



“Gheorghe Asachi” Technical University of Iasi, Romania



PAH REMOVAL EFFICIENCY IN SURFACTANT-ENHANCED SOIL WASHING SYSTEMS: INFLUENCE OF PAH RING NUMBER AND SOIL PROPERTIES

Helian Li^{1,2,3*}, Jiajun Chen², Zhentian Shi²

¹*School of Resources and Environment, University of Jinan, Jinan 250022, China*

²*Key Laboratory for Water and Sediment Sciences of Ministry of Education, School of Environment, Beijing Normal University, Beijing 100875, China*

³*Shandong Provincial Engineering Research Center for Ecological Carbon Sink and Capture Utilization, Jinan 250022, China*

Abstract

Triton X-100 (TX100) and Tween 80 (TW80) were used to study the decontamination of polycyclic aromatic hydrocarbons (PAHs) in the bulk and different size fractions of soil samples from a former coke oven plant. The effects of PAH ring number, initial concentration and soil total organic carbon (TOC)/black carbon (BC) contents on PAH removal efficiencies were analyzed. Surfactant washing for the bulk sample showed clear relation between the removal efficiency and PAH ring number. When the surfactant concentration is below 3000 mg L⁻¹, the removal efficiencies decrease with the increase of aromatic ring numbers. With the increase of surfactant concentration, the effect of ring number on PAH removal became less significant. The removal of PAHs in different soil size fractions was 17.8-62.2% for TX100, and 15.6-41.2% for TW80. Except for the size fraction of <50 μm, on the whole, the removal efficiencies decreased with the increase of particle size. Different PAH forms and TOC/BC contents in soil size fractions are the probable reasons that can be used to explain the results. There were strong negative correlations between PAH removal efficiencies and TOC/BC contents. The linear regression correlation coefficients between PAH removal efficiency versus BC content are closer to 1 than those versus TOC content.

Key words: BC, PAHs, ring number, soil washing, surfactant, TOC

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* Author to whom all correspondence should be addressed: e-mail: ujn_lihl@163.com; Phone/Fax: +86 0531 82769233