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Český institut pro akreditaci, o.p.s.
Olšanská 54/3, 130 00 Praha 3

issues

according to section 16 of Act No. 22/1997 Coll., on technical requirements for products, as amended

CERTIFICATE OF ACCREDITATION

No. 149/2022

Masarykova univerzita
with registered office Žerotínovo náměstí 617/9, 602 00 Brno, Company Registration
No. 00216224

to the Testing Laboratory No. **1666**
RECETOX: Trace Analytical Laboratories

Scope of accreditation:

Special trace and ultratrace analysis of organic compounds and elements in environmental samples, biotic samples, food and feed; sampling of air, surface water, soils, and bottom sediments to the extent as specified in the appendix to this Certificate.

This Certificate of Accreditation is a proof of Accreditation issued on the basis of assessment of fulfillment of the accreditation criteria in accordance with

ČSN EN ISO/IEC 17025:2018

In its activities performed within the scope and for the period of validity of this Certificate, the Body is entitled to refer to this Certificate, provided that the accreditation is not suspended and the Body meets the specified accreditation requirements in accordance with the relevant regulations applicable to the activity of an accredited Conformity Assessment Body.

This Certificate of Accreditation replaces, to the full extent, Certificate No.: 586/2019 of 8. 11. 2019, or any administrative acts building upon it.

The Certificate of Accreditation is valid until: 17. 3. 2027

Prague: 17. 3. 2022




Lukáš Burda
Director of the Department
of Testing and Calibration Laboratories
Czech Accreditation Institute
Public Service Company

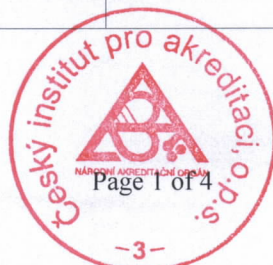
**The Appendix is an integral part of
Certificate of Accreditation No.: 149/2022 of 17/03/2022**

Entity accredited according to ČSN EN ISO/IEC 17025:2018:

Masarykova univerzita
RECETOX: Trace Analytical Laboratories
Kamenice 753/5, pavilon A29, 625 00 Brno

Tests

Ordinal number ¹	Test procedure/method name	Test procedure/method identification ²	Tested object
1	Determination of persistent organic pollutants (POP) ³ by isotope dilution method HRGC-HRMS	SOP-LSA-031 (except chap. 3, <i>b</i> to <i>o</i> , US EPA 1613B, ČSN EN-1948-2, ČSN EN-1948-3, ČSN EN-1948-4)	Outdoor and indoor air
2	Determination of persistent organic pollutants (POP) ³ by isotope dilution method HRGC-HRMS	SOP-LSA-031 (except chap. 3, <i>a</i> and chap. 3 <i>c</i> to <i>o</i> , US EPA 1613B, US EPA 1668B, US EPA 1614)	Surface water
3	Determination of persistent organic pollutants (POP) ³ by isotope dilution method HRGC-HRMS	SOP-LSA-031 (except chap. 3 <i>a</i> to <i>b</i> and chap. 3 <i>g</i> to <i>o</i> , US EPA 1613B, US EPA 1668B, US EPA 1614)	Soils, sediments, ash, moss, and needles
4	Determination of persistent organic pollutants (POP) ³ by isotope dilution method HRGC-HRMS	SOP-LSA-031 (except chap. 3 <i>a</i> to <i>f</i> and chap. 3 to <i>o</i> , US EPA 1613B, ČSN EN 1528-1, ČSN EN 1528-2, ČSN EN 1528-3, ČSN EN 1528-4)	Food and feed
5	Determination of persistent organic pollutants (POP) ³ by isotope dilution method HRGC-HRMS	SOP-LSA-031 (except chap. 3 <i>a</i> to <i>n</i> , US EPA 1613B, US EPA 1668B, US EPA 1614)	Cell tissues and breast milk
6	Determination of polycyclic aromatic hydrocarbons (PAH) ⁴ by GC-MS/MS method	SOP-LSA-055 (EPA-TO-13A)	Outdoor and indoor air
7	Determination of indicator polychlorinated biphenyls (PCB) ⁵ , organochlorine pesticides (OCP) ⁵ , and cyclodiene pesticides by isotope dilution method GC-MS/MS	SOP-LSA-056 (EPA-TO-4A)	Outdoor and indoor air
8	Determination of trace elements ⁶ by ICP-MS method	SOP-LSA-807 ⁷	Whole blood and its components (serum, plasma) and urine



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Ordinal number ¹	Test procedure/method name	Test procedure/method identification ²	Tested object
9	Determination of dry matter by gravimetry and water content (moisture content) by calculation from measured values	SOP-LSA-057 (ČSN EN 15934, method A, ČSN 46 7092-3)	Soils, food, feed, biological material of animal and plant origin
10	Determination of fat by gravimetry	SOP-LSA-058 (ČSN EN ISO 2450 ČSN EN ISO 17189 ISO 11085)	Food and feed
11	Determination of selected polar per- and polyfluorinated substances (PFASs) ⁸ by isotope dilution method LC-MS/MS	SOP-LSA-510 ⁹	Surface, drinking and sea water
12	Determination of selected polar per- and polyfluorinated substances (PFASs) ⁸ by isotopic dilution method LC-MS/MS	SOP-LSA-510 ¹⁰	Blood serum, plasma, and breast milk
13	Determination of mercury by a single-purpose analyzer AMA 254	SOP-LSA-808 ¹¹	Whole blood and its components (serum, plasma), urine, breast milk, hair, soils, sediments, fly ash, moss, and needles

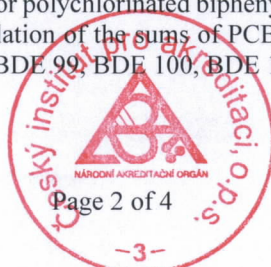
¹ asterisk at the ordinal number identifies the tests, which the Laboratory is qualified to carry out outside the permanent laboratory premises

² if the document identifying the test procedure is dated, only these specific procedures are used. If the document identifying the test procedure is not dated, the latest edition of the specified procedure is used (including any changes)

Explanatory notes

Determined parameters:

³ in the range: Polychlorinated dibenzo-*p*-dioxins PCDD and polychlorinated dibenzo-*p*-furans PCDF (2378-TCDD, 12378-PeCDD, 123678-HxCDD, 123478-HxCDD, 234678-HxCDD, 1234678-HpCDD, OCDD, 2378-TCDF, 12378-PeCDF, 23478-PeCDF, 123678-HxCDF, 123478-HxCDF, 234678-HxCDF, 123789-HxCDF, 1234678-HpCDF, 1234789-HpCDF, OCDF, calculation of TEQ PCDD/F parameters from measured values); dioxin like polychlorinated biphenyls PCB (PCB 77, PCB 81, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 156, PCB 157, PCB 167, PCB 169, PCB 189, calculation of the sums of PCB and TEQ parameters from measured values); indicator polychlorinated biphenyls PCB (PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153, PCB 180, calculation of the sums of PCB from measured values); polybrominated diphenylethers PBDE (BDE 28, BDE 47, BDE 99, BDE 100, BDE 153, BDE 154, BDE 183, BDE 209)



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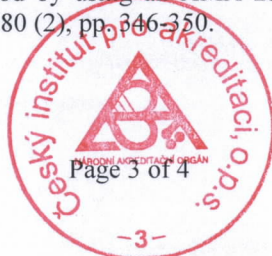
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- ⁴ in the range: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Biphenyl, Retene, Benzo(b)fluorene, Benzo-naphtho-thiophene, Benzo(ghi)fluoranthene, Cyclopenta(cd)pyrene, Triphenylene, Benzo(j)fluoranthene, Benzo(e)pyrene, Perylene, Dibenzo(ac)anthracene, Anthanthrene, Coronene, and calculation of the sums of PAH from measured values
- ⁵ in the range: Indicator polychlorinated biphenyls (PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153, PCB 180, calculation of the sums of PCBs from measured values); Organochlorine pesticides: heptachlor, heptachloroepoxide cis- (= exo, B), heptachloroepoxide trans- (= endo, A), aldrin, dieldrin, endrin, endrin aldehyde, endrin ketone, isodrin, oxychlordane, cis-nonachlor, trans-nonachlor, trans-chlordane (= gamma), cis-chlordane (= alpha), endosulfan I (= alpha), endosulfan II (= beta), endosulfan sulfate, chlordane, methoxychlor, mirex, hexachlorocyclohexanes (alpha-HCH, beta-HCH, gamma-HCH, delta-HCH, epsilon-HCH), DDX (p,p'-DDT, o,p'-DDT, p,p'-DDE, o,p'-DDE, p,p'-DDD, o,p'-DDD), pentachlorobenzene, hexachlorobenzene, calculation of the sums of HCH and DDX from measured values
- ⁶ in the range: As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Se, Zn
- ⁸ in the range: PFAS per- and polyfluorinated alkyl compounds in the range: Perfluorobutanoic acid (PFBA), perfluoropentanoic acid (PFPeA), perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluorobutane sulfonate (PFBS), perfluorohexane sulfonate (PFHxS), perfluorooctane sulfonate (PFOS)

SOP sources:

- ⁷ Gajek, R., Barley, F., & She, J. W. (2013). Determination of essential and toxic metals in blood by ICP-MS with calibration in synthetic matrix. *Analytical Methods*, 5(9), 2193-2202;
Wahlen, R., Evans, L., Turner, J., & Hearn, R. (2005). The Use of Collision/Reaction Cell ICP-MS for the Simultaneous Determination of 18 Elements in Blood and Serum Samples. *Agilent ICP-MS application literature*.
- ⁹ Susan T. Wolf and William K. Reagen, Method and validation for the analysis of perfluorinated compounds in water by pre-sampling isotope dilution-direct injection-LC/MS/MS, *Anal. Methods*, 2013, **5**, 2444-2454,
- ¹⁰ S. Salihovic, A. Kärman, G. Lindström, P. Monica Lind, L. Lind, B. van Bavel, A rapid method for the determination of perfluoroalkyl substances including structural isomers of perfluorooctane sulfonic acid in human serum using 96-well plates and column-switching ultra-high performance liquid chromatography tandem mass spectrometry, *J Chromatogr. A*, Volume 1305, 2013, Pages 164-170.
- ¹¹ Manual, Altec s.r.o., Praha, 2002.
Díez, S., Montuori, P., Querol, X., Bayona, J.M. Total mercury in the hair of children by combustion atomic absorption spectrometry (Comb-AAS), (2007) *Journal of Analytical Toxicology*, 31 (3), pp. 144-149.
Száková, J., Kolihová, D., Mihalová, D., Mader, P. Single-purpose atomic absorption spectrometer AMA-254 for mercury determination and its performance in analysis of agricultural and environmental materials (2004) *Chemical Papers*, 58 (5), pp. 311-315.
Spevácková, V., Korunová, V., Cejchanová, M., Vobecký, M. Sampling procedure and a radio-indicator study of mercury determination in whole blood by using an AMA 254 atomic absorption spectrometer (2004) *Analytical and bioanalytical chemistry*, 380 (2), pp. 346-350.



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Abbreviations

GC-MS/MS – gas chromatography-mass spectrometer

HRGC-HRMS – high resolution gas chromatography-high resolution mass spectrometers

ICP-MS – inductively coupled plasma mass spectrometer

LC-MS/MS – liquid chromatography-mass spectrometer

US EPA – United States Environmental Protection Agency

Sampling

Ordinal number	Sampling procedure name	Sampling procedure identification ¹	Sampled object
1	Air sampling for the determination of persistent organic pollutants (POPs) ² and metals ³ using solid sorbent (polyurethane foam, filter, polyurethane foam + filter)	SOP-LSA-921 (ČSN EN ISO 16000-1, ČSN EN ISO 16000-12, ČSN EN 12341, ČSN EN 14902, ČSN EN 15549, ISO 12884)	Outdoor and indoor air
2	Surface water sampling for the determination of persistent organic pollutants (POPs) ² and metals ⁴	SOP-LSA-965 (ČSN EN ISO 5667-3, ČSN ISO 5667-4, ČSN EN ISO 5667-6, ČSN ISO 5667-17)	Surface water
3	Bottom sediment sampling for the determination of persistent organic pollutants (POPs) ² and metals ⁴	SOP-LSA-980 (ČSN ISO 5667-12, ČSN EN ISO 5667-15)	Bottom sediment
4	Soil sampling for the determination of persistent organic pollutants (POPs) ² and metals ⁴	SOP-LSA-985 (ISO 18400, ČSN EN ISO 16133)	Soil

¹ if the document identifying the test procedure is dated, only these specific procedures are used. If the document identifying the test procedure is not dated, the latest edition of the specified procedure is used (including any changes)

Explanatory notes

Determined parameters:

² in the range: PCDD/F, indicator-PCB, dl-PCB, PAH, OCP

³ in the range: Pb, Cd, As, Ni, Sb, Sr, Ba, V, Cr, Mo, Mn, Co, Cu, Zn, Sn

⁴ in the range: Sb, As, V, Cr, Mo, Co, Ni, Cu, Zn, Cd, Hg, Pb

