APIX

ANALYTICS

www.apixanalytics.com

SUMMARY

About APIX Analytics

APIX Analytics (SA), a startup incorporated in June 2014, is the commercial emanation of 8 years of collaborative research between CEA (France) and California Institute of Technology (Caltech, USA). APIX is focused on the development of highly miniaturized multigas analyzers systems based on integration on silicon of traditional analytical chains: sampling, injection of gases, separation of complex gas mixtures to enhance specificity and then detection, identification and quantification of each mixture compound.

From Silicon Integration to Breakthrough Analyzers

Through miniaturization on Silicon, APIX Analytics changes the use model of Gas Chromatography, making it possible to bring a high performance analyzer to the sample, reducing operating costs and response time. Analyzing gases at the heart of the industrial process, monitoring complex environmental air samples in the field, or detecting security threats now become possible miles away from any laboratory infrastructure.

Key dates

2014
APIX Analytics SA
Creation of the company

2016

ChromPix® V1
Product launch

2017
nCx Instrumentation
Integration of the company

2018

ChromPix® V2
Product launch

2019

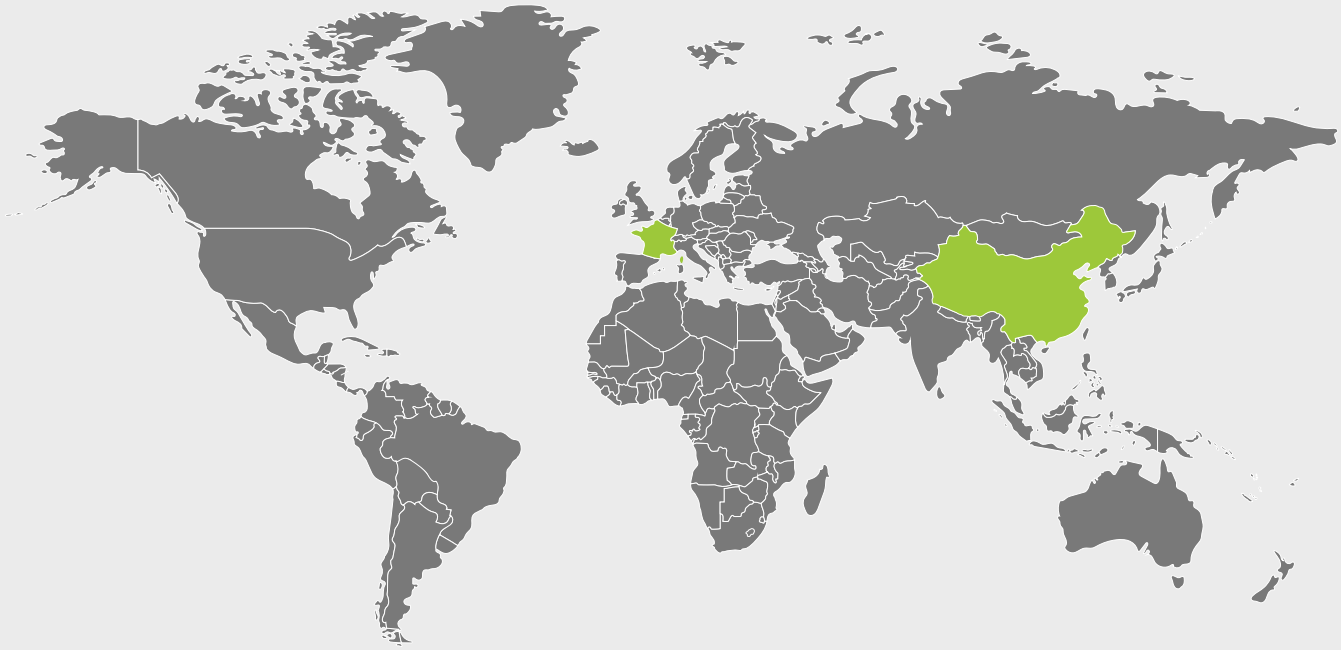
ChromEx 200
Product launch


NanoPix
Product launch

2020

Creation of the subsidiary company in China

Locations



PRODUCTS

ChromPix 2

MODULAR MULTI-GAS ANALYZER FOR INDUSTRIAL AND LABORATORY USE. BASED ON APIX ANALYTICS PATENTED MINIATURIZATION TECHNOLOGY, CHROMPIX2 IS THE FIRST TRULY PLUG&PLAY GC. IT NOW FEATURES UNMATCHED FLEXIBILITY WITH UP TO 4 DIFFERENT ANALYTICAL COLUMNS, UP TO 4 DIFFERENT CARRIER GASES AND THE ABILITY TO ANALYSE SIMULTANEOUSLY 4 DIFFERENT SAMPLES.

Features

450x460x220mm (19' 4U)
10 kg

100 – 240V AC, 50 – 60 Hz
150W consumption*

Carrier gas pressure : 4 bar
Sample gas pressure : 50-500 mbar

Up to 4 carrier gases (He, H_2, N_2, Ar)
Up to 4 analytical modules

Up to 2mL/min/module carrier gas
Up to 2mL/min/module sample gas

Operating T°C range : -10 to 40°C
Noise emission : 45 dB

** Depending on configuration*

Applications

NATURAL GAS ANALYSIS

Configuration with 2 modules : PPU and PDMS for the analysis of C1 to C6, CO_2, N_2. Can give the Calorific Value of Natural Gas.

BIOMETHANE ANALYSIS

Configuration with 4 modules: PPU x2, PDMS and MS5A for the analysis of C1 to C6, CO_2, N_2, H_2S, THT and TBM. Can give the Calorific Value of Biogas/ Biomethane, the H_2S content to monitor the purification and the THT/TBM for odorization.

C6+ ANALYSIS

Configuration with 4 modules : PPU, MS5A, PDMS and ALOX. Can give you the C1 to C10 analysis, alkanes and alkenes, H_2... Perfect for petrochemical analysis.

SPECIALTY GASES ANALYSIS

Several configurations available. Purity of He, H_2 measurement...

CERTIFICATIONS

CE marking

REFERENCES

Total | Air Liquide | Engie...

Modules

The module (or cartridge) is the basic analytical element of the ChromPix2. It is designed as a "plug and play" system. Once installed in upper compartment of the device and once the system is set up, control and data processing are fully assured via the PixLLab software (in the laboratory configuration) or via the PixLPro software (in the configuration of process monitoring).

THE ANALYTICAL MODULE INCLUDES:

- a mechanical injection system based on a diaphragm valve,
- a temperature-regulated guard column (depending on the nature of the analytical modules),
- a temperature-regulated GC capillary column,
- a micro-TCD detector or NGD (Nano Gravimetric Detector) detector with silicon technology.

SEVERAL TYPES OF MODULES ARE PROPOSED, EACH BEING EQUIPPED WITH A COLUMN WHOSE STATIONARY PHASE IS RECOMMENDED FOR THE ANALYSIS OF STANDARD COMPOUNDS.

The temperature control ranges from 50°C to 120 °C for the injector and GC columns, and from 70°C to 120 °C for the µ-TCD / NGD detector. Depending on the type of module installed, a restricted range may be defined when setting up the software.

The mechanical injector allows one, for the modules equipped with a guard column, **to carry out a backflush and thus to reverse the direction of the carrier gas flow in the guard column** after the injection and during the analysis, in order to eliminate all residual gaseous compounds in the guard column.

The TCD detection technology provides a high sensitivity (of the order of ppm) over the entire range of permanent gases and heavy compounds up to C10, with a high speed of analysis. The typical duration of a measurement is a few minutes.

The NGD detection technology provides a high sensitivity (sub ppm) on heavier compounds up to C13.

TwinPix

MODULAR MULTI-GAS ANALYZER FOR INDUSTRIAL AND LABORATORY USE. BASED ON APIX ANALYTICS PATENTED MINIATURIZATION TECHNOLOGY, TWINPIX IS AN EASY TRANSPORTABLE GAS CHROMATOGRAPH. IT CAN HANDLE 2 ANALYTICAL MODULES AND IT HAS TO BE OPERATED WITH A REMOTE COMPUTER.

Features

340 x 230 x 245mm
5,2 kg

90 – 264V AC, 47 – 63 Hz
150W consumption*

Carrier gas pressure : 4 bar
Sample gas pressure : 50-500 mbar

2 carrier gas entries
Up to 2 analytical modules

Up to 2mL/min/module carrier gas
Up to 2mL/min/module sample gas

Operating T°C range : -10 to 40°C
Noise emission : 45 dB

** Depending on configuration*

Applications

NATURAL GAS ANALYSIS

Configuration with 2 modules : PPU and PDMS for the analysis of C1 to C6, CO_2, N_2. Can give the Calorific Value of Natural Gas.

BIOMETHANE ANALYSIS

Can work with 2 Twinpix: PPU x2, PDMS and MS5A for the analysis of C1 to C6, CO_2, N_2, H_2S, THT and TBM. Can give the Calorific Value of Biogas/ Biomethane, the H_2S content to monitor the purification and the THT/TBM for odorization.

C6+ ANALYSIS

Can work with 2 Twinpix: PPU, MS5A, PDMS and ALOX. Can give you the C1 to C10 analysis, alkanes and alkenes, H_2... Perfect for petrochemical analysis.

SPECIALTY GASES ANALYSIS

Several configurations available. Purity of He, H_2 measurement...

CERTIFICATIONS

ISO 9001:2015

REFERENCES

Total | AirLiquid | Engie | Becton Dickinson...

Modules

The module (or cartridge) is the basic analytical element of the TwinPix. It is designed as a "plug and play" system. Once installed in upper compartment of the device and once the system is set up, control and data processing are fully assured via the PixLLab software (in the laboratory configuration) or via the PixLPro software (in the configuration of process monitoring).

THE ANALYTICAL MODULE INCLUDES:

- a mechanical injection system based on a diaphragm valve,
- a temperature-regulated guard column (depending on the nature of the analytical modules),
- a temperature-regulated GC capillary column,
- a micro-TCD detector or NGD (Nano Gravimetric Detector) detector with silicon technology.

The temperature control ranges from 50°C to 120 °C for the injector and GC columns, and from 70°C to 120 °C for the µ-TCD / NGD detector. Depending on the type of module installed, a restricted range may be defined when setting up the software.

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The NGD detection technology provides a high sensitivity (sub ppm) on heavier compounds up to C13.

SEVERAL TYPES OF MODULES ARE PROPOSED, EACH BEING EQUIPPED WITH A COLUMN WHOSE STATIONARY PHASE IS RECOMMENDED FOR THE ANALYSIS OF STANDARD COMPOUNDS.

ChromEx 200/400

MODULAR MULTI-GAS ANALYZER FOR INDUSTRIAL AND PROCESS USE. BASED ON APIX ANALYTICS PATENTED MINIATURIZATION TECHNOLOGY, CHROMEX IS THE FIRST TRULY PLUG&PLAY GC. IT IS EMBEDDED IN AN ATEX ENCLOSURE AND IT CAN HANDLE 2 (CHROMEX 200) OR 4 MODULES (CHROMEX 400).

Features

ChromEx 200
485 x 405 x 280 mm (19' 4U) • 30,4 kg
ChromEx 400
596 x 526 x 290 mm • 39.2 kg

100 – 240V AC, 50 – 60 Hz
150W consumption*

Carrier gas pressure : 4 bar
Sample gas pressure : 30-500 mbar

1 carrier gases (He, H_2, N_2, Ar)
Up to 2/4 analytical modules

Up to 2mL/min/module carrier gas
Up to 2mL/min/module sample gas

Operating T°C range : -10 to 40°C
Noise emission : 45 dB

* Depending on configuration

Applications

NATURAL GAS ANALYSIS

Configuration with 2 modules : PPU and PDMS for the analysis of C1 to C6, CO_2, N_2. Can give the Calorific Value of Natural Gas.

BIOMETHANE ANALYSIS

Configuration with 4 modules: PPU x2, PDMS and MS5A for the analysis of C1 to C6, CO_2, N_2, H_2S, THT and TBM. Can give the Calorific Value of Biogas/ Biomethane, the H_2S content to monitor the purification and the THT/TBM for odorization.

C6+ ANALYSIS

Configuration with 4 modules : PPU, MS5A, PDMS and ALOX. Can give you the C1 to C10 analysis, alkanes and alkenes, H_2... Perfect for petrochemical analysis.

SPECIALTY GASES ANALYSIS

Several configurations available. Purity of He, H_2 measurement...

CERTIFICATIONS

ATEX II 2 G EX DB IIc T5 GB | IECEX
ISO 9001:2015 | CE Marking

REFERENCES

Total | AirLiquide | Engie | Hengchen (CNPC China)...

Modules

The module (or cartridge) is the basic analytical element of the Chromex. It is designed as a «plug and play» system. Once installed in upper compartment of the device and once the system is set up, control and data processing are fully assured via the PixLPro software (in the configuration of process monitoring).

SEVERAL TYPES OF MODULES ARE PROPOSED, EACH BEING EQUIPPED WITH A COLUMN WHOSE STATIONARY PHASE IS RECOMMENDED FOR THE ANALYSIS OF STANDARD COMPOUNDS.

THE ANALYTICAL MODULE INCLUDES:

- a mechanical injection system based on a diaphragm valve,
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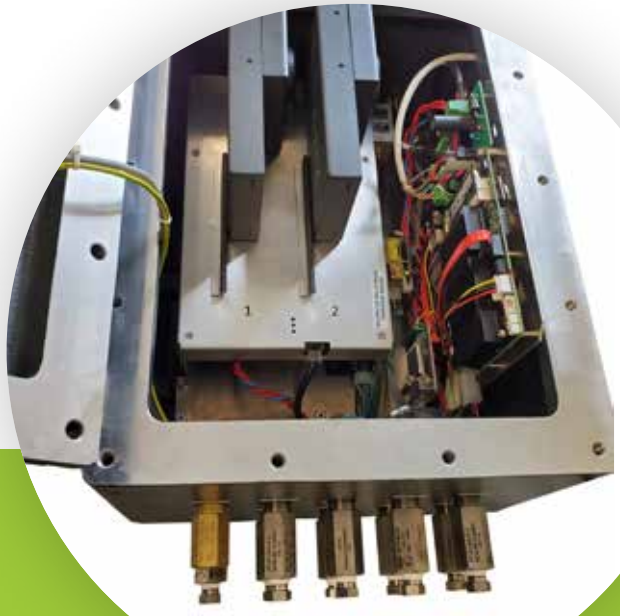
- a temperature-regulated GC capillary column,
- a micro-TCD detector or NGD (Nano Gravimetric Detector) detector with silicon technology.



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The mechanical injector allows, for the modules equipped with a guard column, **to carry out a backflush and thus to reverse the direction of the carrier gas flow in the guard column** after the injection and during the analysis, in order to eliminate all residual gaseous compounds in the guard column.

The TCD detection technology provides a high sensitivity (of the order of ppm) over the entire range of permanent gases and heavy compounds up to C10, with a high speed of analysis. The typical duration of a measurement is a few minutes.

The NGD detection technology provides a high sensitivity (sub ppm) on heavier compounds up to C13.

NanoPix

THIS DEVICE INCLUDES NGD DETECTOR (INNOVATED PATENTED DETECTOR). IT CAN BE PLUGGED ON ANY LAB GC. IT CAN REPLACE ANY OTHER DETECTOR OR IT CAN BE USED IN COMBINATION WITH OTHER INSTALLED DETECTORS (FID, TCD, MS, ...) SINCE IT IS NON DESTRUCTIVE.

Features

- **340 x 230 x 245mm**
  5,2 kg
- **90 – 264V AC, 47 – 63 Hz**
  150W consumption*
- **Carrier gas and sample gas pressure: depending on GC configuration**
- **1 NGD detector**
- **Gas consumption depending on GC configuration**
- **Operating T°C : laboratory condition**

** Depending on configuration*

Applications

Add a new detector to your lab GC

NGD sensitivity performance allow to detect heavy compounds (up to C40) and give access to many sectors of petrochemical applications (kerosene, gasoil, petroleum fractions...)

Environmental applications are also in the scope of NanoPix and its innovative NGD detector.

More detail can be found in an article called : « Characterization of nano-gravimetric-detector response, application to petroleum fluids up to C34 » published in Analytical Chemistry.

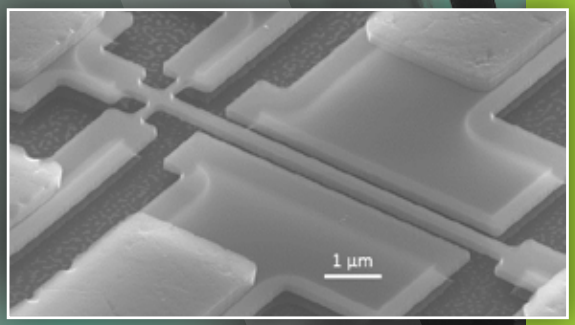
Comparison with common detectors

NGD offers a great alternative to the FID because it has basically the same advantage than FID (highly sensitivity, cheap, low maintenance required, and quantification). It is a concentration detector that can quantify any sorts of molecules including non-organic ones. It can be coupled to a mass spectrometer to perform molecule identification. It doesn't require any gas and is natively explosive proof compliant. Furthermore, it can detect heavy compounds (up to C30) and can therefore complement TCD that is suited for light gases.

	NGD	TCD	FID
Additionnal gas supply	No ☺	No ☺	Yes ☹
Make up gas	No ☺	No ☺	Yes ☹
Non destructive (combination with other detectors)	Yes ☺	Yes ☺	No ☹
ATEX compatible	Yes ☺	Yes ☺	No ☹
No wear up piece or disposable	Yes ☺	Yes ☺	No ☹
Insensitive to carrier gas	Yes ☺	No ☹	Yes ☺
Contamination from combustion of silicone compounds	No ☺	No ☺	Yes ☹
Sensitivity light compounds	No ☹	Yes ☺	Some ☻
Sensitivity heavy compounds	Yes ☺	No ☹	Yes ☺

System

NanoPix integrates a standalone NGD detector and can be mounted on top of a standard lab GC (in a same manner than FID or other detectors). NGD is coupled to the GC oven thanks to a heated transfer line. The transfer line allows the programmation of the NGD temperature independently of the GC oven while ensuring no cold spots. Since the NGD is a non-destructive detector, an FID, a MS (or other detectors) can be connected in series with the NGD.



ELECTRONICS

- The NGD detector embeds its own electronics. From a user point of view, it is seen as a black box detector

SOFTWARE

- A dedicated software is provided to the end user to temperature program the detector and set all necessary parameters. It offers autonomous signal acquisition that it is triggered by the GC (compliant with GC autosampler).
- A post processing software is provided to process the data and help the end-user to perform features such as peak integration, baseline cancellation, etc…).
- It's possible thanks to a A/D digital converter to acquire the signal on your own GC software (e.g. chemstation with Agilent 35900E Dual Channel Interface)

Proportion scale

Technology

New detector called NGD (Nano-gravimetric-detector) is based on a NEMS (Nano-Electromechanical-System) resonator. The nano-gravimetric-detector (NGD) is a clamped-clamped silicon beam that behaves as a resonant sensor. The beam is coated with a chemical layer, a porous oxide, that adsorbs the gas of interest according to its affinity with it. When the gas is adsorbed by the chemical layer, it modifies the mass of the beam and therefore its resonance frequency.

The NGD is a concentration detector as opposed to a mass detector and unlike FIDs, it doesn't burn the gas and therefore, other detectors (e.g. mass spectrometer) can be plugged in series with the NGD. The NGD has a nearly universal response, a low limit of detection (LOD), a wide linear response range, no dead-volume due to its size (below 10µmeter) and a very limited drift. Using appropriate temperature condition, LOD in a few 10 ppb from C7 to C40 has been demonstrated for different molecules such as alkanes and aromatic hydrocarbons.

MODULES

MK10-TCD-2µL-PPU10-PPU1-F2

FEATURES

Reference
MK10-TCD-2µL-PPU10-PPU1-F2

Detector
TCD

Column
PPU (Pora-Plot U) 10m

Internal Diameter
0.25mm

Phase Thickness
12µm

Precolumn
PPU (Pora-Plot U) 1m

Backflush
✔

Sample Loop
2µL

Regeneration
✖

APPLICATIONS

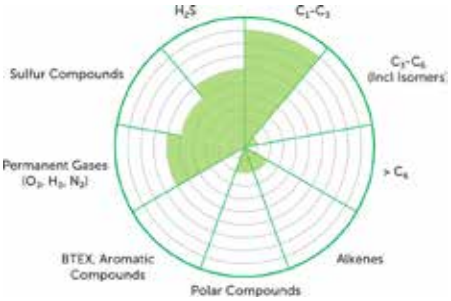
Module dedicated to the analysis of **permanent gases**. This module allows **natural gas** and **biomethane** analysis. It is used for certified **Gross Calorific Value** measurement. It also allows **biogas** compounds analysis.
Perfect for Natural gas analysis and LNG analysis.

SAMPLE

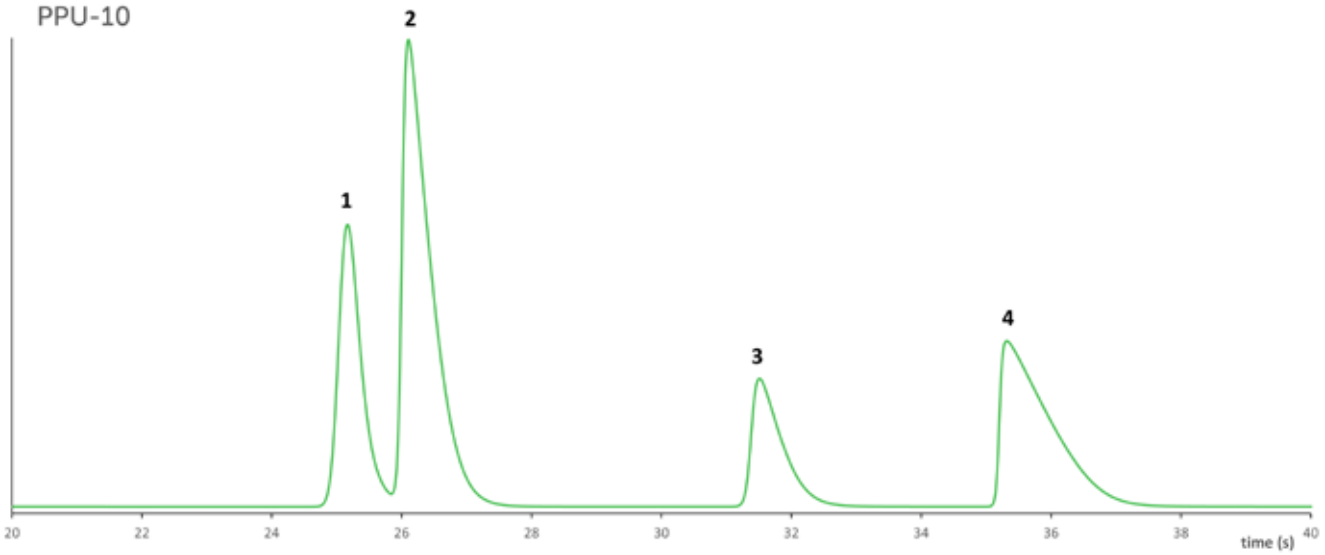
Typical composition of Natural gas or Biomethane samples.
- CH_4 : from 80% to 100%.
- CO_2 : from 0% to 10%.
- N_2 : from 0% to 5%.
- C_2H_6 : from 0% to 5%

CONLUSIONS

- This module enables certified measurement of major compounds of natural gas in less than 2 minutes.
- With this module, you can also measure ethylene, acetylene and hydrocarbons up to C3 with another analytical method. This gives you an analytical solution for fuel gas apllications.
- Finally, for biogas measurement, you can analyse CH_4 and CO_2 from 0 to 100% concentration.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	N_2+O_2	2ppm	6ppm	0.9% (0.6%)
2	CH_4	1%	3%	0.05% (82.81%)
3	CO_2	2ppm	6ppm	0.25% (0.29%)
4	C_2H_6	2ppm	6ppm	0.25% (11.81%)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
70°C
Column Pressure
0.8 bar
Sample Loop T°C
70°C
Sample Loop Pressure
0.5 bar
Injection Time
10s
Analysis Time
120s

MK10-TCD-20µL-PPU10-PPU1-F2

FEATURES

Reference
MK10-TCD-20µL-PPU10-PPU1-F2

Detector
TCD

Column
PPU (Pora-Plot U) 10m

Internal Diameter
0.25mm

Phase Thickness
12µm

Precolumn
PPU (Pora-Plot U) 1m

Backflush
✔

Sample Loop
20µL

Regeneration
✖

APPLICATIONS

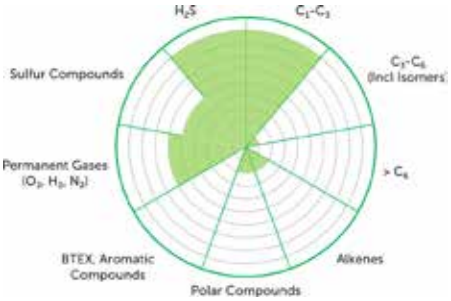
Module dedicated to the analysis of **sulfur compounds**. Works very well for **H_2S** analysis from 2ppm to 2000ppm
Perfect for Natural gas, Biomethane and Biogas analysis

SAMPLE

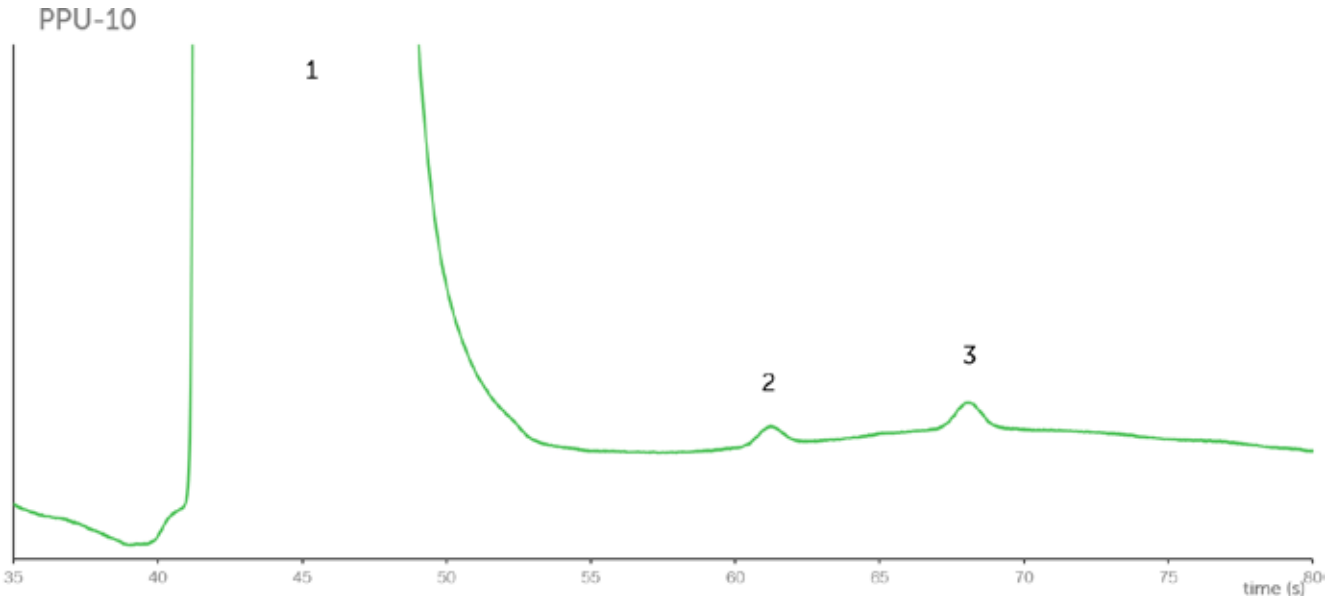
Typical composition of Natural gas, Biomethane or biogas samples.
- H_2S : from 2ppm to 2000ppm
- COS : from 2ppm to 2000ppm

CONLUSIONS

- This module enables traces analysis of H_2S in biogas or biomethane processes before injection in gas network.
- This also allows measurement of H_2S in a wide range of concentration, for analysis before and after biogas purification.
- Finally, you can also analyse methylmercaptan and CS_2 by applying another analytical method.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	H_2S	1ppm	3ppm	10% (3ppm)
3	COS	1ppm	3ppm	10% (3ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
80°C
Column T°C
105°C
Column Pressure
1.5 bar
Sample Loop T°C
105°C
Sample Loop Pressure
0.5 bar
Injection Time
13s
Analysis Time
80s

MK10-TCD-2µL-MS5A15-PPU5-R2

FEATURES

Reference
MK10-TCD-2µL-MS5A15-PPU5-R2
Detector
TCD
Column
MS5A (Molsieve) 15m
Internal Diameter
0.25mm
Phase Thickness
20µm
Precolumn
PPU (Pora-Plot) 5m
Backflush
✓
Sample Loop
2µL
Regeneration
✓

APPLICATIONS

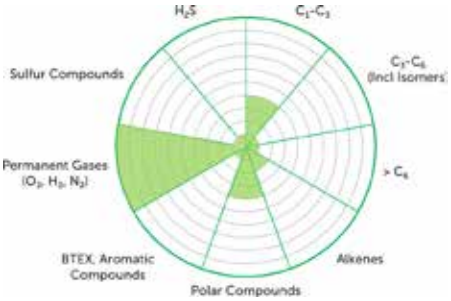
Module dedicated to the analysis of **permanent gases** (H_2, He, N_2, O_2, CH_4, CO).
Perfect for Biomethane, Biogas analysis and Speciality gases purity measurement.

SAMPLE

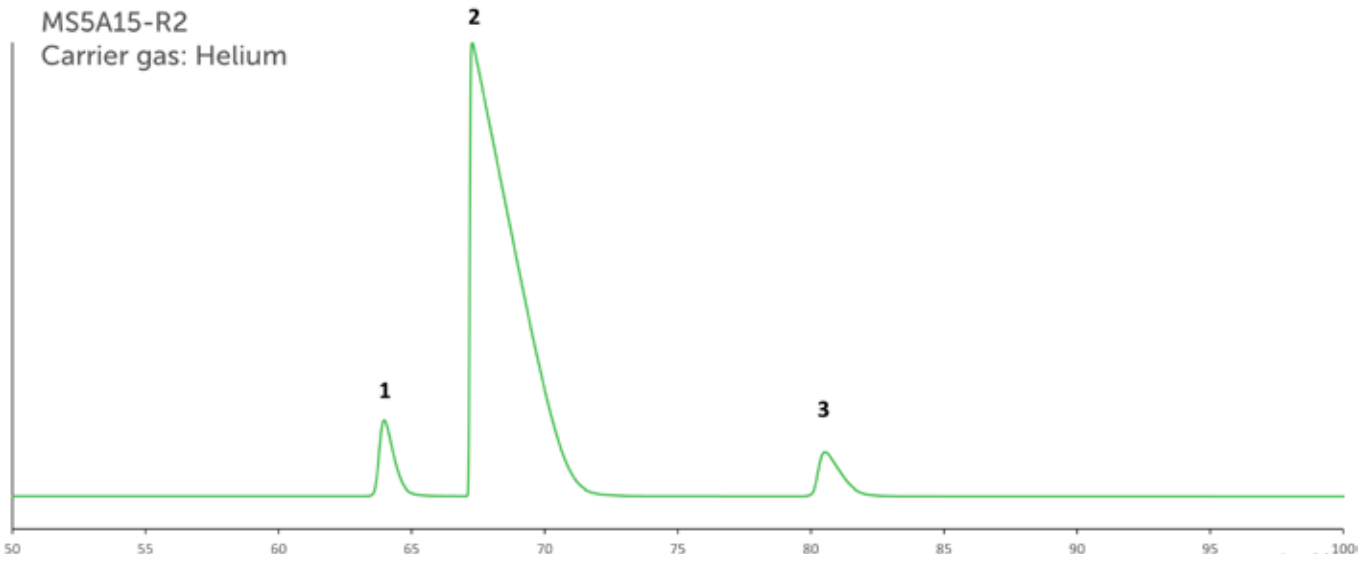
Typical composition of Natural gas, Biomethane and Biogas samples.
- H_2 : from 0% to 20%.
- N_2 : from 0% to 100%
- O_2 : from 0% to 100%
- CH_4 : from 0% to 100%

CONLUSIONS

- This module enables H_2 analysis for Gross Calorific Value of Natural gas. This brings more accurate measurement and helps more valorisation of Green gases processes.
- You can use 2 different carrier gases :
- Argon will bring you better sensitivity for Helium and Hydrogen measurement
- Helium will be the accurate choice for Nitrogen, Oxygen and Methane measurement.
- This module contains a PPU precolumn in order to prevent performances degradation of the main molsieve column.
- Finally, this module offers regeneration function allowing thermal reconditonning of GC column up to 250°C to prevent from GC contamination or drift.



CHROMATOGRAM

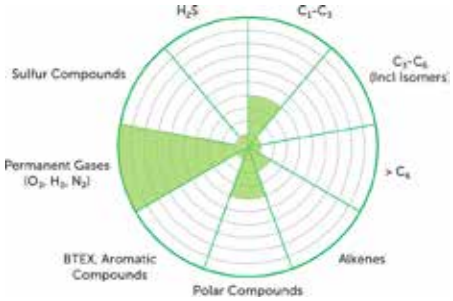


RESULTS

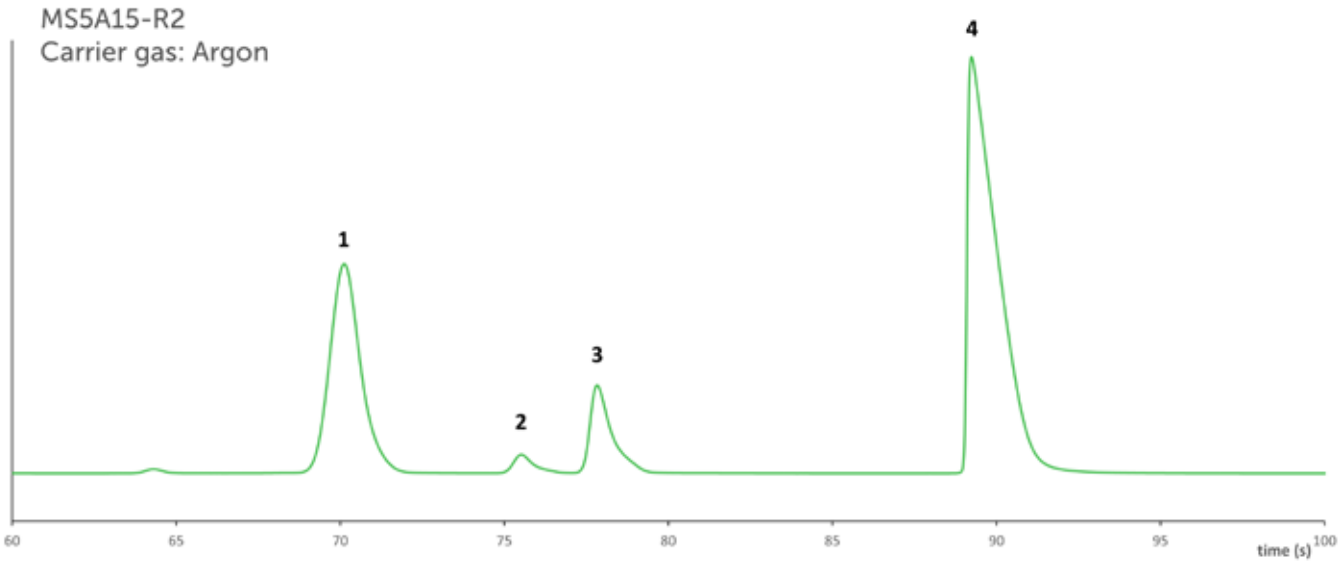
		LOD	LOQ	RSD
1	O_2	20ppm	60ppm	0.5% (5%)
2	N_2	20ppm	60ppm	0.25% (89.5%)
3	CH_4	20ppm	60ppm	0.5% (5%)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
140°C
Column Pressure
1.6 bar
Sample Loop T°C
70°C
Sample Loop Pressure
0.5 bar
Injection Time
23s
Analysis Time
120s



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	H_2	20ppm	60ppm	0.2% (5%)
2	O_2	0.05%	0.1%	0.5% (3%)
3	N_2	0.05%	0.1%	0.5% (18%)
4	CH_4	0.05%	0.1%	1% (53%)

METHOD

Carrier Gas
Argon

Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi

Detector T°C
90°C

Column T°C
140°C

Column Pressure
1.8 bar

Sample Loop T°C
120°C

Sample Loop Pressure
0.5 bar

Injection Time
25s

Analysis Time
120s

MK10-TCD-20µL-MS5A15-PPU5-R2

FEATURES

Reference
MK10-TCD-20µL-MS5A15-PPU5-R2

Detector
TCD

Column
MS5A (Molsieve) 15m

Internal Diameter
0.25mm

Phase Thickness
20µm

Precolumn
PPU (Pora-Plot) 5m

Backflush
✓

Sample Loop
20µL

Regeneration
✓

APPLICATIONS

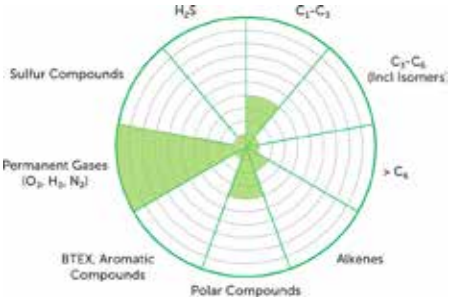
Module dedicated to the analysis of low concentration of **permanent gases** (H_2, He, N_2, O_2, Ar, CH_4, CO).
Perfect for analyses of contaminants in Biomethane, Biogas processes and for Speciality gases purity measurement.

SAMPLE

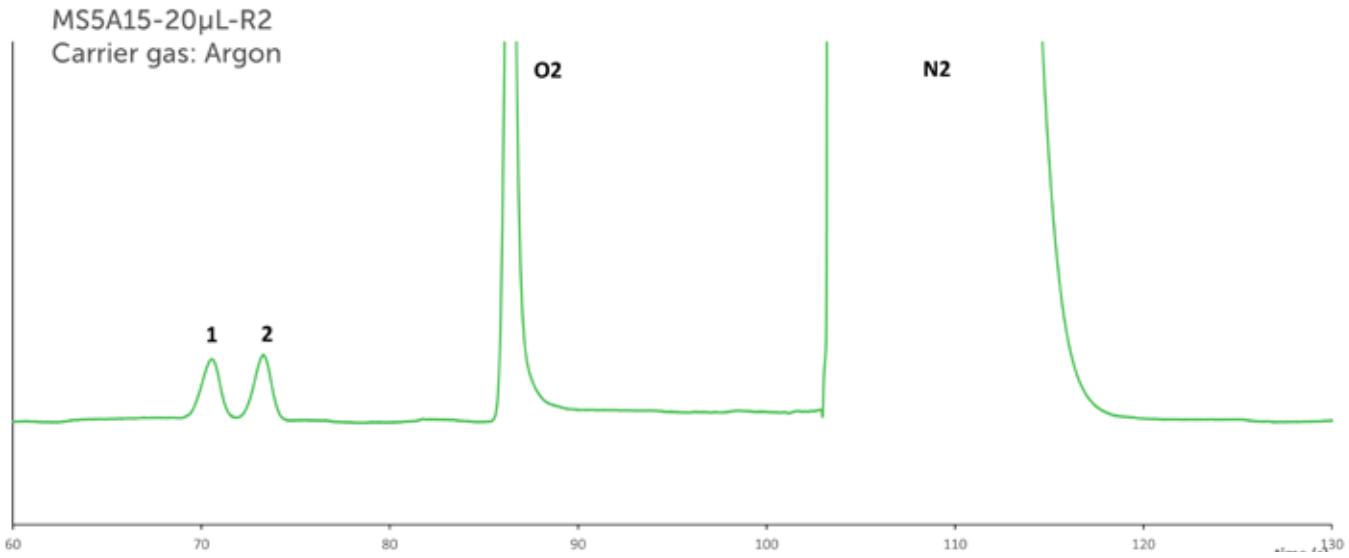
Contaminants of Natural gas, Biomethane and Biogas samples.

CONLUSIONS

- This module enables analysis of low concentration of permanent gases.
- Two different carrier gases can be used:
  - Argon will bring you better sensitivity for Helium and Hydrogen traces measurement
  - Helium will be the accurate choice for Nitrogen, Oxygen and Methane traces measurement.
- This module offers regeneration function allowing thermal reconditonning of GC column up to 250°C to prevent from GC contamination or drift.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	He	1ppm	3ppm	0.5% (100ppm)
2	H_2	1ppm	3ppm	0.5% (100ppm)

METHOD

Carrier Gas
Argon
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
60°C
Column T°C
60°C
Column Pressure
1 bar
Sample Loop T°C
60°C
Sample Loop Pressure
0.5 bar
Injection Time
30s
Analysis Time
200s

MK6-TCD-2µL-PDMS5-F2

FEATURES

Reference
MK6-TCD-2µL-PDMS5-F2
Detector
TCD
Column
PDMS (100% Methyl Polysiloxane) 5m
Internal Diameter
0.15mm
Phase Thickness
1.2µm
Precolumn
None
Backflush
✖
Sample Loop
2µL
Regeneration
✖

APPLICATIONS

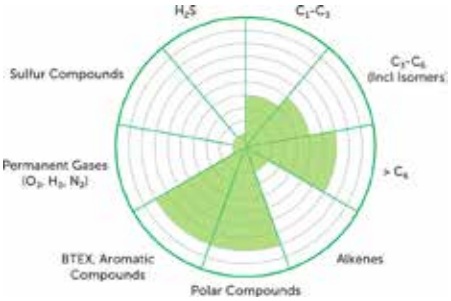
Module dedicated to the analysis of **hydrocarbons** from **C6 to C10** and **VOCs** (Volatile Organic Compounds) including **BTEX** and **Chlorine compounds**
Perfect for Fuel gas and Environmental analyses

SAMPLE

Typical composition of Fuel gas samples :
• mix of Hydrocarbons from Hexane to Decane (<1%)
Typical composition of Environmental samples :
• mix of VOCs (<1000ppm)

CONLUSIONS

• This module enables C6-C10 hydrocarbons separation within a minute and a few ppm sensitivity. This brings more accurate values for HHV measurement.
• Regarding environmental measurement, this module lets you analyse indoor and outdoor air quality with a ppm level of detection.



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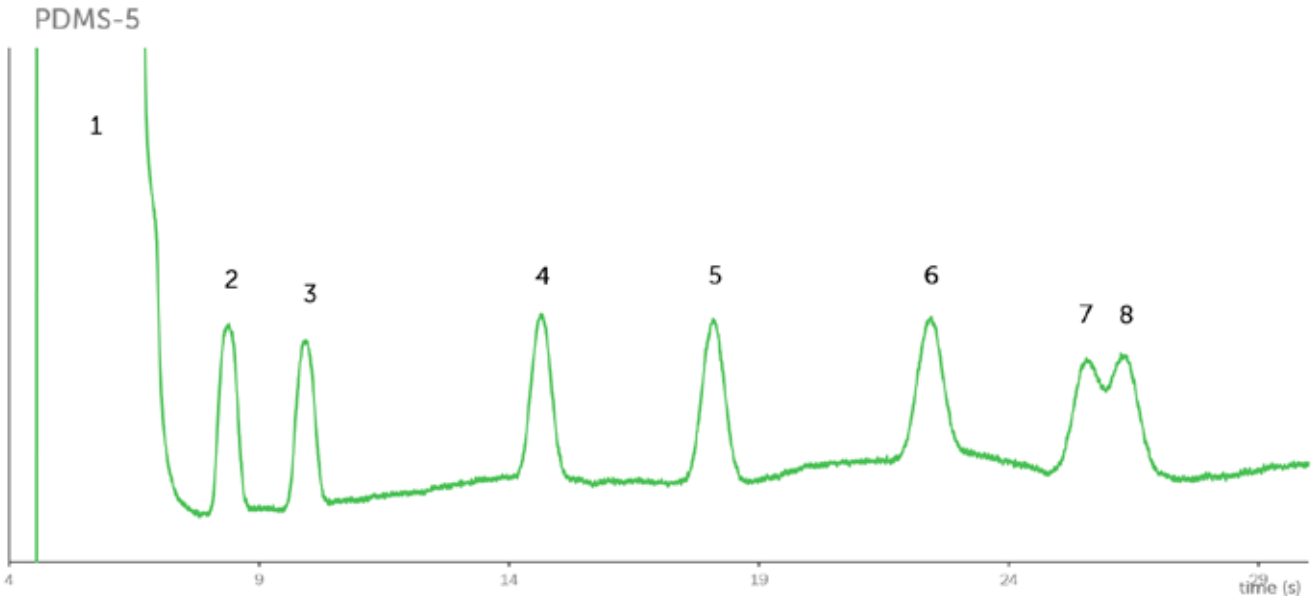
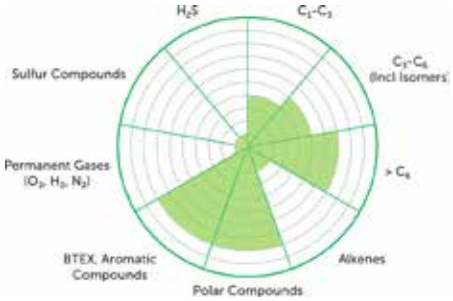


RESULTS

		LOD	LOQ	RSD
1	Injection			
2	Chloroform	1ppm	3ppm	1.4% (10ppm)
3	Benzene	1ppm	3ppm	2.1% (10ppm)
4	Toluene	1ppm	3ppm	2.6% (10ppm)
5	Tetrachloroethylene	1ppm	3ppm	3.2% (10ppm)
6	Ethylbenzene	1ppm	3ppm	3.8% (10ppm)
7	Styrene	1ppm	3ppm	10% (3ppm)
8	O-xylene	1ppm	3ppm	10% (3ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
80°C
Column Pressure
0.8 bar
Sample Loop T°C
80°C
Sample Loop Pressure
0.5 bar
Injection Time
2s
Analysis Time
36s



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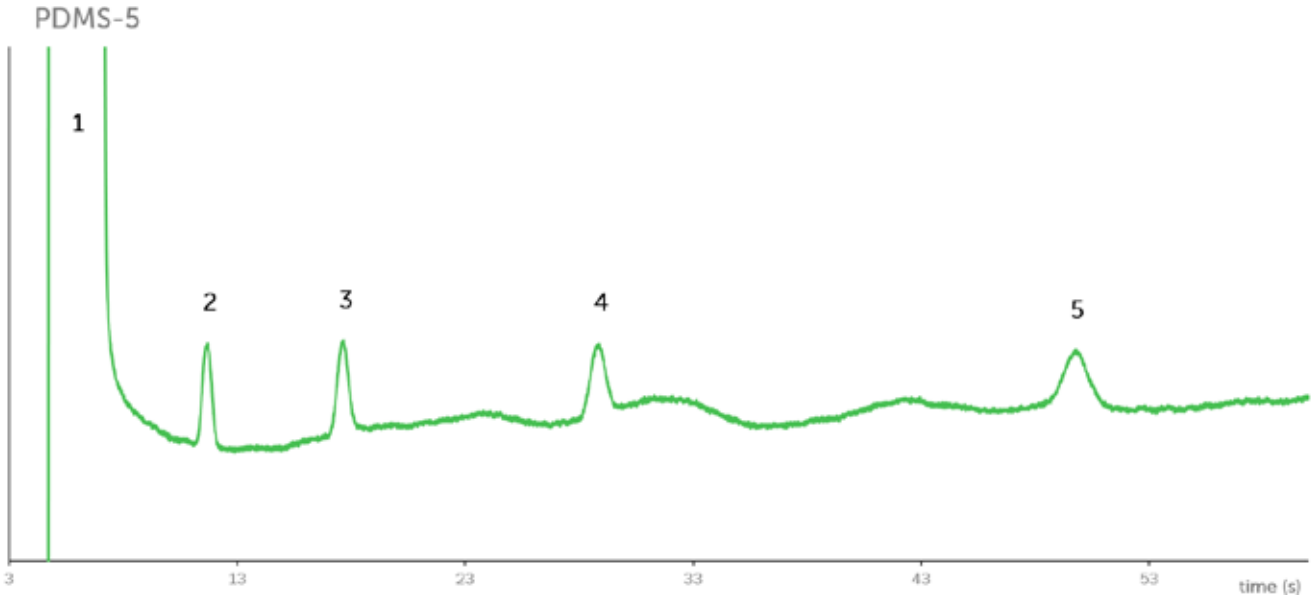


RESULTS

		LOD	LOQ	RSD
1	Injection	1ppm	3ppm	0.3% (24.6ppm)
2	C6	1ppm	3ppm	0.4% (12.3ppm)
3	C7	1ppm	3ppm	1% (6.2ppm)
4	C8	1ppm	3ppm	3% (2.5ppm)
5	C9	1ppm	3ppm	6% (2.2ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
80°C
Column Pressure
0.8 bar
Sample Loop T°C
80°C
Sample Loop Pressure
0.5 bar
Injection Time
2s
Analysis Time
36s

MK6-TCD-2µL-PDMS10-F2

FEATURES

Reference
MK6-TCD-2µL-PDMS10-F2
Detector
TCD
Column
PDMS (100% Methyl Polysiloxane) 10m
Internal Diameter
0.15mm
Phase Thickness
1.2µm
Precolumn
None
Backflush
✖
Sample Loop
2µL
Regeneration
✖

APPLICATIONS

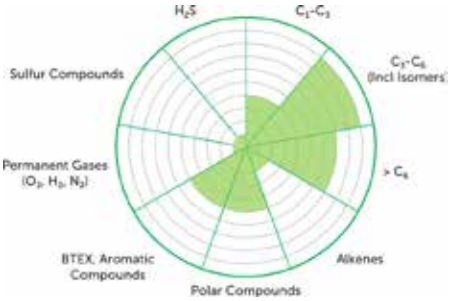
Module dedicated to the analysis of **hydrocarbons** from C3 to C6 with isomers separation.
Perfect for Natural gas analysis

SAMPLE

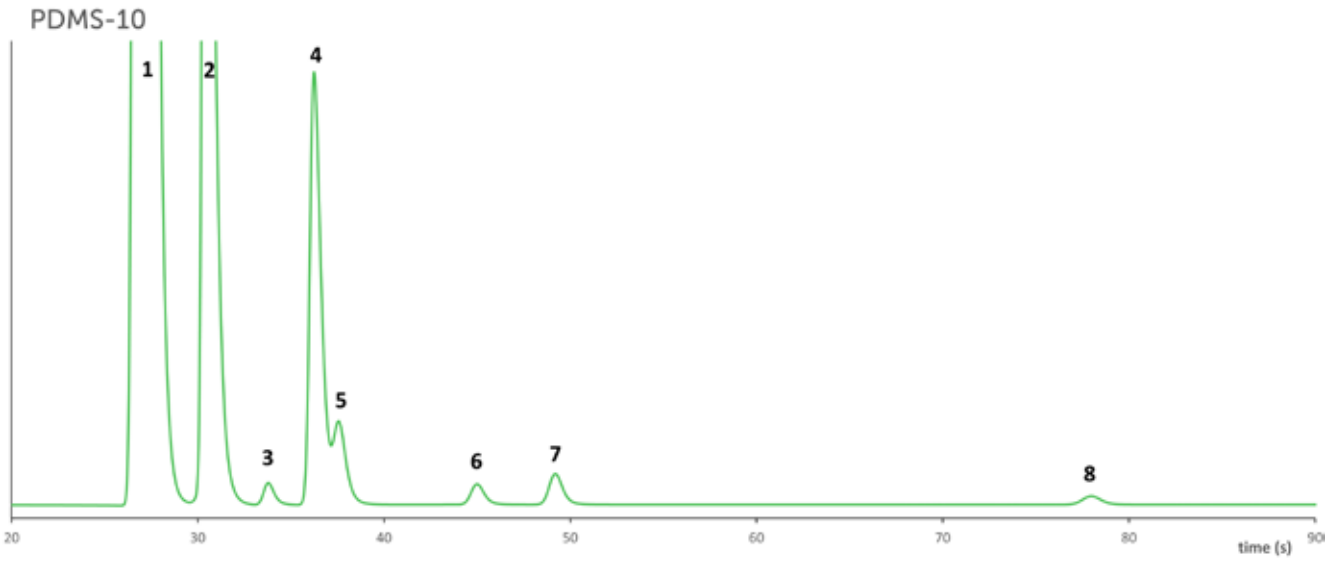
Typical composition of Natural gas samples :
- C3 : from 0% to 5%
- C4 : <1%
- C5 : <0.2%
- C6 : <0.1%

CONLUSIONS

- This module enables measurement of compounds of natural gas from C3 to C6, including isomers.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	C3	1ppm	3ppm	0.1% (7%)
3	iC4	1ppm	3ppm	0.2% (0.1%)
4	nC4	1ppm	3ppm	0.1% (2%)
5	neoC5	1ppm	3ppm	0.3% (0.35%)
6	iC5	1ppm	3ppm	0.2% (0.1%)
7	nC5	1ppm	3ppm	0.4% (0.15%)
8	nC6	1ppm	3ppm	0.6% (500ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
60°C
Column Pressure
1.2 bar
Sample Loop T°C
60°C
Sample Loop Pressure
0.5 bar
Injection Time
1s
Analysis Time
100s

MK10-BFTCD-2µL-PDMS10-PDMS2-F2

FEATURES

Reference
MK10-BFTCD-2µL-PDMS10-PDMS2-F2

Detector
TCD

Column
PDMS (100% Methyl Polysiloxane) 10m

Internal Diameter
0.15mm

Phase Thickness
1.2µm

Precolumn
PDMS (100% Methyl Polysiloxane) 2m

Backflush
✔

Sample Loop
2µL

Regeneration
✖

APPLICATIONS

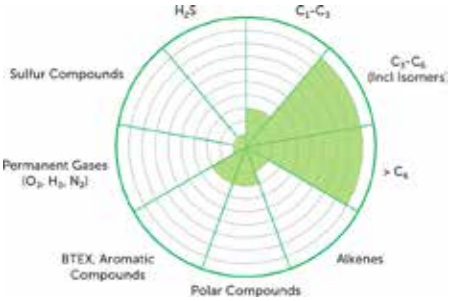
Module dedicated to the analysis of **hydrocarbons** from C3 to C6+ with isomers separation.
Perfect for Natural gas analysis.

SAMPLE

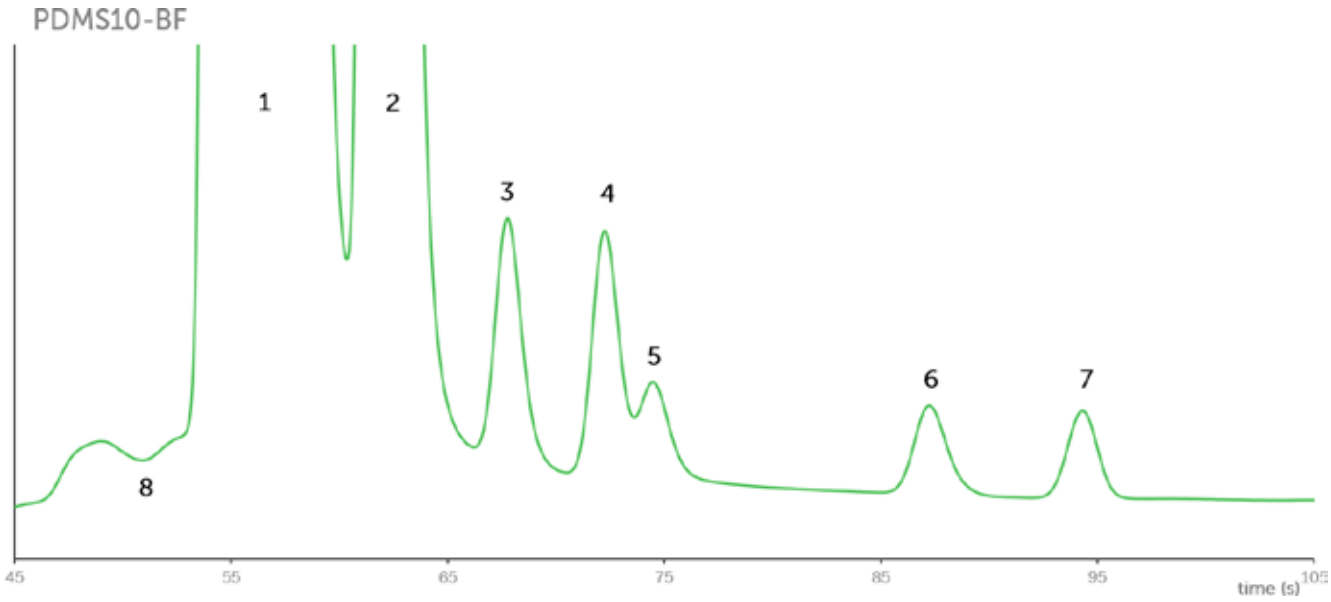
Typical composition of Natural gas samples :
- C3 : from 0% to 5%
- C4 : <1%
- C5 : <0.2%
- C6 : <0.1%

CONLUSIONS

- This module enables certified measurement of compounds from C3 to C6+, including isomers.
- Thanks to backflush to detector feature, it allows you to have a monitoring of all hydrocarbons above C6 (C6+ in one peak).



CHROMATOGRAM



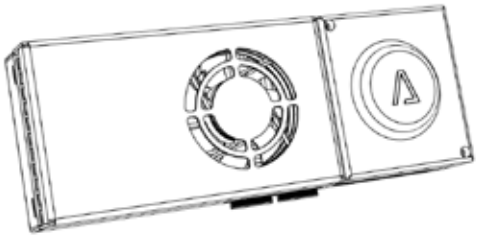
RESULTS

		LOD	LOQ	RSD
1	Injection			
2	C3	1ppm	3ppm	0.56% (3.5%)
3	iC4	1ppm	3ppm	4.3% (500ppm)
4	nC4	1ppm	3ppm	3% (500ppm)
5	neoC5	1ppm	3ppm	2% (198.8ppm)
6	iC5	1ppm	3ppm	2.2% (198.8ppm)
7	nC5	1ppm	3ppm	3.7% (198.7ppm)
8	C6+	10ppm	30ppm	4.8% (50ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
70°C
Column Pressure
0.8 bar
Sample Loop T°C
70°C
Sample Loop Pressure
0.5 bar
Injection Time
25.5s
Analysis Time
120s

MK10-BFNEMS-10µL-PDMS10-PDMS2-F3



FEATURES

Reference
MK10-BFNEMS-10µL-PDMS10-PDMS2-F3

Detector
NGD

Column
PDMS (100% Methyl Polysiloxane) 10m

Internal Diameter
0.15mm

Phase Thickness
1.2µm

Precolumn
PDMS (100% Methyl Polysiloxane) 2m

Backflush
✓

Sample Loop
10µL

Regeneration
✓

APPLICATIONS

Module dedicated to the analysis of **heavy hydrocarbons traces** (from C6 to C13). Perfect for Petrochemical analysis.

SAMPLE

Typical composition of Petrochemical samples :

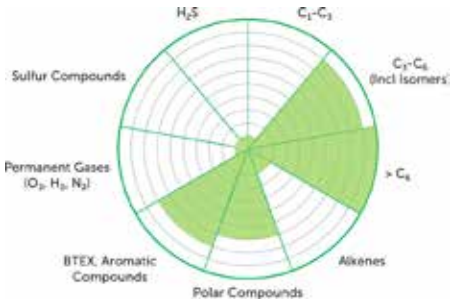
- mix of Hydrocarbons from Hexane to Tridecane (<1ppm for C6 and few ppb for C13)

CONLUSIONS

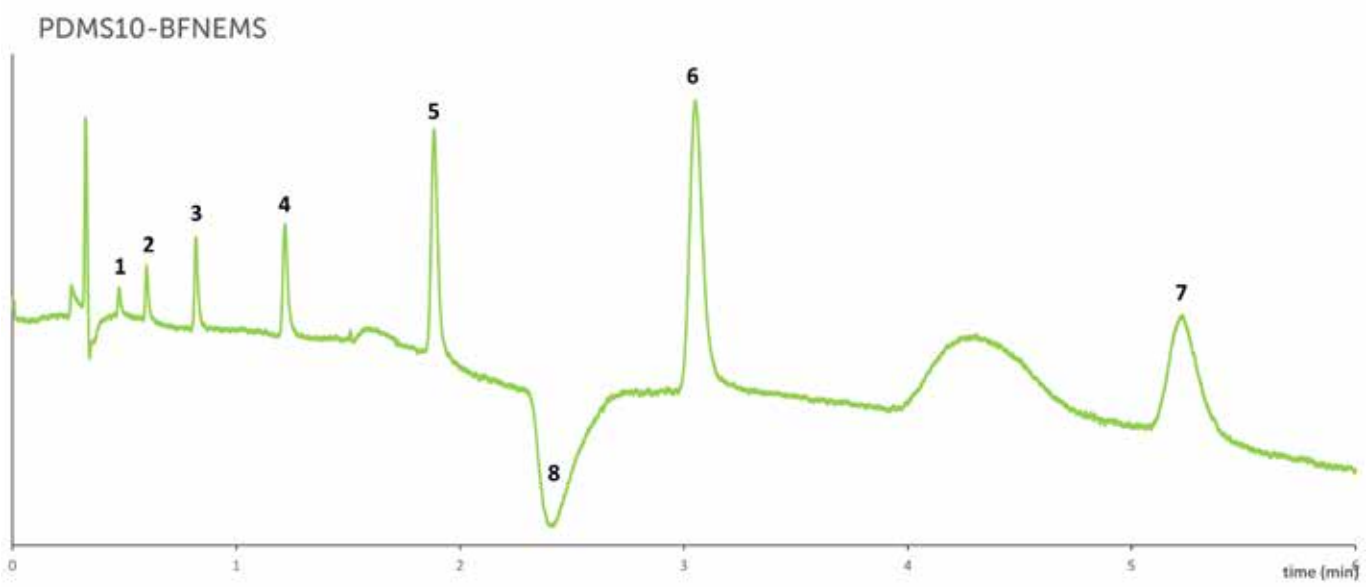
- This modules enables C6-C13 hydrocarbons separation with a few ppb level of detection for C13 (thanks to the NEMS detector which has a lower LOD limit than the TCD detector)

Be aware that the analysis time is much longer than for C6-C10 analysis.
Analysis time can be shortened by applying a temperature ramp on the GC column, as presented in the chromatograph of a real petrochemical sample.

- This lets you investigate new kind of applications in petrochemical, natural gas and environmental applications.



CHROMATOGRAM

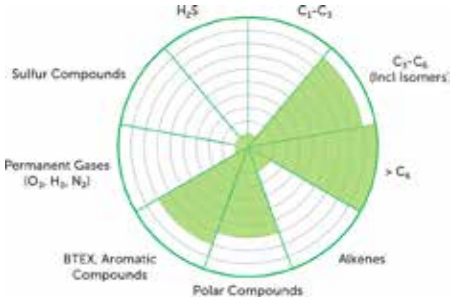


RESULTS

		LOD	LOQ	RSD
1	nC6	1.4ppm	4.25ppm	1.7% (25ppm)
2	nC7	500ppb	1.5ppm	1.3% (12ppm)
3	nC8	270ppb	810ppb	1.3% (6.25ppm)
4	nC9	130ppb	400ppb	1.6% (2.5ppm)
5	nC10	120ppb	360ppb	1.8% (2ppm)
6	nC11	100ppb	300ppb	2.4% (1.25ppm)
7	nC12	60ppb	180ppb	7.2% (250ppb)
8	C13+	40ppb	125ppb	10% (125ppb)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
30°C
Column T°C
120°C
Column Pressure
3 bar
Sample Loop T°C
120°C
Sample Loop Pressure
0.5bar
Injection Time
90s
Analysis Time
400s



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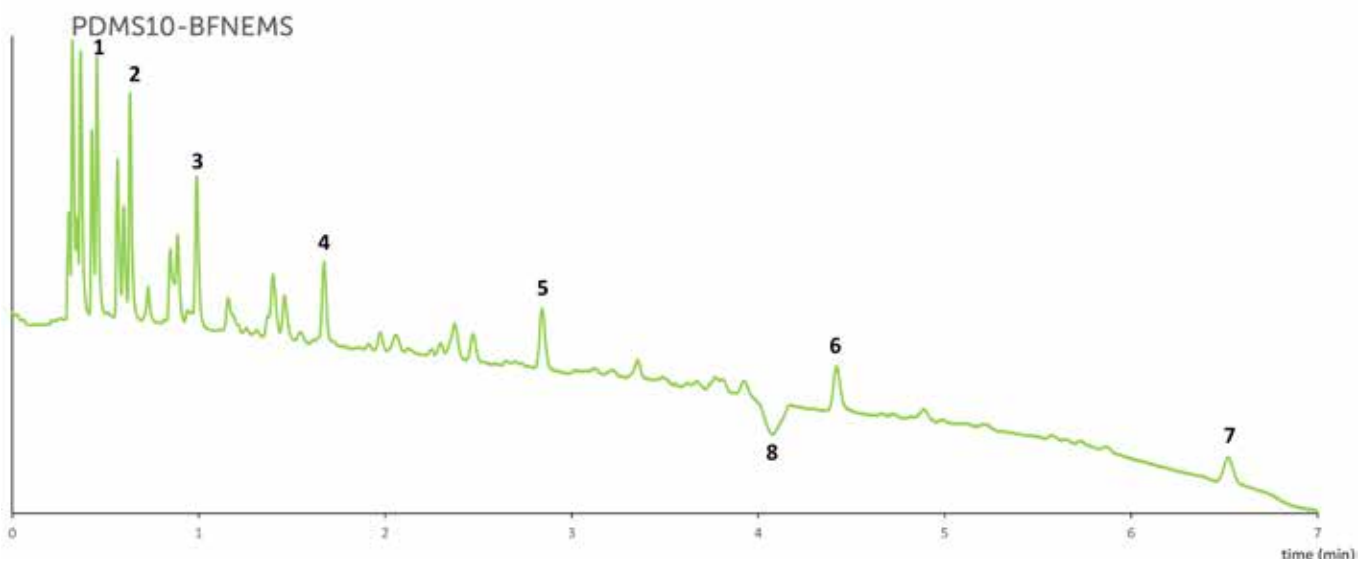


RESULTS

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar maxi**
Detector T°C	**35°C**
Column T°C	**80°C to 110°C (5°C/min ramp)**
Column Pressure	**3 bar**
Sample Loop T°C	**80°C to 110°C (5°C/min ramp)**
Sample Loop Pressure	**0.5bar**
Injection Time	**180s**
Analysis Time	**400s**

MK6-TCD-20µL-PDMSP12-F2

FEATURES

Reference
MK6-TCD-20µL-PDMSP12-F2
Detector
TCD
Column
PDMSP (20 % Diphenyl - 80 % Methylpolysiloxane) 10m
Internal Diameter
0.25mm
Phase Thickness
1µm
Precolumn
None
Backflush
✖
Sample Loop
20µL
Regeneration
✖

APPLICATIONS

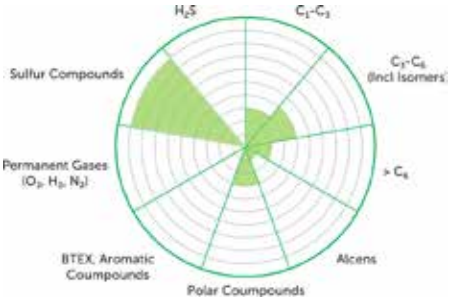
Module dedicated to the analysis of **TBM** (tertio-butyl mercaptan) and **THT** (Tetrahydrofuran).
Perfect for odorization control in Natural gas and Biomethane analysis.

SAMPLE

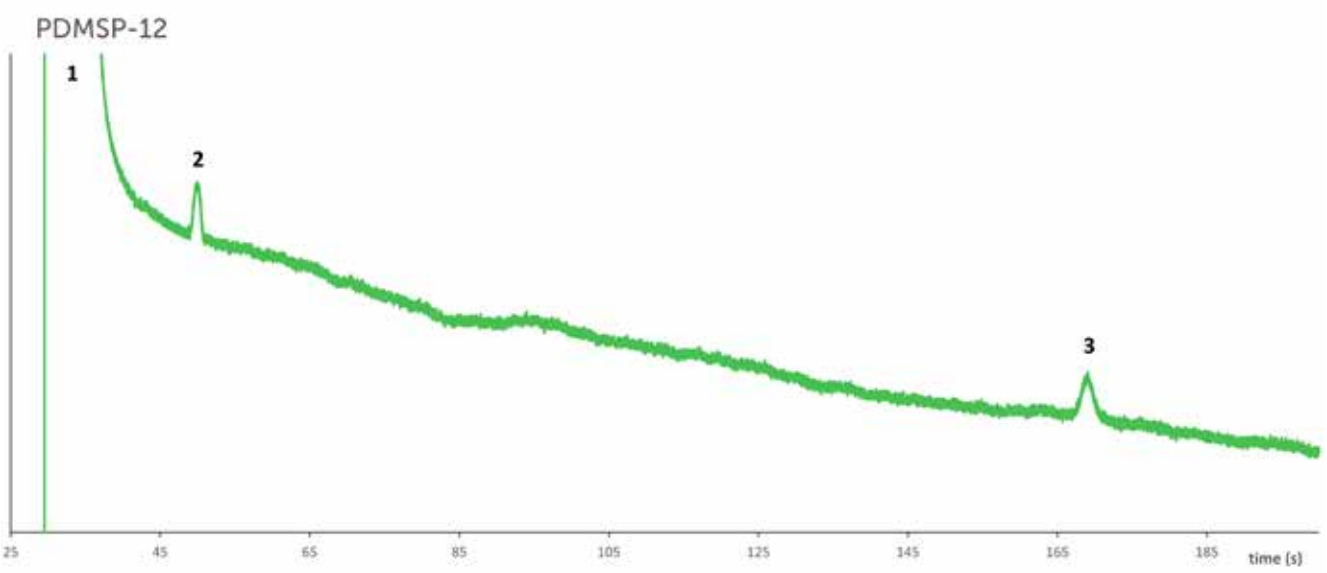
Typical composition of Natural gas sample :
• TBM <10ppm
• THT <10ppm

CONLUSIONS

• This module enables odorization control with the analysis of TBM and THT sulfur compound.
The TBM addition is normalized and used in some european countries like Italy for instance.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	TBM	1ppm	2ppm	<10% (2ppm)
3	THT	1ppm	2ppm	<10% (2ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
60°C
Column T°C
60°C
Column Pressure
1.5 bar
Sample Loop T°C
60°C
Sample Loop Pressure
0.5 bar
Injection Time
1s
Analysis Time
200s

MK6-TCD-30µL-PDMSCP20-F2

FEATURES

Reference
MK6-TCD-30µL-PDMSCP20-F2
Detector
TCD
Column
PDMSCP (14%-Cyanopropylphenyle - 86 % Methylpolysiloxane) 20m
Internal Diameter
0.25mm
Phase Thickness
1µm
Precolumn
None
Backflush
✖
Sample Loop
30µL
Regeneration
✖

APPLICATIONS

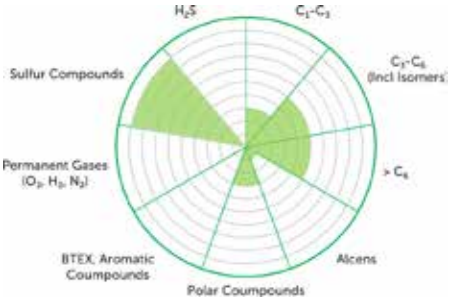
Module dedicated to the analysis of **mercaptans** and **sulfur compounds**
Perfect for total sulfur evaluation in Natural gas analysis.

SAMPLE

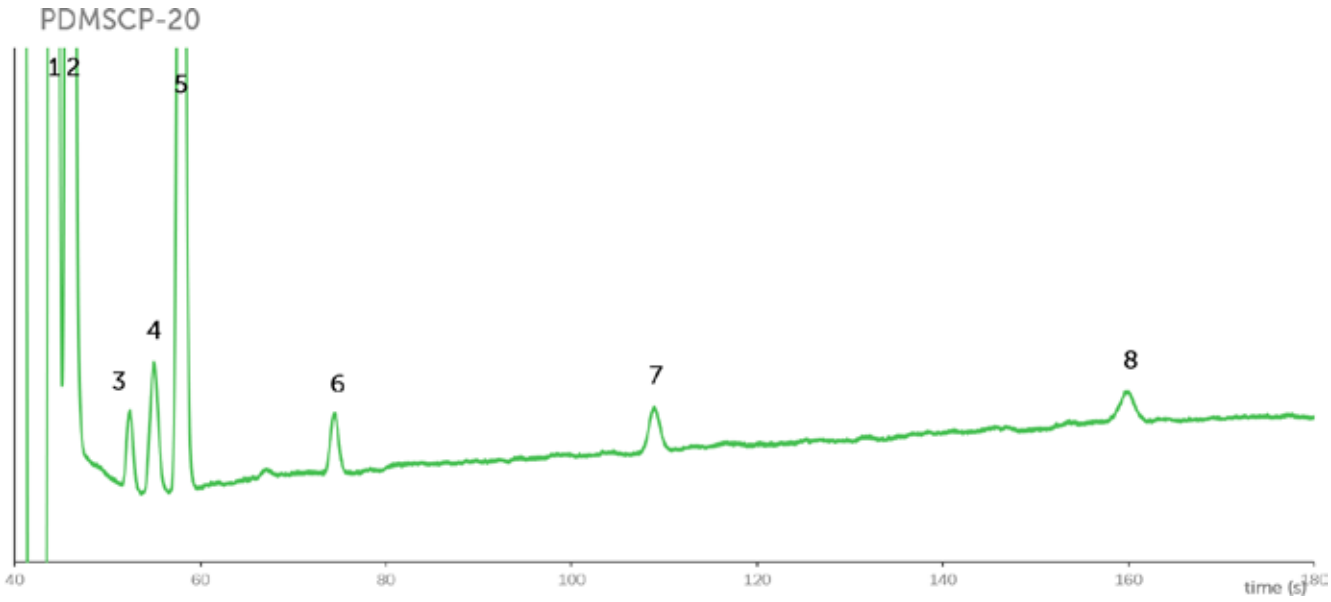
Typical composition of Natural gas sample :
• Mercaptans : <20ppm
• Disulfur compounds : <20ppm

CONLUSIONS

• This module enables Natural gas and Biogas pollutants analysis.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	iC5	1ppm	3ppm	10% (3ppm)
2	nC5	1ppm	3ppm	10% (3ppm)
3	EM	1ppm	3ppm	10% (3ppm)
4	DMS + CS2	1ppm	3ppm	10% (3ppm)
5	nC6	1ppm	3ppm	10% (3ppm)
6	MES	1ppm	3ppm	10% (3ppm)
7	DES	1ppm	3ppm	10% (3ppm)
8	DMDS	1ppm	3ppm	10% (3ppm)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
70°C
Column Pressure
1.5 bar
Sample Loop T°C
70°C
Sample Loop Pressure
0.5 bar
Injection Time
1.5s
Analysis Time
180s

MK10-TCD-2µL-ALOX15-PDMS2-F2

FEATURES

Reference
MK10-TCD-2µL-ALOX15-PDMS2-F2

Detector
TCD

Column
ALOX (Alumina Al_2O_3/KCl) 15m

Internal Diameter
0.25mm

Phase Thickness
4µm

Precolumn
PDMS (100% Methyl Polysiloxane) 2m

Backflush
✔

Sample Loop
2µL

Regeneration
✖

APPLICATIONS

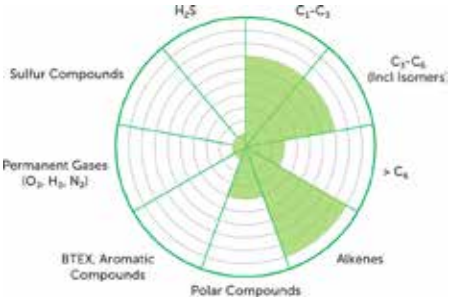
Module dedicated to the analysis of **alkanes** and **alkenes** from C3 to C5, including isomers. Perfect for Fuel gas analysis or LNG analysis

SAMPLE

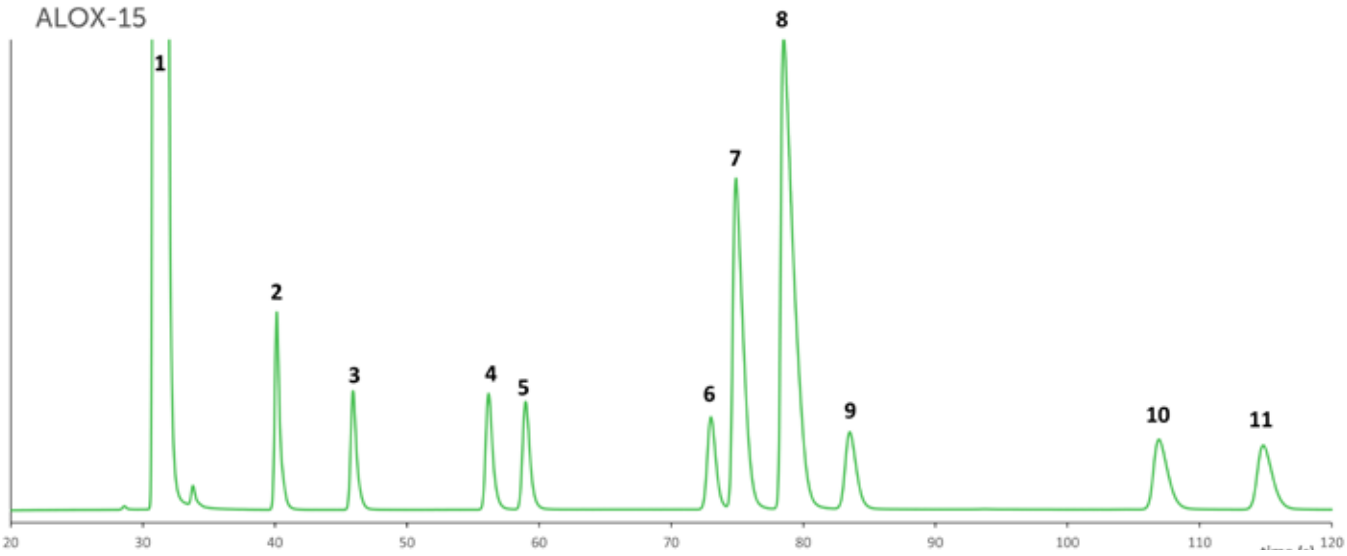
Typical composition of Fuel gas sample :
• C3 to C5 : from 0% to 50%

CONLUSIONS

• This module enables separation of alkanes and alkenes from C3 to C5 in less than 2 minutes.
You should prefer this module instead of PDMS10 module if you want to separate isomers either from alkanes and alkenes.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	C_3H_8	2ppm	5ppm	0.2% (0.5%)
3	C_3H_6	2ppm	5ppm	0.2% (0.5%)
4	iC_4H_{10}	2ppm	5ppm	0.2% (0.5%)
5	nC_4H_{10}	2ppm	5ppm	0.2% (0.5%)
6	Trans but-2-ene	5ppm		0.2% (0.5%)
7	But-1-ene	2ppm	5ppm	0.2% (0.5%)
8	i-Butene	2ppm	5ppm	0.2% (0.5%)
9	Cis-2-butene	2ppm	5ppm	0.2% (0.5%)
10	iC_5H_{12}	2ppm	5ppm	0.2% (0.5%)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
120°C
Column Pressure
2 bar
Sample Loop T°C
120°C
Sample Loop Pressure
0.5 bar
Injection Time
2.8s
Analysis Time
120s

MK10-BFTCD-2µL-ALOX15-PDMS2-F2

FEATURES

Reference
MK10-BFTCD-2µL-ALOX15-PDMS2-F2

Detector
TCD

Column
ALOX (Alumina Al_2O_3/KCl) 15m

Internal Diameter
0.25mm

Phase Thickness
4µm

Precolumn
PDMS (100% Methyl Polysiloxane) 2m

Backflush
✔

Sample Loop
2µL

Regeneration
✖

APPLICATIONS

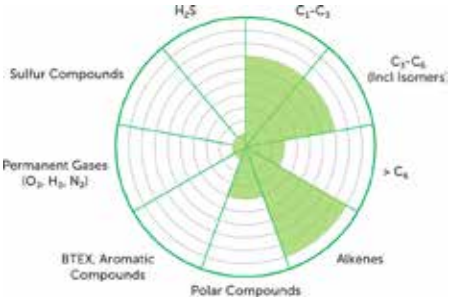
Module dedicated to the analysis of **alkanes** and **alkenes** from C3 to C5, including isomers.
This module offers back-to-detector function that allows the measurement of C6+ compounds into a single peak
Perfect for Fuel gas analysis or LNG analysis

SAMPLE

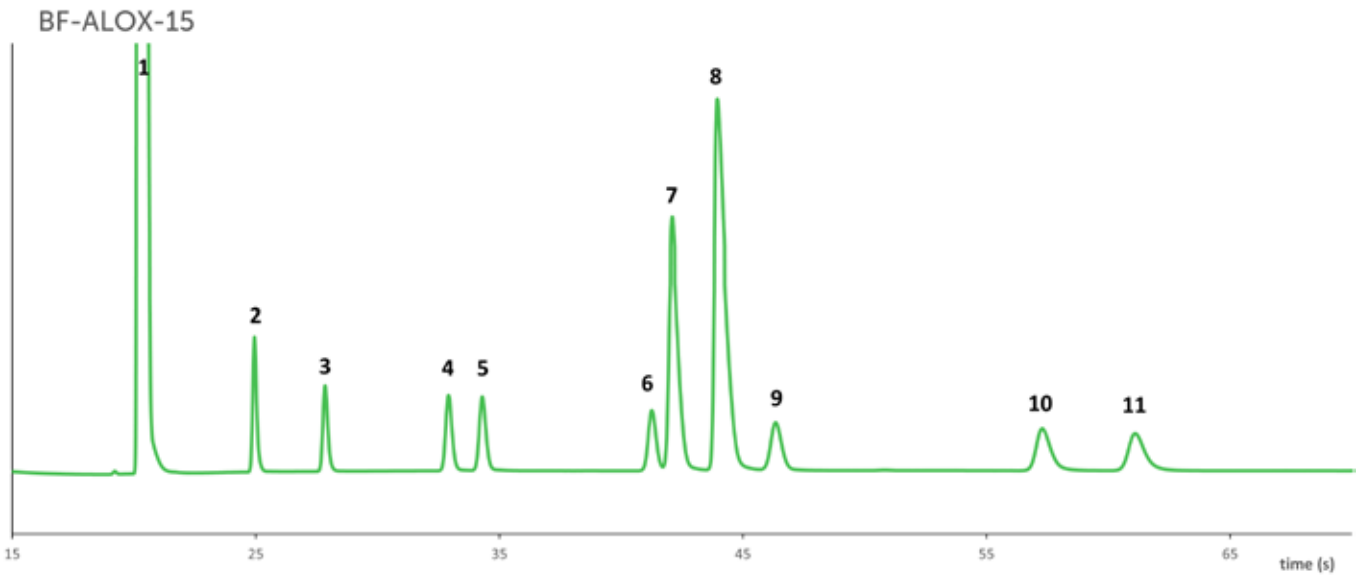
Typical composition of Fuel gas sample :
• C3 to C5 : from 0% to 50%

CONLUSIONS

• This module enables separation of alkanes and alkenes from C3 to C5 in less than 2 minutes. Backflush-toi-detector function enables the measurement of C6+ compounds into a single peak.
You should prefer this module instead of PDMS10 module if you want to separate isomers either from alkanes and alkenes.



CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	C_3H_8	2ppm	5ppm	0.2% (0.5%)
3	C_3H_6	2ppm	5ppm	0.2% (0.5%)
4	iC_4H_{10}	2ppm	5ppm	0.2% (0.5%)
5	nC_4H_{10}	2ppm	5ppm	0.2% (0.5%)
6	Trans but-2-ene	5ppm	0.2% (0.5%)	
7	But-1-ene	2ppm	5ppm	0.2% (0.5%)
8	i-Butene	2ppm	5ppm	0.2% (0.5%)
9	Cis-2-butene	2ppm	5ppm	0.2% (0.5%)
10	iC_5H_{12}	2ppm	5ppm	0.2% (0.5%)

METHOD

Carrier Gas
Helium
Carrier Gas Pressure (max)
36.2 psi - 2.5 bar maxi
Detector T°C
70°C
Column T°C
120°C
Column Pressure
2 bar
Sample Loop T°C
120°C
Sample Loop Pressure
0.5 bar
Injection Time
4.5 s
Analysis Time
200s

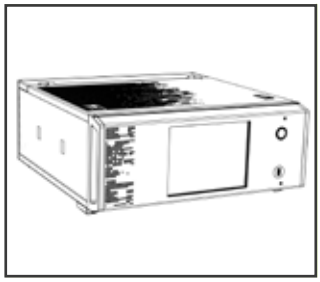
APPLICATIONS NOTES

Natural gas analysis

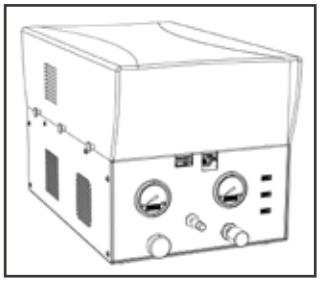
APPLICATIONS

Certified measurement of Gross Calorific Value of Natural gas processes.
Through metrological certification (OIML R140, Welmec 7.2 et ISO 6976), our device is able to provide the Calorific Value that leads to natural gas tarification.
2 modules are mandatory for this 2 min analysis.
PixLPro software gives you direct overview of the measurement.
On the ChromPix® or ChromEx 400 device, you can add two optionnal modules to analyze sulfur compounds (H_2S and odorizant - TBM or THT)

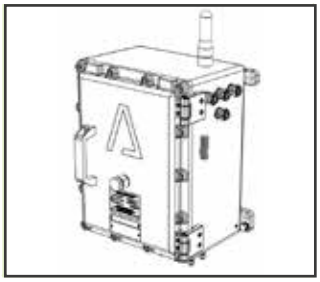
SYSTEMS



ChromPix2®



TwinPix®



ChromEx200/400®

SAMPLE

Typical natural gas sample

CONLUSIONS

APIX systems are pending certified for the measurement of Gross Heating Value of Natural Gas.
Two analytical modules (PPU10 and PDMS10) are mandatory for performing this certified measurement.
System configuration can be completed with two other modules for providing analysis of supplementary compounds (sulfur compounds...)

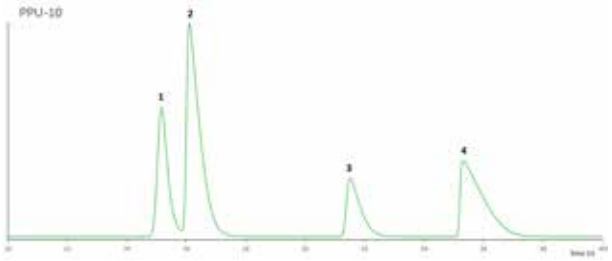
MODULE A

Reference	**MK10-TCD-2µL-PPU10-PPU1-F1**
Detector	**TCD**
Column	**PPU (Pora-Plot U) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**12µm**
Precolumn	**PPU (Pora-Plot U) 1m**
Backflush	✔
Sample Loop	**2µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**70°C**
Column T°C	**70°C**
Column Pressure	**0.8 bar**
Sample Loop T°C	**70°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**10s**
Analysis Time	**120s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	N_2+O_2	2ppm	6ppm	0.9% (0.6%)
2	CH_4	1%	3%	0.05% (82.81%)
3	CO_2	2ppm	6ppm	0.25% (0.29%)
4	C_2H_6	2ppm	6ppm	0.25% (11.81%)

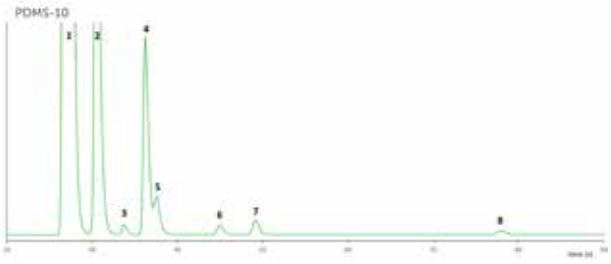
MODULE B

Reference	**MK6-TCD-2µL-PDMS10-F1**
Detector	**TCD**
Column	**PDMS (100% Methyl Polysiloxane) 10m**
Internal Diameter	**0.15mm**
Phase Thickness	**1.2µm**
Precolumn	**None**
Backflush	✖
Sample Loop	**2µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**70°C**
Column T°C	**60°C**
Column Pressure	**1.2 bar**
Sample Loop T°C	**60°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**1s**
Analysis Time	**100s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	C3	1ppm	3ppm	0.1% (7%)
3	iC4	1ppm	3ppm	0.2% (0.1%)
4	nC4	1ppm	3ppm	0.1% (2%)
5	neoC5	1ppm	3ppm	0.3% (0.35%)
6	iC5	1ppm	3ppm	0.2% (0.1%)
7	nC5	1ppm	3ppm	0.4% (0.15%)
8	nC6	1ppm	3ppm	0.6% (500ppm)

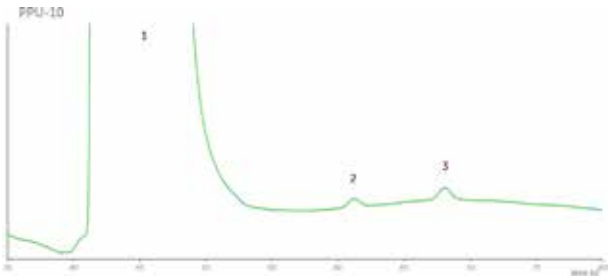
MODULE C

Reference	**MK10-TCD-20µL-PPU10-PPU1-F1**
Detector	**TCD**
Column	**PPU (Pora-Plot U) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**12µm**
Precolumn	**PPU (Pora-Plot U) 1m**
Backflush	✔
Sample Loop	**20µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**80°C**
Column T°C	**105°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**105°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**13s**
Analysis Time	**80s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	H_2S	1ppm	3ppm	10% (3ppm)
3	COS	1ppm	3ppm	10% (3ppm)

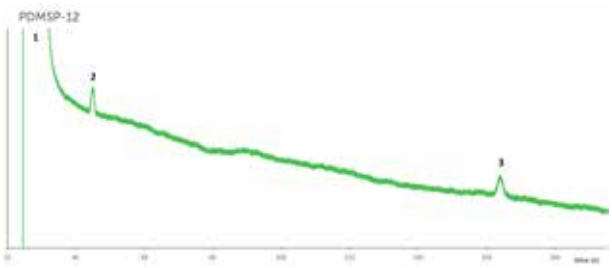
MODULE D

Reference	**MK6-TCD-20µL-PDMSP12-F2**
Detector	**TCD**
Column	**PDMSP (20 % Diphenyl - 80 % Methylpolysiloxane) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**1µm**
Precolumn	**None**
Backflush	✖
Sample Loop	**20µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**60°C**
Column T°C	**60°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**60°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**1s**
Analysis Time	**200s**

CHROMATOGRAM



RESULTS

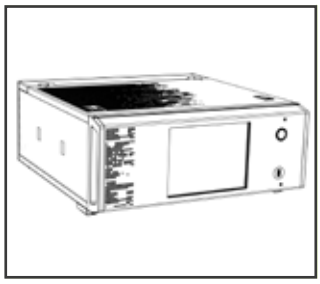
		LOD	LOQ	RSD
1	Injection			
2	TBM	1ppm	2ppm	<10% (2ppm)
3	THT	1ppm	2ppm	<10% (2ppm)

Biomethane analysis

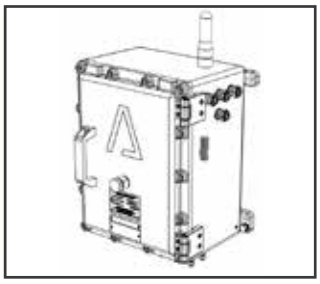
APPLICATIONS

Certified measurement of Gross Calorific Value of Biomethane processes.
Through metrological certification (ISO 6976), our device is able to provide the High Heating Value that leads to Biomethane tarification before injection in Natural gas network.
One module is mandatory for this 2 min certified analysis.
PixLPro software gives you direct overview of the measurement.
On the ChromPix® or ChromEx 400 device, you can add three optionnal modules to analyse sulfur compounds (H_2S and odorizant) and other compounds

SYSTEMS



ChromPix2®



ChromEx200/400®

SAMPLE

Typical biomethane gas sample, before and after purification

CONLUSIONS

APIX systems are pending certified for the measurement of Gross Heating Value of Biomethane.
Only one analytical modules (PPU10) is mandatory for performing this certified measurement.
System configuration can be completed with three other modules for providing analysis of supplementary compounds (permanent gases, suflur compounds...).
Due to system modularity, hydrogen can also be analyzed to increase valorisation of biomethane processes.

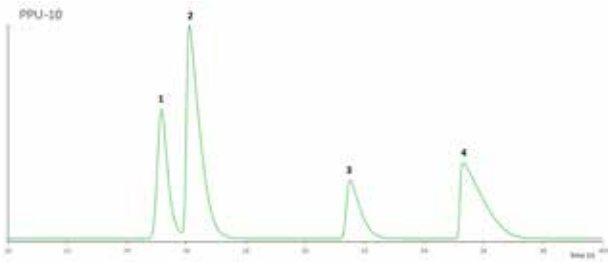
MODULE A

Reference	**MK10-TCD-2µL-PPU10-PPU1-F1**
Detector	**TCD**
Column	**PPU (Pora-Plot U) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**12µm**
Precolumn	**PPU (Pora-Plot U) 1m**
Backflush	✔
Sample Loop	**2µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**70°C**
Column T°C	**70°C**
Column Pressure	**0.8 bar**
Sample Loop T°C	**70°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**10s**
Analysis Time	**120s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	N_2+O_2	2ppm	6ppm	0.9% (0.6%)
2	CH_4	1%	3%	0.05% (82.81%)
3	CO_2	2ppm	6ppm	0.25% (0.29%)
4	C_2H_6	2ppm	6ppm	0.25% (11.81%)

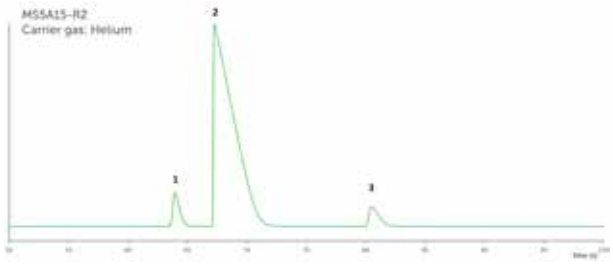
MODULE B

Reference	**MK10-TCD-2µL-MS5A15-PPU5-R2**
Detector	**TCD**
Column	**MS5A (Molsieve) 15m**
Internal Diameter	**0.25mm**
Phase Thickness	**20µm**
Precolumn	**PPU (Pora-Plot) 5m**
Backflush	✔
Sample Loop	**2µL**
Regeneration	✔

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar maxi**
Detector T°C	**70°C**
Column T°C	**140°C**
Column Pressure	**1.6 bar**
Sample Loop T°C	**70°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**23s**
Analysis Time	**120s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	O_2	20ppm	60ppm	0.5% (5%)
2	N_2	20ppm	60ppm	0.25% (89.5%)
3	CH_4	20ppm	60ppm	0.5% (5%)

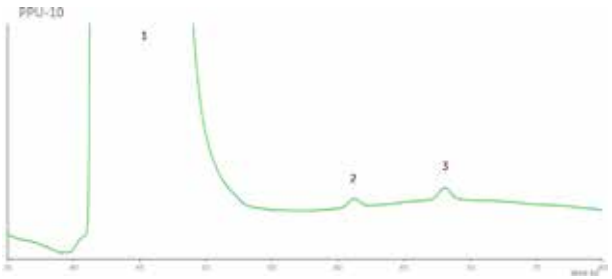
MODULE C

Reference	**MK10-TCD-20µL-PPU10-PPU1-F1**
Detector	**TCD**
Column	**PPU (Pora-Plot U) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**12µm**
Precolumn	**PPU (Pora-Plot U) 1m**
Backflush	✔
Sample Loop	**20µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**80°C**
Column T°C	**105°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**105°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**13s**
Analysis Time	**80s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	H_2S	1ppm	3ppm	10% (3ppm)
3	COS	1ppm	3ppm	10% (3ppm)

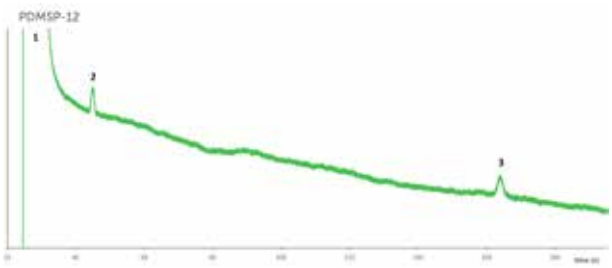
MODULE D

Reference	**MK6-TCD-20µL-PDMSP12-F2**
Detector	**TCD**
Column	**PDMSP (20 % Diphenyl - 80 % Methylpolysiloxane) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**1µm**
Precolumn	**None**
Backflush	✖
Sample Loop	**20µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**60°C**
Column T°C	**60°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**60°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**1s**
Analysis Time	**200s**

CHROMATOGRAM



RESULTS

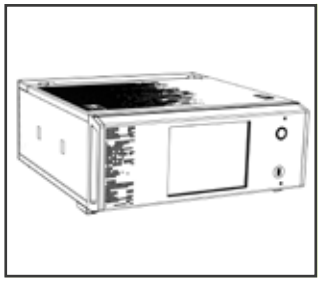
		LOD	LOQ	RSD
1	Injection			
2	TBM	1ppm	2ppm	<10% (2ppm)
3	THT	1ppm	2ppm	<10% (2ppm)

Total Sulfur analysis

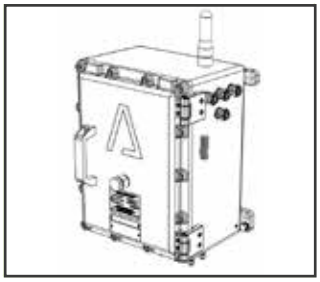
APPLICATIONS

The combination of at least 3 modules in our ChromPix2® allows analysis of a wide range of sulfur compounds with a few ppm sensitivity.
Thanks to the Total Sulfur application of the PixLPro software, total sulfur results, total mercaptan results and concentration of each mercaptan will be monitored.

SYSTEMS



ChromPix2®



ChromEx200/400®

SAMPLE

Natural gas sample or biogas/biomethane sample

CONLUSIONS

System modularity allows to address a specific analytical solution to your process for sulfur compounds analysis.
Combination of three analytical modules inside an unique system provides measurement of a wide range of sulfur compounds.

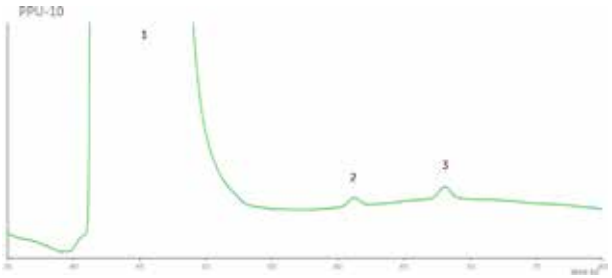
MODULE A

Reference	**MK10-TCD-20µL-PPU10-PPU1-F1**
Detector	**TCD**
Column	**PPU (Pora-Plot U) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**12µm**
Precolumn	**PPU (Pora-Plot U) 1m**
Backflush	✔
Sample Loop	**20µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**80°C**
Column T°C	**105°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**105°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**13s**
Analysis Time	**80s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	H_2S	1ppm	3ppm	10% (3ppm)
3	COS	1ppm	3ppm	10% (3ppm)

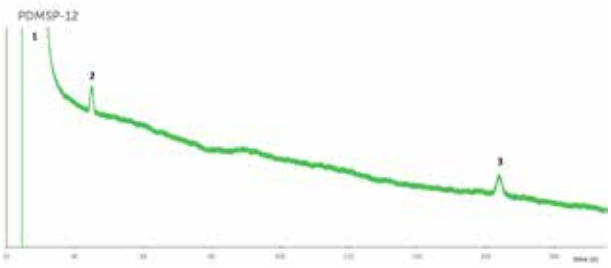
MODULE B

Reference	**MK6-TCD-20µL-PDMSP12-F2**
Detector	**TCD**
Column	**PDMSP (20 % Diphenyl - 80 % Methylpolysiloxane) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**1µm**
Precolumn	**None**
Backflush	✖
Sample Loop	**20µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar**
Detector T°C	**60°C**
Column T°C	**60°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**60°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**1s**
Analysis Time	**200s**

CHROMATOGRAM



RESULTS

		LOD	LOQ	RSD
1	Injection			
2	TBM	1ppm	2ppm	<10% (2ppm)
3	THT	1ppm	2ppm	<10% (2ppm)

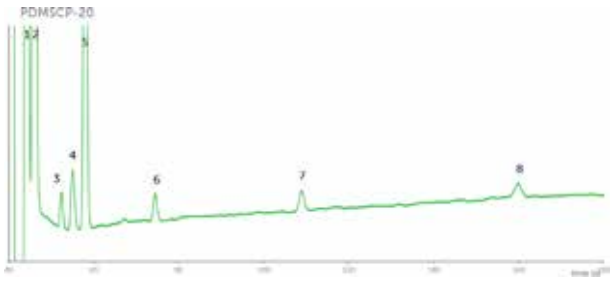
MODULE C

Reference	**MK6-TCD-30µL-PDMSCP20-F1**
Detector	**TCD**
Column	**PDMSCP (14%-Cyanopropylphenyle - 86 % Methylpolysiloxane) 10m**
Internal Diameter	**0.25mm**
Phase Thickness	**1µm**
Precolumn	**None**
Backflush	✖
Sample Loop	**30µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar maxi**
Detector T°C	**70°C**
Column T°C	**70°C**
Column Pressure	**1.5 bar**
Sample Loop T°C	**70°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**1.5s**
Analysis Time	**180s**

CHROMATOGRAM



RESULTS

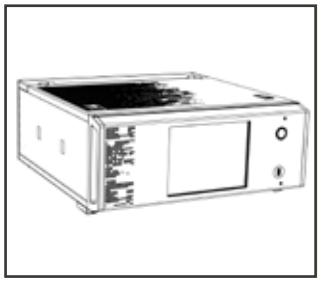
		LOD	LOQ	RSD
1	iC5	1ppm	3ppm	10% (3ppm)
2	nC5	1ppm	3ppm	10% (3ppm)
3	EM	1ppm	3ppm	10% (3ppm)
4	DMS + CS2	1ppm	3ppm	10% (3ppm)
5	nC6	1ppm	3ppm	10% (3ppm)
6	MES	1ppm	3ppm	10% (3ppm)
7	DES	1ppm	3ppm	10% (3ppm)
8	DMDS	1ppm	3ppm	10% (3ppm)

LNG / LPG analysis

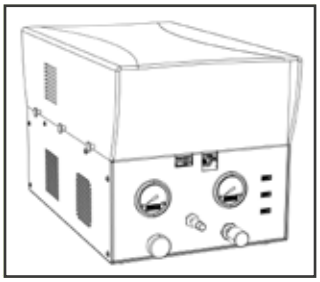
APPLICATIONS

APIX systems can be coupled with an upstream vaporizer system (such as AURA system from Alytech company) to vaporize liquid samples such as Liquified Natural Gas or Liquified Petroleum Gas.
One to two analytical modules are mandatory to perform these analyses.

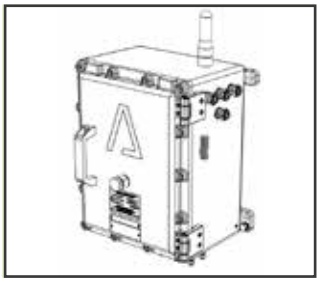
SYSTEMS



ChromPix2®



TwinPix®



ChromEx200/400®

SAMPLE

Liquified petroleum gas sample

CONLUSIONS

Coupling of APIX system to vaporizer allows analysis of liquified samples. Due to thermalisation of sample line inside ChromPix system, there is no sample condensation that could have damaged the analysis.
For LPG analysis, only one module (MK10-BFTCD-2µL-ALOX15-PDMS2-F2) is necessary for the measurement of hydrocarbons froms C3 to C5, including alkanes, alkenes and isomers.
For LNG analysis, two modules are necessary (MK10-TCD-2µL-PPU10-PPU1-F1 and MK6-TCD-2µL-PDMS10-F1) for the analysis of C1 to C5 hydrocarbons of the liquified natural gas sample. Additionnal modules are also available for analysis of heavier hydrocarbons.

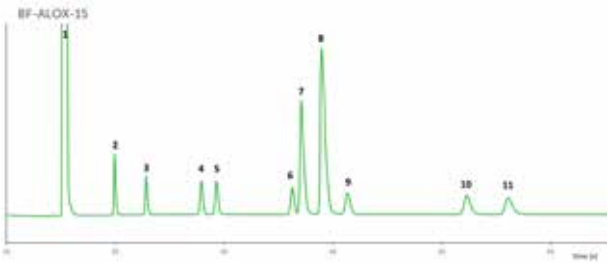
MODULE A

Reference	**MK10-BFTCD-2µL-ALOX15-PDMS2-F2**
Detector	**TCD**
Column	**ALOX (Alumina Al!2?O!3?/KCl) 15m**
Internal Diameter	**0.25mm**
Phase Thickness	**4µm**
Precolumn	**PDMS (100% Methyl Polysiloxane) 2m**
Backflush	✔
Sample Loop	**2µL**
Regeneration	✖

METHOD

Carrier Gas	**Helium**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar maxi**
Detector T°C	**70°C**
Column T°C	**120°C**
Column Pressure	**2 bar**
Sample Loop T°C	**120°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**4.5 s**
Analysis Time	**200s**

CHROMATOGRAM



RESULTS

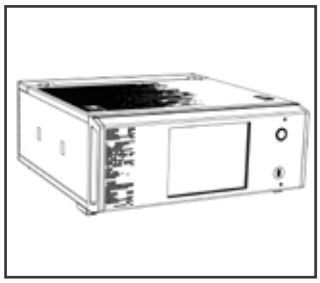
		LOD	LOQ	RSD
1	Injection			
2	C_3H_8	2ppm	5ppm	0.2% (0.5%)
3	C_3H_6	2ppm	5ppm	0.2% (0.5%)
4	iC_4H_{10}	2ppm	5ppm	0.2% (0.5%)
5	nC_4H_{10}	2ppm	5ppm	0.2% (0.5%)
6	Trans but-2-ene	5ppm	0.2% (0.5%)	
7	But-1-ene	2ppm	5ppm	0.2% (0.5%)
8	i-Butene	2ppm	5ppm	0.2% (0.5%)
9	1,2-Butadiene	2ppm	5ppm	0.2% (0.5%)
10	iC_5H_{12}	2ppm	5ppm	0.2% (0.5%)
11	nC_5H_{12}	2ppm	5ppm	0.2% (0.5%)

H_2 and Helium Analysis

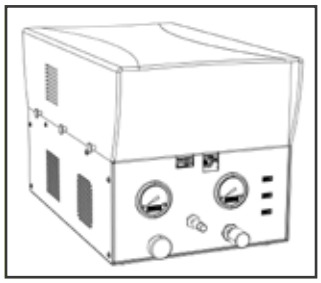
APPLICATIONS

A specific analytical method on MS5A module allows the separation of hydrogen and helium, opening new possibilities for measurement and qualification of industrial and specialty gases.

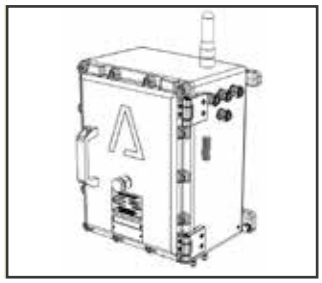
SYSTEMS



ChromPix2®



TwinPix®



ChromEx200/400®

SAMPLE

He/H_2 mixture (Biogas, Biomethane applications)

CONLUSIONS

Module MK10-TCD-20µL-MS5A15-PPU5-R2, which is usually deployed for analysis of permanent gases (analysis of O_2, N_2, CO in biomethane and biogas applications, can also be used for analysis of hydrogen and helium).
An appropriate and specific analytical method is necessary to allow He and H_2 separation. Use of argon as carrier gas is mandatory for a better detection sensitivity.
Limit of detection of 10ppm can be improved by increasing sample loop volume to 20µL.

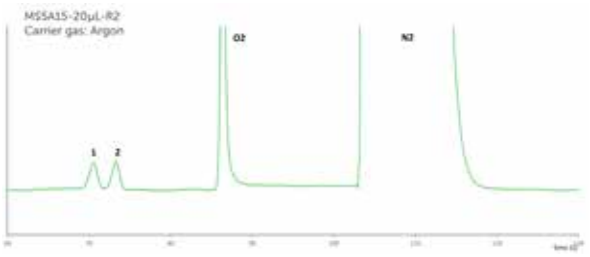
MODULE A

Reference	**MK10-TCD-20µL-MS5A15-PPU5-R2**
Detector	**TCD**
Column	**MS5A (Molsieve) 15m**
Internal Diameter	**0.25mm**
Phase Thickness	**20µm**
Precolumn	**PPU (Pora-Plot) 5m**
Backflush	✓
Sample Loop	**20µL**
Regeneration	✓

METHOD

Carrier Gas	**Argon**
Carrier Gas Pressure (max)	**36.2 psi - 2.5 bar maxi**
Detector T°C	**60°C**
Column T°C	**60°C**
Column Pressure	**1 bar**
Sample Loop T°C	**60°C**
Sample Loop Pressure	**0.5 bar**
Injection Time	**30s**
Analysis Time	**200s**

CHROMATOGRAM



RESULTS

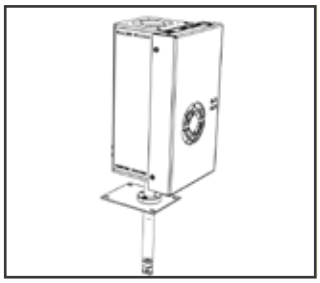
		LOD	LOQ	RSD
1	He	1ppm	3ppm	0.5% (100ppm)
2	H_2	1ppm	3ppm	0.5% (100ppm)

C8 to C24 analysis

APPLICATIONS

Coupling of NanoPix to a traditional GC allows the analysis of refinery gas such as C8 to C24 hydrocarbons with an efficient sensitivity due to its innovative NGD detector.

SYSTEMS



NanoPix®

SAMPLE

Standard Linear Hydrocarbons sample from C8 to C24 integrating pristane and phytane compounds (solution at 1000ppm)

CONLUSIONS

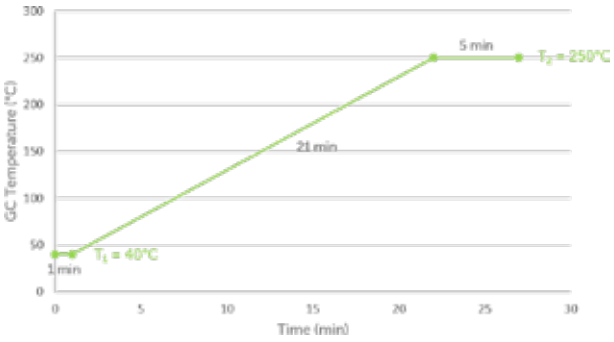
NanoPix integrating the new NGD detector is a useful new tool that can be installed on your conventionnal lab GC, to replace TCD or FID detector.
NGD sensitivity performances allow to detect heavy compounds (up to C40). Analysis of C8 to C24 sample as presented here gives access to many sectors of petrochemical applications.

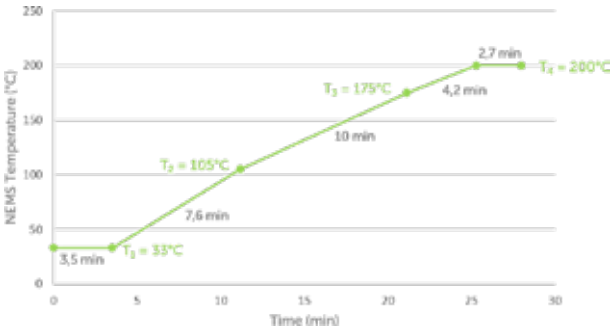
METHOD

GC temperature	**See temperature ramp below**
NEMS temperature	**See temperature ramp below**
Type of column	**100% dimethyle polysiloxane**
Length of column	**30 m**
Internal diameter	**0.25 mm**
Stationnary phase thickness	**0.25 µm**
Pressure	**2 bar**
Split Ratio	**1 : 20**
Injected volume	**1 µL**
Transfer Line temperature	**60°C (1 min) and ramp (10°C/min) to 250°C (8min)**

RESULTS

		LOD	LOQ	RSD
1	nC8	70ppbv	200ppbv	1.2%
2	nC9	50ppbv	150ppbv	1.4%
3	nC10	30ppbv	90ppbv	1.5%
4	nC12	30ppbv	90ppbv	1.6%
5	nC14	30ppbv	90ppbv	1.7%
6	nC16	28ppbv	90ppbv	1.9%
7	nC17	22ppbv	65ppbv	1.7%
8	Pristane	20ppbv	60ppbv	2.0%
9	nC18	15ppbv	45ppbv	2.1%
10	Phytane	20ppbv	60ppbv	2.3%
11	nC20	15ppbv	45ppbv	2.6%
12	nC24	18ppbv	54ppbv	2.4%





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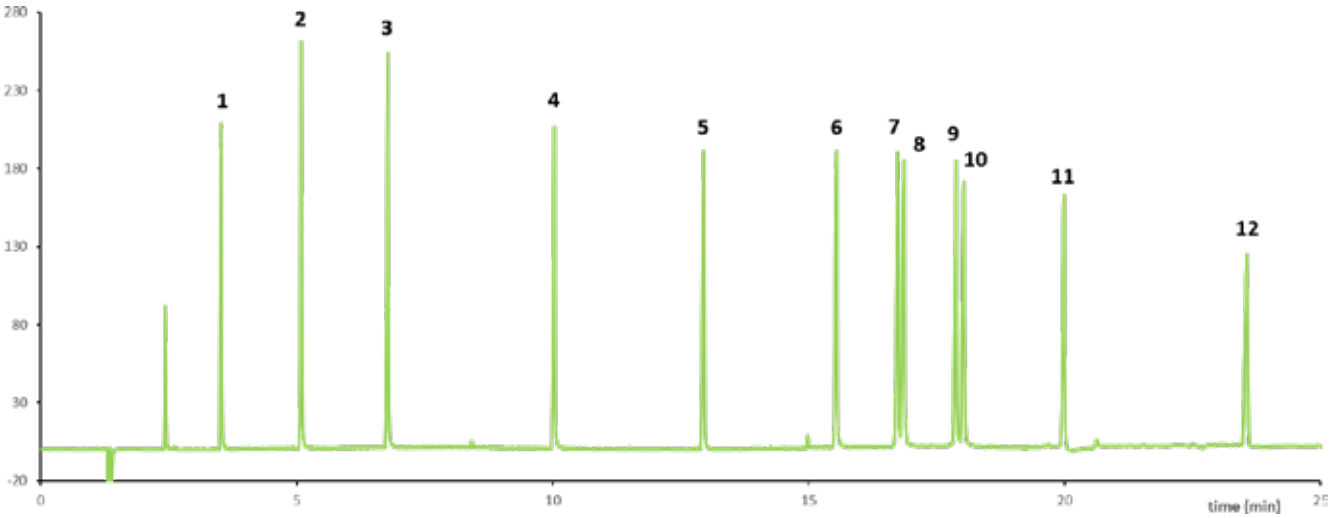
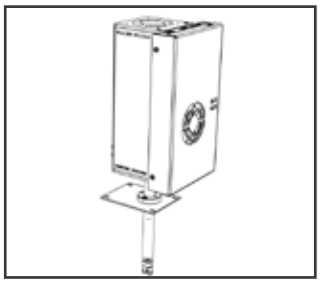


Kerosene analysis

APPLICATIONS

Coupling of NanoPix to a traditional GC allows the analysis of refinery gas such as kerosene with an efficient sensitivity due to its innovative NGD detector.

SYSTEMS



NanoPix®

SAMPLE

Kerosene (Lamp Oil)

CONLUSIONS

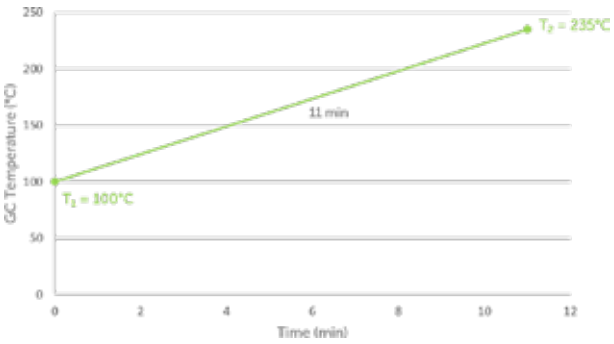
Analysis of kerosene is another example of application that can be easily reached by NanoPix system and its integrated innovative NGD detector.
Others applications such as analysis of gasoil or petroleum fractions are also accessible with NanoPix.

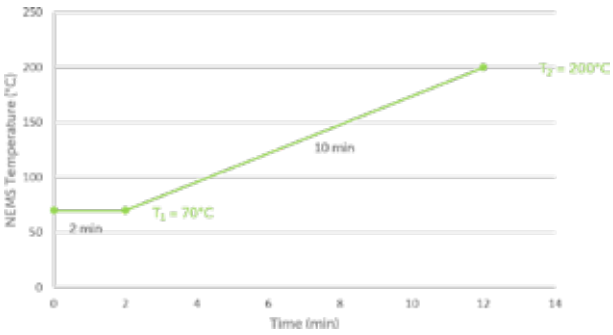
METHOD

GC temperature	**See temperature ramp below**
NEMS temperature	**See temperature ramp below**
Type of column	**(5%-phenyl)-methylpolysiloxane**
Length of column	**30 m**
Internal diameter	**0.32 mm**
Stationnary phase thickness	**0.25 µm**
Pressure	**1.3 bar**
Split Ratio	**1 : 100**
Injected volume	**0,2 µL**
Transfer Line temperature	**140°C**

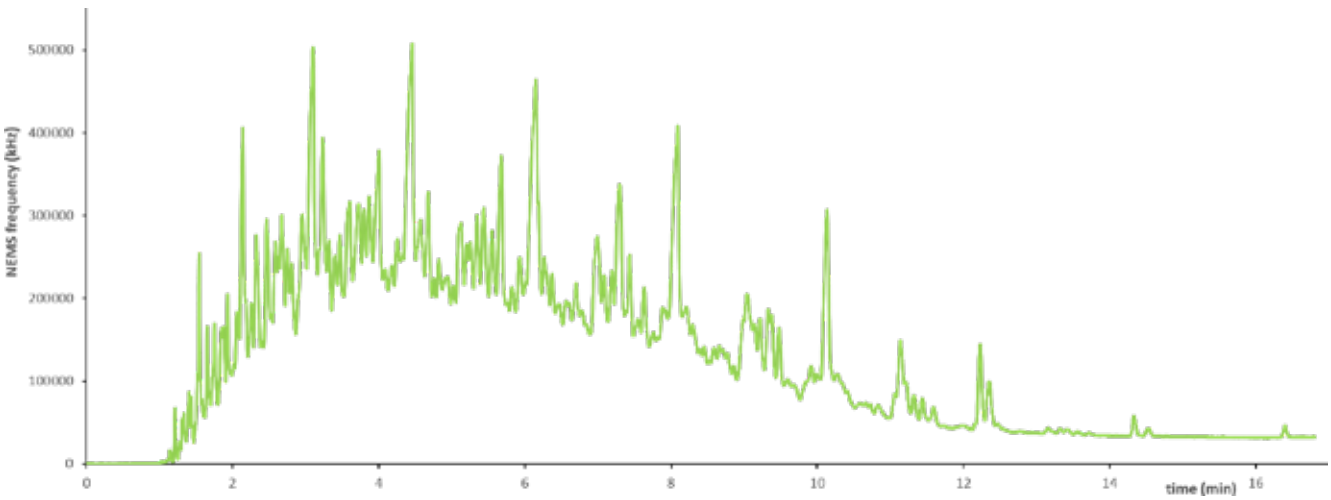
RESULTS

Qualitative analysis of Kerosene





CHROMATOGRAM



Notes

APIX
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