APPLICATION NOTE
LD16-07

Measurement of impurities in UHP Argon using the MultiDetek 2 and PlasmaDetek 2

▲ MultiDetek2 ▲ PlasmaDetek2

Argon is a widely used gas in different needs such as steel industries, air separation, welding, purging, chemical plants, semiconductor and others. Having a good analytical tool is mandatory to ensure the required purity of argon.

The most popular technique for UHP argon analysis is to detect trace impurities by gas chromatography. Some of the most common technologies will use a combination of multiple detectors to achieve the analysis requirements. Most commonly used are FID (flame ionization detector) combined with PDD (pulse discharge detector). This technique requires the need of helium as carrier gas what is an expensive gas to be used as carrier gas for the analysis of H2-N2-CO-CO2. The analyses of hydrocarbons will be performed using the FID what requires extra cost due to air and fuel. On top of that, the oxygen analysis must be performed using a separated trace oxygen analyzer due to the co elution of argon and oxygen in the gas chromatography system with helium ionization detection technique.

LDETEK SOLUTION:

The MultiDetek 2 combined with the PlasmaDetek 2 detector provides an ideal solution to measure the different impurities in UHP argon. With the PlasmaDetek 2, based on plasma emission detection, impurities in low ppb can be easily detected.

The system is simply configured with 3 channels and one plasma detector. Each channel has its own chromatography column mounted in a compact isothermal oven. A simple injection with sampling loop technique mounted on a diaphragm valve is used to introduce the sample gas to the detector.

Channel 1 to trace H2-O2-N2-CH4-CO
Channel 2 to trace CO2
Channel 3 to trace NMHC (NMHC can be measured as required hydrocarbon equivalent depending on the need)

A diaphragm valve network is used for synchronizing the impurities to the plasma detector.

Figure 1 shows a chromatogram of such system with a standard gas containing trace impurities in a balance of Argon. Figure 2 shows the LDL that such Argon purity system can achieve based on noise level to signal ratio calculation.

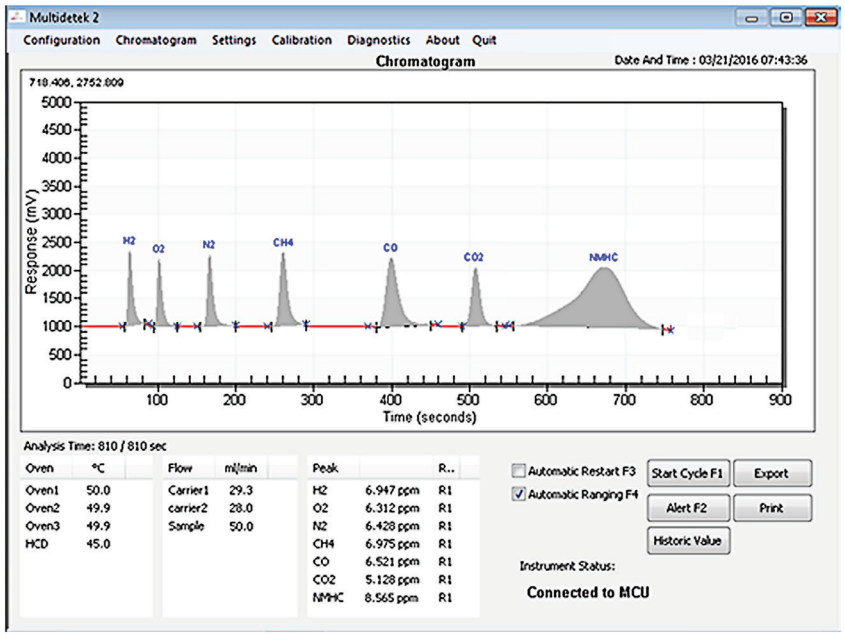

Figure 1

COMPONENT	CONCENTRATION	PEAK HEIGHT	NOISE	LDL (3X NOISE)
H_2	6.947 ppm	2391 mV	5 mV	0.043 ppm
O_2	6.312 ppm	2311 mV	4.3 mV	0.035 ppm
N_2	6.428 ppm	2377 mV	2 mV	0.016 ppm
CH_4	6.975 ppm	2390 mV	4.1 mV	0.036 ppm
CO	6.521 ppm	2270 mV	5.2 mV	0.045 ppm
CO_2	5.128 ppm	2168 mV	4.6 mV	0.033 ppm
NMHC	8.565 ppm	2201 mV	3.1 mV	0.036 ppm

Note: other LDL could be obtained with different injection volume and chromatographic condition

Figure 2

CONCLUSION:

Using the MultiDetek 2 compact GC, it becomes the most convenient solution for argon purity analysis. It is a maintenance free system that offers the required performances. The use of argon as carrier gas entails a low cost of operation. On top of that, the MultiDetek2 offers all the features required by the industrial market for such type of application.

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