Arsenic Speciation In Aerosol Samples From An Industrial Area In Greece

Klaus-Michael Ochsenkühn¹, Fotis Tsopelas² and Maria Ochsenkühn-Petropoulou²

¹ NCSR “Demokritos”, Institute of Physical Chemistry, Laboratory for Trace Elements Studies, Aghia Paraskevi, 15310 Athens, Greece. okenkuen@chem.demokritos.gr
² National Technical University of Athens, School of Chemical Engineering, Laboratory of Inorganic and Analytical Chemistry, Iiron Polytechniou 9, 15773 Athens, Greece.

A method for the quantitative recovery of arsenite, As(III), arsenate, As(V), monomethylarsonic, MMA and dimethylarsinic acid, DMA, from fiberglass and polycarbonate airborne particulate filters was developed. By a two-step leaching procedure with concentrated HCl the quantitative recovery of the As species from polycarbonate filters was achieved, while fiberglass filters require a subsequent washing with water as a third step of the proposed procedure. The separation of the arsenic species was carried out using the ion-exchangers AG-1 X8 and Dowex 50-X8, according to our previous work [1, 2], while the detection of the individual arsenic species was carried out by hydride generation ICP-AES and voltammetric techniques. The developed procedure was applied for As speciation in aerosol samples collected from Thriassion Plain’s atmosphere, Greece, from December 2004 to June 2006. This area combines urban with industrial pollution and its air quality is crucial with respect to the rapid increase of its population in the last decade [3]. It was found that arsenic is enriched in the fine (PM₁₀) fraction in contrast to heavy metals, such as cadmium and lead, which are enriched in the coarse (PM₁₀₋₂.₅) fraction of airborne particulate matter. Moreover, As concentration in the PM₁₀ fraction for the investigated time period was below the target value of 6 ng As · m⁻³, while As(V) was found to be the predominant arsenic species in all samples.

Figure 1. Map of the industrial area of Thriassion Plain along with the possible pollution sources and the sampling station used for this work.

References