
Geochemical characterization of Traffic Related Elements (TRE) in solids samples in road environments

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Abstract

With the increased awareness of traffic as a major source of diffuse metal emission the need for clear characterization of Traffic Related Elements (TRE) in solids samples in road environments becomes more apparent. TREs are key tracers of non-exhaust emissions (such as brake, clutch and tire wear). In order to recognize road-specific pollution sites near roads characterized by a very high traffic and congestions in Cracow, Wroclaw, Warsaw and Opole (Poland) were selected as research points. The main objective of research presented is to analyze road and pavement dust, surrounding soil as well as sediments from stormwater drains with respect to the specificity of the research area (traffic intensity, crossroads types and sewage system class) as an indicator in the process of assessing and identifying vehicle-derived metal pollution in different environment compartments.

The purpose of the study was to investigate the content of TREs (As, Zn, Cr, Cu, Pb, Fe, Ba, Mn, Ti, Ce, Y, Os, Zr, Sb) in size classified solid samples. Metals were extracted from solid samples according to U.S. EPA 3050B. Next, metals were determined with use of ICP-MS and ICP-EOS. Results revealed that road dust, sludge from gullies and especially pavement dust are especially contaminated with Zn, Cr, Cu, Pb, Ba, and Ti. The concentrations of the most elements were significantly elevated when compared with the concentrations found in samples from relatively traffic unpolluted area. These metals are key tracers of non-exhaust brake wear emissions and their high concentrations confirm that brake wear highly contributes to road dust contamination and furthermore can be easily realised to the river system.

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