

ONLINE GAS ANALYZER EXPERTS

Trace H₂S analysis in complex gas mixtures

Hydrogen sulfide (H₂S) is a very flammable, corrosive and toxic gas, with a characteristic odor of rotten eggs. Even when present at low trace-level concentrations, H₂S can damage equipment, pipelines and lead to catalysts poisoning. Therefore, it must be carefully monitored and controlled in industrial processes where it is generated or used.

Chromatotec®'s H₂S MEDOR analyzer measures H₂S in gas samples at trace-level concentration ranges (0-1ppm). It consists of an automatic process Gas Chromatograph (autoGC) equipped with Sulfur Specific Electrochemical wet cell Detector (ED) which only reacts with sulfur compounds and providing excellent results down to 1ppb. All compounds have a linear response with the ED, with R₂ > 0.995. Moreover, the MEDOR® detector is not affected by the moisture in the sample, which can be up to 100% relative humidity.

It is available with dedicated configuration for safe and hazardous areas (ATEX, IECEx, CSA and CSA international certifications) including an integrated N₂ generator. Its simplicity for online application in refineries and petrochemical plants is achieved thanks to its flameless detector: no Hydrogen is required. Specially designed for on-field deployment, this standalone solution includes a built-in nitrogen generator and a touch screen in the front door of the wall-mounted cabinet. It is temperature-controlled



for outdoor installation to provide the best performance for operation from -10 to +55°C. The H₂S MEDOR analyzer has been used for H₂S measurement in a recycle gas stream composed of up to 60% of H₂ or in reactor effluent gas with very high concentration of COS (5000 ppm).

The H₂S MEDOR is a reliable, simple and robust turnkey solution. It is fully autonomous thanks to the integrated gas generators to avoid the need for gas cylinders and embedded internal calibration for automatic data validation. Moreover, this process device is designed for very low maintenance requirements.

Exhibitions 2019 - 2020



ADIPEC 2019
Abu Dhabi - UAE
11-14 November 2019
French Pavilion - Booth 9239



**SINO-FRENCH
JOINT WORKSHOP 2019**
Chengdu - China
17-20 November 2019



ANALYTICA 2020
Munich - Germany
31 March - 3 April 2020
French Pavilion

Chromatotec®'s on-line dual TD-GC-FID/MS for automatic and continuous VOC monitoring in ambient and industrial air

Ambient air is polluted by many Volatile Organic Compounds (VOCs) coming from anthropogenic and natural sources. Due to the large number of these molecules, there is a need to combine their separation and quantification by Gas Chromatography (GC) with Flame Ionization Detection (FID) and their individual identification by Mass Spectrometry (MS).

With this aim, Chromatotec® has developed a turnkey solution which allows the automatic quantification and identification of VOCs: the airmoSCAN XPERT. It is a combination of two robust instruments: a dual GC-FID for the monitoring of C₂ to C₁₆ compounds (airmoVOC expert) and a process Quadrupole MS. The instrument allows the monitoring of up to 123 VOCs at ppt, ppb, ppm and % levels in only 30 minutes.

Thanks to its many advantages (easy to use, fully automatic, intrinsically linear, precise and very stable system with data validation) this solution has been implemented in fixed and mobile laboratories for urban and industrial field analysis all over the world. Among its main industrial applications are those that require very high sensitivity, such as the air analysis in clean air rooms with airmoTWA (including a multiplexer to analyze up to 16 streams.)



Monitoring of odorants, VOCs and sulfur species in gas or liquid (LPG/LNG) matrices

Chromatotec®, specialist in the manufacturing of process gas analyzers for online monitoring, is now entering the world of liquid sample analysis through the development of a simplified enhanced liquid sampling system (XXvalveLPG) specifically designed to extract representative samples from the liquid phase.

The extracted liquid sample is vaporized and injected in continuous mode into the column of the auto-GC analyzer with speciation of more than 16 sulfur compounds or 123 Volatile Organic Compounds (VOCs) according to the configuration type.

Considering sulfur compounds approach, H₂S, mercaptans such as tert-butyl mercaptan (TBM), dimethyl sulfide (DMS) and/or Total Sulfur (TS) can be analyzed in Liquid Propane Gas (LPG), Liquefied Natural Gas (LNG) and other liquid samples such as crude oil, diesel, fuel, oil, water and condensates at very low concentration levels (ppb and/or ppm) in automatic routine mode.

This is very useful to control the effectiveness of the odorization process of LPG as it is usually odorized with DMS and TBM to alert in case of leakage. Chromatotec®'s liquid valve allows

performing the analyses directly from the liquid phase to overcome the problem of lack of uniformity of the odorized liquid vapors due to the different boiling points of the species when associated with auto-GC with a MEDOR® sulfur specific electrochemical detector, such as energyMEDOR® analyzer.

It is available with dedicated configuration for safe and hazardous areas: ATEX, IECEx, CSA and CSA international certifications for its application in refineries and petrochemical plants.



Analyzer with internal calibration

Monitoring of liquid matrices by Gas Chromatography using a simplified and enhanced headspace sampling system

Chromatotec® presents a headspace sampling system designed to extract representative samples from the liquid phase.

The vaporized sample can be preconcentrated using a trap to achieve quantification at very low concentration levels (ppb and/or ppm). Then, it is injected automatically and in continuous mode into the auto-GC analyzer. Speciation of sulfur compounds or VOCs is done with a MEDOR® sulfur specific electrochemical detector or a FID respectively. The complete system allows online analysis without human intervention.

This technology can be used for a wide variety of applications in the oil and gas industry. It allowed controlling the effectiveness of the LPG odorization process with DMS and TBM, to alert in case of leakage.

In aqueous mode, it has been applied for the analysis of acrylonitrile. This polymer is used in plastics, fibers or as a component of additives to enhance oil recovery. This sampling system reduces the risk of polymerization of its monomer, acrylamide, avoiding the clogging of the column.

New cylinder-free auto-GC-FID range

Reliable and certified results from an all-in-one unit without gas cylinders: this was the design challenge that Chromatotec achieved to satisfy market expectations for VOCs/Hydrocarbons monitoring.



auto-GC-FID system

Gas Chromatography (GC) analyzers with Flame Ionization Detection (FID) allow the speciation of Volatile Organic Compounds (VOCs) with exceptional sensitivity and linear response for wide concentration ranges (ppt to %) in automatic routine mode.

When comparing lab GC-FID with auto-GC-FID used in the field for online monitoring systems, users may be concerned with the on-site use of hydrogen (H₂) and the complexity of cylinder management. Indeed, FID detectors require a H₂/air flame and, in the case of cylinders, must be changed before exhaustion or else risk interrupting analyses while also decreasing the usable amount of gas. In terms of safety, gas cylinders are bulky and heavy so personnel must be trained on how to move and secure them.

To solve these problems, H₂ and zero air gas generators are used, instead of cylinders, in the first fully-automatic, standalone, cylinder-free, auto-GC-FID system manufactured by Chromatotec.

Designed for industrial applications, the performance of the cylinder-free auto-GC-FID system is highlighted by its main features:

- Low cost of ownership: Only distilled water and ambient air are needed!

The integrated generators provide the FIDs total gas consumption requirement. (30 mL/min H₂ and 180 mL/min air).

- Improved safety: No compressed hydrogen cylinders are required.
- Complete autonomy: The FID can be operated continuously, avoiding the exchange of empty cylinders.
- Better sensitivity: Zero grade gases without hydrocarbon impurities for lower noise level and greater column protection.
- Saves space: The analyzer and both generators are housed in an all-in-one wall-mounted cabinet.
- Multi-stream analysis (channeled/surface/ambient): A custom-designed analyzer and integrated multiplexer sampling device to provide inlet/outlet process monitoring with full traceability for each stream analyzed.
- Enhanced ease of use: The measurement system performance evaluation is completed with internal calibration using NIST traceable permeation tube technology to provide automatic data validation. This fully automatic, user-friendly system does not require specialized personnel to operate.

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