



Case Study

Pure Gases Monitoring Applications

O₂, CO₂, Ar and N₂ traces in pure gas (like H₂ or N₂) from ppm to % range
ChromaTCD

Context & Challenges

Pure gases such as Ar, CO₂, He, N₂, N₂O, H₂ or O₂ are used in a wide range of industries: medical, food and beverages, petrochemical or chemical industry. Depending on the application, purity requirements can be required from ppm to percentages.

Pure gas manufacturers need to control the amount of impurities before delivery to customer to ensure equipment integrity and safety. There is a growing need for precisely and continuous gas chromatography analyzers for gas quality assurance applications.

Chromatotec® Solutions

Chromatotec® has developed a turnkey solution which allows the online analysis and monitoring of permanent gases and/or hydrocarbons from **low ppm to % levels**.

The ChromaTCD consists of a Gas Chromatography (GC) analyzer with a sampling loop, two specific metallic columns manufactured by Chromatotec, an **O₂ trap** (Oxytrap) and a **Thermal Conductivity Detector (TCD)**.



This universal detector measures the thermal conductivity difference between the reference cell (carrier gas) and the measure cell (outlet of the column).

Thanks to the TCD W2X filaments we can reach **LDL values around 2 ppm** of impurities (like O₂) in H₂. A relative **electronic pressure measurement sensor**, controlled by the software, checks that there is always a carrier gas flow to protect the filament, providing added safety.

Unlike conventional systems for this application, hydrogen can be used as carrier gas. In this case, it is provided by Chromatotec® Hydroxychrom generator with purifier, achieving a cylinder free configuration. This compact and transportable instrument requires only a small

amount of space and power supply. If necessary, the system can also use He or Ar from a cylinder as carrier gas.

VistaCHROM software allows easy data acquisition and treatment. Reference substance tables included allow the automatic identification of the target compounds by the retention time of the peaks obtained in the chromatograms.

Technical information and results

Ar, CO₂, O₂ and N₂ impurities in high purity H₂ were continuously analyzed using a ChromaTCD with H₂ as carrier gas. Chromatographic run of **10 min** allowed the separation and quantification of the main impurities present in the sample (Figure 1).

The instrument can be calibrated in ambient air (Figure 2). A two streams multiplexing systems allows to analyze the sample and the ambient air for calibration.

As shown in Figure 3, the instrument is very stable and robust (**RSD of 0.15%** in 8h for O₂+Ar concentration). Therefore, it does not need maintenance on a daily basis.

Conclusion

We have presented here a highly repeatable, specific, linear and very sensitive analytical system for the simultaneous detection of most important contaminants in pure gases (hydrogen) in 10 min.

Its ease of use makes the device perfectly suitable for the quality monitoring of pure gases.

The security for filament protection included leads to an increased TC D lifetime.

This cylinder free autonomous solution with Hydroxichrom generator is also available in ATEX version.

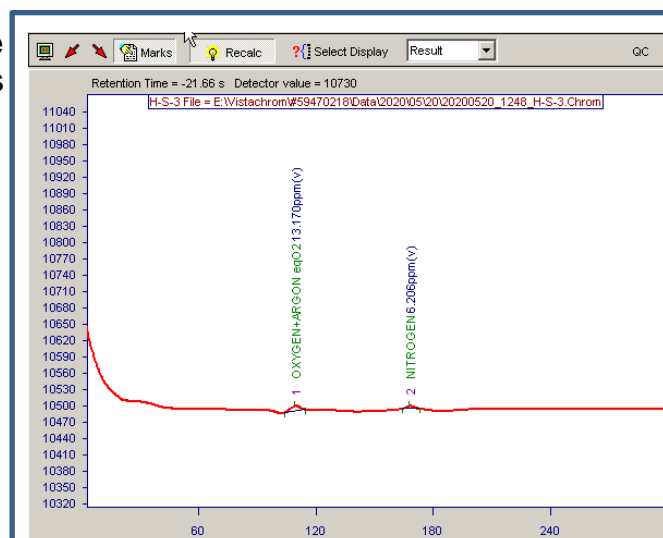


Fig. 1: Impurities in H₂.

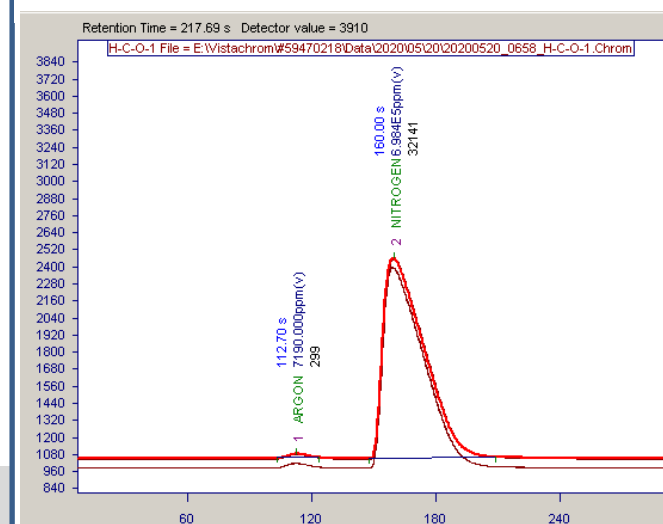


Fig. 2: Ambient air calibration.



Fig. 3: Stability of the system for concentration (ppm).