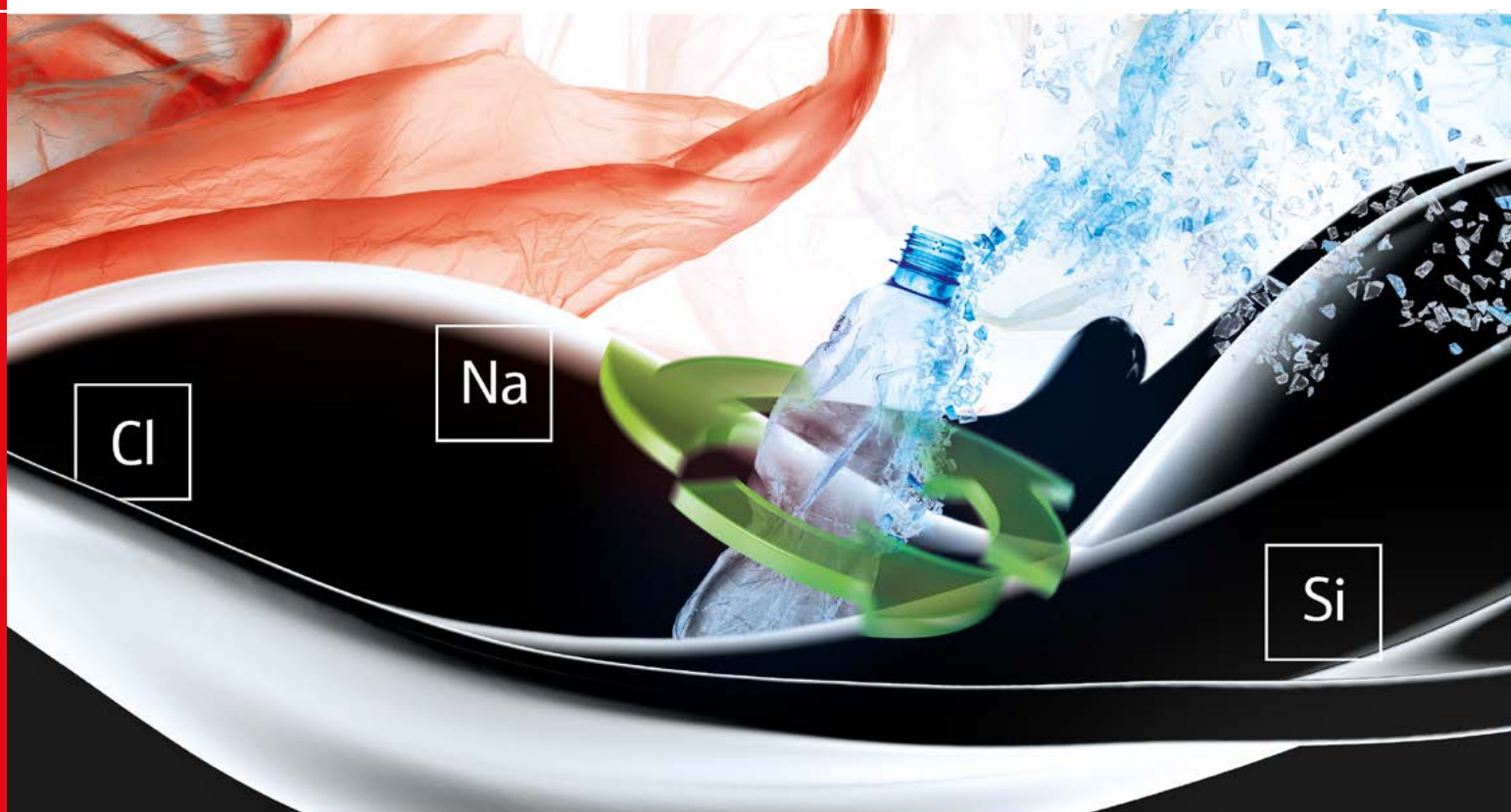


Chemical Recycling of Plastics

Analytical Solutions for Crucial Quality Gates



Contact us to talk about your individual analysis needs.

Benefit from the expertise our application specialists have gathered for plastic waste, oil samples, and refinery effluents.

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One of the biggest challenges faced by chemical recycling is the highly variable composition of the plastic feedstock and of the derived pyrolysis oil. Metals and heteroatoms can have disastrous effects during oil refining such as catalyst poisoning, corrosion, and fouling.

Our analytical instruments help you quickly and reliably assess contaminant levels in the plastic feedstock, pyrolysis oil, and refinery wastewater.

Plastic feedstock and pyrolysis oil

- Metals (e.g., Na, Si, Fe, Pb, Ca, Hg)
- Chlorine
- Carbon, nitrogen, sulfur

Refinery wastewater and brine

- TOC/TN_b (total organic carbon / total bound nitrogen)
- AOX (adsorbable organic halides)

Metal analysis of pyoil

Experience lowest detection limits thanks to our high-resolution optics (2 pm at 200 nm). The signal remains stable over the entire day due to the high excitation power of the generator and an optimal torch design. Save argon gas by shutting down the analyzer during short measurement breaks; warm-up takes < 15 minutes. Measurement range: sub-ppb to %

► **PlasmaQuant 9100 Elite (ICP-OES)**

Cl, S, and N analysis of pyoil

Sample combustion is optimized by a flame sensor. This guarantees correct results in the shortest time, while avoiding soot formation. Cl analysis is made especially safe and stable due to a light-protected and cooled coulometric cell as well as safety features that prevent the backflush of sulfuric acid. No hardware conversion is needed when switching from simultaneous C/N/S to Cl analysis. Measurement range: ppb to %

► **multi EA 5100 (combustion elemental analyzer)**

Cl analysis of the plastic feed

Up to 300 mg of shredded plastic can be analyzed with minimal sample preparation. A flame sensor ensures optimal combustion of the sample in the shortest possible time – no operator expertise is needed. Chlorine analysis is further simplified with a 3-in-1 combination electrode and a self-cleaning silver anode.

Measurement range: ppm to 10%

► **multi EA 4000 (combustion elemental analyzer)**

TOC/TN₆ in wastewater and brine

The usual wear and tear caused by particles is minimized due to unique injection techniques. The wide-range NDIR detector makes time-consuming sample dilution obsolete. Calibration is long-term stable (≥ 1 year) and consumables are easily accessible via the front doors. The optional salt kit provides optimized brine analysis. Measurement range: 4 µg/L to 30,000 mg/L TOC

► **multi N/C 3300 (combustion-based TOC/TN₆ analyzer)**

AOX in wastewater and brine

Before analysis, organic halides need to be adsorbed onto charcoal columns. Our sample prep systems allow the use of multiple columns per sample. This guarantees that AOX is completely captured, while blockages due to particles are reliably prevented. Charcoal columns are then introduced into the AOX analyzer via a high-throughput autosampler.

Measurement range: 10 ng to 1 mg Cl

► **APU sim or APU 28 connect (sample preparation systems)**
► **multi X 2500 (AOX analyzer)**



PlasmaQuant 9100 Elite



multi EA 5100



Learn from experts!

► **Spotlight:** Jean-Francois Borny from Lummus Technology is vice-chair of the ASTM Recycled Products committee D02.PO. In our web seminar he gives an overview of all analytical tests that are relevant for pyoil and lists the corresponding ASTM standards.

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Subjects to changes in design and scope of delivery as well as further technical development!