

Introduction

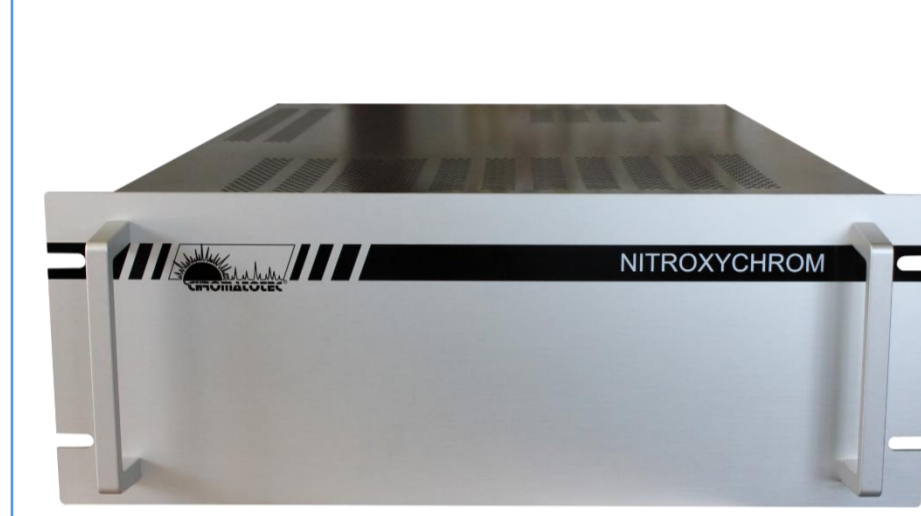
The presence of odorous compounds presents issues for both ambient air pollution and specific industrial processes¹. Monitoring these odorous compounds is important because some of them have adverse effects on human health, on the environment and on the process efficiency, even at very low concentrations. In industrial areas, many odorous compounds, such as Volatile Organic Compounds (VOCs), can be emitted, in a wide range of concentrations and specific identification and quantification of all these molecules can be a challenge given the number of potential interferences.

In this study, we present a complete cabinet solution for the continuous monitoring of some VOCs and odorous VOCs. Five systems (including 4 auto-GCs and one FT-UV spectrometry module) were integrated into two airtight and waterproof cabinets. The solution also includes gas generators, thus allowing for a fully autonomous solution. The cabinet is specifically designed to protect its content from the outside (bad weather and temperature variations) making it ideal for industrial sites. Monitored compounds are automatically identified and quantified. This solution was installed in an industrial site for the monitoring of a deodorization process.

Material and Method

The complete solution includes:

Type of system	Analyzed compounds
GC/FID	Aldehydes and ketones
GC/FID	Amines
GC/FID	Total hydrocarbon monitoring
GC/electrolytic cell	Sulfur compounds
FT/UV	NH ₃



Nitrogen generator



Hydrogen generator



Air generator

The auto-GCs and gas generators are integrated into two cabinets:

- In-built calibration system for each GCs: **easy and automatic verification of system stability**
- **Autonomous solution** with the gas generators
- **Multiplexer** allows the analysis before and after the deodorization process
- Suitable for **industrial processes**
- **Protection from outdoor conditions** (bad weather and temperature variations)
- **Automatic identification and quantification** of the compounds



Airtight cabinet

Results

Chromatograms

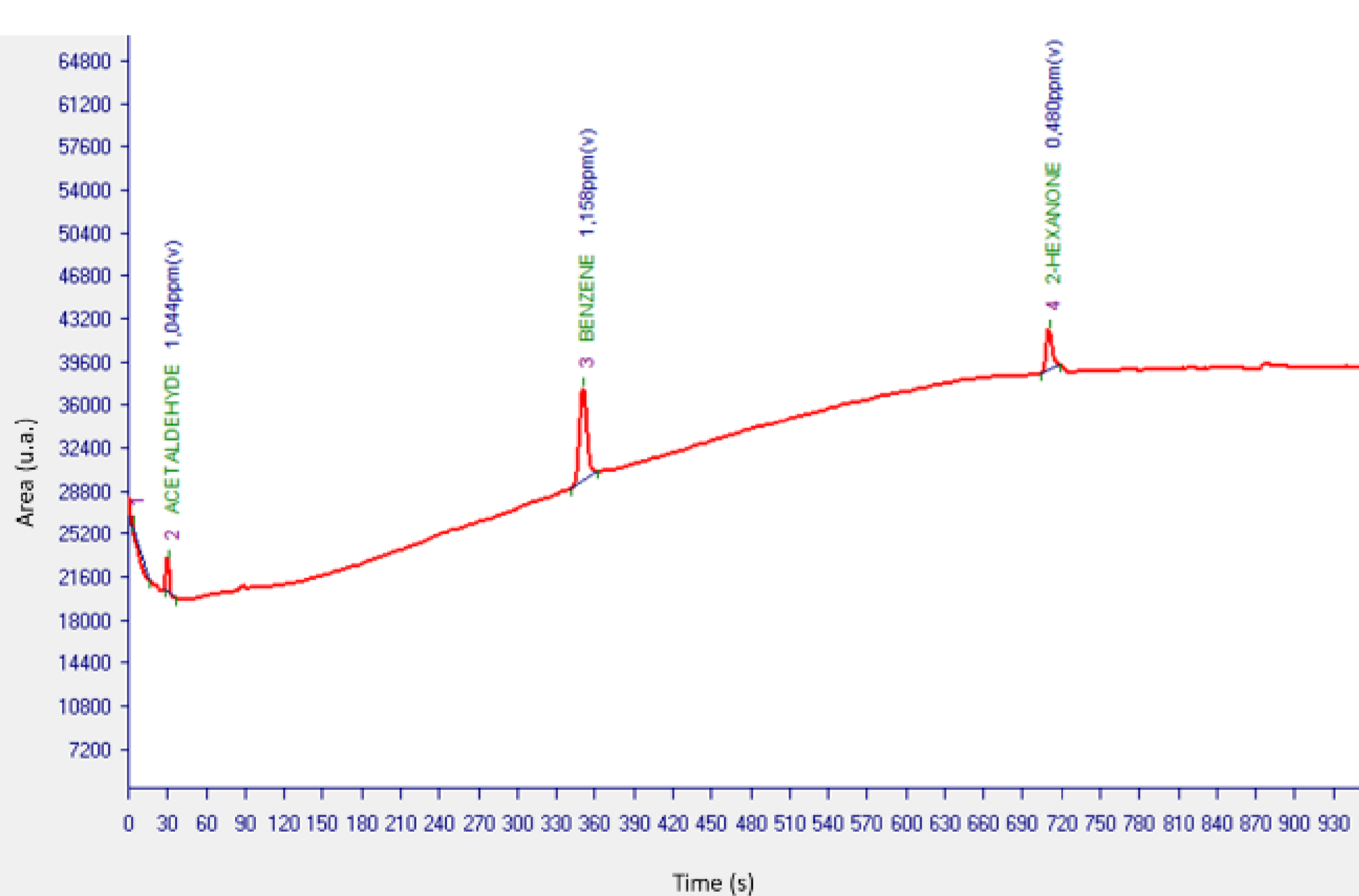


Figure 1: Internal gas standard chromatogram obtained on the auto-GC/FID monitoring aldehydes and ketones

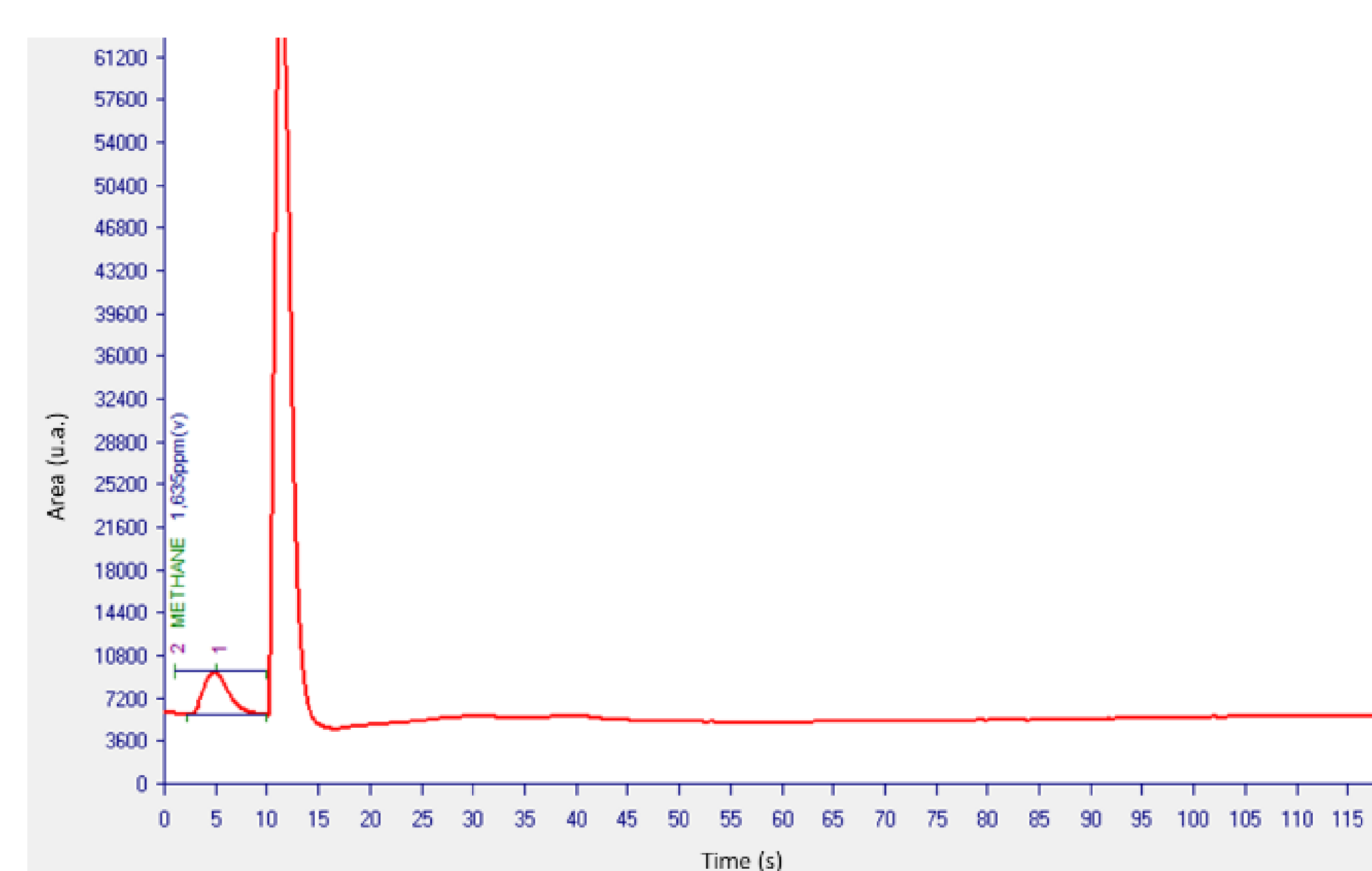


Figure 3: Ambient air chromatogram obtained on the chromaTHC

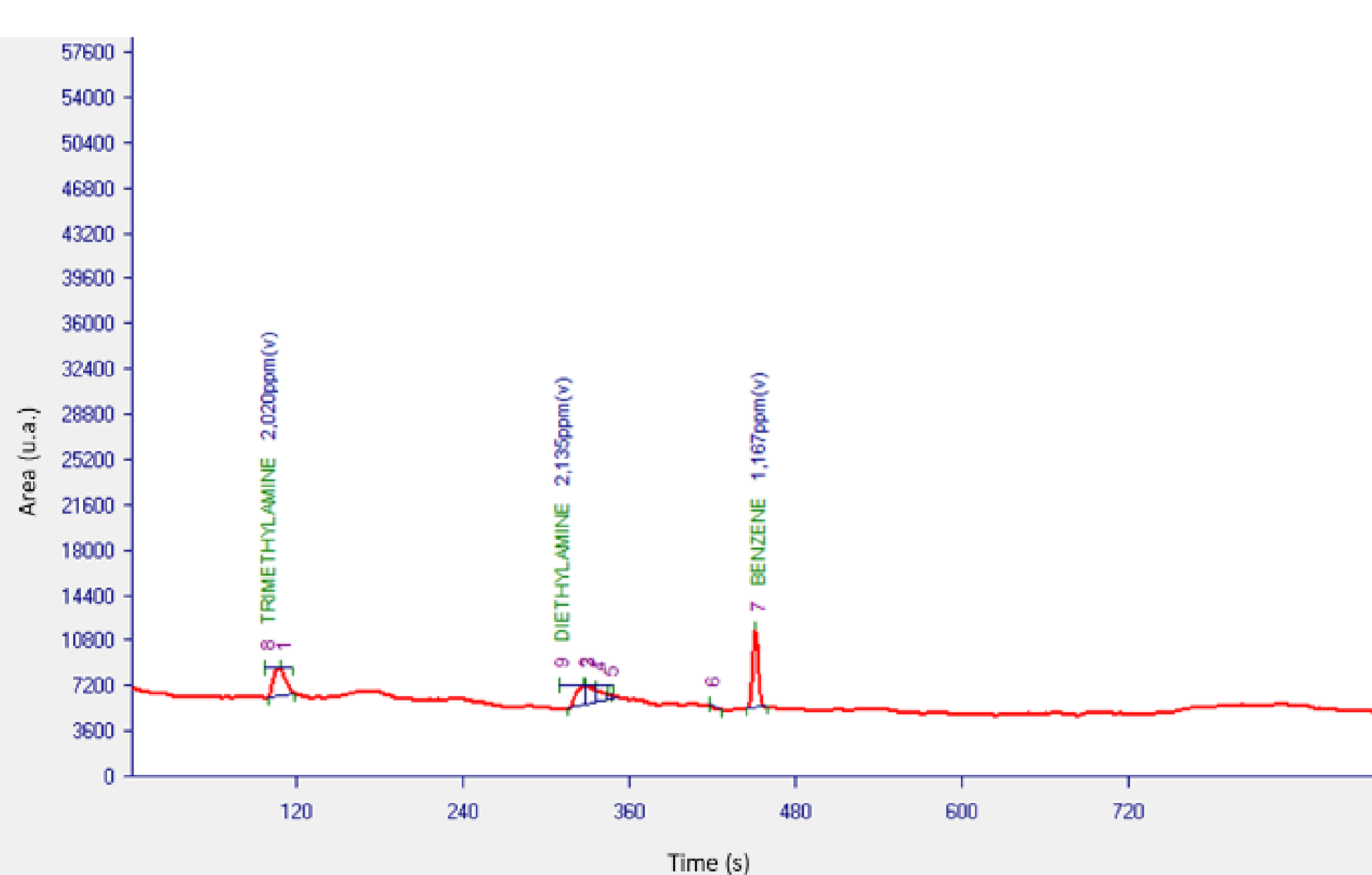


Figure 2: Internal gas standard chromatogram obtained on the auto-GC/FID monitoring amines

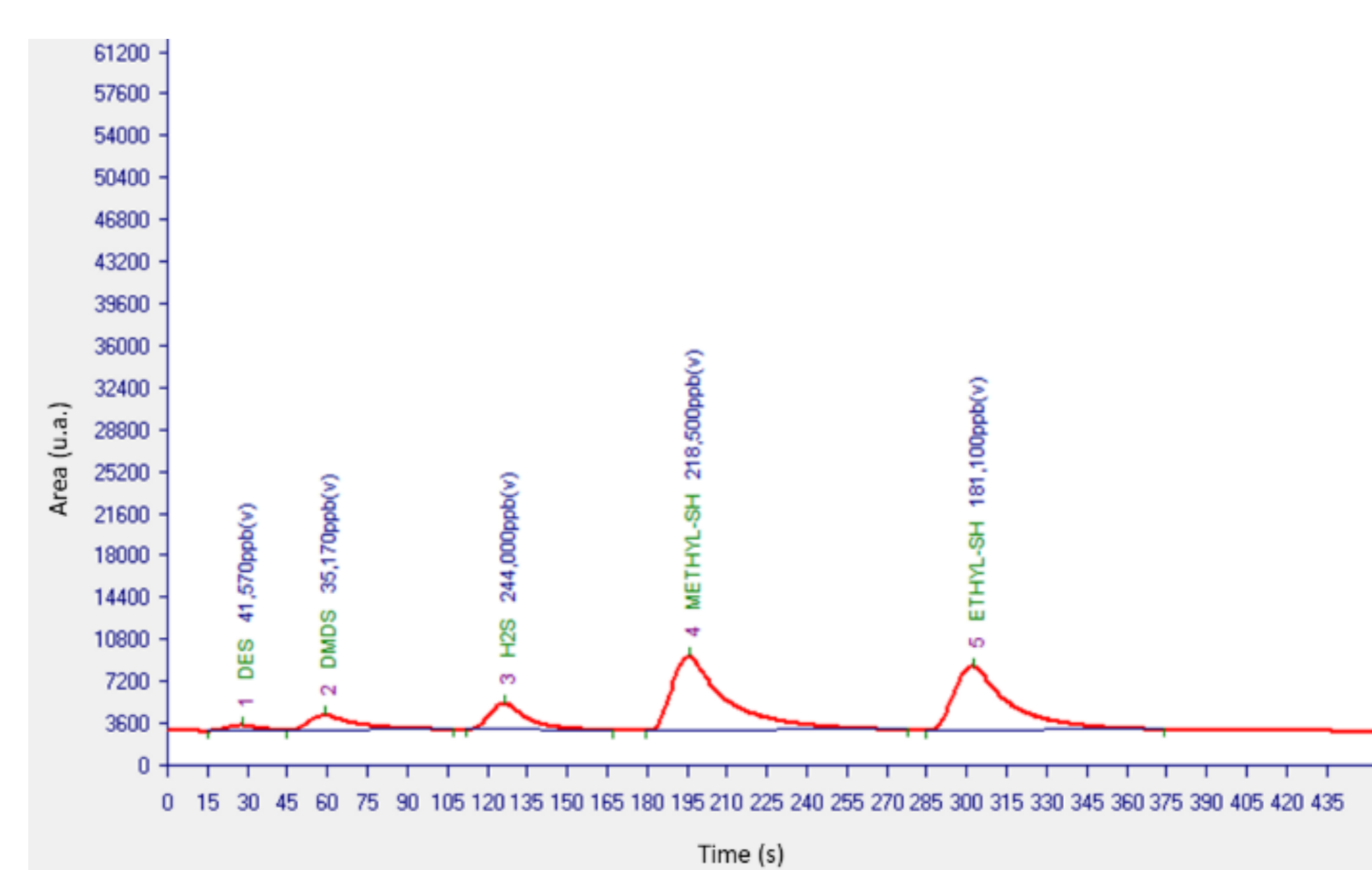
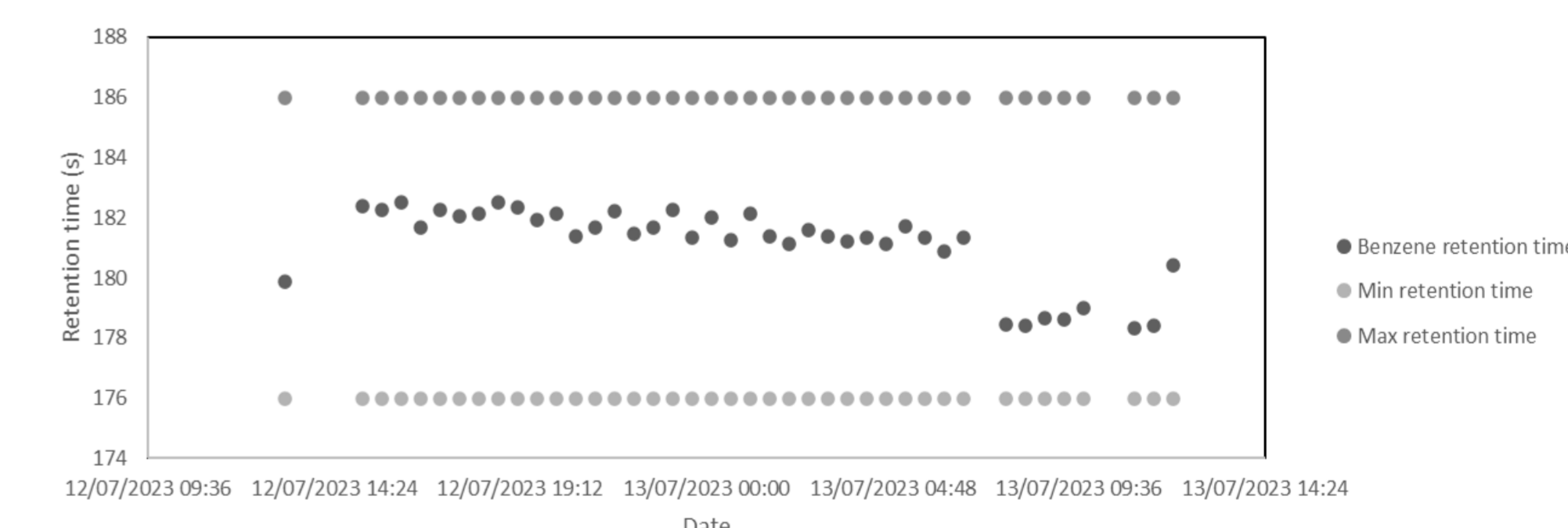
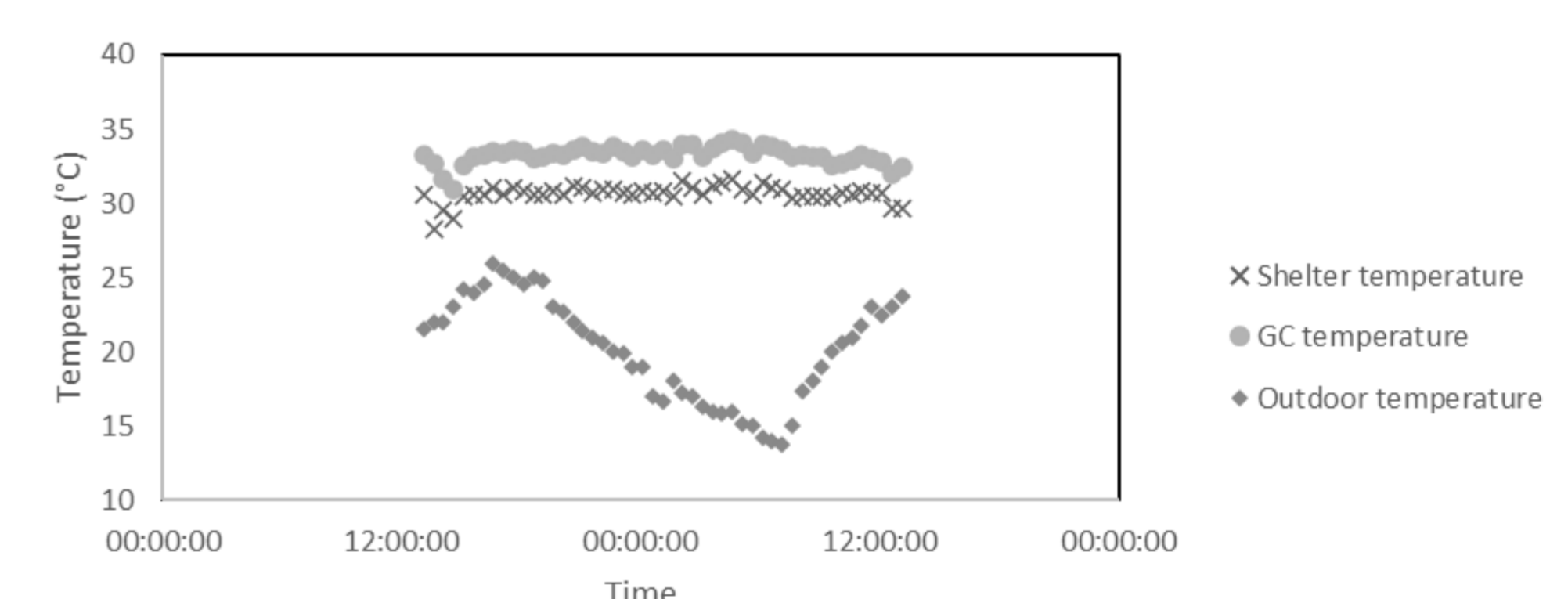


Figure 4: Chromatogram of a mixture of sulfur compounds obtained on the TRSMEDOR

Temperature stability in the shelter

A study of the temperature measured inside the shelter in comparison to the outside temperature was realized. In parallel, the concentration of an internal standard gas of benzene was monitored continuously for the duration of the test.



- Min and max retention time is the retention time window for benzene identification
- Relative standard deviation on **benzene retention time = 0,7%**
- Small temperature drop less than 3°C observed
- **Very good temperature and retention time stability**
- **Identification of compounds** even when outside temperatures vary

Conclusion

In this work, a complete solution designed for the monitoring of odorous compounds was presented. Several auto-GCs were used in order to identify and quantify different families of compounds. The solution is completely autonomous thanks to all the gas generators that are able to supply the different modules. The analyzers are designed to work in a continuous mode. All the systems are integrated into two shelters that are able to handle outdoor conditions (precipitations, temperature variations). This is ideal for the monitoring of industrial processes where controlled laboratory conditions can be hard to achieve.