of elements with uniform thermochemical properties. Matrix interference have been minimized for the solutions with different salts content. Uniform analytical procedure of ETAAS analysis has been developed for the HM content in the range of 0.001 - 0.1 mg l⁻¹ in the saline solutions. The conditions of matrix separation with simultaneous preconcentration of heavy metals by the dynamic sorption have been studied. Results of direct ETAAS determination are in a good agreement with the results of sorption - ETAAS procedure.

Methods developed for the trace analysis (Ag, Au, Pt-group, As, Se, Te, Sb, Co, Ni, Cu, V, Ti, Cr, Sn, etc.) include preconcentration and separation step (extraction, sorption, coprecipitation). Using different atomic spectrometry methods (flame, furnace, plasma) the methods of preconcentration have been developed for the different samples:

- Pb, Cd, Co, Ni, Cu, As, Sb, Au, Ag in natural water; Se (VI) in geochemical objects; Pt, Pd, Rh in rocks, industrial and organic solutions, based on the sorption by complexing sorbents POLIORGS (in static) and slurry analysis in graphite furnace. It was found that carbon after destruction of sorbent works as a platform and reducing agent.
- Inorganic forms of Sb (III) and Sb (V) in potable water and snow using POLIORGS 31 sorbent (in static) and slurry analysis in graphite furnace.
- Tracec of As (III) and Sb (III) in different samples after preconcentration by solid-phase extraction using DIAPAK-C16 cartridges.
- Multielement preconcentration of Pb, Cd, Cu, Al, V, Ti, etc., in the waste brines of salt industry using DETATA sorbent (0.09 mİ miero column) and ETAAS determination.
- An automated system for on-line flow injection analysis based on a 48-channel ICP - AES spectrometer (ICAP 9000), flow injection manifold and special software has been developed. The system realizes the multielement preconcentration and measurement of element concentrations automatically.

Using microwave and autoclave sample preparation the new methods of sample preparation have been developed, including the total digestion of organic (sorbents, oil, bitums, filters, etc.), and selective extraction of analytes from rocks, minerals, sludge.

Evolution of the analytical atomic spectrometry technique is advanced far enough now. Technical progress has also brought a number of theoretical and practical problems, the solution of which will contribute to increased application of atomic spectrometry technique.

STUDY OF DYNAMIC SORPTION OF HEAVY METALS FOR DETATA AND CHELEX-100 SORBENTS BY USING FACTORIAL DESIGN AND ICP-AES

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Flow sorption ICP-AES has been used for the investigation of sorption efficiency for DETATA and Chelex-100 sorbents used for heavy metals preconcentration from potassium chloride solutions. Simultaneous separation and preconcentration of Zn, Pb, Co, Cu, Ni, Mn, V, Ti, Al from saline matrix have to solve the problem of salt analysis. The analytical problems arising from high salts concentration (NaCl, KCl, CaCl₂, MgCl₂, ~200g/l) result in high viscosity and high background emission in ICP-AES.
The instrumentation used consists of the ICP-AES polychromator Jarrell Ash ICAP 9000, installed on-line device for flow injection sorption preconcentration BPI - 01 (Cortec, Russia), micro column packed with DETATA sorbent (aminocarboxylic) and Chelex-100 sorbent. Off-line sorption experiments were realized with multi channel flow device BPI (Acvita Co., Russia).

There are many factors that influence effective FI preconcentration: content of salts, sorption and desorption flow rates, sorption and desorption times (ore volumes of the sample and eluent), pH, acid concentration in eluent, kind of eluent, etc. Therefore, fractionary factorial design was used to obtain an adequate sensitivity and also to optimize the emission signal of ICP. The orthogonal designs have been used, recovery, equivalent volume, emission signal, enhancement factor has been chosen as dependent variable. The investigation of recovery was carried out in off-line mode. The second order design for two independent variables has been realized. The regression functions describing the investigated systems have been calculated, and visual graphical interpretations of these dependencies were developed as well. The model enables to calculate a value of the sorption degree for any salt concentration and pumping rate inside the ranges investigated. It is shown that in dynamic sorption DETATA is more effective compared to Chelex-100. The optimum conditions differ for each of the analytes studied. Therefore, the optimization of a group sorption for 10 analytes studied is the conciliatory solution of the mathematical models for the whole group of analytes. For correcting the sorption incompleteness in compromised conditions, a correction factor for each analyte, calculated from the obtained models, was entered into the determination program. The proposed method is the fast and effective tool for the investigation of sorbents and developments of the analytical procedures.

The ICP-AES methods of the determination of Al, Co, Cu, Ni, Mn, V, Pb, Zn, Ti in potassium chloride solution with their on-line and off-line pre-concentration were developed. Variations of the sorption degree when the matrix concentration in solutions changes are corrected with the help of the factors calculated from the developed models. The determination range is 0.001-0.5 mg l-1 and the relative standard deviation is 0.08-0.30, depending on the analyte and its concentration.

FLOW INJECTION SORPTION PRECONCENTRATION - ETAAS AND ICP-AES AS STANDARD METHODS FOR THE Al, Ti, Ni, Pb, Zn, Cu, V, Mn, AND Cd DETERMINATION IN SALTS AND BRINES

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Flow sorption preconcentration ICP-AES has been used for the development of new sensitive and selective methods of heavy metals determination in the brines and salts. Determination of Cd, Zn, Pb, Cu, Ni, Mn, V, Ti, Al in saline matrix is necessary for certification of industrial salt products and ecological control of waste brines (pollution by industrial waste). The analytical problems arises from high salts concentration (NaCl, KCl, CaCl2, MgCl2,