



An Environmental Forensic study of PAHs in river sediments

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Bank soils and alluvial soils along Mosel River (Germany) show elevated concentrations of the 16 EPA PAHs. Concentrations up to 70 mg/kg were found. So far the question of the origin and environmental risk of PAHs and their alkylated derivatives is not answered.

Environmental forensics are applied to identify the PAH source. Ratios of individual PAHs and alkylated PAHs, which are present in environmental samples, can be used to “fingerprint” the source (e.g. phenanthrene/anthracene, fluoranthene/pyrene) (MURPHY AND MORRISON 2002). For example, the fingerprint present in residual material from combustion is quite different from that of typical crude oil. This can contribute to the differentiation of “petrogenic” from “pyrogenic” source (STOUT ET AL., 2004). Generally, high molecular weight PAHs are generated mainly by high temperature combustion, inferring the pyrogenic PAHs. In contrast, lower molecular weight PAHs are major constituents of petroleum (FERNANDES ET AL., 1997). Petrogenic PAHs are mainly alkylated homologs while pyrogenic are mainly parent PAHs (especially fluoranthene, pyrene).

An analytical protocol for GC-MS measurements is developed to qualitatively differentiate and quantify PAHs, including alkylated metabolites. Anthropogenic and geogenic PAHs will be distinguished based on the fingerprinting technique, petrographic analyses of organic material and statistical analyses.

To assess the environmental risk of PAHs at Mosel River, the mobility has to be clar-

ified. Therefore, the first step is to characterise the bank and alluvial soils. Grain size analyses, microscopic analyses, XRD and X-ray fluorescence analyses are applied to get a general survey of the soils.

First results show that the soils are mainly sandy and/or silty with a great quantity of quartz. Coal particles could be identified by microscopic analyses. On the one hand, these particles are expected to be the source of the PAHs. In addition they could act as a strong geosorbent with a high sorption capacity, thus minimising PAH release.

Forensic studies are a helpful tool for identifying the source and fate of PAHs in river sediments. Results from this study will be presented at the meeting.

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