INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROMETRY - AIR QUALITY MONITORING

Serafim Velichkov,1 Petranka Petrova,2 Valeria Stoyanova3, Jaroslav Fisak,4 Ivan Havezov,1 Nonka Daskalova1

1Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria. E-mail: das14582@svr.igic.bas.bg

2South-West University “Neofit Rilsky”, 2700, Blagoevgrad, Bulgaria

3Institute of Physical Chemistry, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria.

4Institute of Atmospheric Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic

The concentration levels of heavy and toxic elements circulating in the environment have increased due to various industrial activities. The routes of aerosol exposure may involve skin deposition, the food chain (after deposition on soils, waters, plants, etc.) and inhalation. The particles with aerodynamic diameters larger than ~ 5 μm are collected by Bergerhoff's method [1] around metallurgical works “Kremicovtzi”, Sofia, Bulgaria. The samples of atmospheric particles with diameters below 5 μm are collected by filter technique from Czech meteorological stations Milesovka (837 m above sea level) and Kopisty (240 m above sea level) This is one of the most polluted industrial region, so called “black triangle” of the Czech Republic [2,3]. The nitrocellulose filters are used. The inductively coupled plasma atomic emission spectrometry (ICP-AES) is applied for quantitative determination of traces of elements after sample extraction with aqua regia, according to ISO 11466:1995. The accuracy is ensured by the following ICP-AES methodology: (a) quantification of spectral interferences in the presence of Al, Ca, Mg, Fe and Ti as a complex environmental matrix around prominent lines of analytes. (b) line selection for trace analysis; (c) calculation of the total background signal under the selected analysis line and comparison with the other background correction procedures. The content of pollutants is compared with the corresponding threshold concentration levels.

1. VDI-Richtlinie, VD12119, Blt 2 (Juni 1972): Messung partikelförmiger Niederschläge, Bestimmung der partikelförmiger Niederschlags mit dem Bergerhoff-Geräte (Standardverfahren)].
2. R.K. Stevens, J.P. Pinto, R.D. Willis, Y. Mamane, J.J. Novak, J. Benes, Monitoring and Modeling Methods for Air Pollution Control Strategies: A Case Study in the Northwest Czech Republic", in NATO ASI Series. Partnership Sup-
Series. 2. Enviroment - vol. 8, Urban Air Pollution, Edited by Allergini and F. De Santis, Springer Verlag, Berlin, Heidelberg, 1996, pp 151-166