

# airmoTWA: New TRAP-GC-MS-FID instrument for ambient air monitoring designed for onsite use

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To ensure people safety and a good repeatability of industrial process, the analysis of ambient air is crucial. Especially, electronic boards are produced in clean air room by complex lithographic process using very reactive chemicals. The nature and concentration of organic and organosilicon volatile compounds can be different depending on the chemical process and can also vary rapidly. There is a need to analyze precisely and continuously gas process in air with an instrument designed for industrial use.

Since 1986, Chromatotec® is a worldwide recognised expert in gas analysis, renowned and certified (TÜV in 1996; MCERT in 2013) for its precise analysis in ambient air monitoring and natural gas. In industry, our systems prove their value in online monitoring, quality control and environmental protection. They make substantial contributions to process control, to the improvement of product quality, and to the enhancement of system safety as well as to environmental protection. The airmoTWA is a turnkey solution which allows the quantification and identification of compounds at ppt, ppb, ppm and % levels. It is a new industry standard for online and continuous TRAP-GC-MS-FID.

## airmoTWA

Combination of two technologies :

Gas Chromatography with Flame ionization detector

Concentrate the compounds in a trap

Compounds separated by column in pure hydrogen carrier gas

First identification by RT

Automatic quantification certified by different organisms

Quadrupol Mass Spectrometer

Mass analysis Second identification by Mass Spectrum



- Multiplexer 6 ways + calibrator
- Multiplexer 6 ways + selection valve for GCMS coupling or direct MS measurement
- Supervisor
- Mass Spectrometer with heated transfer line: DET QMS
- airmoVOC Expert
- H2 generator: Hydroxychrom
- By pass pump for sampling

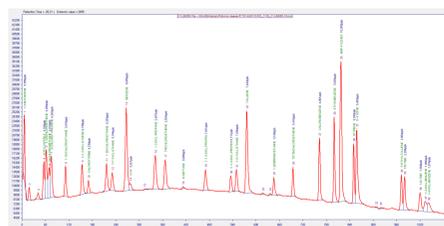


Automatic results without reprocess – MCERTS Certified in 2013<sup>1</sup>

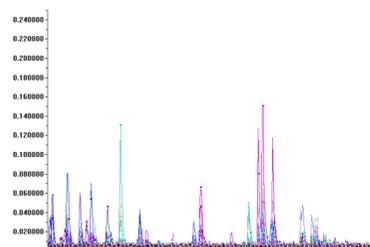
## Analysis at ppt level

### Automatic mapping of the chemical composition of clean air room

airmoTWA can perform a mapping of the chemical composition of the clean air room. Thanks to the multiplexer, up to 12 streams can be analyzed automatically. The results obtained with the GC and the mass spectrometer will be monitored and saved (cycle time 20-30 minutes). It allows the measurement of organic and organosilicon compound concentrations down to 1 ppt. The different species are identified and quantified by the GCFID<sup>2</sup>. The mass spectrometer allows a second identification of the compounds.

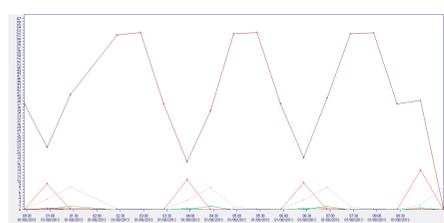


TRAP GC FID chromatogram

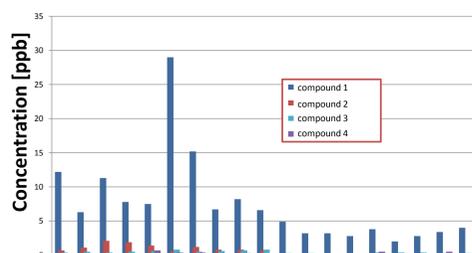


TRAP GC MS chromatogram

The chemical compound concentrations are displayed for the different sampling points. High concentrations of compounds can be measured on different points. It shows that either filtration processes are not efficient or instruments involved in the production process are leaking. This method is very good for the measurement of low concentrations even after filtration. With this method, the mass spectrometer will allow you to identify every single compound.



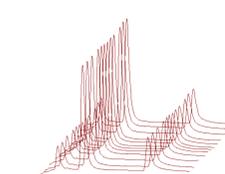
Automatic trend obtained with Vistachrom software



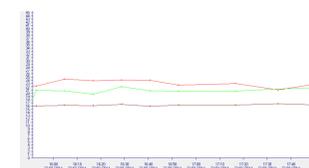
Mapping of the clean air room molecular composition

## Fast analysis for leak detection

Once high concentrations are measured in one location, shorter sequences of analysis can be used. For instance here a "6 minutes method" has been developed to detect the source of the leak (works also with 3 minutes method). The probe is moved at different locations to find precisely the source of the leak. If coelution of species occurs, the mass spectrometer will be able to identify the chemicals analyzed by the FID.



Chromatograms 3D view



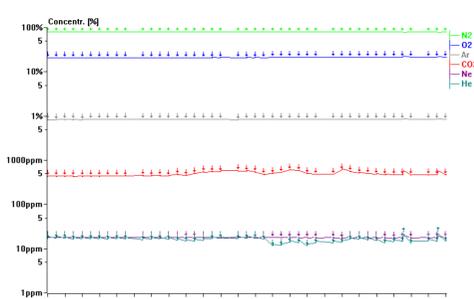
Measured concentrations versus time

When the concentration of the compounds of interest are relatively high, this method can also be used for quantification with high precision.

## Direct analysis by the mass spectrometer

In addition to the obtained results with the GCMS, it is also possible to measure directly the surrounding atmosphere using the MS within the same method. The low limit concentration here is low ppm level (i.e. 500 ppb for Benzene). An alarm system can be set to inform the user of important changes of the surrounding atmosphere.

Here the CO2 concentration is increasing during the working hours from 400 to 500 ppm. This method can be used to find leaks of N2, Ar, He, O2...



Measurement of N2, O2, CO2, Ar, Ne, He for 24h

The airmoTWA is simple to use and incredibly sensitive and delivers robust and reliable performance. Particularly, the instrument can monitor high and low concentrations (from ppt to %) for a large number of molecules (organic, organosilicon, permanent gases...). The instrument is measuring and recording concentrations of chemicals automatically without reprocess and can have alarm systems which can be set to inform on important changes of the surrounding atmosphere.

<sup>1</sup> MCERTS Certified by SIRA with tests carried out by the NPL of London according to EN 14662-3: Method to establish the performance criteria for the measurement of Benzene concentration using an automated sampling pump with in-situ gas chromatography.

<sup>2</sup> Due to confidentiality reasons, the chromatograms obtained on-site are not shown.