TECHNICAL GUIDE

# ETV-ICP-OES THE MOST ACCURATE DETECTION LIMITS

## FOR HIGH PURITY CARBON AND GRAPHITE

MERSEN

# ETV-ICP OES

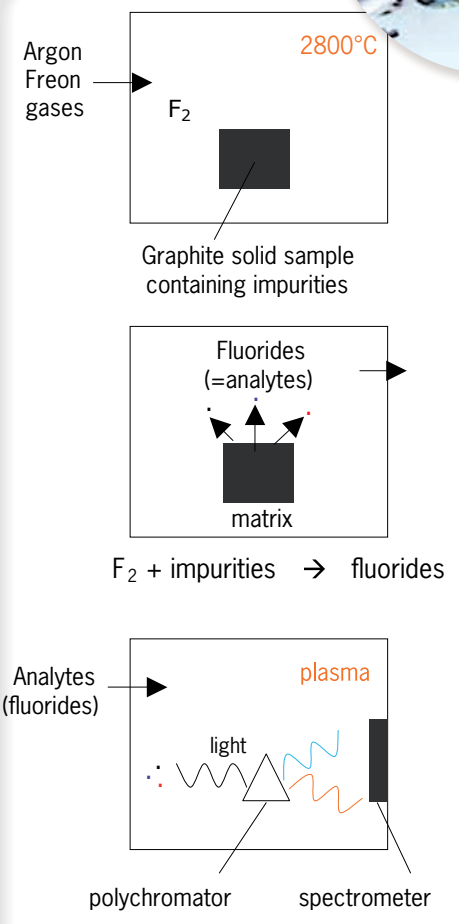
## Electro Thermal Vaporization & Inductively Coupled Plasma Optical Emission Spectrometry


The high-tech applications of graphite (semiconductors, photovoltaics, nuclear…) often require strict control over impurities in the material. After setting the standard for supplying the highest purity graphite in the industry, Mersen now offers the most sophisticated method for measuring graphite purity. The ETV-ICP analytical method has been applied to develop a powerful, rapid and reliable tool for analysing impurity content of solid samples with very low limits of detection. ETV-ICP has proven to be the reference for analysing graphite and can be considered as state-of-the-art technique.

## How does it work?

### Sampling, loading and heating

The graphite sample (solid or powder) is loaded into a high temperature graphite furnace. The sample is heated up to 2800°C.




### Electro Thermal Vaporization

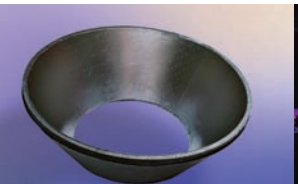
Freon gas and Argon carrier gas circulate in the furnace. The precursor gas decomposes into Fluor (F2), that reacts with impurities contained in graphite to form fluorides (analytes), and extracts them from the graphite matrix.

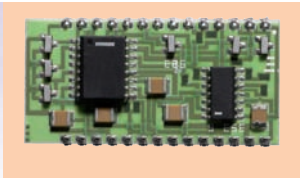
### Inductively Coupled Plasma

The gas carrying analytes (fluorides with impurities) is introduced into a plasma chamber. Molecules are excited under plasma and emit light with different wavelengths characteristic of each atom of impurity.

### Optical Emission Spectrometry

Light is then decomposed by wavelength through a polychromator (prism-like) and analysed by a spectrometer. Light intensity at a given wavelength is directly proportional to the concentration of an atom in the plasma. Thus exact content proportion of each atom can be calculated.

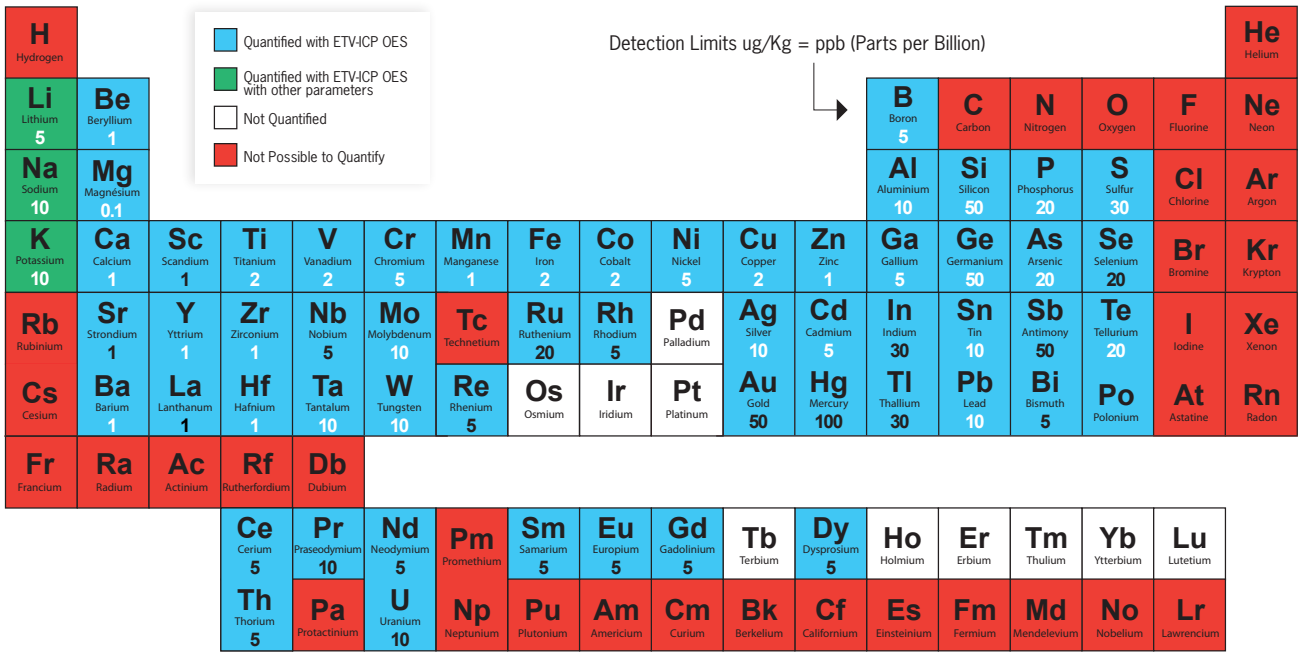



## Advantages of the ETV-ICP analytical method

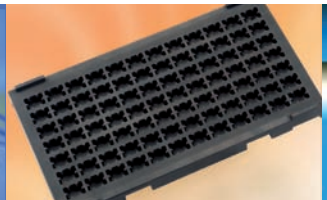
- Contamination-free introduction of samples without sample decomposition or dilution. Solid as well as liquid sampling is possible.
- Sampling and calibration of graphite possible with existing standards and reference solutions, which is not the case with the GDMS method (Glow Discharge Mass Spectrometry).
- Very effective thanks to high transport efficiency of gases used. No spectral interference from the matrix.
- Simple and rapid acquisition: up to 50 samples analysed per day with automatic loading. Suitable for routine analysis.
- Very low limits of detection for most elements of the periodic classification, 1 - 50 µg/kg = ppb (parts per billion).
- Perfectly adapted to purified graphite, carbon/carbon composite and carbon insulation materials.
- Value-added service for customers.

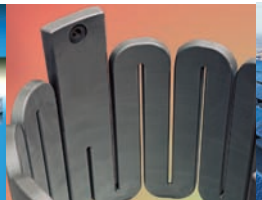
## ETV-ICP-OES, Limits of detection




White numbers define - Units selected Elements for Polychrometer (35). All Blue & Green Elements detectable using Monochrometer (selectable)







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