APPLICATION NOTE
LD20-02

MultiDetek2 gas chromatograph with PlasmaDetek2 detector uses for hydrogen isotopes separation and the analysis of impurities in Deuterium

▲ MultiDetek2 ▲ PlasmaDetek2

LDETEK SOLUTION:

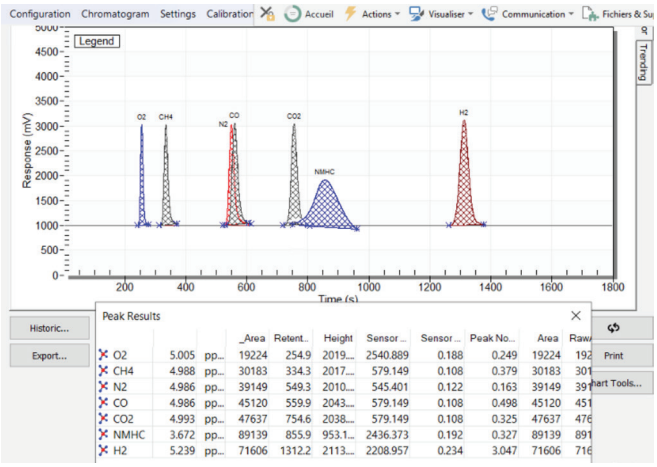
The complex analysis of the impurities in a sample gas containing high purity deuterium (D2) can be realized with our gas chromatograph model MultiDetek2. The detector uses for the trace impurities is the PlasmaDetek2, which is configured with its selective optics to obtain the best selectivity and sensitivity to the required impurities to measured. The requirements here was a range of 10ppm and 100ppm capable of detecting down to 10ppb limit of detection for each impurity. The GC has been coupled with our cryo system to realize the separation of the hydrogen isotopes without interference in a relative short analysis time.

Sample composition of deuterium (D2):

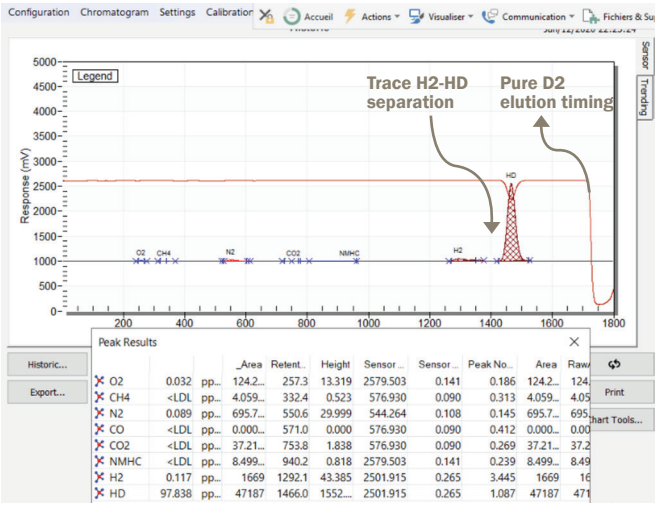
IMPURITIES	RANGE	SYSTEM LDL	SYSTEM LOQ
O_2	0-10 ppm	10 ppb	50 ppb
CH_4	0-10 ppm	10 ppb	50 ppb
N_2	0-10 ppm	10 ppb	50 ppb
CO	0-10 ppm	10 ppb	50 ppb
CO_2	0-10 ppm	10 ppb	50 ppb
NMHC	0-10 ppm	10 ppb	50 ppb
H_2	0-10 ppm	10 ppb	50 ppb
HD	0-100 ppm	10 ppb	50 ppb
D_2	100 %	---	---

RESULTS

Chromatogram of trace ppm impurities O2-CH4-N2-CO-CO2-NMHC-H2 in pure D2 (deuterium)



Chromatogram of trace ppm impurity HD (hydrogen deuteride) in pure D2 (deuterium)



This chromatogram shows the good separation of the hydrogen isotopes H2-HD-D2 by using our PED detector combines with our MultiDetek2 cryo system.

COMPONENT	CONCENTRATION	PEAK HEIGHT	NOISE	LDL (3X NOISE)
O_2	5.005 ppm	2019 mV	1.3 mV	9.66 ppb
CH_4	4.988 ppm	2017 mV	1.2 mV	8.90 ppb
N_2	4.986 ppm	2010 mV	0.9 mV	6.69 ppb
CO	4.986 ppm	2043 mV	1.5 mV	10.9 ppb
CO_2	4.993 ppm	2038 mV	1.4 mV	10.2 ppb
NMHC	3.672 ppm	953 mV	0.9 mV	10.4 ppb
H_2	5.239 ppm	2113 mV	1.2 mV	8.92 ppb
HD	97.838 ppm	1552 mV	0.07 mV	13.2 ppb

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

CONCLUSION:

The MultiDetek2 gas chromatograph uses with the PlasmaDetek2 detector and the LDetek cryo column cooling system all in one unit can measured trace impurities in deuterium. The system is capable to achieve a full ppm range with 10ppb limit of detection. The separation of the hydrogen isotopes is easily realized by maintaining the micro packed column in a cryogenic environment. The system is rackmount and compact offering a full remote control. The industrial communication protocols are all built in and must simply be selected specifically for your requirements.

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