ANALYSIS OF PERMANENT GASES IN DIFFERENT MATRIX USING PLASMADETEK

The goal of this application is to analyze permanent gases in different matrix used for electronic industry. The investigation of these impurities is important for gas providers to ensure the high purity of their products to their customers.

This analyzer has been configured with two independent channels, each one dedicated to one matrix. The system is based on a GC Clarus 580 from Perkin Elmer equipped with electronic pressure regulators. Two high quality 10 ports diaphragm valves with internal purge ensure sample injection directly on-column and matrix backflush. The precolumn is a semi-capillary Plot Q 30m x 530um column. The analytical column is a Molsieve 5A 30m x 530um column with a by-pass flow to elute CO_2. Two detectors Plasmadetek with two internal detectors each are used to quantify the components. The signal coming from each PED is sent to the acquisition software Totalchrom.
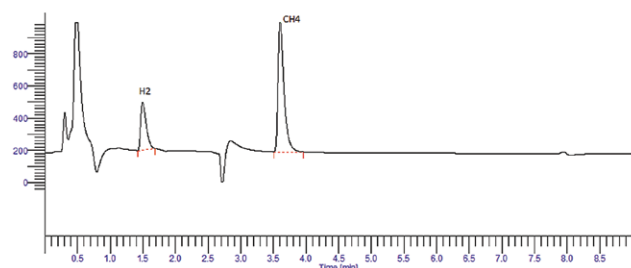

Figure 1

Figure 2

A 5 ppm standard of each permanent gas has been used to calibrate the system and determine LOQ for each component. The chromatograms shown below illustrate the results we can obtain from this configuration. The chromatogram in figure 2 is obtained with the detector optimized for H_2 and CH_4. The chromatogram in figure 3 is obtained with the detector optimized for N_2, CO and CO_2.

Figure 3

COMPONENT	CONC. (PPM)	PEAK HEIGHT	NOISE	S/N	LOD (PPB) S/N=3	LOQ (PPB) S/N=5
H_2	5	296	0.02	14800	1.0	1.7
CH_4	5	808	0.02	40400	0.4	0.6
CO_2	5	223	0.02	11150	1.3	2.2
N_2	5	793	0.02	39650	0.4	0.6
CO	5	110	0.02	5500	2.7	4.5

Figure 4

The use of Plasmadetek in this system provides excellent results regarding sensibility and selectivity. The Plasmadetek is ideal for this kind of analyses because it can support high volume of sample injection and we can adjust Make Up gas flow to obtain a suitable chromatogram. The installation of Plasmadetek on a Clarus GC is easy and don't need physical modification of the GC. Its design is in full harmony with the GC whose all parts are accessible for an easy modification (figure 5).

One of the main advantages of Plasmadetek is that it is maintenance free, so that gives a robust system for long analyses sequences in the laboratory or for on-line measuring analyzers. The large range of concentrations (from ppb to %) and the available selectivity of Plasmadetek make this detector ideal to work in a lot of domains where GC is necessary.
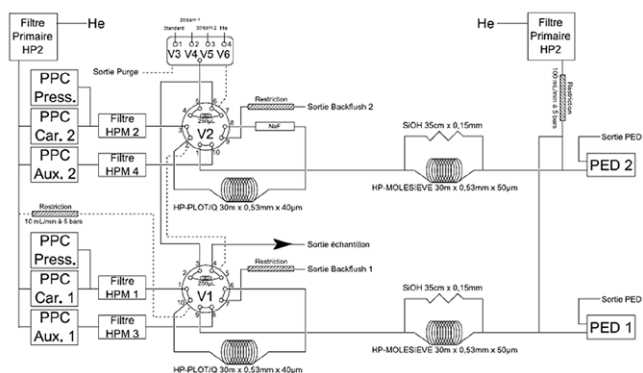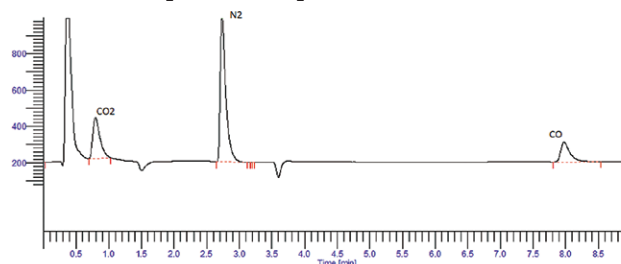

Figure 5