Taking your physical and chemical characterization of polymers to the next level

infrastructure - methods - data analysis

vito

VITO is your partner for sustainable polymer technologies and can help you analyze & characterize by combining cutting-edge technology with unparalleled expertise.

This brochure offers a sneak peek in the vast portfolio of equipment we have in house. If you were to have any questions don't hesitate to reach out!

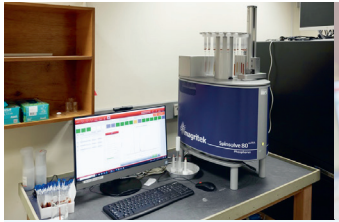
VITO is the reference for independent, applied technological research to generate a positive impact for a society in transition. Scientifically based, driven by collaboration and solution-oriented. We combine our domain knowledge of people and environment with technological innovations, (pilot) infrastructure and digital applications. In this way, we achieve a tangible effect for citizens, industry and policy in Flanders, Europe and the world, for our three impact domains: sustainable use of raw materials (circular-bio-economy, energy and water), climate mitigation and adaptation, and a sustainable living environment for all. Hence, we can improve the quality of life for all and support the United Nations' SDGs. United for a better future.

At VITO, our comprehensive suite of polymer characterization services combines cutting-edge technology with unparalleled expertise. Our state-of-the-art laboratory is equipped with a diverse array of tools designed to provide detailed insights into the properties and behaviors of polymers. From analytical techniques that unveil molecular structures to thermal analyses that explore stability and transitions, and from mechanical tests that assess strength and durability to thermo-mechanical evaluations that measure responses under varying temperatures, our offerings ensure thorough and precise characterization. Trust us to deliver the high-quality data you need to drive innovation and ensure the success of your materials.

ANALYTICAL TECHNIQUES


FTIR Spectroscopy

- Identification and quantification of chemical compounds
- Temperature-dependent measurements possible
- Solid as well as liquid materials (few mg)




Benchtop NMR spectroscopy

- Identification chemical structure of compounds
- ^{1}H-, ^{31}P- and ^{19}F-NMR
- Soluble samples (10-30 mg)

LC-MSMS

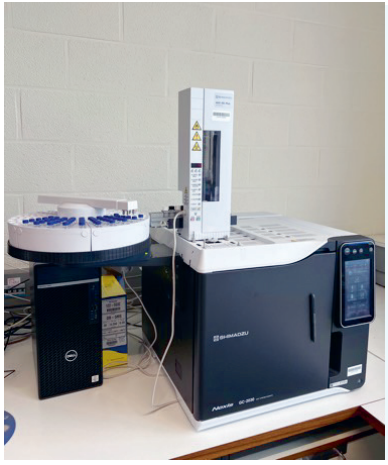
- Low level quantification of target compounds (e.g. PFAS, surfactants, BFRs…)
- LC-MSMS is used for polar compounds

GC-MSMS

- Low level quantification of target compounds (e.g. PFAS, surfactants, BFRs…)
- GC-MSMS is used for non-polar, small compounds

GC-MS

- Identification and quantification of non-polar and volatile compounds



GC-FID

- Quantification of non-polar and volatile compounds

ANALYTICAL TECHNIQUES

GPC

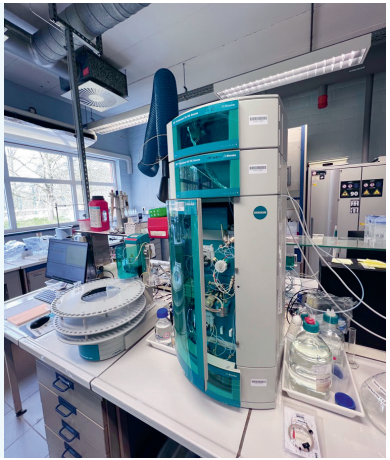
- Dedicated THF system
- Flexible system using water or organic solvents
- RI and PDA detector

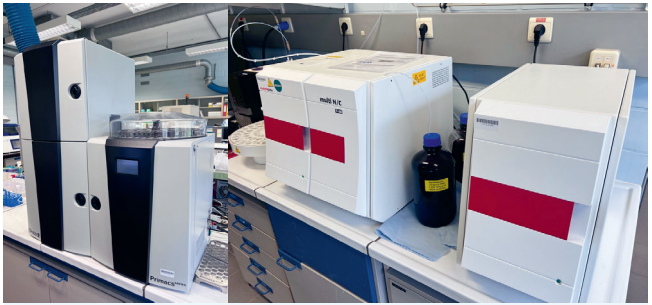
APC

- High pressure GPC
- Flexible solvents
- RI, PDA and QDA detectors

Ion chromatography

- Detection of free ions (Cl, Br, acids…)





TOC analysis

- Determination of total organic content in diverse liquid and solid samples

Combustion Ion chromatography

- Determination of total halogen concentration
- Combined with IC gives a value for free and bound halogens

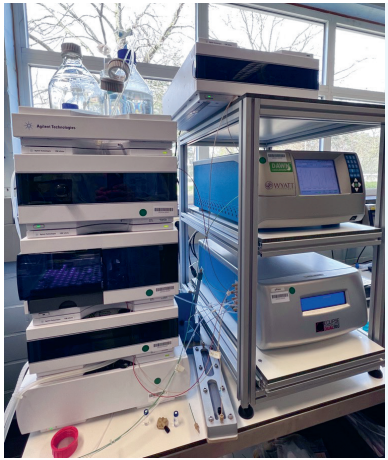
Organic element analyser

- Simultaneous carbon, hydrogen, nitrogen, and sulfur analysis
- Additional oxygen, chlorine, and total inorganic carbon

Atomic absorbance

- EOF analysis

ANALYTICAL TECHNIQUES



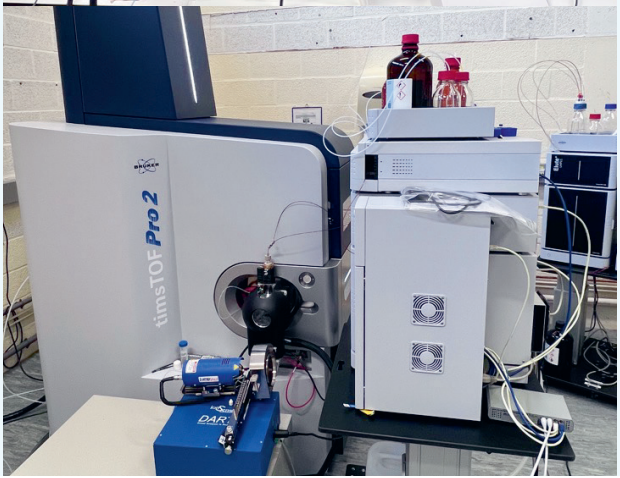
Field Flow Fractionation

- Detection and determination of particle size of micro and nano plastics

ANALYTICAL TECHNIQUES

Ambient HR mass spectrometry

- DART-MS and Direct probe MS on Orbitrap and QTOF
- Direct analysis of solid and liquid samples
- No sample preparation
- Low amounts
- Identification of organic composition of polymers and polymer mixtures: polymer structure and additives
- Identification of chemically related off-spec material: e.g. polymer bleeding,, defects
- Identification of very diverse samples (e.g. unknown precipitate, coating,dust, contamination…)
- Screening for unwanted compounds (e.g. PFAS, BFR, AZO dyes…)



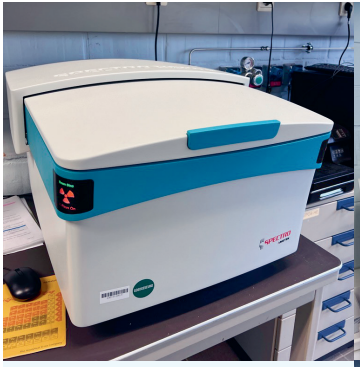
LC- HR mass spectrometry

- Orbitrap and QTOF coupled to UPLC
- ESI, APCI and APPI ionization
- Identification and quantification of additives, NIAS (non intentionally addes substances) and other compounds
- Identification of coloring compounds
- Screening of process samples, waste…, both target and total screening
- Time resolved screening
- Data processing and visualization

Pyrolysis GC-MS

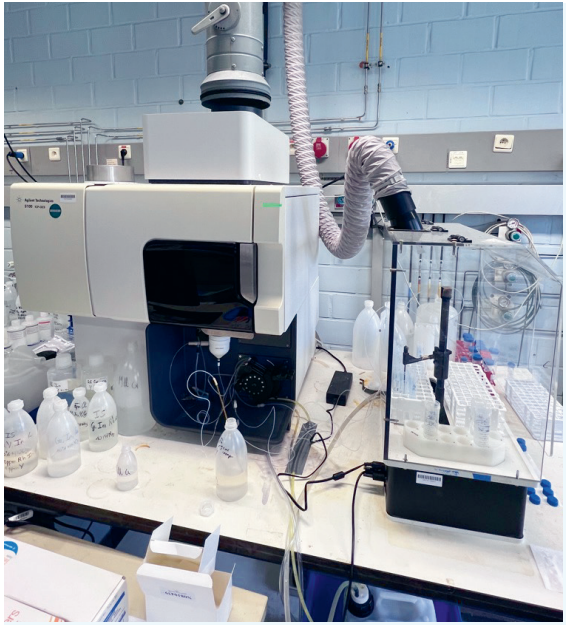
- Includes autosampler
- Identification of polymers
- Detection and quantification of micro and nanoplastics
- Thermal desorption possible

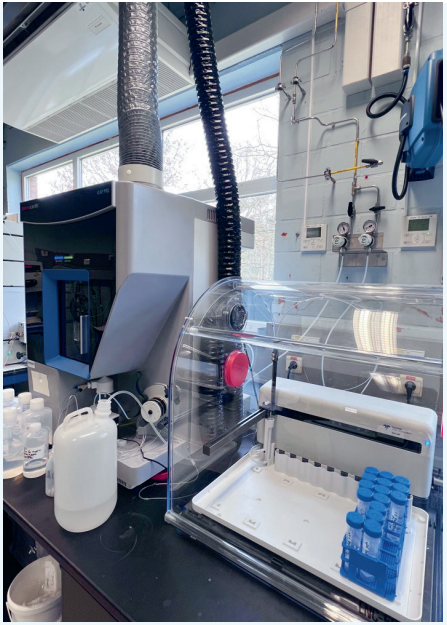
ANALYTICAL TECHNIQUES

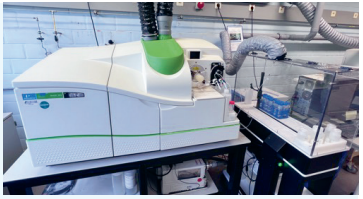


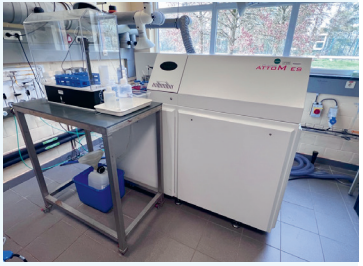
(μ)XRF

- Elemental analysis
- Elemental imaging
- Investigation of off spec material
- Fast screening for inorganic additives and catalysts







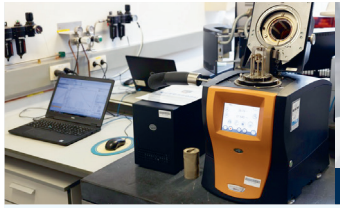


ICP-AES/(HR)MS

- Elemental analysis
- Absolute low level quantification of inorganic elements
- NIAS analysis
- Catalyst rests
- Single particle ICP

Rheology

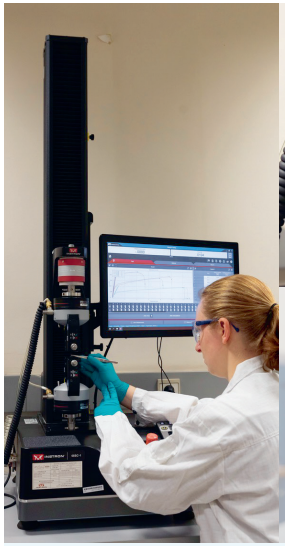
- Viscoelastic properties of soft solids and liquids
- Viscosity (also possible via viscometer)
- Creep/stress relaxation
- -60 – 200 °C
- Liquid samples: 2 g
- Rigid samples: 8 mm disks (3 replicates)
- Soft samples: 25 mm disks (3 replicates)



*specimen punches available to obtain right dimensions

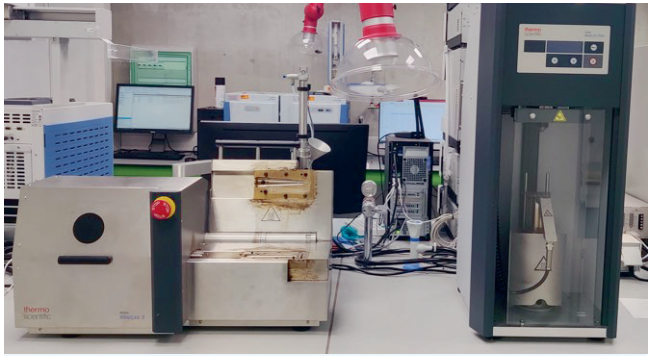
Dynamic mechanical analyser (DMA)

- Viscoelastic properties of solid samples
- Creep/stress relaxation
- Tensile, 3-point bending & cantilever clamp
- -160 °C – 300 °C
- Rectangular bars; max 60 x 10 x 1 mm but dimensions depend on type of material (3 replicates)



Tensile testing machine

- Mechanical testing of solid samples
- Tensile mode
- Compression mode
- Identification of Young's modulus, stress, strain, break, toughness, …
- Max force: 1kN
- Tensile bars of different sizes and thicknesses possible: at least 5 replicates

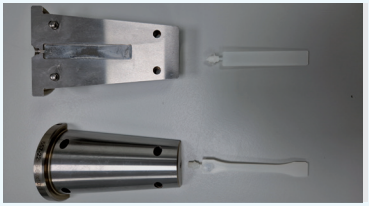


Extruders and injection molding

SMALL-SCALE TWIN SCREW EXTRUDER
- Blending
- Polymerization reactions
- Max 5 g

REACTIVE EXTRUDER
- Blending
- Polymerization reactions
- From 20 g/h to 1.5 kg/h

INJECTION MOLDING
- Tensile bars (ISO527-2-1BA)
- DMA bars (60x10x1 mm)



PROCESSING TECHNIQUES

Pressing and drying

HOT PRESS
- Molding, laminating, bonding
- Max temp: 343 °C
- Max clamping force: 15 tons
- Plates 15 x 15 cm

VACUUM OVEN
- Max 200 °C
- Different sizes

Dynamic scanning calorimetry (DSC)

- Identification of thermal transitions (-90 °C – 550 °C)
- Melting, crystallization, glass transitions,…
- Kinetic studies
- Curing
- Solid as well as liquid materials (4-8 mg)

Thermogravimetric analyser (TGA)

- Thermal degradation profile (40 °C – 1000 °C)
- Ash content
- Solids as well as liquid materials (1 mg)

REACHING OUT TO US

This brochure is only a sneak peek in the vast portfolio of equipment & capabilities we have in house. Don't hesitate to reach out to us for further collaboration.

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