

LDetek CHROMATOMag

SECOND EDITION

PETROCHEMICAL
FORMAL DEHYDE ETHANE PROPANE ARGON ISOBUTANE ACETONE
SAFETY NITRIC OXIDE I-BUTENE HYDROGEN KRYPTON OXYGEN PHOSPHINE
FOOD XENON NEON HELIUM SILANE METHANE
ENVIRONMENT CARBON DIOXIDE PROPANE PROPYLENE
NITROGEN N-BUTANE ETHYLENE SULFUR DIOXIDE HYDROGEN SULFIDE
BEVERAGE CARBON MONOXIDE TETRAFLUOROMETHANE
DIFLUOROETHANE NITROUS OXIDE ACETYLENE
INDUSTRIAL GASES METHYL CHLORIDE NITRIC DIOXYDE
PHARMACEUTICAL ARSINE ACETAL DEHYDE
MEDECINE CARBONYL SULFIDE
AGRICULTURE GREENHOUSE GASES
METHYL CHLORIDE



▲ MultiDetek2

▲ PlasmaDetek-2

In constant innovation,
LDetek can now offer the PlasmaDetek series and MultiDetek2 with Argon, Helium or Nitrogen as carrier gas to achieve ppm/ppb detection.



Where innovation leads to success

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PLASMADETEK₂

INTELLIGENT PLASMA EMISSION DETECTOR SYSTEM FOR GAS CHROMATOGRAPH



Patent pending

This microprocessor based plasma emission detector system gives all the tools to the GC integrator, manufacturer and user to integrate a plug and play detection system. With its customizable configuration capability, a detector has never been so intelligent.

IN A GLANCE:

- **Argon, Helium or Nitrogen carrier gas**
- No dead volume design
- All in one detector by replacing existing technologies commonly used
- Selective and non-selective configuration
- Analog or digital interface
- Wide range of applications
- Easy to interface with any GC and analyzer design
- PPB to % detection
- Very stable signal
- Maintenance free
- Fast installation and tune up
- Configuration software
- Possibility of customizable protocol to control the device
- Detect organic and inorganic compounds, permanent gases and noble gases (including Ne)

MULTIDETEK₂

MICRO GC FOR MULTIPLE IMPURITIES



With its plug and play philosophy, offering more features than ever LDetek pushes further the possibilities with its new chromatograph system. It provides an attractive and cost effective solution for the industrial and laboratory market.

Based on the LDetek high performances Plasma Emission Detector technology, this stand-alone Gas Chromatograph is a flexible and customized platform providing the best solution for any type of gas analysis from ppb to % using Argon, Helium or Nitrogen as carrier gas.

The use of Nitrogen as carrier gas can now be achieved and brings new possibilities and promising benefits for improving gas detection. Patent pending system.

FEATURES & DESIGN:

- Multi-trace impurities in one chassis
- Multiple configurations available in one chassis
- Based on the PlasmaDetek technology
- **Use Argon, Helium or Nitrogen carrier gas**
- Isothermal and/or programmed ramping ovens available
- LDetek's electronic mass flow controllers for carrier & sample gas
- Optional integrated purifier for generating high purity carrier gas in the chassis
- Easy maintenance with its slide out design
- Compact & robust industrial rackmount 6U chassis
- ppb to % application
- Large 8.4" LCD touch screen & user-friendly interface
- High performance diaphragm valves
- Ethernet connectivity for remote control
- Profibus/Modbus communication protocols
- Data storage software (LDchrom)

NEW ERA



OF LIGHT HYDROCARBON MEASUREMENT

Looking for a **SAFE, SENSITIVE, LOW OPERATION COST** and **MAINTENANCE FREE** system?

The patent pending **PlasmaDetek-E** is the solution



SAFE

No fuel (H_2) and no related safety accessories



SENSITIVE

< 1 ppb lowest detection possible



LOW OPERATION COST

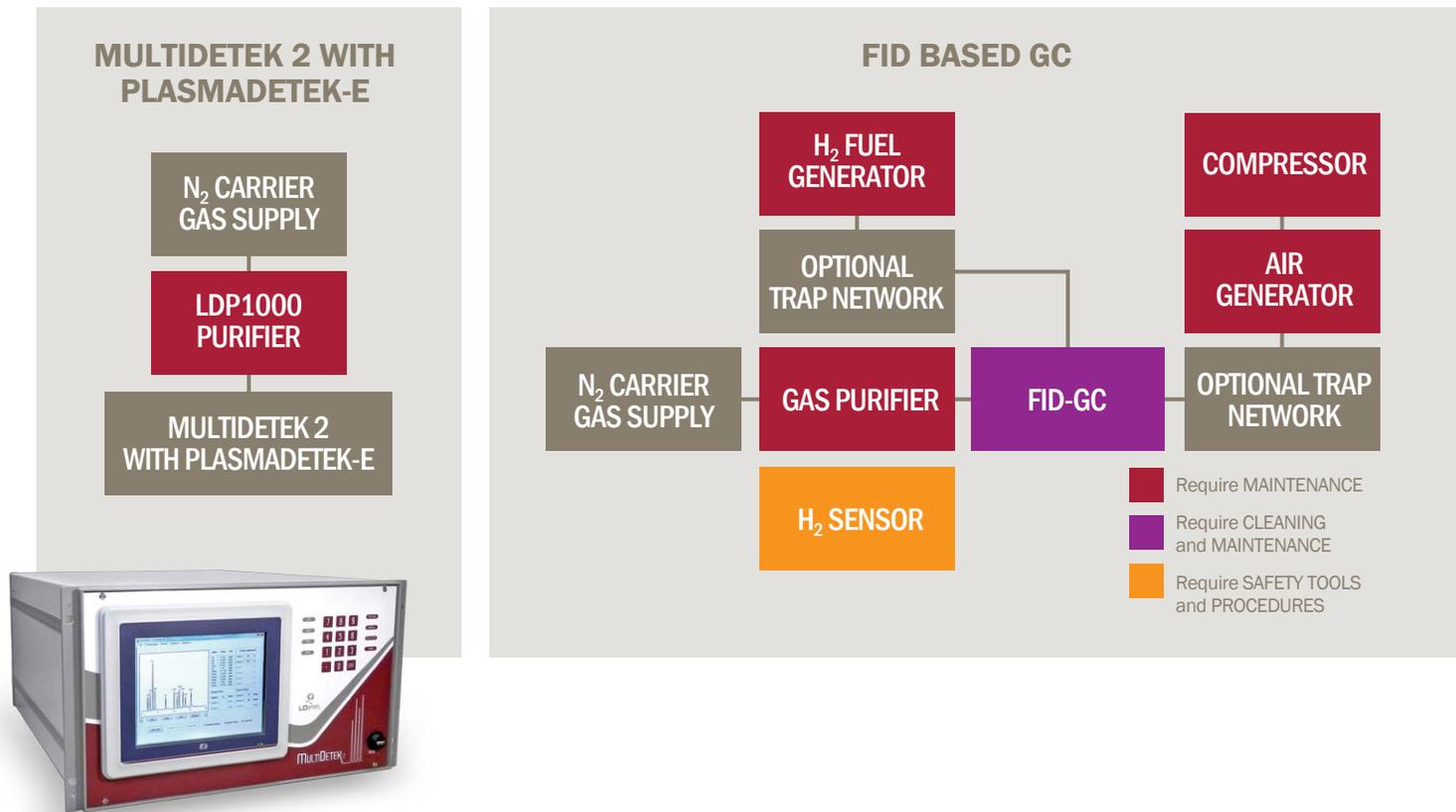
Only N_2 carrier gas supply



MAINTENANCE FREE

No periodic detector cleaning

TYPICAL INSTALLATION for light hydrocarbon measurement



INSTALLATION COST* COMPARISON

Parts	MultiDetek 2 with PlasmaDetek-E	FID-GC
H ₂ generator	N/A	\$7200
Zero air generator	N/A	\$2125
Air compressor	N/A	\$1200
H ₂ safety accessories	N/A	\$1500
2 year maintenance cost	\$2000	\$5000
Total cost*	\$2000	\$17 025

* costs are approximate and may vary for each system

N/A: not applicable

Please consult Application Note LD14-01 on LDetek web site for more technical details.

LDetek is proud to publish its second ChromatoMag edition. The goal of this publication is to demonstrate some of the capabilities using the PlasmaDetek series stand alone gas detector system and the micro GC MultiDetek series.

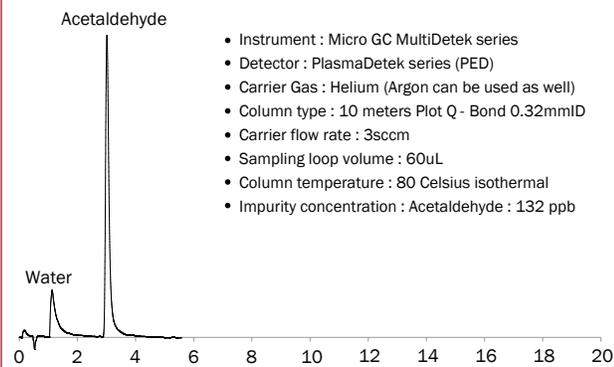
This magazine shows a variety of chromatograms that have been run in different conditions:

- The chromatograms show analysis of numerous impurities at different concentration level to see the sensitivity level of the PlasmaDetek.
- **The use of Argon, Helium or Nitrogen as carrier gas has been demonstrated to show the extended possibilities of the PlasmaDetek. With the worldwide Helium shortage and continuous Helium price increasing, the use of Argon and Nitrogen as carrier gas is more and more attractive.**
- The components have been analyzed using different types of columns; Plot, Micro Packed, Packed at different flows and different temperatures. It demonstrates the capacity of the plasma to work easily with low and high carrier flow.
- Some of the analyses have been performed with different matrix gases to show the advantages of using the PlasmaDetek in its selective mode. The selectivity of the detectors can be adjusted depending on the application for being sensitive to desired impurities and block the matrix gas. It simplifies the chromatography configuration and can reduce the analysis time.
- On every chromatogram, the system conditions have been described. It is a good tool for developing method using the PlasmaDetek technology.

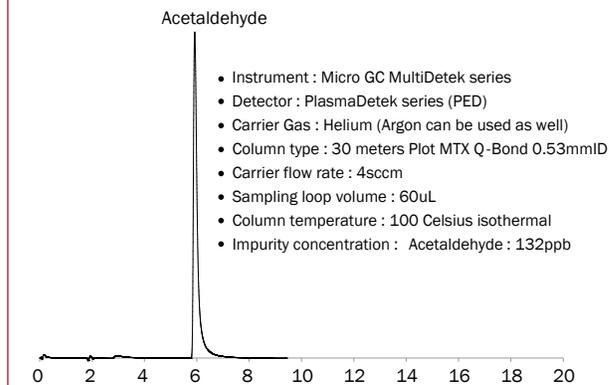
If you have an application for which you would like to have a quotation for the PlasmaDetek or the MultiDetek, at the end of the magazine, you will find the PlasmaDetek and the MultiDetek guidelines. Feel free to fill the form with the details about your application and send it back to info@ldetek.com. A LDetek representative will get back to you with a detailed quotation.

For more information, please contact LDetek at info@ldetek.com or visit our LDetek web site at www.ldetek.com.

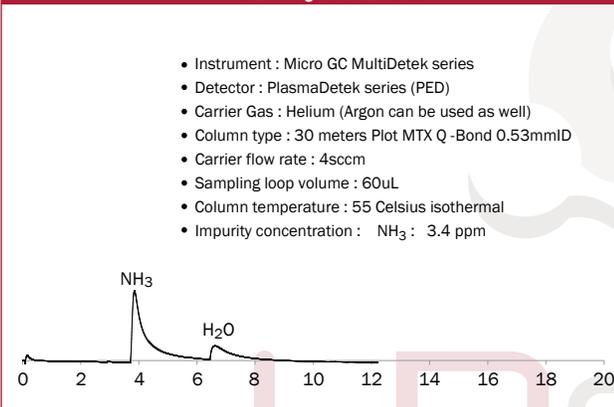
TRACE ACETALDEHYDE ANALYSIS



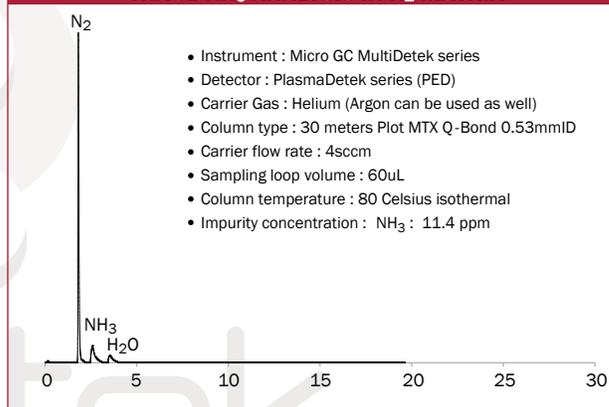
TRACE ACETALDEHYDE ANALYSIS



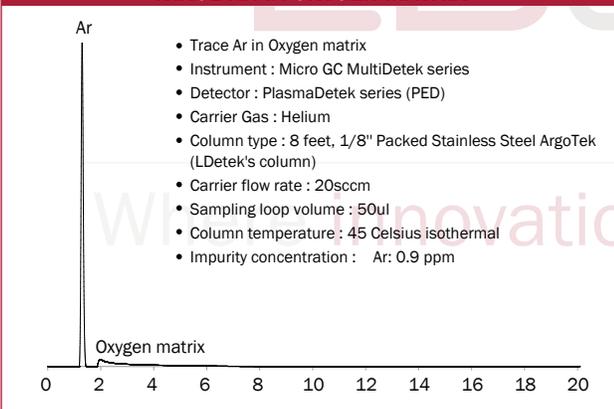
TRACE NH₃ ANALYSIS



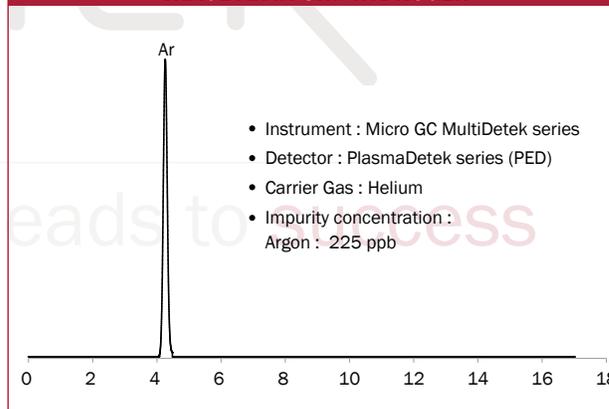
TRACE NH₃ ANALYSIS IN N₂ MATRIX



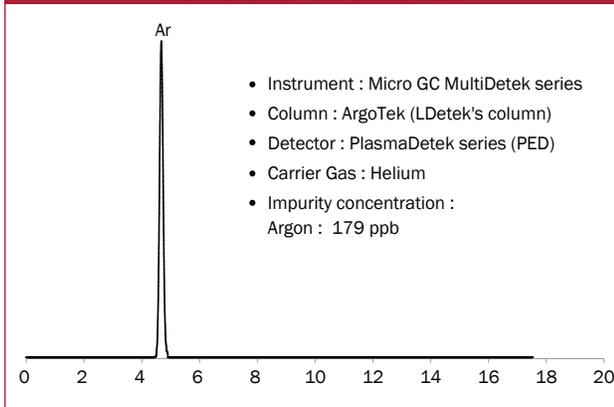
TRACE AR IN OXYGEN MATRIX



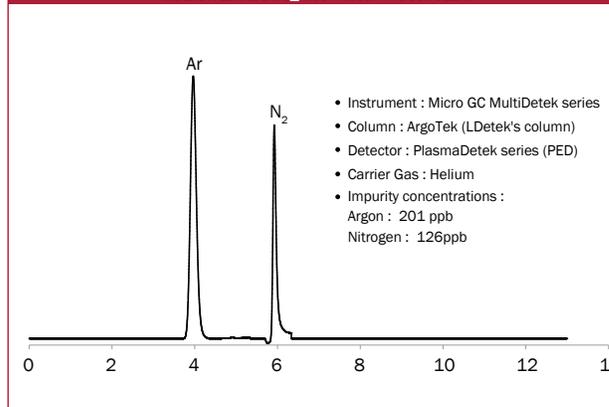
TRACE AR IN UHP HYDROGEN



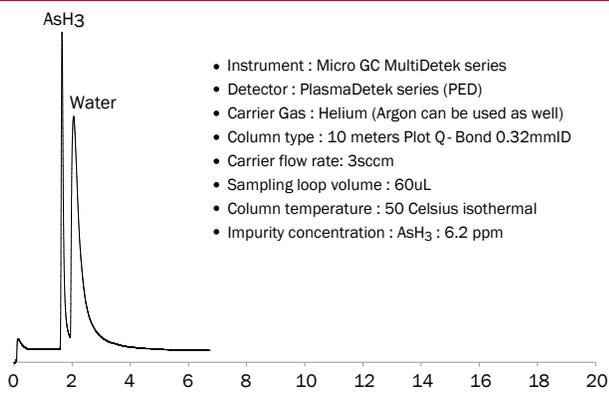
TRACE AR IN UHP NITROGEN



TRACE AR-N₂ IN UHP OXYGEN

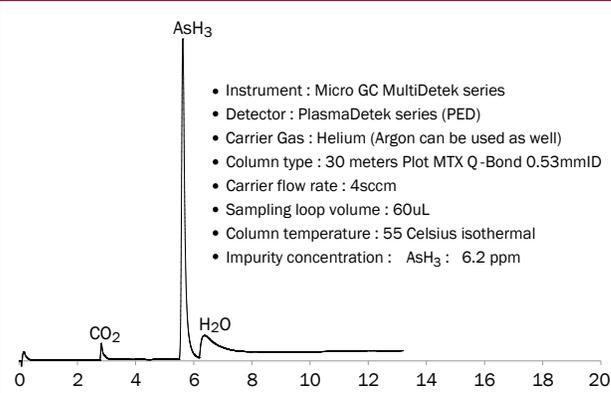


TRACE ARSINE ANALYSIS



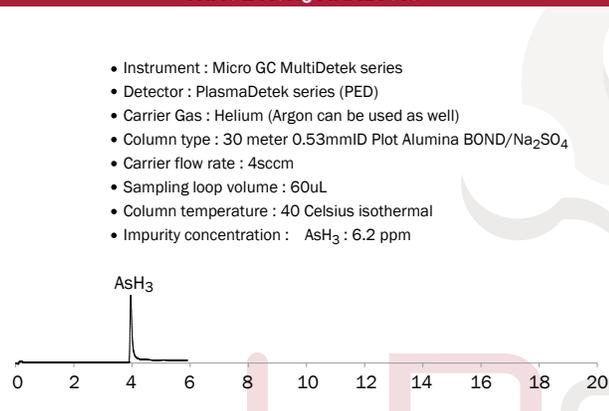
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 10 meters Plot Q - Bond 0.32mmID
- Carrier flow rate : 3scm
- Sampling loop volume : 60uL
- Column temperature : 50 Celsius isothermal
- Impurity concentration : AsH₃ : 6.2 ppm

TRACE AsH₃ ANALYSIS



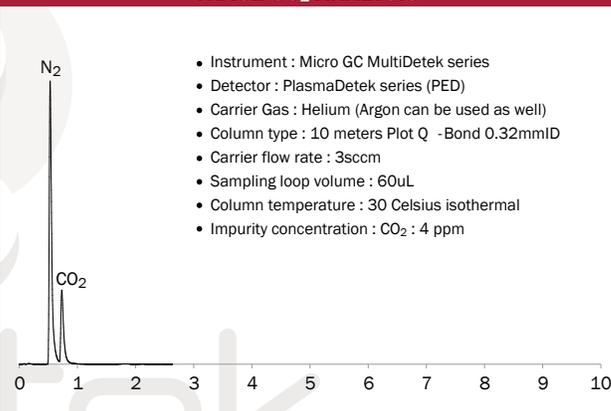
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 30 meters Plot MTX Q - Bond 0.53mmID
- Carrier flow rate : 4scm
- Sampling loop volume : 60uL
- Column temperature : 55 Celsius isothermal
- Impurity concentration : AsH₃ : 6.2 ppm

TRACE AsH₃ ANALYSIS



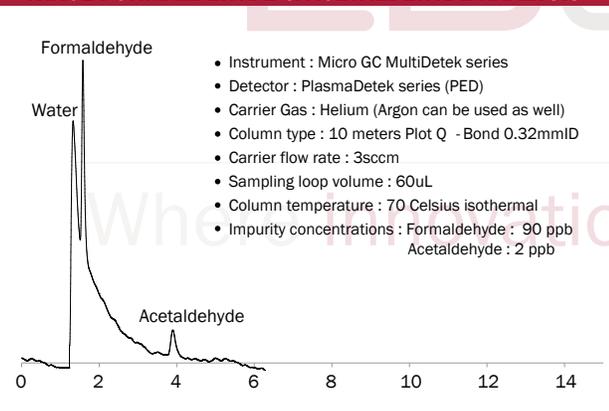
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 30 meter 0.53mmID Plot Alumina BOND/Na₂SO₄
- Carrier flow rate : 4scm
- Sampling loop volume : 60uL
- Column temperature : 40 Celsius isothermal
- Impurity concentration : AsH₃ : 6.2 ppm

TRACE CO₂ ANALYSIS



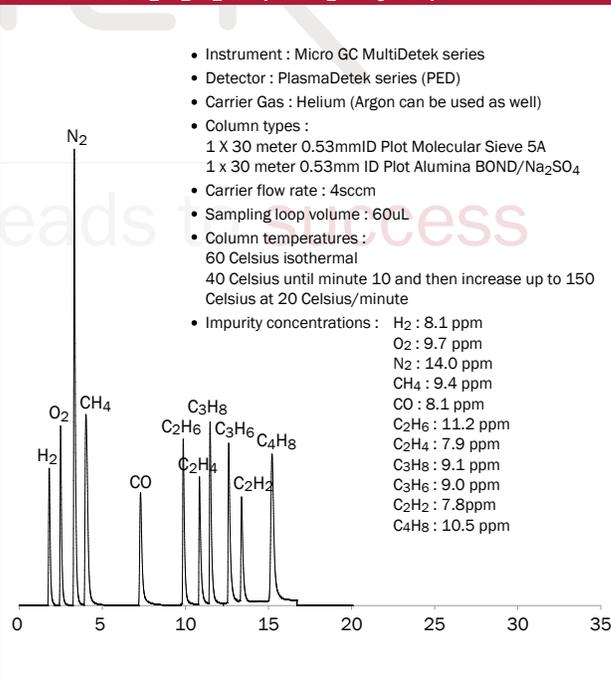
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 10 meters Plot Q - Bond 0.32mmID
- Carrier flow rate : 3scm
- Sampling loop volume : 60uL
- Column temperature : 30 Celsius isothermal
- Impurity concentration : CO₂ : 4 ppm

TRACE FORMALDEHYDE & ACETALDEHYDE ANALYSIS



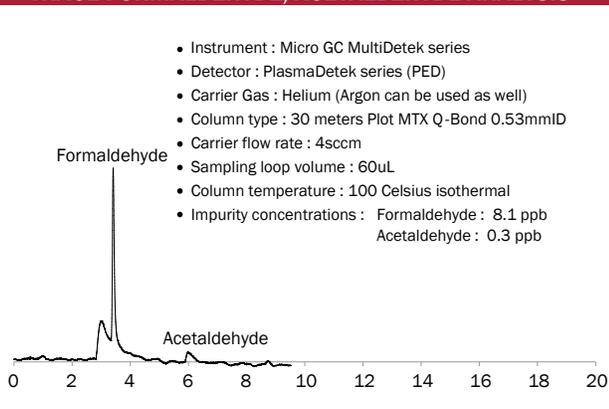
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 10 meters Plot Q - Bond 0.32mmID
- Carrier flow rate : 3scm
- Sampling loop volume : 60uL
- Column temperature : 70 Celsius isothermal
- Impurity concentrations : Formaldehyde : 90 ppb
Acetaldehyde : 2 ppb

TRACE H₂-O₂-N₂-CH₄-CO-C₂'S-C₃'S-C₄'S ANALYSIS



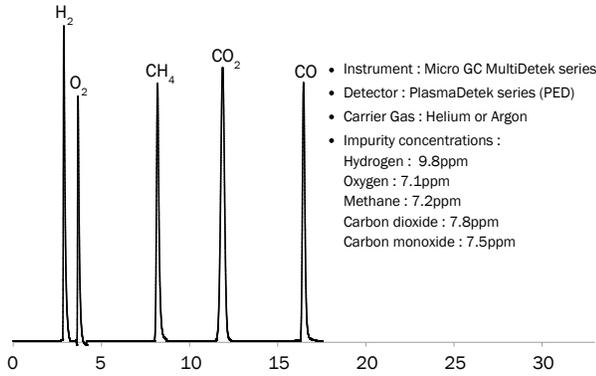
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column types :
1 X 30 meter 0.53mmID Plot Molecular Sieve 5A
1 x 30 meter 0.53mm ID Plot Alumina BOND/Na₂SO₄
- Carrier flow rate : 4scm
- Sampling loop volume : 60uL
- Column temperatures :
60 Celsius isothermal
40 Celsius until minute 10 and then increase up to 150 Celsius at 20 Celsius/minute
- Impurity concentrations : H₂ : 8.1 ppm
O₂ : 9.7 ppm
N₂ : 14.0 ppm
CH₄ : 9.4 ppm
CO : 8.1 ppm
C₂H₆ : 11.2 ppm
C₂H₄ : 7.9 ppm
C₃H₈ : 9.1 ppm
C₃H₆ : 9.0 ppm
C₂H₂ : 7.8 ppm
C₄H₈ : 10.5 ppm

TRACE FORMALDEHYDE, ACETALDEHYDE ANALYSIS

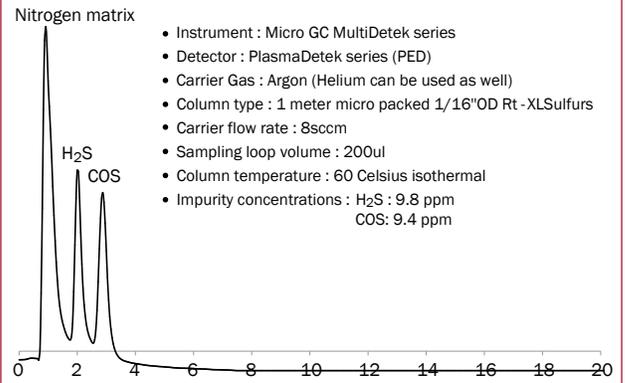


- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 30 meters Plot MTX Q - Bond 0.53mmID
- Carrier flow rate : 4scm
- Sampling loop volume : 60uL
- Column temperature : 100 Celsius isothermal
- Impurity concentrations : Formaldehyde : 8.1 ppb
Acetaldehyde : 0.3 ppb

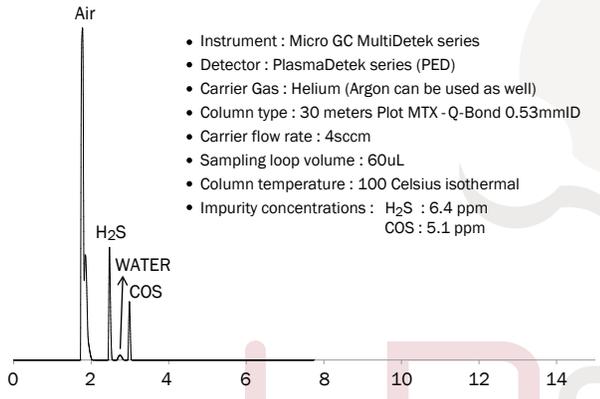
TRACE H₂-O₂-CH₄-CO₂-CO IN HYDROGEN CHLORIDE (HCL)



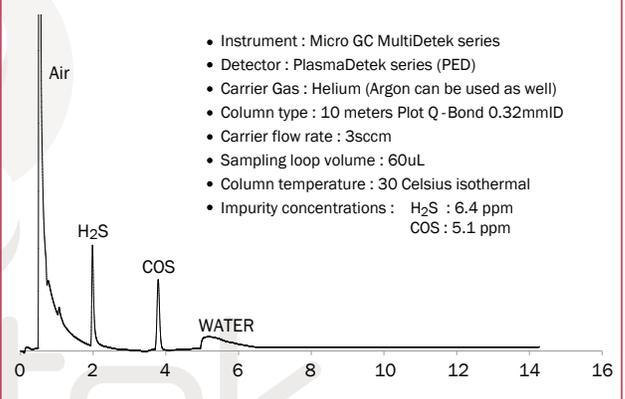
TRACE H₂S-COS ANALYSIS IN NITROGEN MATRIX



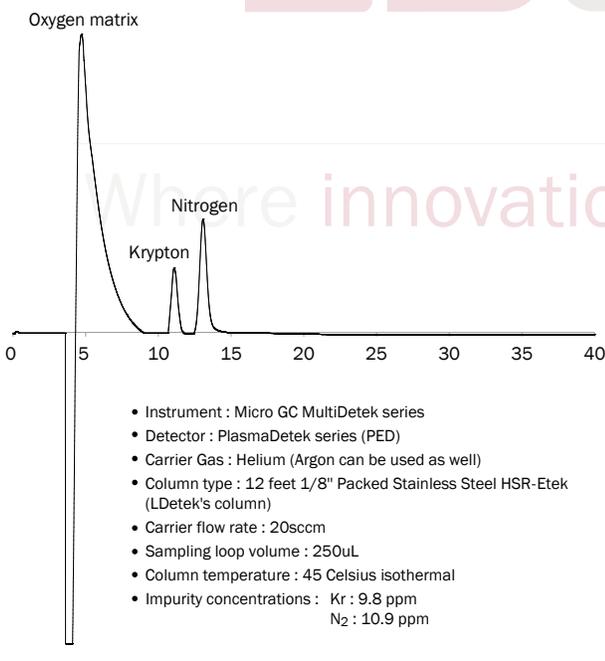
TRACE H₂S-COS ANALYSIS IN SYNGAS OR AIR



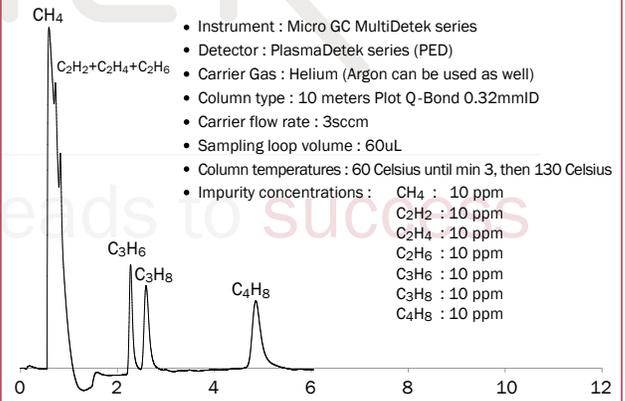
TRACE H₂S-COS ANALYSIS IN SYNGAS OR AIR



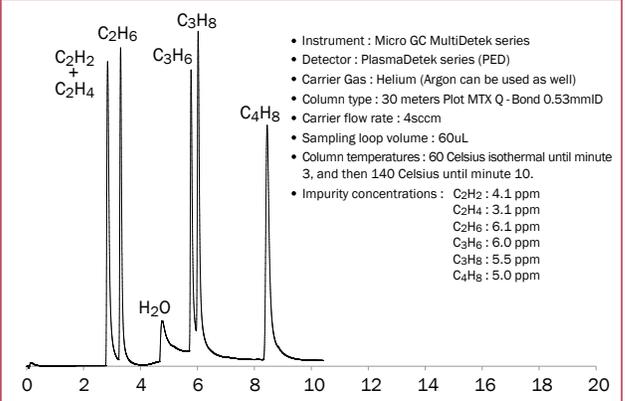
TRACE KR-N₂ ANALYSIS IN OXYGEN MATRIX



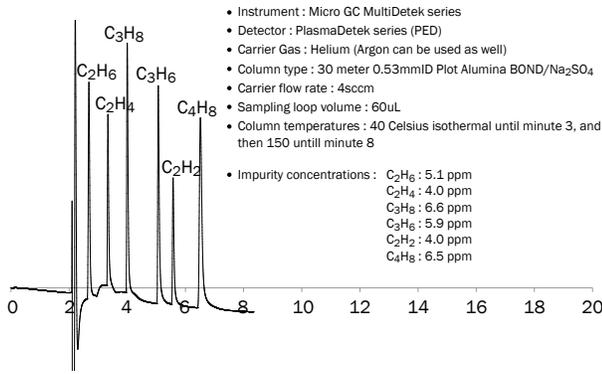
TRACE LIGHT HYDROCARBONS ANALYSIS



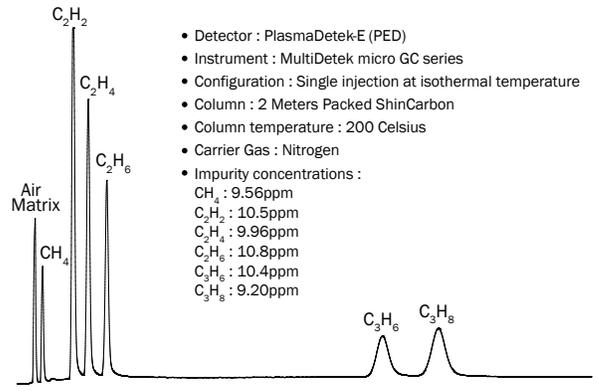
TRACE C₂'S-C₃'S-C₄'S ANALYSIS



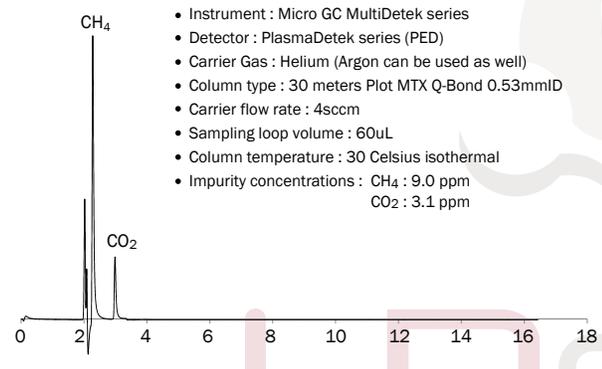
TRACE C₂'S-C₃'S-C₄'S ANALYSIS IN N₂ MATRIX



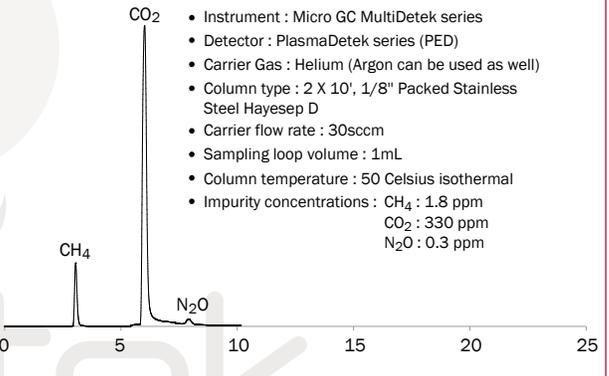
TRACE HYDROCARBONS IN AIR



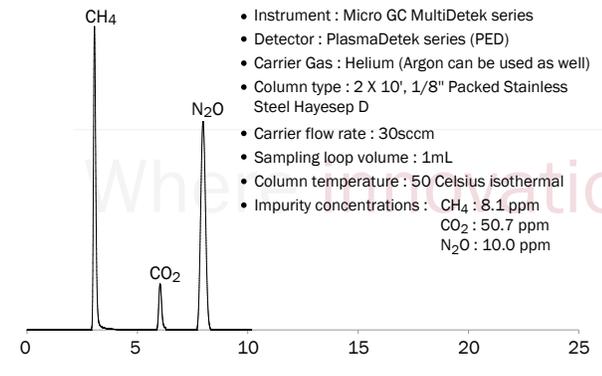
TRACE CH₄-CO₂ analysis



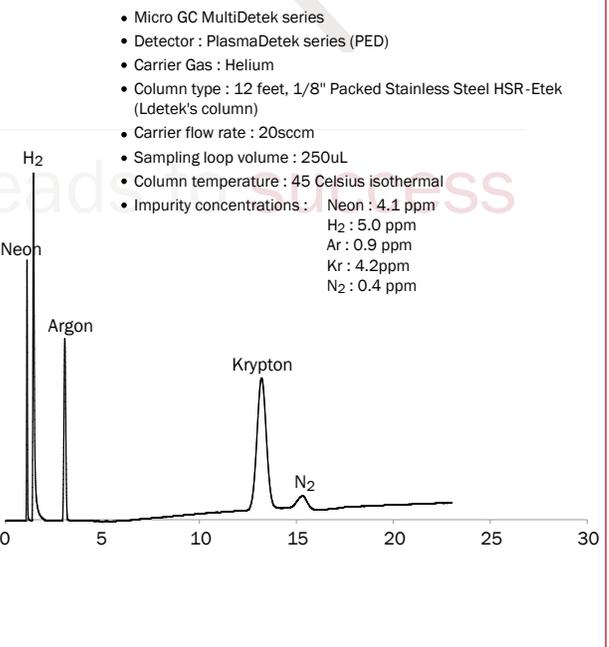
TRACE CH₄-CO₂-N₂O ANALYSIS IN AIR



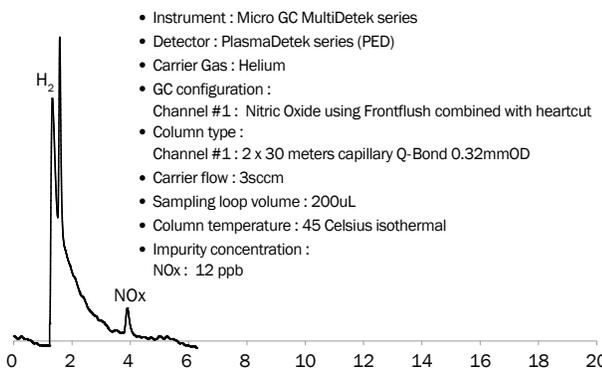
TRACE CH₄-CO₂-N₂O ANALYSIS



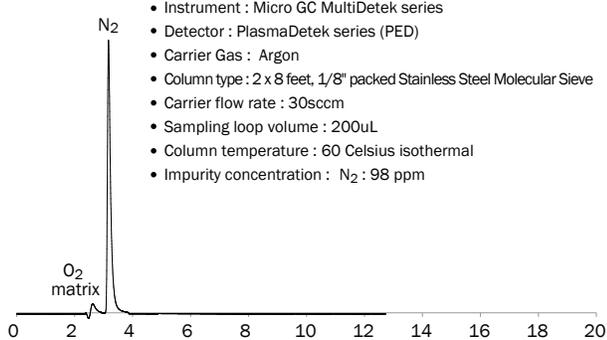
TRACE NE-H₂-AR-KR-N₂ ANALYSIS



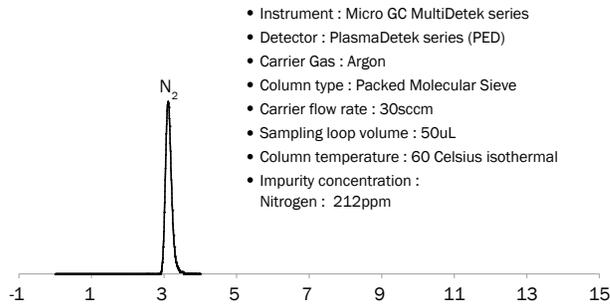
TRACE PPB NO_x IN BULK HYDROGEN



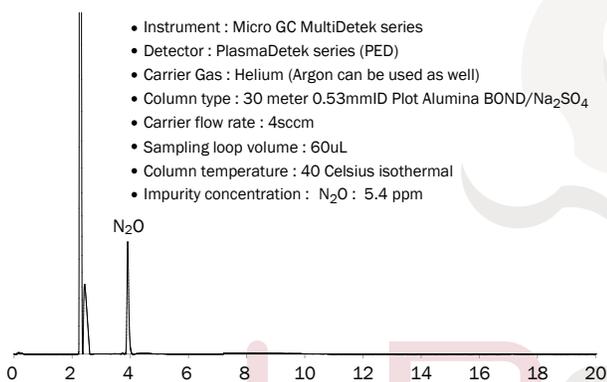
TRACE N₂ IN CRUDE ARGON



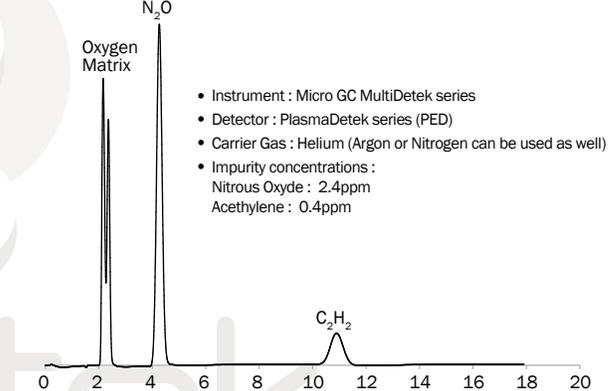
TRACE N₂ IN CRUDE ARGON (90% OXYGEN/10% ARGON)



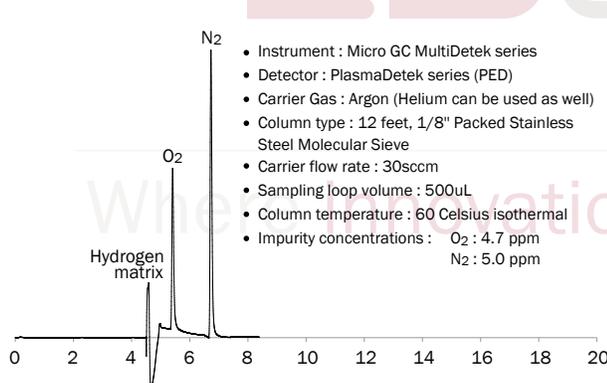
TRACE N₂O ANALYSIS IN ARGON MATRIX



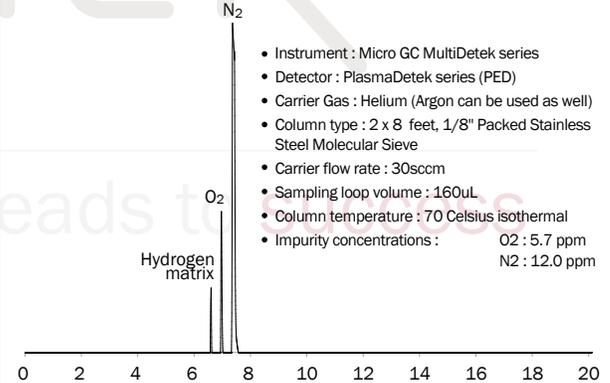
TRACE N₂O-C₂H₂ IN OXYGEN



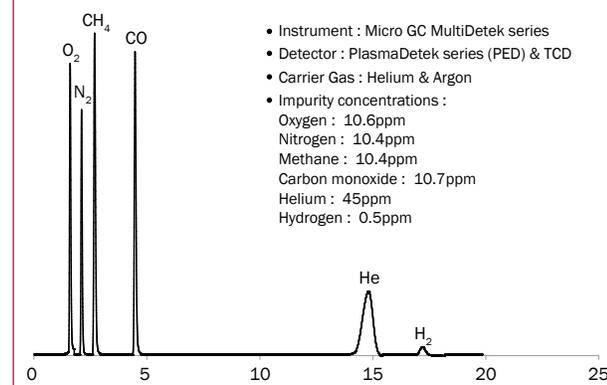
TRACE O₂-N₂ ANALYSIS IN HYDROGEN MATRIX



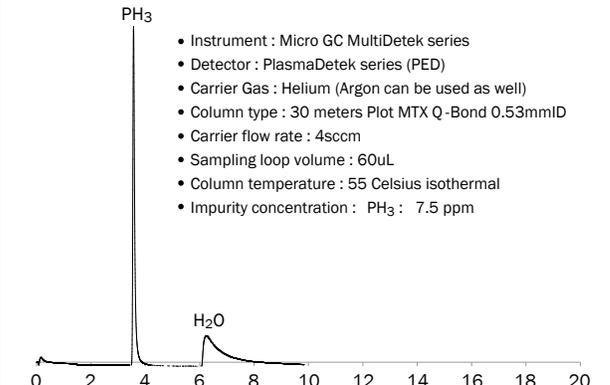
TRACE O₂-N₂ ANALYSIS IN HYDROGEN MATRIX



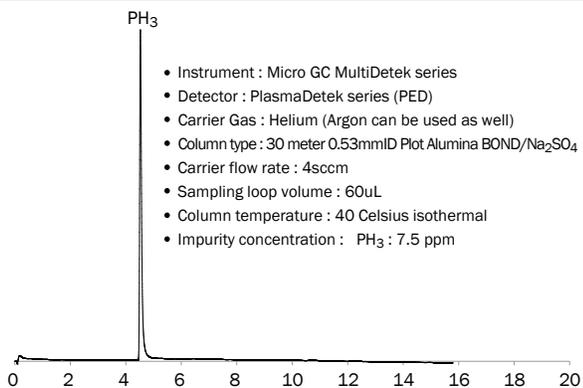
TRACE O₂-N₂-CH₄-CO-HE-H₂ IN NEON



TRACE PH₃ ANALYSIS

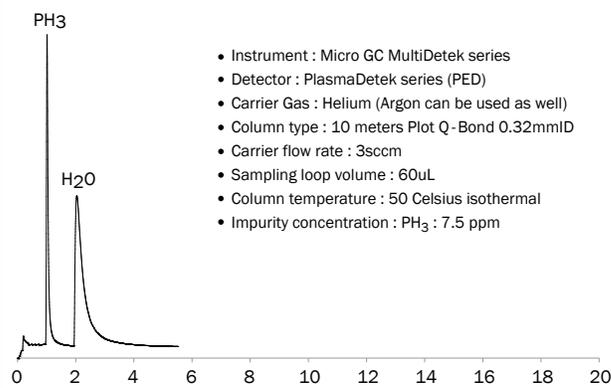


TRACE PH₃ ANALYSIS



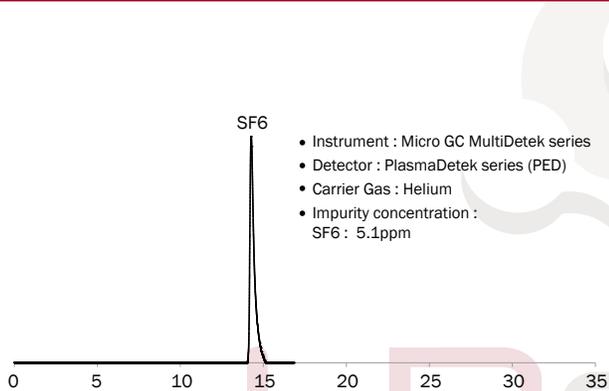
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 30 meter 0.53mmID Plot Alumina BOND/Na₂SO₄
- Carrier flow rate : 4sccm
- Sampling loop volume : 60uL
- Column temperature : 40 Celsius isothermal
- Impurity concentration : PH₃ : 7.5 ppm

TRACE PHOSPHINE ANALYSIS



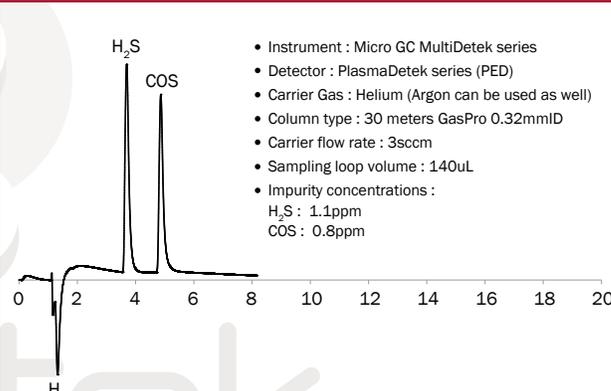
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 10 meters Plot Q - Bond 0.32mmID
- Carrier flow rate : 3sccm
- Sampling loop volume : 60uL
- Column temperature : 50 Celsius isothermal
- Impurity concentration : PH₃ : 7.5 ppm

TRACE SF₆ IN XENON



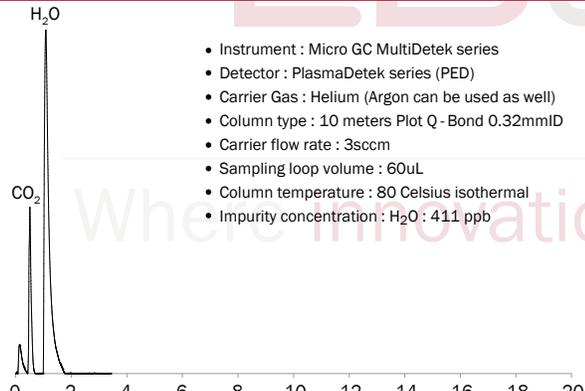
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium
- Impurity concentration : SF₆ : 5.1ppm

TRACE SULFURS IN HYDROGEN



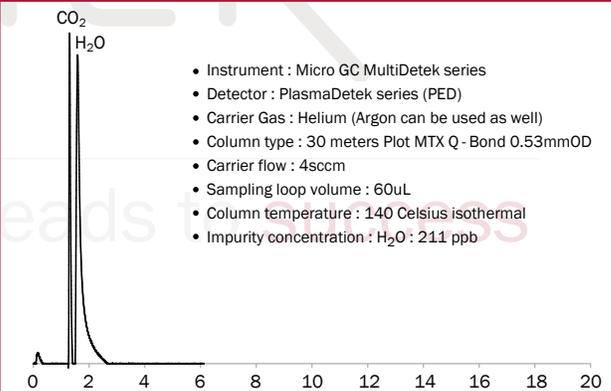
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 30 meters GasPro 0.32mmID
- Carrier flow rate : 3sccm
- Sampling loop volume : 140uL
- Impurity concentrations :
H₂S : 1.1ppm
COS : 0.8ppm

TRACE WATER ANALYSIS



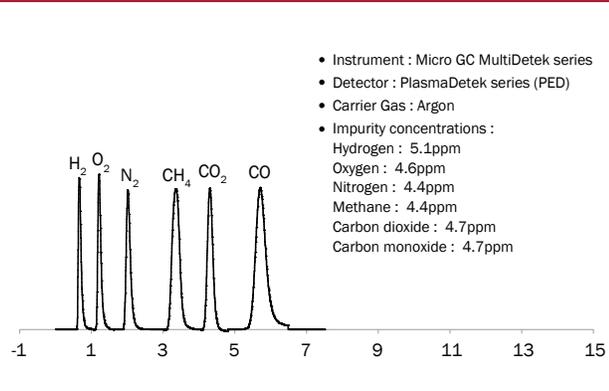
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 10 meters Plot Q - Bond 0.32mmID
- Carrier flow rate : 3sccm
- Sampling loop volume : 60uL
- Column temperature : 80 Celsius isothermal
- Impurity concentration : H₂O : 411 ppb

TRACE WATER ANALYSIS



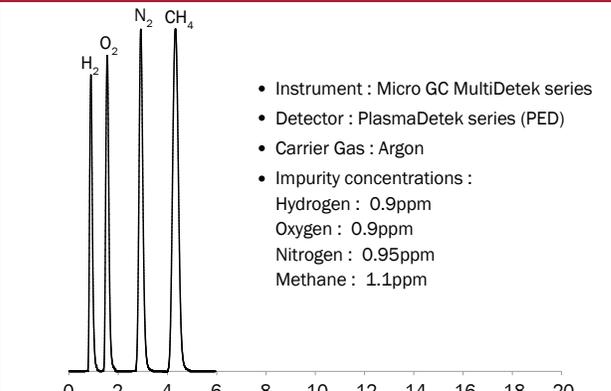
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium (Argon can be used as well)
- Column type : 30 meters Plot MTX Q - Bond 0.53mmOD
- Carrier flow : 4sccm
- Sampling loop volume : 60uL
- Column temperature : 140 Celsius isothermal
- Impurity concentration : H₂O : 211 ppb

TRACE PERMANENT GASES IN UHP ARGON



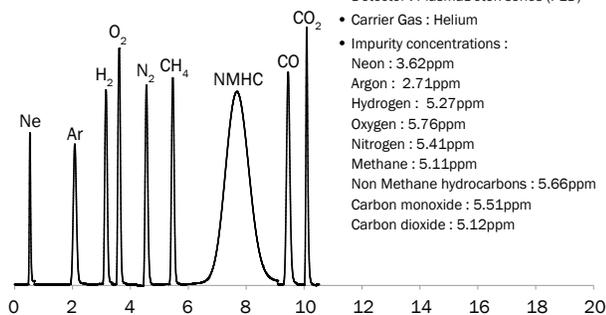
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Argon
- Impurity concentrations :
Hydrogen : 5.1ppm
Oxygen : 4.6ppm
Nitrogen : 4.4ppm
Methane : 4.4ppm
Carbon dioxide : 4.7ppm
Carbon monoxide : 4.7ppm

TRACE PERMANENT GASES IN UHP ARGON



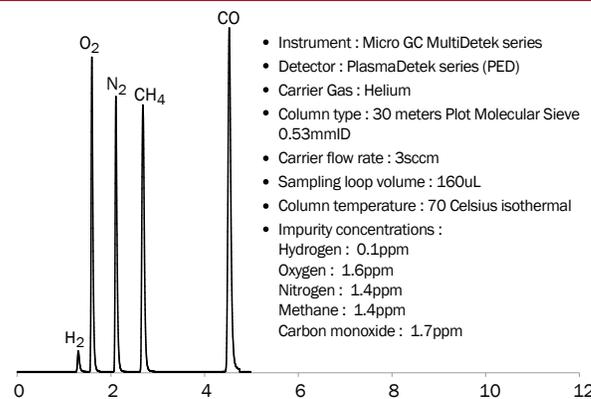
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Argon
- Impurity concentrations :
Hydrogen : 0.9ppm
Oxygen : 0.9ppm
Nitrogen : 0.95ppm
Methane : 1.1ppm

TRACE PERMANENT GASES IN UHP HELIUM



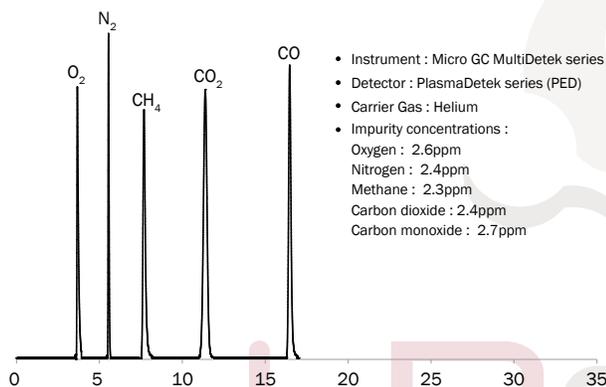
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium
- Impurity concentrations :
 Neon : 3.62ppm
 Argon : 2.71ppm
 Hydrogen : 5.27ppm
 Oxygen : 5.76ppm
 Nitrogen : 5.41ppm
 Methane : 5.11ppm
 Non Methane hydrocarbons : 5.66ppm
 Carbon monoxide : 5.51ppm
 Carbon dioxide : 5.12ppm

TRACE PERMANENT GASES IN UHP HELIUM



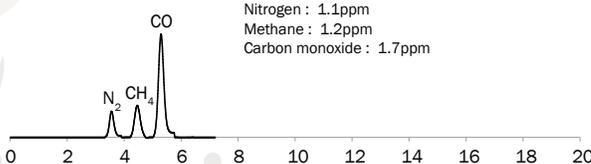
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium
- Column type : 30 meters Plot Molecular Sieve 0.53mmID
- Carrier flow rate : 3scm
- Sampling loop volume : 160uL
- Column temperature : 70 Celsius isothermal
- Impurity concentrations :
 Hydrogen : 0.1ppm
 Oxygen : 1.6ppm
 Nitrogen : 1.4ppm
 Methane : 1.4ppm
 Carbon monoxide : 1.7ppm

TRACE PERMANENT GASES IN UHP HYDROGEN



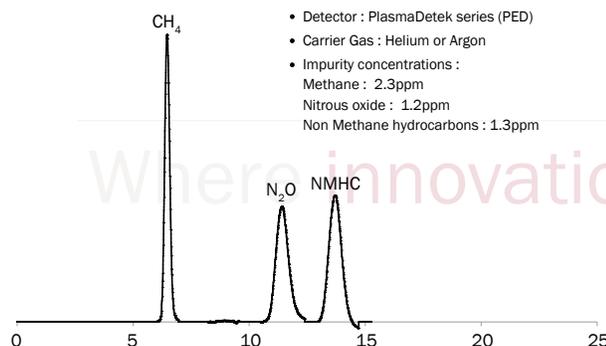
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium
- Impurity concentrations :
 Oxygen : 2.6ppm
 Nitrogen : 2.4ppm
 Methane : 2.3ppm
 Carbon dioxide : 2.4ppm
 Carbon monoxide : 2.7ppm

TRACE PERMANENT GASES IN UHP HYDROGEN



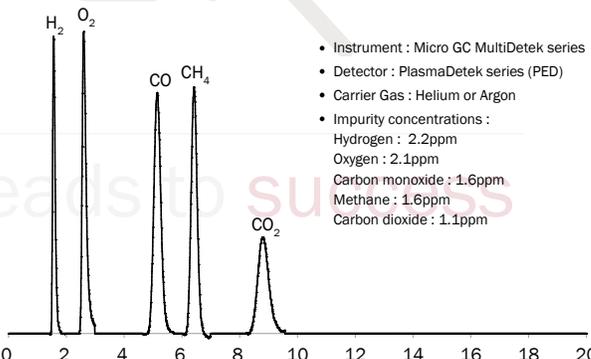
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Argon
- Impurity concentrations :
 Nitrogen : 1.1ppm
 Methane : 1.2ppm
 Carbon monoxide : 1.7ppm

TRACE PERMANENT GASES IN UHP NITROGEN



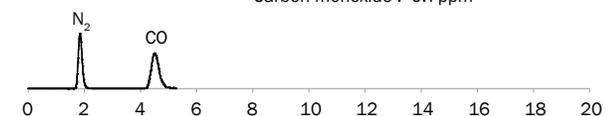
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium or Argon
- Impurity concentrations :
 Methane : 2.3ppm
 Nitrous oxide : 1.2ppm
 Non Methane hydrocarbons : 1.3ppm

TRACE PERMANENT GASES IN UHP NITROGEN



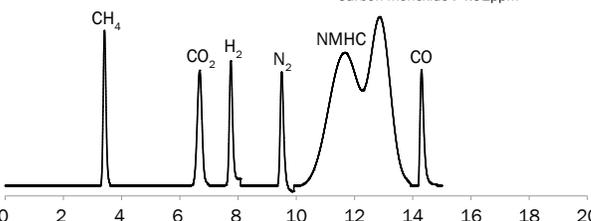
- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium or Argon
- Impurity concentrations :
 Hydrogen : 2.2ppm
 Oxygen : 2.1ppm
 Carbon monoxide : 1.6ppm
 Methane : 1.6ppm
 Carbon dioxide : 1.1ppm

TRACE PERMANENT GASES IN UHP OXYGEN



- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Argon
- Impurity concentrations :
 Nitrogen : 0.9ppm
 Carbon monoxide : 0.7ppm

TRACE PERMANENT GASES IN UHP OXYGEN



- Instrument : Micro GC MultiDetek series
- Detector : PlasmaDetek series (PED)
- Carrier Gas : Helium or Argon
- Impurity concentrations :
 Methane : 5.38ppm
 Carbon dioxide : 4.12ppm
 Hydrogen : 4.73ppm
 Nitrogen : 5.86ppm
 Non Methane hydrocarbons : 5.38ppm
 Carbon monoxide : 4.92ppm



INTELLIGENT PLASMA EMISSION DETECTOR SYSTEM FOR GAS CHROMATOGRAPH

The following form will help us designing a detection system that fits perfectly your needs. The more we know about your application, the better your PlasmaDetek will work for you.

YOUR GAS CHROMATOGRAPH

- 1) GC manufacturer and model: _____
- 2) GC input detector voltage scale (Volts): _____
- 3) Power supply (80 to 240 VAC; 50-60 Hz): _____
- 4) Column Type: _____
- 5) Operating temperature: _____
- 6) Chromatographic valves type: _____

APPLICATION REQUIRED

- 1) Gas composition:
- 2) Impurities to be measured:
- 3) Measurement range:
- 4) Lower detection limit:
- 5) Sample pressure and temperature:



Where **innovation** leads to **success**

271 St-Alphonse Sud, Thetford Mines, (Qc), Canada, G6G 3V7

Phone: 418 755-1319 • Fax: 418 755-1329 • info@ldetek.com • www.ldetek.com



MICRO GC FOR MULTIPLE IMPURITIES

The following form will help us designing a complete gas chromatograph that fits perfectly your needs. The more we know about your application, the better your MultiDetek will work for you.

TECHNICAL DETAILS

1) Power supply (80 to 240 VAC; 50-60 Hz): _____

APPLICATION REQUIRED

1) Gas composition: _____

2) Impurities to be measured: _____

3) Measurement range: _____

4) Lower detection limit: _____

5) Sample pressure and temperature: _____

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LDP1000



Gas purifier compatible with any trace gas analysis system

Ideal for gas calibration, the LDP1000 is a sub ppb purifier that calibrates gas for online analyzers as well as carries gas for chromatograph.

Designed with two steps of purification, this unique purifier ensures no undesired impurity is released during process.

WHY CHOOSE LDP1000 ?

- **2 beds of purification**
Allows perfect purification
- **RS-232 port**
Monitor the temperature of the 2 beds of purification
- **LEDs indication**
Self-diagnostic and status of the purifier
- **Cost effective solution for long-term use**
Interchangeable getter



NOTES



LDetek

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