

# SmartNotes

# QA

## Why the gas chromatographic separation method used in the Thermo Scientific FlashSmart Elemental Analyzer is the most reliable for elemental analysis?

The Thermo Scientific™ FlashSmart™ Elemental Analyzer (Figure 1) operates with the dynamic flash combustion (modified Dumas Method) of the sample for CHNS determination while for oxygen analysis, the system operates in pyrolysis mode. The resulted gases are carried by a helium (or argon) flow till a gas chromatographic column that provides the separation of the gases, and finally, detected by a thermal conductivity detector (TCD). A complete report is automatically generated by the Thermo Scientific™ EagerSmart™ Data Handling Software and displayed at the end of the analysis.

### Thermo Scientific FlashSmart: The Elemental Analyzer



Figure 1. Thermo Scientific FlashSmart Elemental Analyzer.

The gas chromatography IC (GC) provides a “real” picture of the analytical process during combustion (CHNS) and pyrolysis (O).

GC technique provides you with complete peak separation and sharp peak shapes, which ensure superior precision and higher sensitivity.

From the chromatogram you can quantify the amount of elements in your sample and recognize what is happening inside the analyzer anytime. GC separation features provide you with:

- Full insight of the combustion showing complete conversion of:
  - Nitrogen and nitrogen oxide in N<sub>2</sub>
  - Carbon in CO<sub>2</sub>
  - Hydrogen in H<sub>2</sub>O
  - Sulfur in SO<sub>2</sub>
- Full insight of the pyrolysis showing complete conversion of:
  - Oxygen in CO
- Determination of low nitrogen content in a sample with high carbon amount and vice versa.
- Detection of low sulfur content in a sample with high carbon and hydrogen amount and vice-versa.
- Determination of trace amount of an element, by evaluating the peak area with the optimization of the sample weight.
- Determination of low (traces) sulfur content by the EagerSmart Data Handling Software option which allows to amplify, during acquisition at a preset time, the signal sensitivity by 10 times (Gain x10).
- Real-time analytical control of the analysis workflow, which allows identification of when maintenance is needed. The chromatogram reflects ash build up in the crucible/reactor, the condition of reactor catalysts and of adsorber filters and very rarely the presence of leaks in the system.

The advantages of the separation method are:

- “Real” peak of each element.
- Easy integration of the peaks by the EagerSmart Data Handling Software.
- The area of the peak corresponds to the total amount of the element.
- Proper quantification of the elements.
- Maintenance free, long lifetime GC column operating for years without the need for replacement: it is not a consumable.
- GC Column easy to use, directly installed in the analyzer
- Straightforward continuous flow design from sample processing through gas separation and detection. There are no valves or adsorption points in the process which can adversely affect sample quantification.
- No memory effect (only pure elemental gases pass through the column).

## Summary

The gas chromatographic separation method used in the Thermo Scientific FlashSmart Analyzer is the simplest and most reliable method for the quantitative determination of nitrogen, carbon, hydrogen, sulfur and oxygen, demonstrating the high performance of the Analyzer.

The chromatogram works as an “open window”, giving information on what is happening inside the analyzer in real-time.

Find out more at [thermofisher.com/OEA](http://thermofisher.com/OEA)