



SERVICES, ANALYSIS AND TESTINGS OFFER

**SR EN ISO/IEC
17025:2018**

ISO 9001:2015



National Institute for Research & Development
in Chemistry and Petrochemistry

ICECHIM

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**I. SR EN ISO/IEC 17025:2018 compliant services for
LABORATORY TESTS and TRIALS
RENAR Accreditation Certificate no. LI 843 / 24.03.2023**

For this particular set of laboratory tests and trials please address your price related inquiries to: laborator.analyze@icechim.ro

Crt. No.	Name of the test	Tested material / product / object	Reference methodologies
ANALISYS LABORATORY – WATERS			
Gravimetric methods			
1.	Sulphates determination	Surface and wastewater	STAS 8601-70, PO-ATI-10
Volumetric methods			
2.	Chlorides determination	Surface and wastewater	SR ISO 9297:2001, PO-ATI-08
Molecular absorption spectrometry methods			
3.	Determination of nitrites content	Surface, ground and wastewater	SR EN 26777:2002, SR EN 26777:2002/ C91:2006, PO-ATI-06
Inductively coupled plasma optical emission spectrometry methods			
4.	Determination of metals by ICP-OES method (Al, Cu, Cr, Fe, Mn, Zn & Ni)	Potable water	SR EN ISO 11885:2009, PO-ATI-11



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Crt. No.	Name of the test	Material / product / object to be tested	Reference methodologies
ANALYSIS LABORATORY – HAZARDOUS SUBSTANCES, CHEMICAL COMPOUNDS AND WASTES			
Physical methods			
5.	Determination of density	Liquid petroleum products, solvents, biocides, aqueous solutions	SR EN ISO 3838:2004, SR ISO 758:1995, PO-ATI-12
6.	Thermal Analysis (DSC & TGA) Determination of thermal stability, of transition temperature and enthalpy	Substances and chemicals, Polymers, solid electrical insulators	OECD Guideline for the Testing of Chemicals no. 102:1995 ASTM E 537 – 12 ASTM D 3418-21 ASTM D 3850-19 PO-ATI-13
Volumetric methods			
7.	Determination of water content	Petroleum products, solvent mixtures, varnishes for paints	SR ISO 760:1994 SR EN ISO 12937:2001, PO-ATI-15
8.	Determination of calcium and magnesium concentration	Explosive precursors (technical calcium nitrate), calcium and magnesium amendments	ISO 10821:1984 SR EN 12946:2003, PO-ATI-34
9.	Determination of hydrogen peroxide concentration	Hydrogen peroxide	SR EN 902:2016 PO-ATI-36



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Volumetric methods / confirmation by ion chromatography			
10.	Determination of sulfuric acid concentration	Technical sulfuric acid, aqueous sulfuric acid solutions	STAS 9482-74, PO-ATI-31 Ed. 5 Rev. 0
11.	Determination of nitric acid and nitrogen oxides concentration	Nitric acid, aqueous nitric acid solutions	STAS 2033-66, PO-ATI-32 Ed. 5 Rev. 0
GC-FID methods / GC-MS confirmation			
12.	Determination of acetone concentration	Technical acetone	PO-ATI-38 Ed. 5 Rev.0
ANALISYS LABORATORY – FERTILIZERS AND BIOCIDES			
Electrochemical methods			
13.	pH determination	Biocides Fertilizers Potable & waste waters	CIPAC Handbook, vol. F, MT 75 EC Regulation 2003/2003, Annex III, method 4 SR EN ISO 10523:2012, PO-ATI-01
Gravimetric methods			
14.	Determination of phosphorus	Fertilizers	SR ISO 6598:1996 EC Regulation 2003/2003, Annex IV B, method 3.2, PO-ATI-102
15.	Determination of potassium	Fertilizers	SR EN 15477:2009 EC Regulation 2003/2003, Annex IV B, method 4.1 PO-ATI-103



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Volumetric methods			
16.	Determination of ammoniacal and nitric nitrogen	Fertilizers Explosive precursors (Ammonium nitrate)	SR EN 15475:2009 SR EN 15558:2009 EC Regulation 2003/2003, Annex IV B, methods 2.1&2.2 PO-ATI-100
17.	Determination of total nitrogen	Fertilizers	SR EN 15478:2009, EC Regulation 2003/2003, Annex IV B, method 2.3, PO-ATI-101
18.	Determination of active chlorine	Water treatment chemicals (sodium hypochlorite)	SR EN 901:2013, PO-ATI-114
Volumetric methods / confirmation by mass spectrometry (LC - TOF - MS)			
19.	Determination of total content of quaternary ammonium salts	Biocides containing: - benzalconium chloride (BAC) - dimethyl didecylammonium chloride (DADC)	European Pharmacopoeia 8.8 [0372] – Benzalkonium chloride European Pharmacopoeia 8.8 [0371] – Benzalkonium chloride solution PO-ATI-110 Ed. 5 Rev. 0
HPLC-DAD Chromatography Methods / Mass Spectrometry Confirmation (LC-TOF-MS)			
20.	Determination of chlorhexidine concentration	Biocides containing: chlorhexidine diacetate or chlorhexidine di-gluconate	European Pharmacopoeia 8.8 [0657] – Chlorhexidine diacetate European Pharmacopoeia 8.8 [0658] – Chlorhexidine di-gluconate solution United States Pharmacopoeia 39 nf 34, 2016 – Clorhexidine PO-ATI-112 Ed. 5 Rev. 0



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Crt No.	Name of the test	Material / product / object to be tested	Reference methodologies
HPLC-DAD Chromatography Methods / Mass Spectrometry Confirmation (LC-TOF-MS) continued			
21.	Determination of average molecular weight and concentration of Benzalkonium chloride (C12, C14)	Biocides containing quaternary ammonium salts	European Pharmacopoeia 8.8 [0371] – Benzalkonium chloride solution JAOCS, 58 (1), 72,1981: Rapid Analysis of Ionic and Nonionic Surfactant Homologs by High Performance Liquid Chromatography, PO-ATI-115 Ed. 5 Rev. 0
Methods by GC - FID chromatography / confirmation by GC - MS			
22.	Determination of ethanol, 1-propanol and 2-propanol concentrations	Ethanol; 1-propanol; 2-propanol; ethanol, 1-propanol and 2-propanol mixtures	United States Pharmacopoeia 39 NF 34, 2016 – Isopropyl alcohol PO-ATI-116 Ed. 5 Rev. 0



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II. Other specialized engineering commissioning services

ICECHIM is currently accepting price inquiries for exploratory products and specialized engineering trials services. Should you be interested in receiving a quote, please do not hesitate to contact us through our website or email. Our dedicated team is available to answer any questions and provide you with the information you need. Our research team leaders are committed to providing exceptional customer service and ensuring that our clients receive the best value for their investment.

Thank you for considering our services!

Research Team 1 – ADVANCED POLYMER MATERIALS AND POLYMER RECYCLING

The following types of determinations can be performed in the team's laboratories:

- Intrinsic viscosity - polyethylene terephthalate;
- Melting temperature – polymers.

Team leader Dr. Eng. Tanța-Verona Iordache
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Research Team 2 - ALTERNATIVE BIORESOURCES AND BIOFUELS

The group's laboratories can perform the following analyses:

- Qualitative and quantitative determination of thermally stable organic compounds using GS-MS / MS TRIPLE QUAD (vegetable oils and fats; essential oils; biodiesel and additives for conventional fuels; hydrocarbons and petroleum products);
- Qualitative and quantitative determination of thermolabile organic compounds using LC-MS / TOF (biologically active compounds: plant extracts, proteins, amino acids, vitamins);
- Qualitative and quantitative determination of organic compounds using UV-VIS spectrometry.

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Research Team 5 – ANALYSIS, TESTS AND TESTING LABORATORY

The group's laboratories can perform the following analyses:

Water laboratory

- Determination of biochemical oxygen within 5 days (CBO₅);
- Determination of total phosphorus concentration;
- Determination of detergent content;
- Determination of conductivity;
- Determination of hardness;
- Determination of turbidity;
- Determination of acidity / alkalinity;
- Residue determination;
- Extractable substances in solvents determination;
- Total content of suspended matter determination;
- Determination of chemical oxygen consumption (CCO_{Cr});
- Determination of ammonium content;
- Determination of nitrates content;
- Determination of nitrites content;
- Determination of chemical oxygen demand CCO-Mn.

Laboratory of substances, chemicals and hazardous waste

- Determination of carbon, hydrogen, nitrogen and sulfur content: organic compounds;
- Qualitative analysis by infrared spectrometry: organic and inorganic compounds;
- Determining the composition of essential oils: lavender, thyme, cinnamon, incense, etc.;
- Flash point: petroleum products, odorous;
- Humidity: various matrices;
- Determination of ash content: various matrices;
- Determination of Cr (VI) content: polymers, waste;
- Determination of volatile organic compounds: paints and varnishes;
- Determination of calcium and ammonium nitrate content: fertilizers, calcium and ammonium nitrate;
- Determination of PCB content: waste oils;
- Determination of free formaldehyde content: resins;
- Petroleum hydrocarbons: soil;
- Determination of calcium chloride concentration: calcium chloride;



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Laboratory of substances, chemicals and hazardous waste (continued)

- Determination of alkali and magnesium chloride content as sodium chloride: calcium chloride;
- Determination of water-insoluble matter content: calcium chloride, sodium chloride;
- Determination of sulphate content: calcium chloride;
- Determination of sodium chloride concentration: sodium chloride;
- pH: sodium chloride;
- Mechanical impurities: sodium chloride;
- Determination of the particle size distribution: sodium chloride;
- Determination of sulphate content: sodium chloride;
- Determination of hexamine concentration;
- Determination of sodium nitrate concentration;
- Determination of potassium chlorate concentration.

Test laboratory for fertilizers and biocides

- Determination of metals content: fertilizers, wastewater, potable water, mineral oils, paint, polymeric materials and other matrices;
- Determination of sulfur content: fertilizers;
- Determination of chloride content: fertilizers;
- Determination of the particle size distribution: soil amendments, fertilizers;
- Determination of neutralization value: soil amendments;
- Determination of hydrogen peroxide and peracetic acid content: biocidal products;
- Determination of glutaraldehyde content: biocidal products;
- Determination of PVP content: biocidal products;
- Determination of active iodine content from PVP-Iodine: biocidal products;
- Determination of ethyl salicylate concentration: biocidal products;
- Determination of methylene blue concentration: biocidal products;
- Determination of methyl ethyl ketone concentration: solvents;
- Determination of tert-butanol concentration: solvents;
- Determination of denatonium benzoate concentration: solvents.

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Research Team 6 - BIOTECHNOLOGY & BIOANALYSIS

The group can perform the following types of determinations:

Microbiological analysis

- Isolation and identification of microbial species from different sources;
- Antimicrobial activity of different compounds or materials.

Microbial degradation of substances and materials (under laboratory conditions)

Sensors and Biosensors

- Detection of toxins, pollutants and metabolites in environment and agri-food products using biosensors (electrochemical, optical, surface acoustic waves);
- Determination of antioxidant activity of agri-food products.

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Research Team 7 – EMERGING NANOTECHNOLOGIES

Compositional and phase analyzes

The laboratory can provide complete analyzes of the composition and structure for organic and inorganic materials and products (plastics, chemical fibers, catalysts, pigments, dyes, chemical fertilizers, detergents, minerals, metals and metal alloys, ceramic masses, construction materials, recovered materials, objects belonging to the cultural heritage, etc.), archaeometry and compatibility studies of restoration/conservation materials, as well as the analysis of the presence of inorganic pollutants from different matrices, using X-ray Diffraction, X-ray Fluorescence and Inductively coupled plasma atomic emission spectroscopy.

Physico-chemical analyzes in the field of detergents and evaluation of the surface properties of surfactants

The laboratory can provide physico-chemical analyzes for a wide range of detergents and cleaning products for household or industrial use:

- Determination of anionic active substance content;
- Determining of solutions or dispersions pH;
- Determination of the cationic active substance content;
- Determination of inorganic sulfates content;



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- Determination of hydroxyl index;
- Determination of water content;
- Determination of carbonate content;
- Determination of apparent density;
- Determination of active oxygen content;
- Foaminess measurement;
- Determination of free caustic alkalis content (Soaps);
- Determination of water and volatile substances (Soaps);
- Determination of flow properties using the rotational viscometer;
- Determination of the total content of alkalis and fatty substances (Soaps);
- Determination of ethyl alcohol insoluble substances content (Soaps);
- Determination of unsaponifiable, unsaponified and saponifiable unsaponified substances (Soaps);
- Determination of active chlorine content;
- Determination of total phosphorus oxide (V) content;
- Determination of chloride content;
- Determination of chloride content (Soaps);
- Determination of free alkalinity or free acidity;
- Determination of water insoluble substances content.

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Research Team 8 – MULTIPHASE MATERIALS

The laboratory holds extensive expertise in:

- Applied and fundamental research for obtaining new multi-phase polymeric material compatible with 3D/4D printing for sustainable applications in agreement with the new Pre- & post-consumer polymeric items mechanical recycling considering the defects dilution principle.
- Development of new active/smart multi-phase polymeric materials and biomaterial interest, larger in size, complex shape and surface.
- 3D/4D printing considering methods as fused filament fabrication, sintering (in perspective), photopolymerization (in perspective), others.
- Pre-and post-consumer polymeric items mechanical recycling obtained through 3D/4D printing techniques considering the defects dilution principle.
- Technologies for various level of technological maturity:
 - 3D and 4D printing design (Scanning, conversions in a 3D CAD representation and printing);
 - Scaling-up materials and 3D/4D printed parts-products;
 - New printing techniques;

Team leader Dr. Habil. Florin Oancea,
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Research Team 9 - HETEROGENEOUS SYSTEMS

The group can perform the following types of determinations:

- Environmental Scanning Electron Microscope (ESEM) - operating modes: High Vacuum (<1.3 Pa); Low Vacuum (10-130 Pa); ESEM (130-2600 Pa), SEM + EDS (Energy Dispersive Spectroscopy);
- Particle size (DLS) (0.6-6000 nm): stable aqueous dispersions; unstabilized aqueous dispersions; stable dispersions in organic solvents; unstabilized dispersions in organic solvents;
- Zeta potential: aqueous samples; samples dispersed in organic solvents;
- FTIR spectroscopy FTIR (400 ÷ 4000 cm⁻¹): by Reflectance (ATR)/ by Transmittance;
- UV-VIS Spectroscopy (200 ÷ 800 nm);
- Thermal Analysis: DSC, TGA, DMA, Simultaneous DSC-TGA (SDT);
- Porosimetry (BET method).

Team leader Dr. Eng. Cristian Petcu,
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Research Team 10 - FUNCTIONAL DYES AND RELATED MATERIALS

Photocatalytic activity of surfaces

- Determination of photocatalytic activity by degradation of methylene blue.

Camouflage testing – UV-VIS-NIR

- Ultraviolet Reflective (UVR) White Color for the Camouflage of Military Equipment in Snow Environments;
- Infra-Red Reflective (IRR) Green Color for Painting Military Equipment.

Tests for paints and varnishes

- Color measurement and calculation of color differences.

Textiles — Tests for color fastness

- Instrumental assessment of the degree of staining on adjacent fabrics;
- Instrumental assessment of change in color for determination of grey scale rating;
- Instrumental assessment of relative whiteness;
- Color fastness to artificial light: Xenon arc fading lamp test;
- Color fastness to artificial weathering: Xenon arc fading lamp test;
- Color fastness and ageing to artificial light at high temperatures: Xenon arc fading lamp test;
- Detection and assessment of photochromism;
- Color fastness to washing;
- Color fastness to domestic and commercial laundering;
- Color fastness to dry cleaning;
- Color fastness to rubbing;
- Color fastness to chlorinated water (swimming-bath water);
- Color fastness to water: hot water;
- Calculation of color differences;
- Color fastness to bleaching agents;
- Color fastness to heat treatments.

Textiles: Solar UV protective properties

Pigments and extenders – Methods of dispersion for assessment of dispersion characteristics

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Research Team 11 – EVALUATION&CONSERVATION OF CULTURAL HERITAGE

The following types of analyzes can be performed in the team's laboratories:

- Determination the humidity of stone, wood, paper surfaces;
- Determination of hysteresis curves for wood objects;
- Determination of the masonry temperature and the internal air flux;
- Determination of the noise level;
- Determination of ammonium content from mortars and masonry;
- Determination of nitrate and nitrite content in mortars and masonry;
- Determination of chloride content in mortars and masonry;
- Determination of chromium content in mortars and masonry;
- Determination of sulfate content in mortars and masonry;
- Determining the hardness of coatings on various surfaces;
- Identification of organic and inorganic compounds from artifacts / surfaces;
- Determination of chromatic parameters for various surfaces;
- Determining the layer thickness of some coatings on metal surfaces;
- Determination of the resistivity and corrosion degree of cement-based buildings;
- Determination of compressive strength;
- Freeze-thaw behavior tests;
- Salt crystallization tests;
- Determination of electrochemical behavior and corrosion induced by pollutants; on stone and metal artifacts;
- Determination of anti-fouling capacity for metallic and polymeric surfaces;
- Preparation and supply of solutions, gels / pastes suitable for chemical / microbiological conservation / restoration of paper / manuscript / wood / stone / painting surfaces.

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Research Team 12 – POLYMERIC COMPOSITES AND NANOCOMPOSITES

Within the team's laboratories, the following types of analyzes can be performed under standardized conditions or apparatus norms, for various matrices:

- Thermogravimetric analysis (TGA);
- Differential Scanning Calorimetry (DSC);
- Dynamic mechanical analysis (DMA);
- Determination of tensile properties on films and injected specimens;
- Determination of impact strength;
- Nanoindentation;
- Atomic force microscopy (AFM).

Team leader Dr. Eng. Adriana Nicoleta Frone,
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Research Team 13 – (CRYO) TRANSMISSION ELECTRON MICROSCOPY

Transmission Electron Microscopy (TEM)

- Bright Field-TEM (câmp luminos);
- High Resolution-TEM (rezoluție înaltă);
- Dark Field-TEM (câmp întunecat).

Scanning Transmission Electron Microscopy (STEM)

- Bright Field -STEM (câmp luminos);
- Dark Field -STEM (câmp întunecat);
- HAADF (câmp întunecat, inelar, cu unghi înalt).

Energy dispersive X-ray Spectrometry (EDX)

- Single point;
- Line profile;
- Mapping.

Electron tomography

- Tomography studies and elemental analysis (EDX).

Cryogenic Transmission Electron Microscopy

- Cryogenic temperature electron tomography studies and elemental analysis;
- Subtomogram averaging analysis (LOW DOSE).

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