactor at 800°C using the carbon dioxide and superheated steam. Activated biochars were applied to three types of soils: 1) from landfill, where industrial wastes from coking plant are deposited (KB), 2) from the area of coking battery (KOK), and 3) from the area of bitumen processing plant (POPI).

Soils were mixed with original and activated biochars with 5.0% w/w dose and conditioned for two months in the dark. A battery of three bioassays was used for ecotoxicological evaluation of samples: Phytotoxkit F (*Lapidium sativum*), Collembolan test (*Folsomia candida*) and Microtox® (*Vibrio fischeri*). Solid phase soil samples were tested in Phytotoxkit F and Collembolan test, whereas in the case of Microtox®, leachates from investigated soils were analysed.

The highest content of total 16 PAHs was noted in KOK soil (39.9 mg/kg), next for KB (17.2 mg/kg) and POPI (9.2 mg/kg). The biochars had a significantly increased surface area, surface of micropores and volume of micropores due to the activation by the treatments. The ecotoxicity depend on soil type and type of the biochar activation. Bioassays results showed that biochar activations could lead to less toxicity. The most promising biochar were that activated by superheated steam, which showed the best results in used bioassays.

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