Comprehensive two-dimensional gas chromatography GC×GC

REPSOL
Technology Lab

Short Description

Comprehensive two-dimensional gas chromatography hyphenated to different detectors FID, MS, NCD and SCD provides a detailed characterization of complex samples due to its greater resolution and enhanced sensitivity.

Deliverable

Report containing the obtained information:

- Brief description of the experimental procedure.
- 2D Chromatogram.
- List of the compounds or families detected in the sample.
- Conclusions.
- Other information required by the client.

Benefits

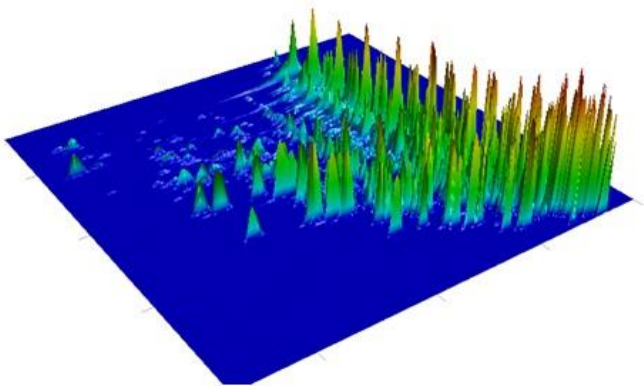
- Because of the high resolution power, enhanced sensitivity and chemical identification of GC×GC a detailed characterization of very complex samples is achieved.
- This technique can be applied to very different fields: petrochemical, biomedical, food, forensic, environmental, etc.
- Minimal sample preparations.
- Great versatility of analysis due to the possibility of combining different injection techniques (Liq, TDU, HS) and different detectors (FID, MS, NCD, SCD).

Two dimensional gas chromatographer hyphenated to Mass Spectrometer Time of Flight (GC×GC-TOFMS)

Differential Features

Technology Lab has various GC×GC equipment and skilled personnel:

- GC×GC-FID: for quantitative analysis.
- GC×GC-MS: for quantitative and qualitative analysis.
- GC×GC-NCD: determination of nitrogen organic compounds.
- GC×GC-SCD: determination of sulfur organic compounds.



3D Chromatogram obtained by GC×GC

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Requirements

- Small amount of sample is needed. Few milliliters or grams of sample is enough for a detailed characterization.
- The compounds of interest should be sufficiently thermally stable and reasonably volatile.

Limitations

- Final boiling point no greater than 500ºC.
- Inhomogeneous samples can have variable results.
- Does not detect most inorganic components and thermally unstable compounds.

The Product in Depth

Two-dimensional gas chromatography (GC × GC or Comprehensive two dimensional gas chromatography) is a very powerful separation technique and from the very beginning it has demonstrated its great separation power, which allows the study of very complex samples.

Its principle of separation is based on the use of two columns with different stationary phases, giving rise to an orthogonal system by which compounds are subject to two independent mechanisms of separation. The columns are connected in series by a modulator, a device that focuses and subsequently transfers fractions of the effluent from the first column to the second one. Due to the refocusing process during the modulation operation, system sensitivity is enhanced.

Thus, the greater resolution and enhanced sensitivity of the GC×GC technique offer a unique capability for the analysis of extremely complex mixtures. Moreover, the combination of two columns increases peak capacity in comparison with the ordinary gas chromatography.

Some Use Cases

- PIONA analysis of middle distillates: kerosene, diesel, LCO, UCO, GOV, etc.
- Characterization of pyrolysis oils.
- Detection of Sulphur and Nitrogen organic compounds in petrochemical samples and bio-fuels.
- Oxygen speciation in Bio-oils.
- Volatile compounds in polymers, aqueous solutions, bitumen, etc.
- Detection of MOSH-MOAH in polymers.
- Analysis of additives.
- FAME analysis in fuels.