ContrAA 300 High-resolution continuum source atomic absorption spectrometer

Characteristics, performances
High-resolution double-monochromator with Echelle grating. Spectral range: 185 – 900 nm. Resolution: 2pm/200 nm. Detection: charge-coupled device (CCD). Optical source: xenon lamp. Limits of detection in the range: 10 – 100 ng/ mL

Uniqueness, complexity
The ContraAA 300 spectrometer is unique within the research infrastructure of Babeș-Bolyai University due to its use of a high-resolution monochromator (2 pm/200 nm resolution) and a single xenon lamp (185-900 nm spectral range) for determining all elements, in contrast to classical spectrometers equipped with single-element hollow cathode lamps. It enables simultaneous detection and correction of both continuous and fine spectral background while measuring the analytical signal. The instrument allows rapid sequential multielement determinations in an acetylene–air flame and for elements that form chemical vapors.
The spectrometer, coupled with the HS55 and HS60 hydride generation systems, enables the determination of As, Sb, Bi, Te, Sn, and Se at sub ng/mL concentration levels, and enables Hg detection in the sub ng/L range due to the HS60 system's gold-filament preconcentration module. The high-resolution continuum-source atomic absorption technology is unique on the global market, and currently there is only one manufacturer worldwide (Analytik Jena, Germany).

Cost and year of acquisition
ContrAA 300 spectrometer: 60.000 EUR, year of acquisition: 2008;
HS55 batch hydride generator: 10.000 EUR, year of acquisition: 2018;
HS60 continuous hydride generator: 10.000 EUR, year of acquisition: 2020

Area of interest
Rapid, sequential determinations of metals and hydride-forming elements (e.g., As, Sb, Se, Te), as well as mercury in the form of cold vapors, can be performed in environmental samples, food matrices, and various materials for applications in environmental quality assessment, food safety, nano/material synthesis and characterization, and in the development of emerging eco- and nanotechnologies. Speciation analyses can also be conducted, for example: arsenic speciation (arsenite, arsenate, monomethylarsonic acid, dimethylarsinic acid); mercury speciation (inorganic Hg^{2+} and organomercury species such as monomethylmercury, CH_3Hg^+); and selenium speciation (selenite, selenate) in food and environmental matrices. Both solid and liquid samples can be analyzed, with a maximum sample consumption of 5 mL. Research topics include: environment evaluation, food safety, synthesis and characterization of nano/materials, emergent technologies (eco-, nano- technologies) for material synthesis, etc.

Research groups
The instrument is used by the following units existing within Babes-Bolyai University:
members of the Research Center for Advanced Chemical Analysis, Instrumentation and Chemometrics (ANALYTICA); Research Centre in Electrochemistry and Unconventional Materials,
Institutes outside the university:
Research Institute for Analytical Instrumentation (ICIA) Cluj-Napoca

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Teaching activities
The instrument is also used by the students in teaching activities at the bachelor, master and doctoral level for carrying out laboratory experiments or research activity within the preparation of bachelor, dissertation and doctoral thesis.

MSc Courses
Analytical techniques in speciation and chemical imaging, Clinical chemistry MSc level
Environment monitoring by modern analytical methods, IMPM, MSc level

BSc Courses
Analytical chemistry - Instrumental analysis, Chemistry and Chemical Engineering specializations, all programmes, years of study II
Analytical Chemistry, Biochemistry and Industrial Biotechnology specializations, BSc level, year II

List of services offered to the academic community

- Determination of metals and hydride-forming elements (As, Sb, Se, Te, etc.) and cold vapor Hg in environmental, food, and material samples.
- Speciation analysis for As, Se, and Hg species in research projects (national and international), theses (BSc, MSc, PhD), and academic collaborations.
- Support for laboratory teaching activities at undergraduate, master's, and doctoral levels.
- Method development and validation for analytical chemistry techniques.

List of services offered to the economic sector

- Determination of trace metals and metalloids in water, soil, food, and industrial materials.
- Assessment of materials and industrial products requiring trace-level elemental determination.
- Support for R&D activities in companies working in environmental protection, food safety, material sciences, and emerging technologies.

List of services offered to the civil society

- Analysis of environmental samples (water, soil, sediments) relevant to public health, environmental protection, and community concerns.
- Support for environmental incident investigations, such as contamination events involving heavy metals

Access to infrastructure from university and external stakeholders
Contact person: Lect. Dr. Eniko Covaci

The spectrometer is operated only by trained personnel, complying with the instructions for using the instrument in the laboratory. Contact address for analysis request from research groups is: eniko.covaci@ubbcluj.ro or by phone 0264 593833/5691. The laboratory analysis request must contain details about sample characteristics and analysis purpose. The costs of the analysis will be covered by supplying the necessary consumables (acetylene, reagents, standards, etc.) by the beneficiary. If it is not possible, costs could be covered under a financial agreement concluded between the executor and external beneficiary.

Opening hours, access
Monday-Friday 8-16