

Abstract

Polychlorinated biphenyls (PCBs) which belong to persistent organic pollutants (POPs) pose a large environmental burden, because of their chemical stability and ubiquitous prevalence in environment. Due to their bioaccumulative properties, PCBs threaten organisms and wildlife including human even in low concentrations.

Diploma thesis concerns with characterization of PCBs contamination in the Červený stream locality in the Litavka River drainage area, which is substantially contaminated by the PCBs. The possible source of the contamination is the discharge of municipal waste water treatment plant in Komárov village which also treats waste water from engineering plant Buzuluk Komárov. In 2008, water and sediments were sampled at six sampling sites in longitudinal profile of the Červený stream. Two sampling sites were situated above and four of them were below the possible source of contamination. Samples of water were treated by means of liquid-liquid extraction. Samples of sediments were freeze dried, sieved in order to gain two different grain size fractions <2 mm and <200 μm , and extracted by two methods: Soxhlet extraction and microextraction. Efficiency of used extraction methods was evaluated by means of certified reference material Metranal. Concentrations of eight indicative PCB congeners (PCB 28, 52, 101, 138, 153, 180 and 194) in treated samples were measured by ECD gas chromatography. TOC analyses of sediment samples were performed in order to obtain content of organic matter.

The results show, that concentrations of PCB in water samples were below detection limit of the method. Soxhlet extraction of Metranal standard performed higher extraction efficiency for all PCB congeners in comparison with the microextraction. The highest concentration of Σ 8 PCB congeners was measured in sampling site No. 3-Komárov pod. Further below the contamination source amount of PCBs in sediments decreased. Lowest concentrations were measured upstream from contamination source on sample point No. 1-Neřežín and No. 2-Komárov nad. Concentrations of PCBs grew with increased content of organic matter in sediment (% TOC). After normalization of PCB congeners concentrations to TOC, finer grain size fraction of sediment (<200 μm) bounded more PCBs.

The low-chlorinated congener PCB 28 showed the highest distribution in all sampling sites. High-chlorinated congeners were sorbed preferentially on finer grain size fraction of sediment <200 μm . Proportion of this congeners increased in further sample points from contamination source. Congener constitution of contamination with dominance of congeners PCB 28, 153 and 138 indicated pollution with technical PCB mixtures Delor 103 and Delor 105.