



DETERMINATION OF PLATINUM GROUP METALS BY ICP-AES IN ENVIRONMENTAL SAMPLES AFTER PRECONCENTRATION

Renata VLAŠÁNKOVÁ, Lumír SOMMER

Institute of Environmental Chemistry and Technology, Faculty of Chemistry, Brno University of Technology
Purkyňova 118, 612 00 Brno, Czech Republic, E-mail: vlasankova@fch.vutbr.cz

Platinum group metals (PGM) may have toxic properties and their presence in the environment represent danger for human health. With the introduction of automobile catalytic converters containing platinum group metals, the emission of these noble metals into the atmosphere has increased. Platinum (Pd and Rh) are used in this catalytic converters to decrease toxic emissions of carbon monoxide, unburnt hydrocarbons and nitrogen oxides in vehicles exhaust gases. These catalysts are mobile sources of PGM into the environment. Thus, increased platinum concentrations have been found in various objects of environment because of the massive introduction of such catalytic converters at present. Moreover, selected platinum (II) complex species based on *cis*-dichlorodiamineplatinum(II) (cisplatin) are effective cytostatics in the cancer chemotherapy and platinum appears in waste waters of hospitals treating cancer.

In spite of that trace of PGM are still available in the environment in comparison to common metals in industrial areas and environmental objects, especially in road dust, plants and soils near the frequented highways. Elevated amounts of Platinum are present in river sediments.

Preconcentration and separation of PGM are necessary prior to their determination by ICP-AES. The main advantage of preconcentration procedures is the possibility of determining lower analyte concentrations and avoiding matrix effects by effective separation of the analyte from interfering matrix components. The best method for enrichment of PGM appear solid phase extraction (SPE). At present various types of sorbents are used for preconcentration of noble metals from solutions, such as hydrophobic sorbents with surface immobilized reagents, complexing or chelating sorbents, fibrous complexing sorbents, sorbents coated with liquid anion exchanger and extracting agents or anion exchangers.

Various sorbents (Separon SGX C18, Separon SGX C8, Separon SGX RPS, Separon SGX phenyl and Separon SGX CN) were used for separation and preconcentration of PGM. The preconcentration based on the sorption of ion associates of halogenocomplexes of PGM with the cationic surfactants (Septonex-carbethoxypentadecyltrimethylammonium bromid, Sterinol - dimethylaurylbenzylammonium bromid, hexadecyltrimethylammonium chlorid and tetradecyltrimethylammonium bromid). Finally PGM were determined by ICP-AES after elution from the sorbent by ethanol. Recoveries of 20 μ g PGM from 50 ml of synthetic solution were 100 \pm 5 %. The method will be used for the determination of PGM in some environmental samples, especially in the soils and waters.