Abstract

The Laboratory of Analytical Chemistry was established in 1963 and is part of the Department of Physical, Analytical and Environmental Chemistry of the School of Chemistry in the Faculty of Sciences of Aristotle University of Thessaloniki (AUTH). Today the Laboratory has seven Faculty members: Six Professors (Aristidis Anthemidis, Stella Girousi, Victoria Samanidou, George Theodoridis, George Zachariadis, Anastasia-Stella Zotou), and two Assistant Professors (Paraskevas Tzanavaras and George Tsogkas). Its function is also supported by 1 member of the Technical Staff (Foteini Zougrou, MSc Chemist). The main subject of the Laboratory’s teaching and research is analytical chemistry, namely the development, validation and application of new analytical methods, as well as the exploration of new instrumental techniques and innovative materials used in chemical analysis. Within the framework of the educational services provided by the Laboratory, a number of courses are offered in the undergraduate and postgraduate curricula. Besides the students of the Department of Chemistry, students of other departments of AUTH are also trained. The main research fields served by the faculty members of the Laboratory of Analytical Chemistry, include:

1. SEPARATION AND HYPHENATED ANALYTICAL TECHNIQUES
2. SPECTROSCOPIC, AUTOMATED AND MULTIELEMENTAL TECHNIQUES
3. ELECTROANALYTICAL TECHNIQUES, SENSORS AND BIOSENSORS
4. MODERN SAMPLE PREPARATION TECHNIQUES AND INNOVATIVE MATERIALS

1. Analytical Chemistry Laboratory - Chemistry School – Aristotle University of Thessaloniki- GREECE
(Paraskevas Tzanavaras and George Tsogkas). Its function is also supported by 1 member of the Technical Staff (Foteini Zougrou, MSc Chemist). The main subject of the Laboratory’s teaching and research is analytical chemistry, namely the development, validation and application of new analytical methods, as well as the exploration of new instrumental techniques and innovative materials used in chemical analysis. Within the framework of the educational services provided by the Laboratory, a number of courses are offered in the undergraduate and postgraduate curricula. Besides the students of the Department of Chemistry, students of other departments of AUTh are also trained.

The main research fields served by the faculty members of the Laboratory of Analytical Chemistry, include:

2. Separation and Hyphenated Analytical Techniques
Various separation techniques: High Pressure Liquid Chromatography (HPLC), Gas Chromatography (GC). Ion Chromatography (HPC), Capillary electrophoresis (CE) as well as hyphenated ones using sequential injection (SI), Flow injection (FI), mass spectroscopy (MS) such as SI/FI-HPLC, SI/FI-CE, LC-MS, GC-MS, etc are used for method development to solve any analytical problem. The methods are subsequently validated and applied in bioanalysis, metabolomic analysis, pharmaceutical analysis, environmental and food analysis, forensics, dentistry, etc.

3. Spectroscopic, Automated and Multielemental Techniques
New sensitive and reliable analytical techniques with improved performance characteristics are developed and applied to the Archaeometric Analysis, Environmental Analysis, Bioanalysis, Food Analysis, etc. These techniques include Atomic Spectroscopy (FAAS, ETAAS, ICP-AES, AES) Techniques, Hyphenated techniques combining a separation technique with powerful and atom-selective detectors such as Mass Spectrometers, Inductively Coupled Plasma atomizers etx (SI/FI-HPLC, SI / FI-CE, LC-MS, GC-MS, LC-ICP etc), flow injection and other automated techniques (FIA, SIA, etc), Automated sample processing, plasma-based multi-element analytical techniques etc.
4. Electroanalytical Techniques, Sensors and Biosensors
New sensitive analytical techniques with improved performance characteristics are developed and applied to Bioanalysis and Food Analysis. These techniques include Voltammetry, Ion Selective Electrodes, Potentiometry, Sensors and Biosensors.

5. Modern Sample Preparation Techniques and Innovative Materials
New sample preparation protocols are developed based on the use of innovative materials (nanomaterials, polymers, graphite, sol-gel fabric phase media, magnetic sorbents etc.). These protocols are focused in specific analytical issues dealing with various matrices, target analytes and application fields. Prior to their use, they are validated and further applied to the analysis of biological samples, food samples, environmental samples etc.
6. Selected Publications

1. Pressure-driven mesofluidic platform integrating automated on-chip renewable micro-solid-phase extraction for ultrasensitive determination of waterborne inorganic mercury.


2. Integrated lab-in-syringe platform incorporating a membraneless gas-liquid separator for automatic cold vapor atomic absorption spectrometry.


3. Automated headspace single-drop microextraction via a lab-in-syringe platform for mercury electrothermal atomic absorption spectrometric determination after in situ vapor generation.


4. An automated flow injection system for metal determination by flame atomic absorption spectrometry involving on-line fabric disk sportive extraction technique.

A. Anthemidis, V. Kazantzì, V. Samanidou, A. Kabir, K. G. Furton, Talanta 156-157 (2016) 64–70. DOI: [http://dx.doi.org/10.1016/j.talanta.2016.05.012](http://dx.doi.org/10.1016/j.talanta.2016.05.012)


6. Evaluation of polypropylene and polyethylene as sorbent packing materials in on-line preconcentration columns for trace Pb(II) and Cd(II) determination by FAAS.

Viktoria Kazantzì, Eleni Drosaki, Arina Skok, Andriy B. Vishnikin, Aristidis Anthemidis

DOI: https://doi.org/10.1016/j.microc.2019.05.033

7. pH: Principles and measurements,
S. Karastogianni, S. Girousi, S. Sotiropoulos,

8. Electroanalytical quantification of total dsDNA extracted from human sample using, an ionic liquid modified, carbon nanotubes paste electrode,
C. Serpi, L. Kovatsi, S. Girousi.
Analytica Chimica Acta (2014), pp. 26-32

S. Karastogianni, S. Girousi.

10. Electrochemical behavior and voltammetric determination of a manganese(II) complex at a carbon paste electrode
S.Karastogianni, S. Girousi, Analytical chemistry insights 11 (2016) 1

11. A novel electrochemical bioimprinted sensor of butyl paraben on a modified carbon paste electrode with safranine-o capped to silver nanoparticles
S.Karastogianni, S. Girousi

12. Extraction of metal ions with metal–organic frameworks
Manousi, N., Giannakoudakis, D.A., Rosenberg, E., Zachariadis, G.A.
Molecules, 2019, 24, art. no. 4605. DOI: 10.3390/molecules24244605
Katsifas, C.S., Touloumzidou, A., Zachariadis, G.A.
Archaeometry, 2019, 61, 1313-1332. DOI: 10.1111/arcm.12486

14. Investigating the performance characteristics of the barrier discharge ionization detector and comparison to the flame ionization detector for the gas chromatographic analysis of volatile and semivolatile organic compounds
Antoniadou, M., Zachariadis, G.A., Rosenberg, E.
Analytical Letters, 2019, 52, 2822-2839. DOI: 10.1080/00032719.2019.1628247

15. Determination of Cisplatin and Carboplatin Anticancer Drugs by Non-suppressed Ion Chromatography with an Inductively Coupled Plasma Atomic Emission Detector
DOI: 10.1080/00032719.2017.1366498

16. An integrated sequential injection analysis system for ammonium determination in recycled hygiene and potable
water samples for future use in manned space missions

Giakisikli, G., Trikas, E., Petala, M., Karapantsios, T., Zachariadis, G., Anthemidis, A.

17. Determination of Tyrian purple by High Performance Liquid Chromatography with diode array detection
Athina Vasileiadou, Ioannis Karapanagiotis, Anastasia Zotou

18. Targeted profiling of hydrophilic constituents of royal jelly by hydrophilic interaction liquid chromatography–tandem mass spectrometry
Athanasia Pina, Olga Begou, Dimitris Kanelis, Helen Gika, Stavros Kalogiannis, Chrysoula Tananaki, Georgios Theodoridis, Anastasia Zotou

19. Wine and grape marc spirits metabolomics. A review
Dimitra Diamantidou, Anastasia Zotou, Georgios Theodoridis

20. UV-induced degradation of wool and silk dyed with shellfish purple
Ioannis Karapanagiotis, Anastasia Zotou, Athina Vasileiadou

21. Development and validation of an ultra-high performance liquid chromatography-tandem mass spectrometry method for the determination of phthalate esters in Greek grape marc spirits
Dimitra Diamantidou, Olga Begou, Georgios Theodoridis, Helen Gika, Emmanouil Tschatzis, Stavros Kalogiannis, Natalia Kataiftsi, Evangelos Soufleros, Anastasia Zotou

22. Within-day reproducibility of an HPLC− MS-based method for metabonomic analysis: application to human urine
HG Gika, GA Theodoridis, JE Wingate, ID Wilson
Journal of proteome research 6 (8), 3291-3303, 2007

23. Liquid chromatography−mass spectrometry based global metabolite profiling: a review
GA Theodoridis, HG Gika, EJ Want, ID Wilson
Analytica chimica acta 711, 7-16, 2012.

24. LC-MS-based methodology for global metabolite profiling in metabonomics/metabolomics
G Theodoridis, HG Gika, ID Wilson
HG Gika, E Macpherson, GA Theodoridis, ID Wilson

26. UPLC-MS-based analysis of human plasma for metabonomics using solvent precipitation or solid phase extraction
F Michopoulos, L Lai, H Gika, G Theodoridis, I Wilson

27. Rapid monitoring of organochlorine pesticides residues in various fruit juices and water samples using fabric phase sorptive extraction and gas chromatography-mass spectrometry
Ramandeep Kaur, Ripneel Kaur, Susheela Rani, Ashok Kumar Malik,
Abuzar Kabir, Kenneth G. Furton, VictoriaSamanidou
Molecules 2019, 24, 1013; doi:10.3390/molecules24061013

28. Fabric phase sorptive extraction for the isolation of five common antidepressants from human urine prior to HPLC-DAD analysis
Artemis Lioupi, Abuzar Kabir, Kenneth Furton, Victoria Samanidou

29. Fabric phase sorptive extraction for simultaneous observation of four penicillin antibiotics residues from human blood serum prior to high performance liquid chromatography and photo-diode array detection
Vasileios Alampanos, Abuzar Kabir, Kenneth G. Furton, Victoria Samanidou, Ioannis Papadoyannis

30. Synthesis of Graphene Oxide Based Sponges and Their Study as Sorbents for Sample Preparation of Cow Milk Prior to HPLC Determination of Sulfonamides
Martha Maggira, Eleni Deliyanni, Victoria Samanidou
Molecules 2019, 24, 2086; doi:10.3390/molecules24112086

31. Graphene Oxide Based Magnetic Nanocomposites with Polymers as Effective Bisphenol–A Nanoadsorbents
Kyriazis Rekos, Zoi-Christina Kampouraki, Charalampos Sarafidis, Victoria Samanidou, Eleni Deliyanni
Materials 2019, 12(12), 1987; https://doi.org/10.3390/ma12121987

32. Micelles mediated zone fluidics sensor for hydrazine determination in environmental samples
T.D. Karakosta, C. Christophoridis, K. Fytianos and P.D. Tzanavaras
33. Automated fluorimetric determination of the genotoxic impurity hydrazine in allopurinol pharmaceuticals using zone fluidics and on-line solid phase extraction

P.D. Tzanavaras, S Themistokleous and C.K. Zacharis


34. Automated Stopped-Flow Fluorimetric Sensor for Biologically Active Adamantane Derivatives Based on Zone Fluidics

P.D. Tzanavaras, S. Papadimitriou and C.K. Zacharis

Molecules, 24 (2019) 3975

35. Zwitterionic hydrophilic interaction chromatography coupled with post-column derivatization for the analysis of glutathione in wine samples

C.K. Zacharis, P.D. Tzanavaras, T. Karakosta and D.G. Themelis


36. Selective fluorimetric method for the determination of histamine in seafood samples based on the concept of zone fluidics

P.D. Tzanavaras, O. Deda, T. Karakosta, D.G. Themelis


Keywords
analytical chemistry; separation techniques; Aristotle University of Thessaloniki; School of Chemistry; hyphenated techniques; automated techniques; electroanalytical techniques; spectroscopic techniques; sensors and biosensors; sample preparation

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