



Non-target screening analyses of organic contaminants in river systems as a base for monitoring measures

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Organic contaminants discharged to the aquatic environment exhibit a high diversity with respect to their molecular structures and the resulting physico-chemical properties. The chemical analysis of anthropogenic contamination in river systems is still an important feature, especially with respect to (i) the identification and structure elucidation of novel contaminants, (ii) to the characterisation of their environmental behaviour and (iii) to their risk for natural systems.

A huge proportion of riverine contamination is caused by low-molecular weight organic compounds, like pesticides plasticizers, pharmaceuticals, personal care products, technical additives etc. Some of them, like PCB or PAH have already been investigated thoroughly and, consequently, their behaviour in aqueous systems is very well described. Although analyses on organic substances in river water traditionally focused on selected pollutants, in particular on common priority pollutants which are monitored routinely, the occurrence of further contaminants, e.g. pharmaceuticals, personal care products or chelating agents has received increasing attention within the last decade. Accompanied, screening analyses revealing an enormous diversity of low-molecular weight organic contaminants in waste water effluents and river water become more and more noticed. Since many of these substances have been rarely noticed so far, it will be an important task for the future to study their occurrence and fate in natural environments. Further on, it should be a main issue of environmental studies to provide a comprehensive view on the state of pollution of river water, in particular with respect to lipophilic low molecular weight organic contaminants. However, such non-target-screening analyses has been performed only rarely in the past.

Hence, we applied extended non-target screening analyses on longitudinal sections of the rivers Rhine, Rur and Lippe (Germany) on the base of GC/MS analyses. The investigations revealed complex pattern of anthropogenic contaminants comprising a lot of still unnoticed pollutants (e.g. specific sulfones, trifluoromethyl substituted substances, nitrogen heterocycles etc.) or still unidentified compounds (such as selected brominated aromatics) of obviously high environmental relevance. In this presentation, a selection of several different contaminants will be discussed in detail comprising their emission sources, their emission behaviour, their fate within the river water bodies and in particular their structural properties.

Generally, this investigation demonstrated the need to expand our analytical focus on a broader spectrum of organic contaminants, in particular to build up an adapted base for advanced monitoring studies.