

APPLICATION NOTE

LD23-04

PST
PROCESS SENSING
TECHNOLOGIES



Analysis of trace impurities in UHP Argon



▲ MultiDetek3

▲ PlasmaDetek2
patent US 9,310,308 B2

The Argon has many commercial and industrial usages. To name just a few, it is used as shield gas in welding and as an inert gas to prevent oxidation in heat treatment processes for metal/titanium production and 3D printing.

Argon is industrially extracted from liquid air in a cryogenic air separation unit by means of fractional distillation.

LDETEK SOLUTION

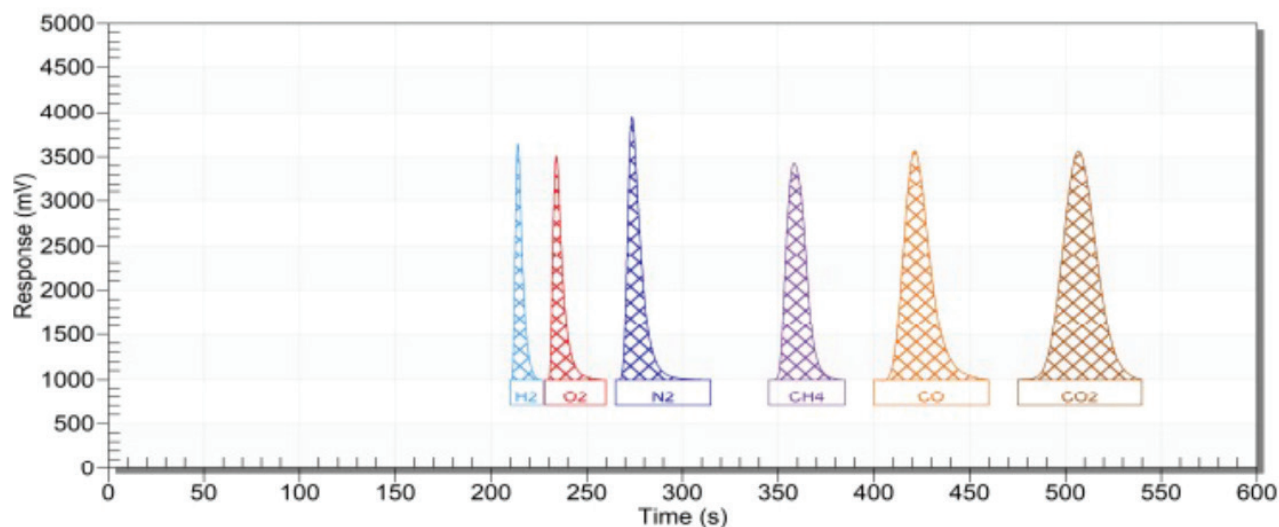
Measuring trace ppb/ppm impurities in UHP Argon with the MultiDetek3 gas chromatograph using an Argon PED carrier gas makes the best analytical instrument capable of measuring all impurities in one online analyzer. The argon carrier makes the analyser operating cost low while the performances stays excellent.

The unit has been configured with measuring range of 0-50ppm and Idl of 25-50 ppb for impurities H₂-O₂-N₂-CH₄-CO-CO₂.

Other configurations and ranges/Idls are possible. The parameters mostly depend of the site production requirements and process.

RESULTS

Chromatograms (Span calibration) of trace impurities H₂-O₂-N₂-CH₄-CO-CO₂ in balance gas Argon

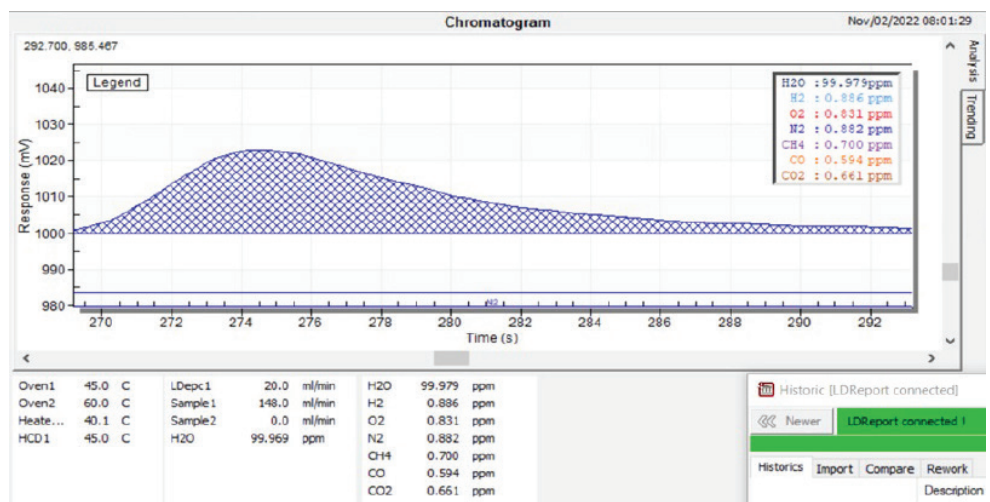
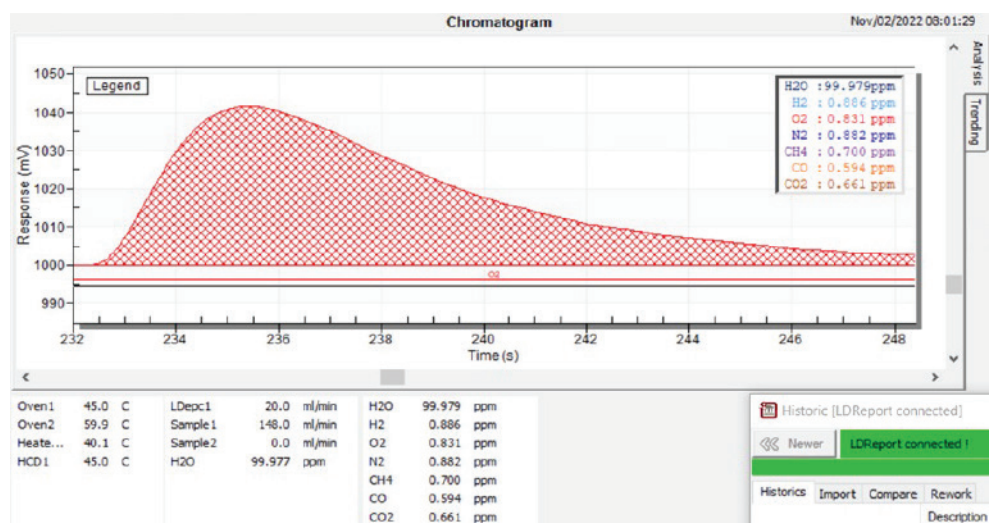
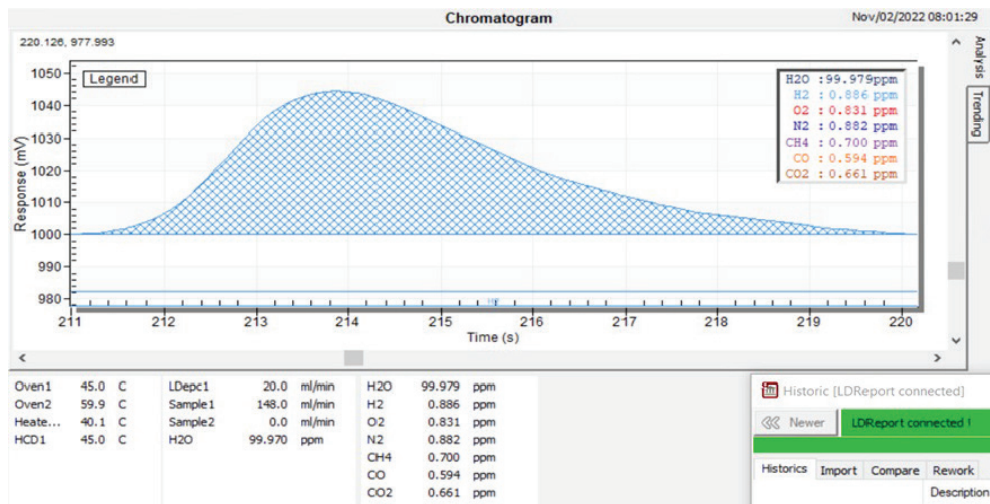


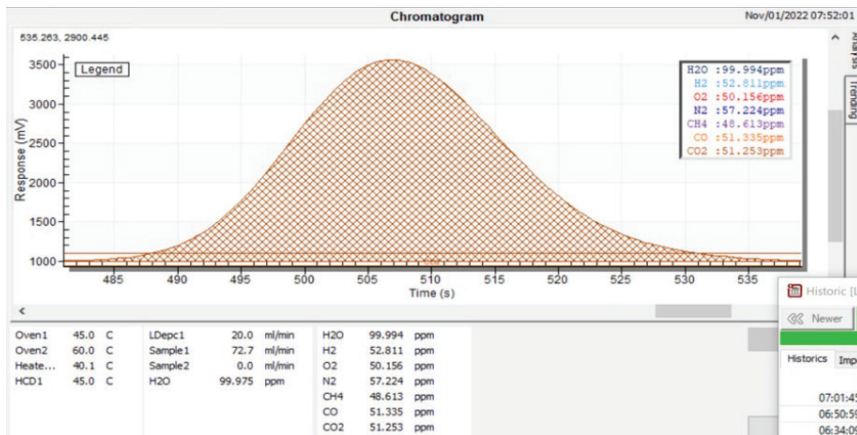
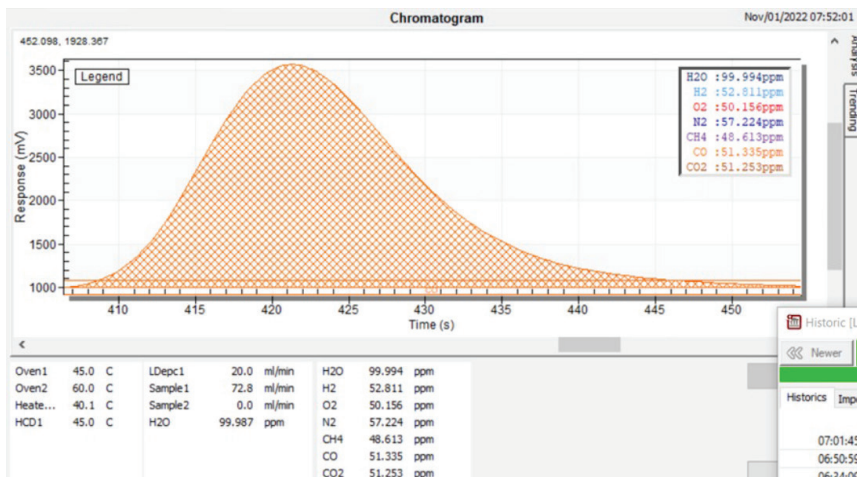
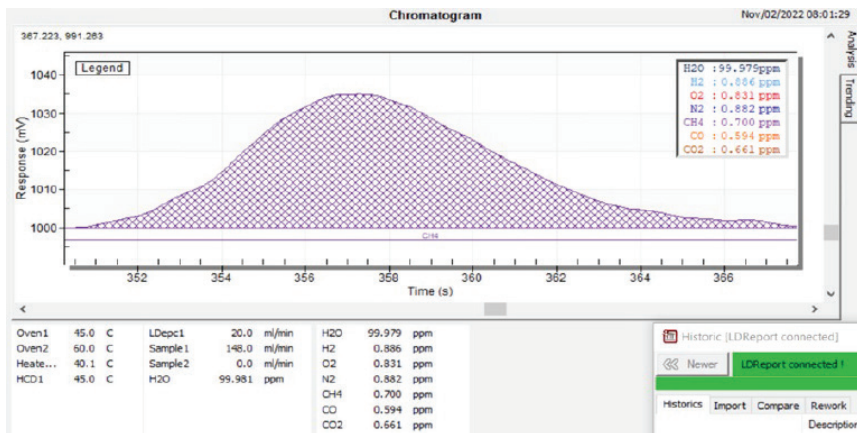
Peak	Unit	Calibration Value	_Area Counts
H ₂	ppm	52.52	1831
O ₂	ppm	49.50	11831
N ₂	ppm	104.00	28684
CH ₄	ppm	47.72	5485
CO	ppm	50.59	6762
CO ₂	ppm	51.19	11477

Limit of detection (based on 3 times the noise level from a blank)

COMPONENTS	CONCENTRATION (ppb)	PEAK HEIGHT	NOISE	LDL (3X NOISE)
H ₂	0.8	44mV	0.43mV	23ppb
O ₂	0.8	42mV	0.46mV	26ppb
N ₂	0.8	24mV	0.21mV	21ppb
CH ₄	0.7	36mV	0.39mV	23ppb
CO	51.3	2601mV	0.76mV	45ppb
CO ₂	51.2	2557mV	0.56mV	34ppb

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





Repeatability: Based on the GC standards. Using 6 of 10 consecutive runs, being lower than 5% of $3 \times CV\%$

Linearity: Based on the GC standards. A linear curve having its R^2 at a value between 0.998 and 1.00.

Accuracy: Based on the GC standards. $\leq 1\%$ of error or Idl whichever is higher

CONCLUSION

The MultiDetek3 configured with an Argon PED offers a good analytical solution for trace ppb/ppm impurities for quality and validation of UHP Argon. The gas chromatograph is configured with standard industrial communication protocols and remote-control interface. The platform is modular to adapt any of additional requirement in terms of UHP Argon production. The MultiDetek3 is a very robust gas analyzer configured for industrial market to run 24/7.



990 Monfette Est, Thetford Mines, (Qc), Canada, G6G 7K6
Phone: 418 755-1319 • Fax: 418 755-1329 • info@ldetek.com

www.ldetek.com