Accumulation of PAHs in plants from vertical flow-constructed wetland

Tomasz Waręża, Maria Włodarczyk-Makułab,*, Zofia Sadecka

aThe Institute of New Technologies in Environmental Engineering, Nowe Żabno 20, 67-100 Nowa Sól, Poland, email: sekretariat@int.edu.pl
bDepartment of Environmental Chemistry, Water and Wastewater Technology, Częstochowa University of Technology, 69 Dąbrowskiego Str, 42-200 Częstochowa, Poland, Tel. +48 34 32 50 919; Fax: +48 32 50 496; email: mwm@is.pcz.czest.pl
cInstitute of Environmental Engineering, University of Zielona Góra, Szafarna st 15, 65-516 Zielona Góra, Poland, Tel. +48 68 328 26 30; email: Z.Sadecka@iis.uz.zgora.pl

Received 19 August 2014; Accepted 20 January 2015

ABSTRACT

The aim of the investigation was to determine PAHs concentration in the biofilter and in parts of the plant taken from a wetland wastewater treatment plant vertical flow-constructed wetland in technical conditions. Determination of PAHs in parts of plants of Glyceria maxima: roots, stems, and leaves was carried out. The high pressure liquid chromatography with a diode array detector was used for qualification and quantification of PAHs. The extraction process for samples was carried out in an ultrasonic bath with dichloromethane as solvents. Then extracts were purified using SPE columns packed with silica gel in vacuum conditions. The 16 PAHs according to US EPA list were analyzed. The initial contents of total PAHs were 37 μg/kg dm on average. Concentration of these compounds in roots was twice as high (85 μg/kg dm). The highest concentration of analyzed hydrocarbons in leaves was noted (143 μg/kg dm). In extracts from the surface of leaves the total of PAHs concentration did not exceed 60 μg/kg dm. It demonstrates the ability of deposition of these compounds from the air. The content of PAHs in stems (92 μg/kg dm) was similar to the content of these compounds in roots (85 μg/kg dm).

Keywords: Wastewater; VF-CW treatment plant; PAHs; HPLC-DAD

*Corresponding author.

Presented at the 12th Scientific Conference on Microcontaminants in Human Environment 25–27 September 2014, Częstochowa, Poland

1944-3994/1944-3986 © 2015 Balaban Desalination Publications. All rights reserved.