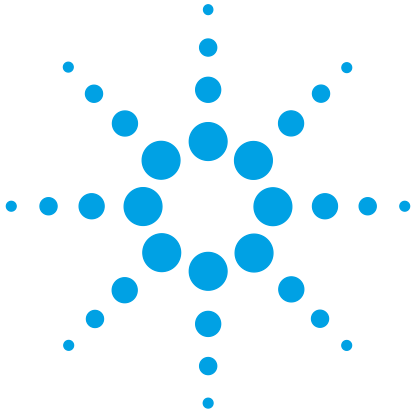

# Agilent 490 Micro GC Natural Gas Analyzer

## User Manual

Agilent Technologies

# Notices



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# Contents

# 1 Agilent 490 Micro GC - Natural Gas Analyzers

## Introduction

Natural gas is a fossil fuel. Millions of years ago, the remains of plants, animals, and micro-organisms were buried underneath layers of soil and sediment. Due to the weight of the soil and sediment, the pressure and temperature increased. This resulted in the slow transformation of the organisms into natural gas and oil.

The composition of natural gas varies widely. Natural gas is a combustible mixture of hydrocarbon gases that mainly consists of methane, smaller amounts of light hydrocarbons such as ethane, propane, n-butane, n-pentane, hexanes plus, and other gases such as nitrogen, carbon dioxide, oxygen, hydrogen, and hydrogen sulfide. Natural gas can also contain traces of argon, helium, neon, and xenon. Natural gas in its pure form is colorless and odorless.

Natural Gas Analyzers have been designed to analyze the different compositions of natural gas.

## Types of Agilent 490 Micro GC - Natural Gas Analyzers

The following four types of Natural Gas Analyzers can be used to analyze natural gas:

- The Agilent 490 Micro GC - Natural Gas Analyzer A
- The Agilent 490 Micro GC - Natural Gas Analyzer A Extended
- The Agilent 490 Micro GC - Natural Gas Analyzer B
- The Agilent 490 Micro GC - Natural Gas Analyzer B Extended

# Agilent 490 Micro GC - Natural Gas Analyzer A and the Extended Version

## Natural Gas Analyzer A

The Agilent 490 Micro GC - Natural Gas Analyzer A is used to analyze natural gas samples containing methane, carbon dioxide, and hydrocarbons up to n-nonane.

The Agilent 490 Micro GC - Natural Gas Analyzer A is a dual cabinet micro GC equipped with two channels:

- HayeSep A channel (straight)
- 6 meter CP-Sil 5 CB channel

## Natural Gas Analyzer A Extended

The Agilent 490 Micro GC - Natural Gas Analyzer A Extended is used to analyze methane, carbon dioxide, and hydrocarbons up to n-dodecane.

The Agilent 490 Micro GC - Natural Gas A Extended is a quad cabinet micro GC equipped with three channels:

- HayeSep A channel with a backflush option
- 4 meter CP-Sil 5 CB channel with a backflush option
- 8 meter CP-Sil 5 CB channel

# Agilent 490 Micro GC - Natural Gas Analyzer B and the Extended Version

## Natural Gas Analyzer B

The Agilent 490 Micro GC - Natural Gas Analyzer B is used to analyze methane, carbon dioxide, hydrogen sulfide, and light hydrocarbons up to n-nonane in natural gas.

The Agilent 490 Micro GC - Natural Gas Analyzer B is a dual cabinet micro GC equipped with two channels:

- PoraPLOT U channel with a backflush option
- 6 meter CP-Sil 5 CB channel

## Natural Gas Analyzer B Extended

The Agilent 490 Micro GC - Natural Gas Analyzer B Extended is used to analyze hydrogen, nitrogen, oxygen, methane, carbon dioxide, carbon monoxide, hydrogen sulfide, and hydrocarbons up to n-nonane.

The Agilent 490 Micro GC - Natural Gas Analyzer B Extended is a quad cabinet micro GC equipped with three channels:

- CP-Molsieve 5A channel with a backflush option
- PoraPLOT U channel with a backflush option
- 6 meter CP-Sil 5 CB channel

The Natural Gas Analyzer B Extended version is equipped with a dual carrier gas option for the CP-Molsieve 5A channel. It is made flexible for analysis of hydrogen and helium on the CP-Molsieve 5A channel if required. For the analysis of helium on the CP-Molsieve 5A channel, the carrier gas must be argon. All analyzers are factory tuned on carrier gas helium.

Before starting up the Agilent 490 Micro GC - Natural Gas Analyzer, ensure that correct carrier gases are connected for all channels. For all types of analyzers, the required carrier gas is helium. However, to analyze helium on the CP-Molsieve 5A, the carrier gas must be argon. The required pressure for carrier gas is 550 kPa (80 psi). For more information on the Agilent 490 Micro GC, see the Agilent 490 Micro GC User Manual.

# 2 Checkout Information

## Introduction

The Agilent 490 Micro GC - Natural Gas Analyzers are factory tuned on carrier gas helium including appropriate settings for back flush times for the following channels:

- HayeSep A
- 4 meter CP-Sil 5 CB
- CP-Molsieve 5A
- PoraPLOT U

The final checkout of the Agilent 490 Micro GC - Natural Gas Analyzer is performed with a NGA Gas Calibration standard and a Universal Gas Calibration standard.

- The NGA Gas Calibration standard contains nitrogen, methane, ethane, carbon dioxide, propane, iso-butane, n-butane, iso-pentane, n-pentane, and n-hexane. This natural gas standard does not contain all components specified for each type of Natural Gas Analyzer. Therefore, a second checkout sample, the Universal Gas Calibration standard is analyzed on the Natural Gas Analyzer.
- The Universal Gas Calibration standard contains helium, neon, hydrogen, oxygen, nitrogen, methane, ethane, ethylene, carbon dioxide, carbon monoxide, acetylene, propane, methyl acetylene, n-butane, n-hexane, and n-heptane. Not all components in the Universal Gas Calibration standard are specified for the Natural Gas Analyzer.

More detailed information about the NGA Gas Calibration standard and the Universal Gas Calibration standard can be found in Appendix A on page 27 and Appendix B on page 28.

The components specified for each channel are described in "Agilent 490 Micro GC - Natural Gas Analyzer A and the Extended Version" on page 6 and "Agilent 490 Micro GC - Natural Gas Analyzer B and the Extended Version" on page 7.

The NGA Gas Calibration standard and the Universal Gas Calibration standard are shipped with the analyzer and used by the Agilent Customer Engineer at installation. The factory tuned method, final chromatogram (Test Report), and the Natural Gas Analyzer User Manual are supplied on the Analyzer CD.

**To perform reference checks** on the analyzer, use the NGA Gas Calibration standard or the Universal Gas Calibration standard. If OpenLAB CDS EZChrom is used, load the method from the analyzer CD or create a method using the settings from the method pdf-file available on the analyzer CD. For a quick start, see the method settings for Natural Gas Analyzers listed in Appendix C on page 29. Connect and inject the NGA Gas Calibration standard.

**To analyze helium** on the CP-Molsieve 5A channel, use the Universal Gas Calibration standard for the checkout. Ensure that the carrier gas argon is supplied and configured before starting the analysis. For more information on how to configure the carrier gas for the analyzer see Appendix D on page 31. Method settings for this analysis can be found in Appendix E on page 35.

The NGA Gas Calibration standard and the Universal Gas Calibration standard do not contain hydrogen sulfide. A reference chromatogram of hydrogen sulfide is included in this manual.

# Natural Gas Analyzer A and the A Extended Version

## HayeSep A straight

The HayeSep A channel of the Natural Gas Analyzer A is specified for the analysis of methane, carbon dioxide, ethane, and propane.

Analysis of the NGA Gas Calibration standard results in the chromatogram shown in Figure 1.

Analysis of the Universal Gas Calibration standard results in a chromatogram similar to Figure 2

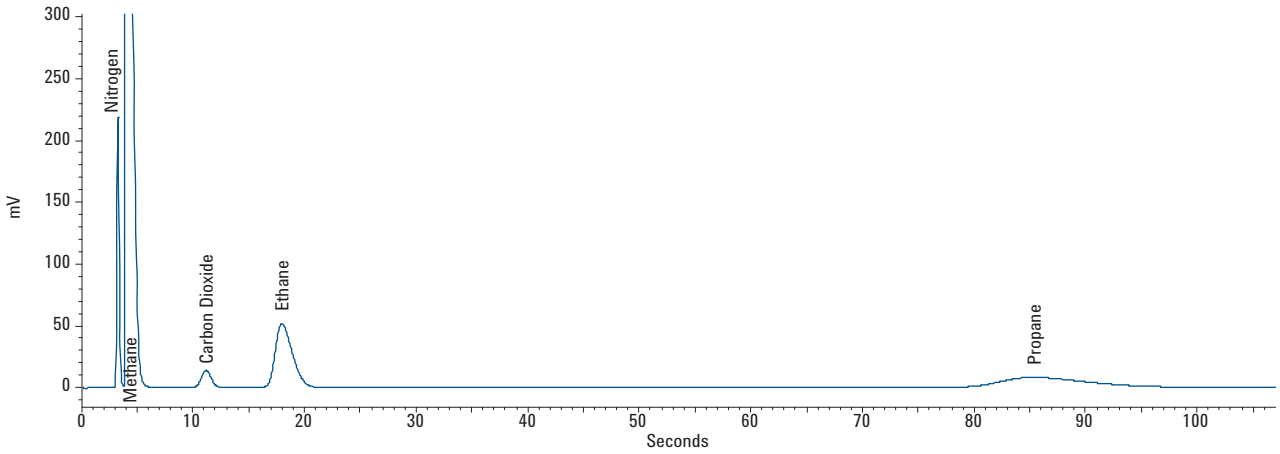


**Figure 1** NGA Gas Calibration standard analyzed with the HayeSep A channel on Analyzer A

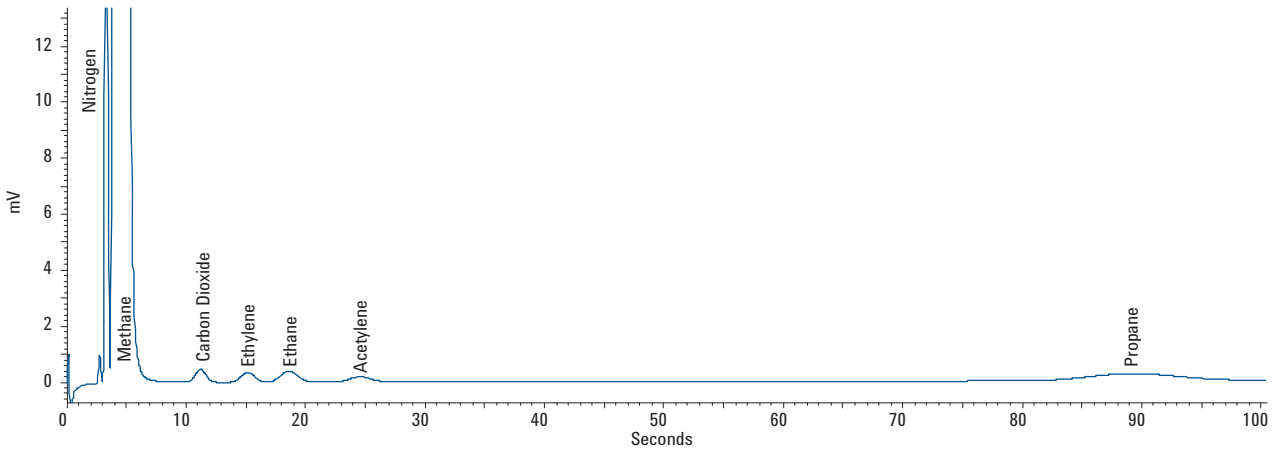


**Figure 2** Universal Gas Calibration standard analyzed with the HayeSep A channel on Analyzer A

## 6 meter CP-Sil 5 CB

The 6 meter CP-Sil 5 CB channel of the Natural Gas Analyzer A is specified for the analysis of light hydrocarbons from propane up to n-nonane.

Analysis of the NGA Gas Calibration standard results in a chromatogram similar to Figure 3.

Analysis of a sample containing neo-pentane results in a chromatogram similar to Figure 4.

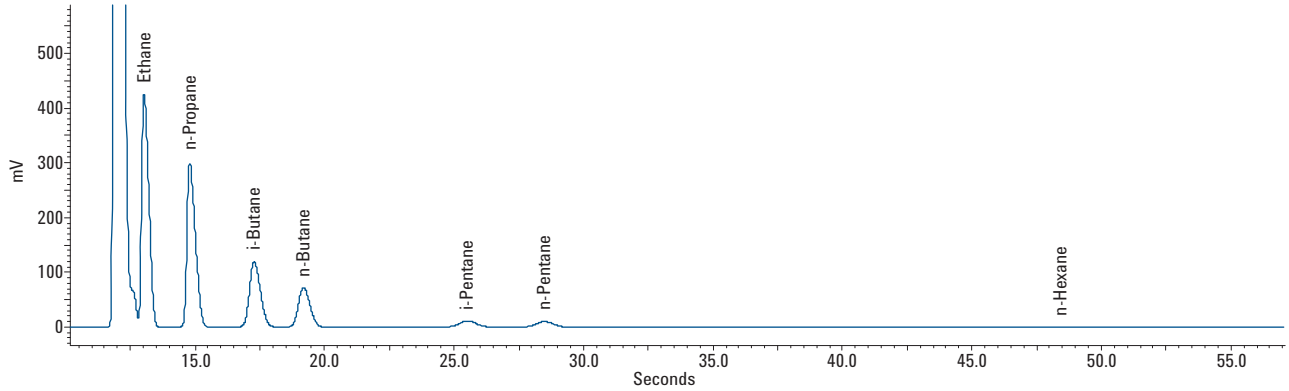


**Figure 3** NGA Gas Calibration standard analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer A

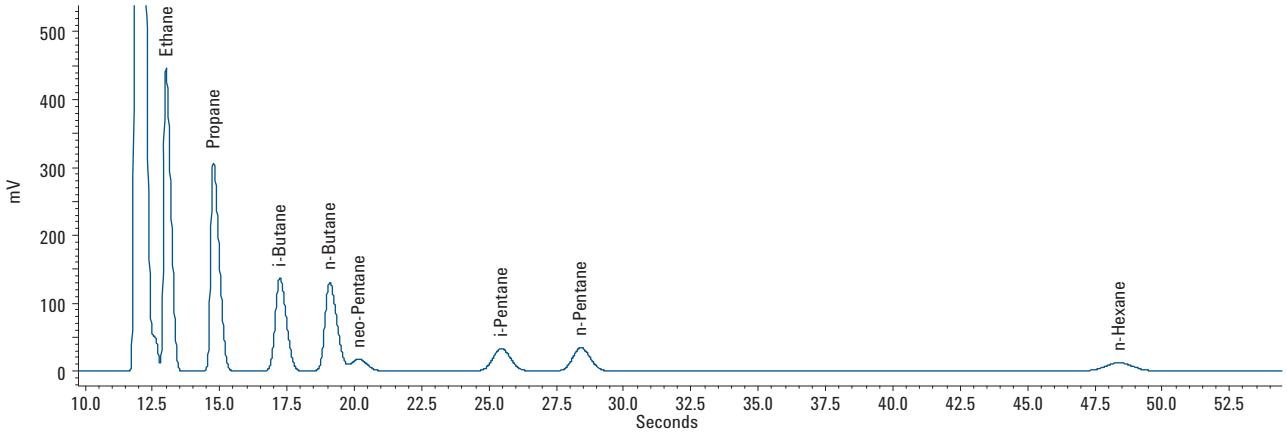


**Figure 4** Sample containing neo-pentane analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer A

Analysis of the Universal Gas Calibration standard results in a chromatogram similar to Figure 5.

Analysis of a sample containing heavier hydrocarbons up to n-nonane results in a chromatogram similar to Figure 6.

If a sample contains hydrocarbons up to n-nonane ensure that the total run time is increased sufficiently to detect all hydrocarbons on this channel.

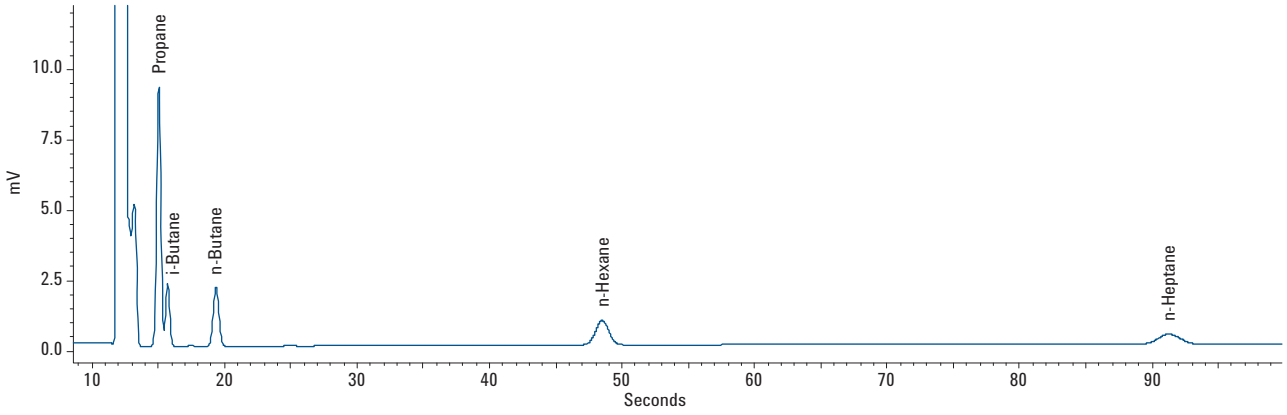


**Figure 5** Universal Gas Calibration standard analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer A

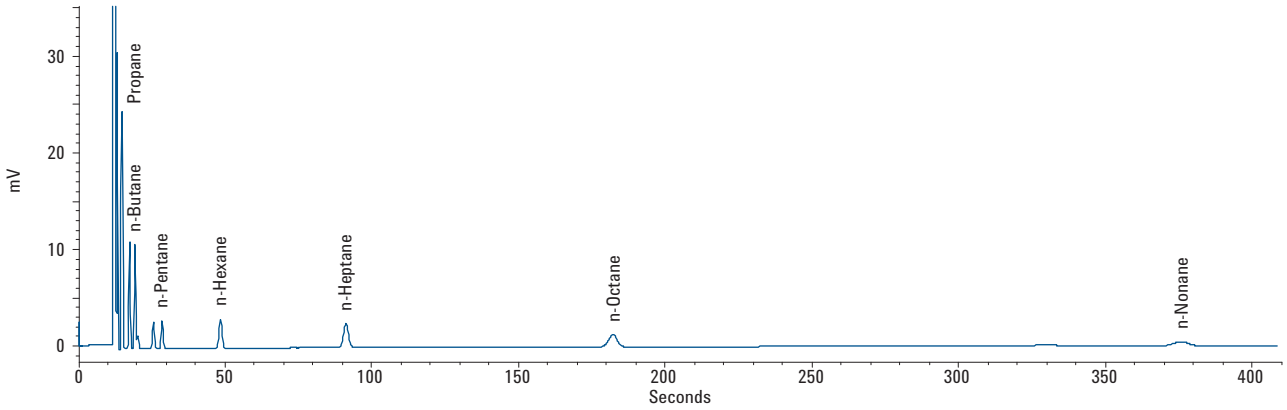


**Figure 6** Sample containing hydrocarbons up to n-nonane analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer A

## HayeSep A backflush

The HayeSep A channel, with backflush option, of the Natural Gas Analyzer A Extended is specified for the analysis of methane, carbon dioxide, ethane, and propane.

Analysis of the NGA Gas Calibration standard results in the chromatogram shown in Figure 7.

Analysis of the Universal Gas Calibration standard results in a chromatogram similar to Figure 8.

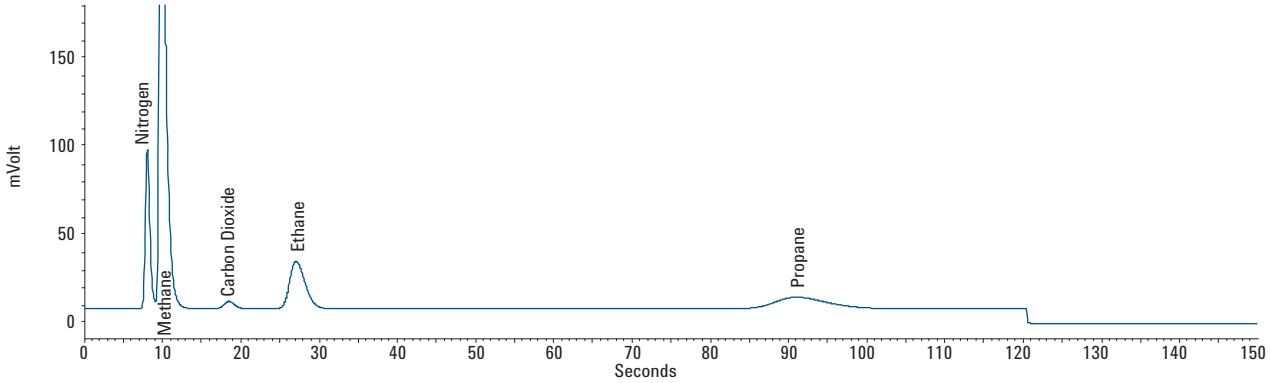


**Figure 7** NGA Gas Calibration standard analyzed with the HayeSep A channel on Analyzer A Extended

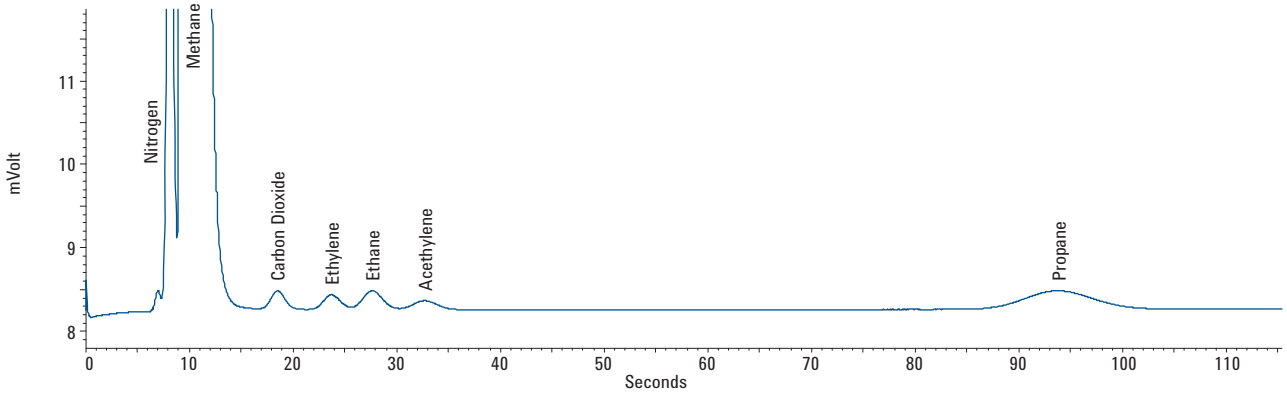


**Figure 8** Universal Gas Calibration standard analyzed with the HayeSep A channel on Analyzer A Extended

## 4 meter CP-Sil 5 CB

The 4 meter CP-Sil 5 CB channel of the Natural Gas Analyzer A Extended is specified for the analysis of light hydrocarbons propane, n-butane, iso-butane, iso-pentane, and n-pentane.

Analysis of the NGA Gas Calibration standard results in the chromatogram shown in Figure 9.

Analysis of a sample containing neo-pentane results in a chromatogram similar to Figure 10.

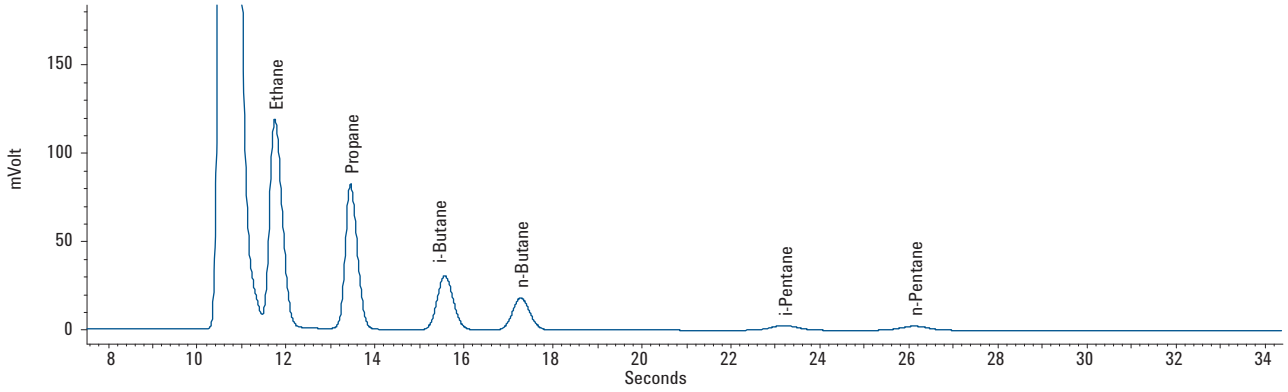


**Figure 9** NGA Gas Calibration standard analyzed with the 4 meter CP-Sil 5 CB channel on Analyzer A Extended

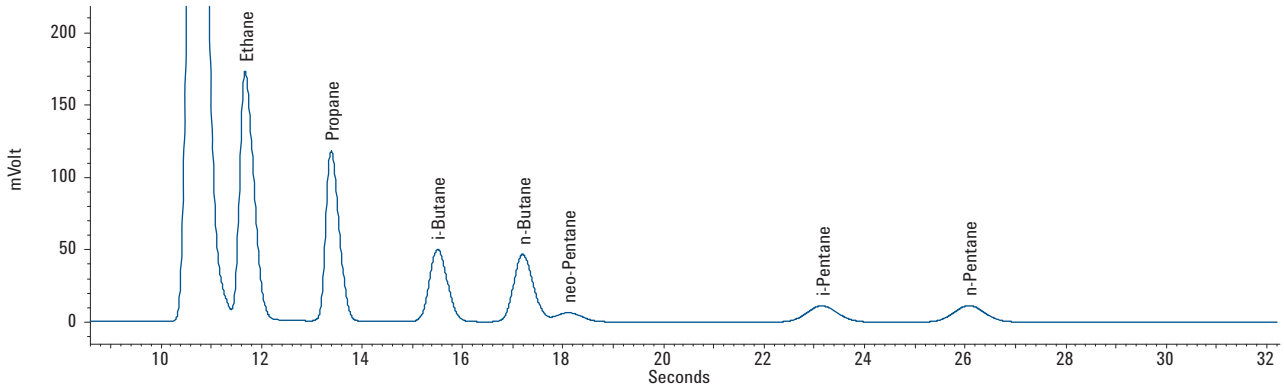


**Figure 10** Sample containing neo-pentane analyzed with the 4 meter CP-Sil 5 CB channel on Analyzer A Extended

Analysis of the Universal Gas Calibration standard results in the chromatogram shown in Figure 11.

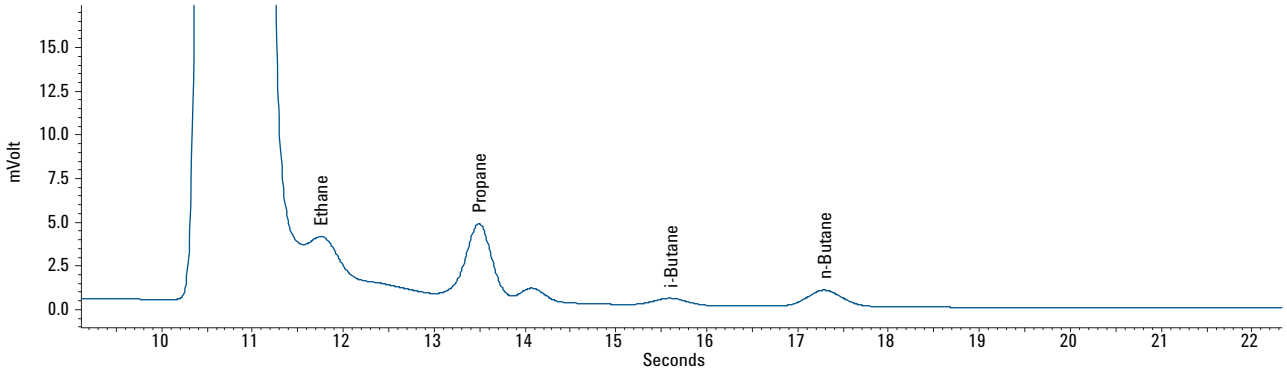


**Figure 11** Universal Gas Calibration standard analyzed with the 4 meter CP-Sil 5 CB channel on Analyzer A Extended

## 8 meter CP-Sil 5 CB

The 8 meter CP-Sil 5 CB channel of the Natural Gas Analyzer A Extended is used for the analysis of hydrocarbons from n-hexane up to n-dodecane.

The NGA Gas Calibration standard and the Universal Gas Calibration standard do not contain heavy hydrocarbons up to n-dodecane. Reference chromatograms of the NGA Gas Calibration standard and the Universal Gas Calibration standard are included in this manual. For heavy hydrocarbons up to n-dodecane an additional sample is analyzed for identification.

Analysis of the NGA Gas Calibration standard results in the chromatogram shown in Figure 12.

Reference check of the Universal Gas Calibration standard results in a chromatogram similar to Figure 13.

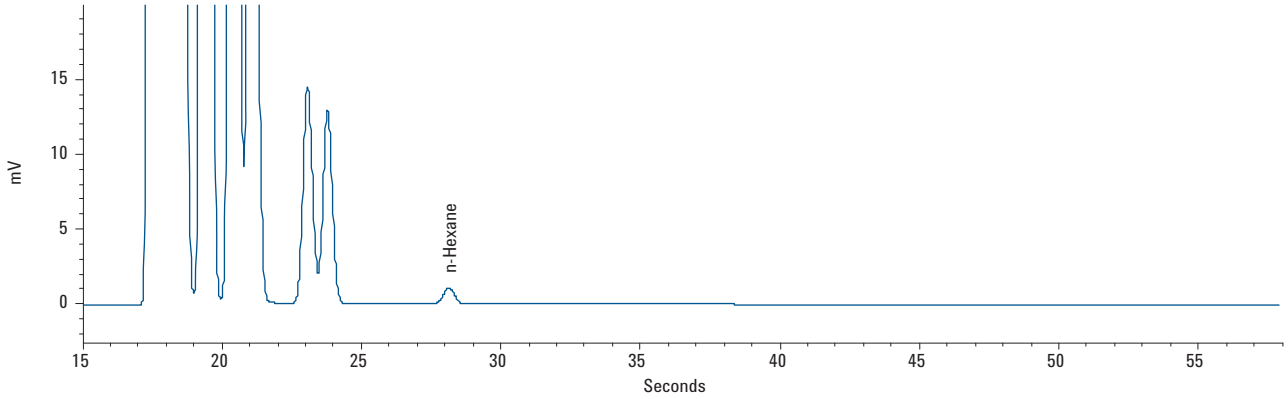


**Figure 12** NGA Gas Calibration standard analyzed with the 8 meter CP-Sil 5 CB channel on Analyzer A Extended

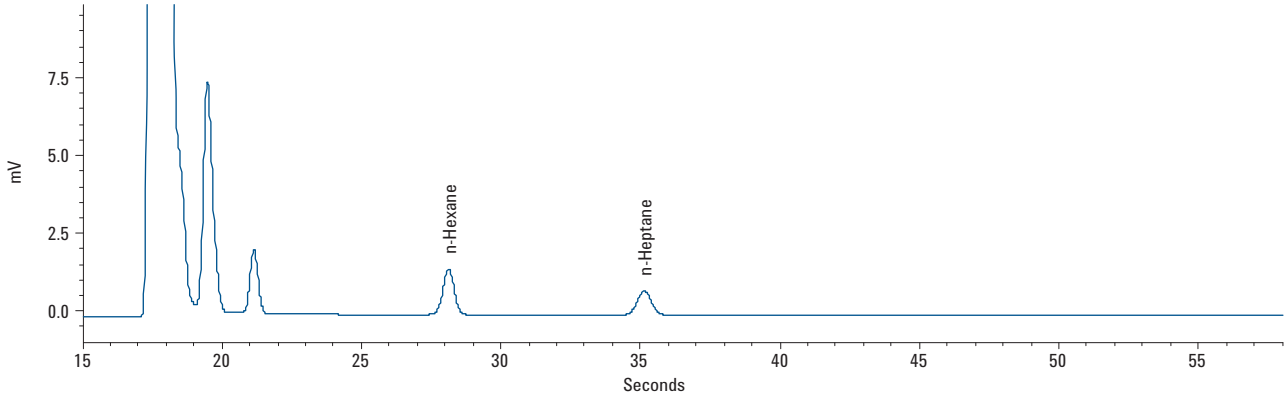


**Figure 13** Universal Gas Calibration standard analyzed with the 8 meter CP-Sil 5 CB channel on Analyzer A Extended

Analysis of a sample containing heavier hydrocarbons up to n-decane results in the chromatogram shown in Figure 14.

Analysis of a sample that contains heavier hydrocarbons up to n-dodecane results in a chromatogram similar to Figure 15.

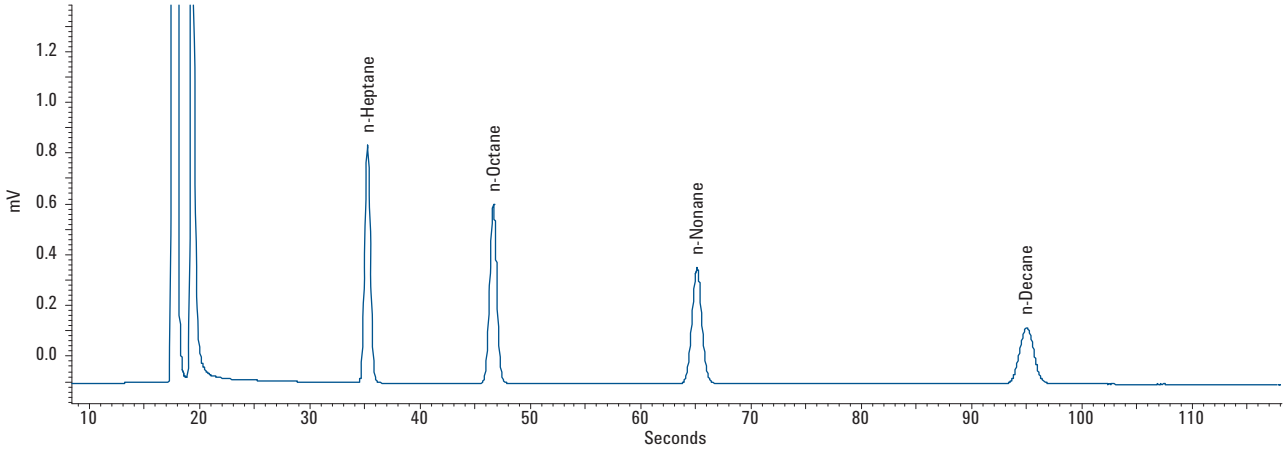


**Figure 14** Hydrocarbon gas mix containing n-heptane to n-decane analyzed with the 8 meter CP-Sil 5 CB channel on Analyzer A Extended

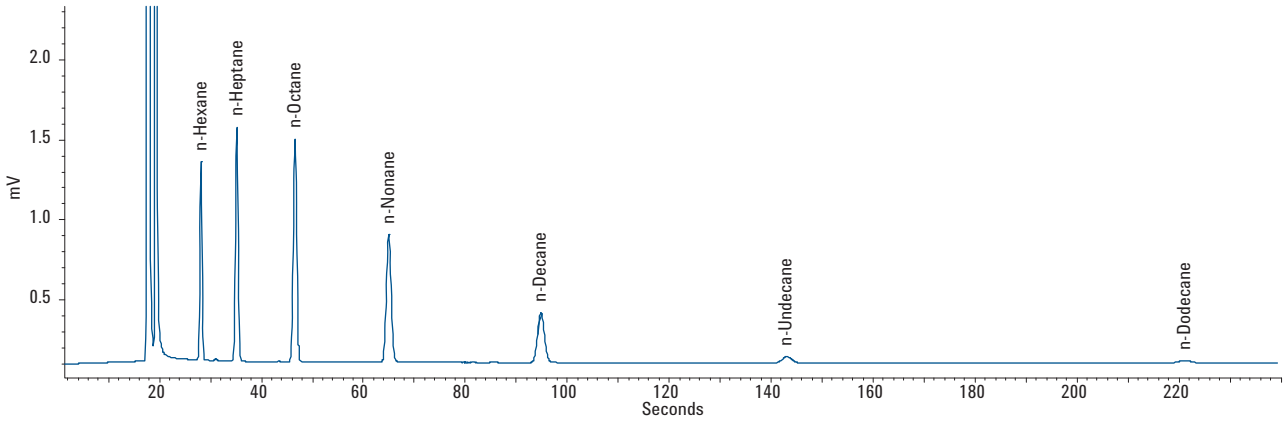


**Figure 15** Hydrocarbon gas mix containing n-hexane to n-dodecane analyzed with the 8 meter CP-Sil 5 CB channel on Analyzer A Extended

# Natural Gas Analyzer B and B Extended Version

## PoraPLOT U

The PoraPLOT U channel of the Agilent 490 Micro GC - Natural Gas Analyzer B and Extended version is specified for the analysis of methane, carbon dioxide, ethane, hydrogen sulfide, and propane in natural gas samples. The total sample path of this channel is deactivated (Ultimetal), which results in better performance and peak shape for hydrogen sulfide.

Analysis of the NGA Gas Calibration standard results in a chromatogram similar to Figure 16.

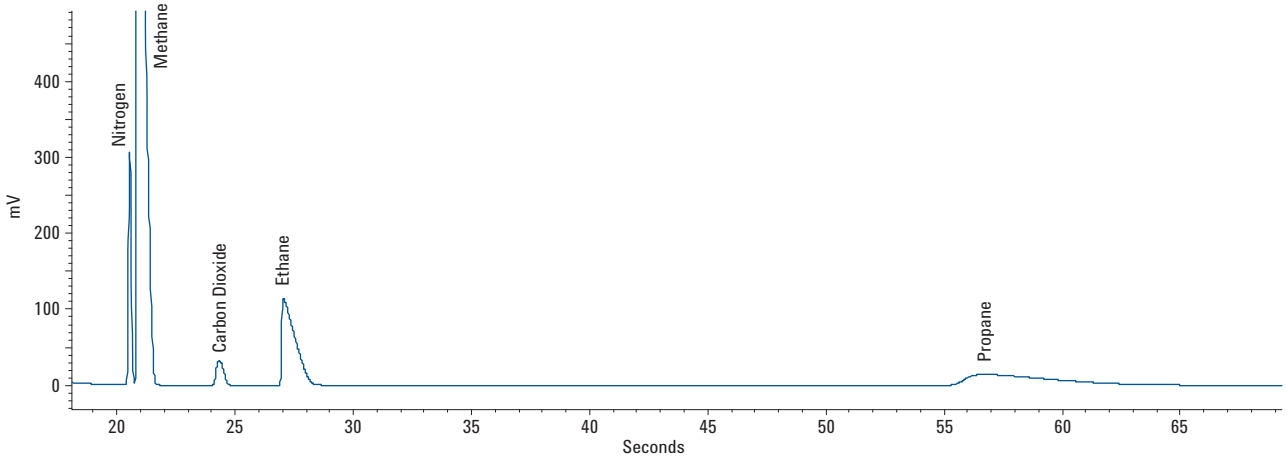


**Figure 16** NGA Gas Calibration standard analyzed with the PoraPLOT U channel on Analyzer B

Analysis of the Universal Gas Calibration standard results in a chromatogram similar to Figure 17.

Analysis of a sample containing hydrogen sulfide results in a chromatogram similar to Figure 18.

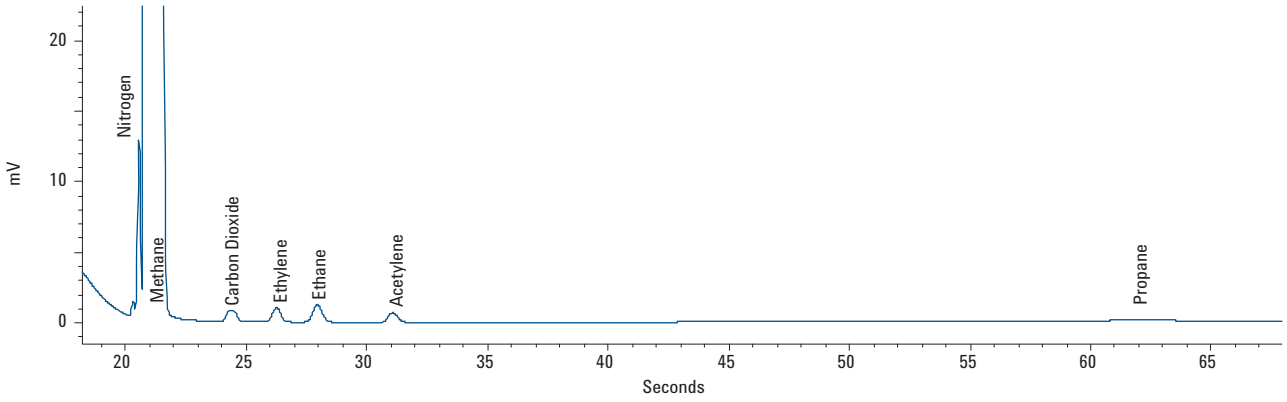


**Figure 17** Universal Gas Calibration standard analyzed with the PoraPLOT U channel on Analyzer B

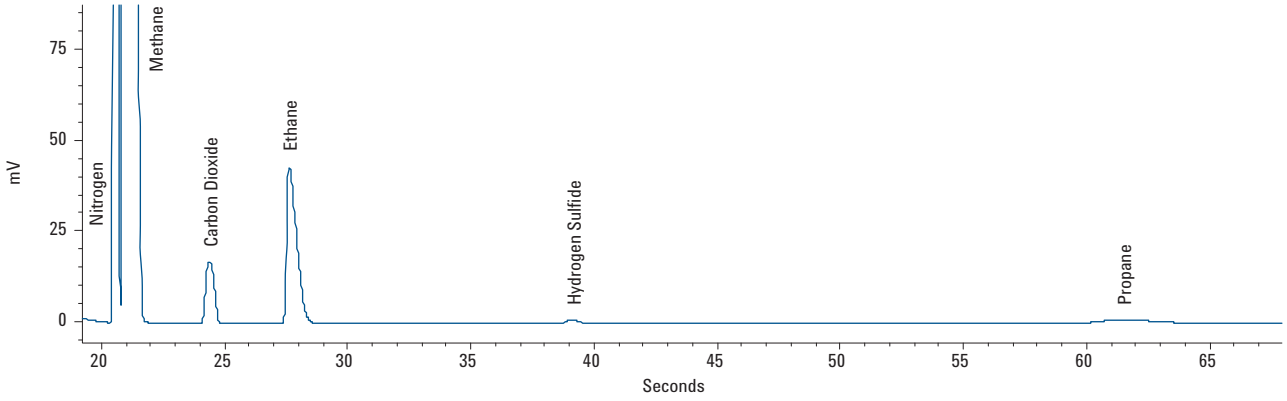


**Figure 18** Sample containing hydrogen sulfide analyzed with the PoraPLOT U channel on Analyzer B

## 6 meter CP Sil 5 CB

The 6 meter CP-Sil 5 CB channel of the Natural Gas Analyzer B and the B Extended is specified for the analysis of hydrocarbons from propane to n-nonane.

Analysis of the NGA Gas Calibration standard results in the chromatogram shown in Figure 19.

Analysis of the Universal Gas Calibration standard results in a chromatogram similar to Figure 20.

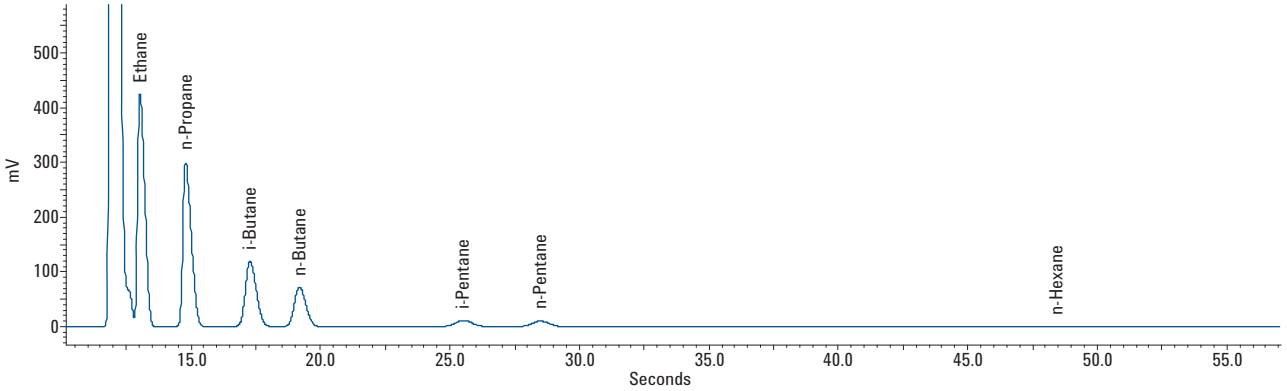


**Figure 19** NGA Gas Calibration standard analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer B

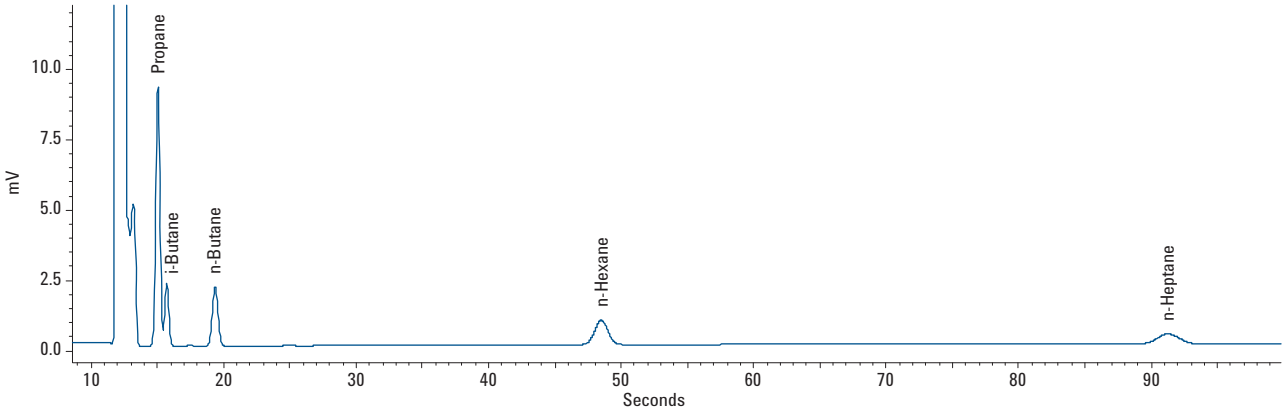


**Figure 20** Universal Gas Calibration standard analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer B

Analysis of a sample containing neo-pentane results in a chromatogram similar to Figure 21.

Analysis of a sample containing hydrocarbons up to n-nonane results in a chromatogram similar to Figure 22.

For samples that contain hydrocarbons up to n-nonane, increase the total run time to detect all hydrocarbons on this channel.

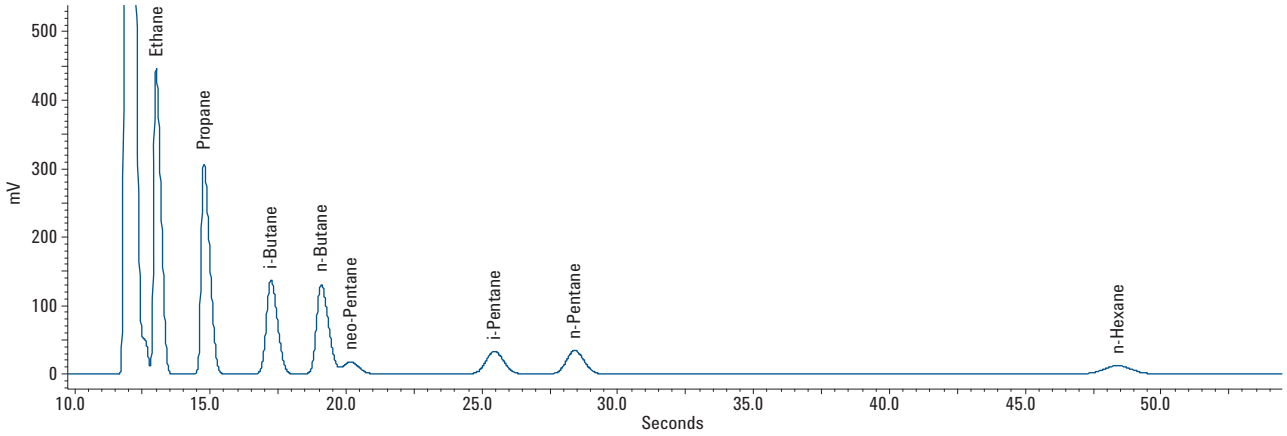


**Figure 21** Sample containing neo-pentane analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer B

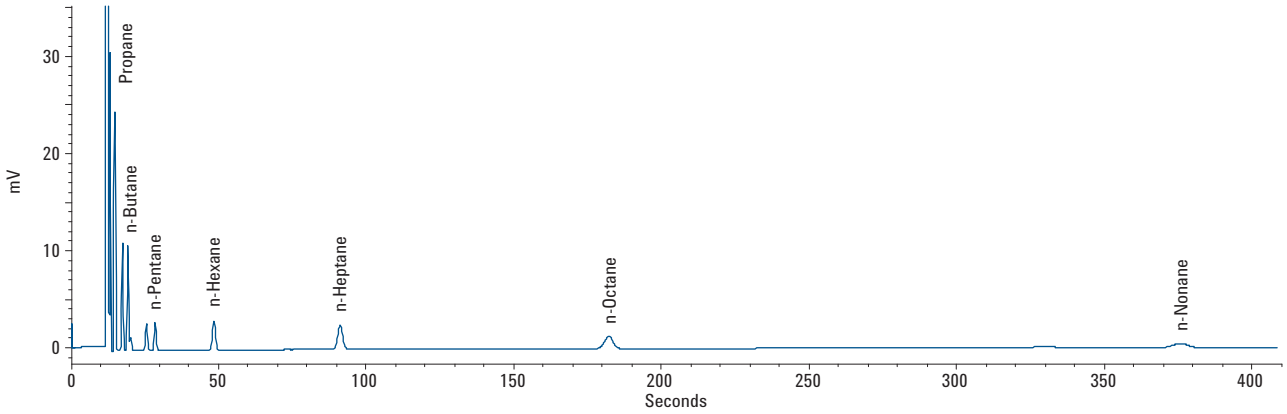


**Figure 22** Sample containing hydrocarbons up to n-nonane analyzed with the 6 meter CP-Sil 5 CB channel on Analyzer B

## CP-Molsieve 5A

The CP-Molsieve 5A channel of the Natural Gas Analyzer B Extended is used for the analysis of permanent gases such as hydrogen, oxygen, nitrogen, methane, and carbon monoxide.

Analysis of the NGA Gas Calibration standard results in a chromatogram similar to Figure 23.

Analysis of the Universal Gas Calibration results in the chromatogram shown in Figure 24.

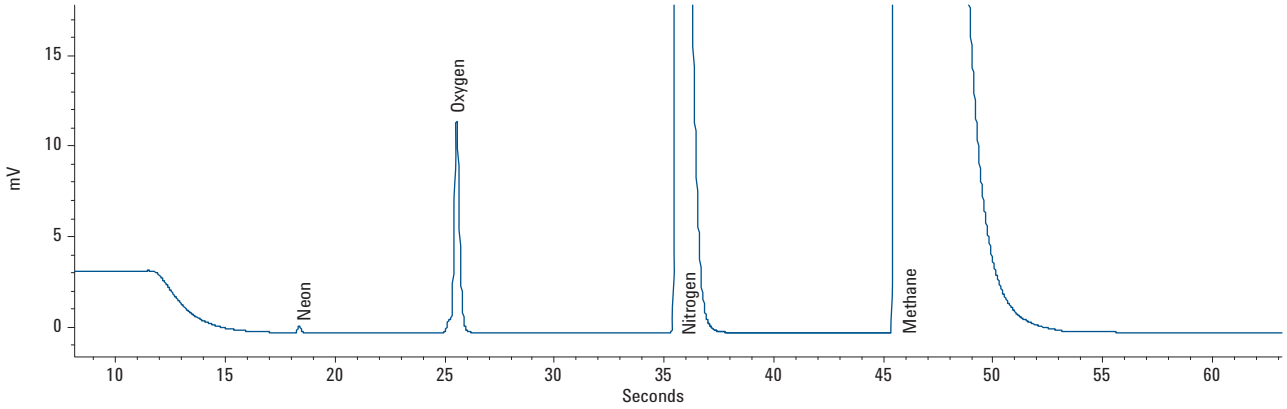


**Figure 23** NGA Gas Calibration standard analyzed with the CP-Molsieve 5A channel on Analyzer B Extended

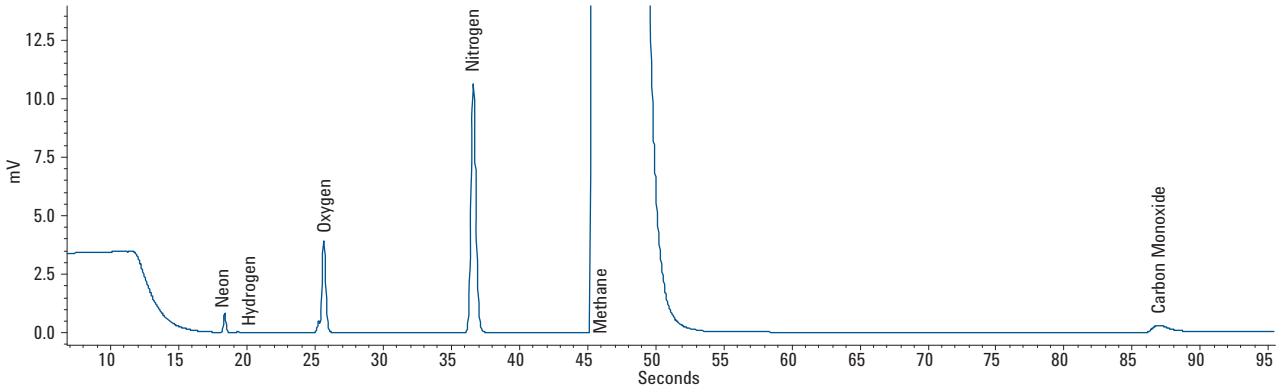


**Figure 24** Universal Gas Calibration standard analyzed with the CP-Molsieve 5A channel on Analyzer B Extended

**CAUTION**

The CP-Molsieve 5A channel is factory tuned on carrier gas helium. If analysis of helium or hydrogen is required on the CP-Molsieve 5A channel, the carrier gas must be changed and configured for argon. The procedure for configuring the carrier gas in OpenLAB CDS EZChrom is described in Appendix D on page 31.

Analysis of the Universal Gas Calibration standard results in a chromatogram similar to Figure 25.

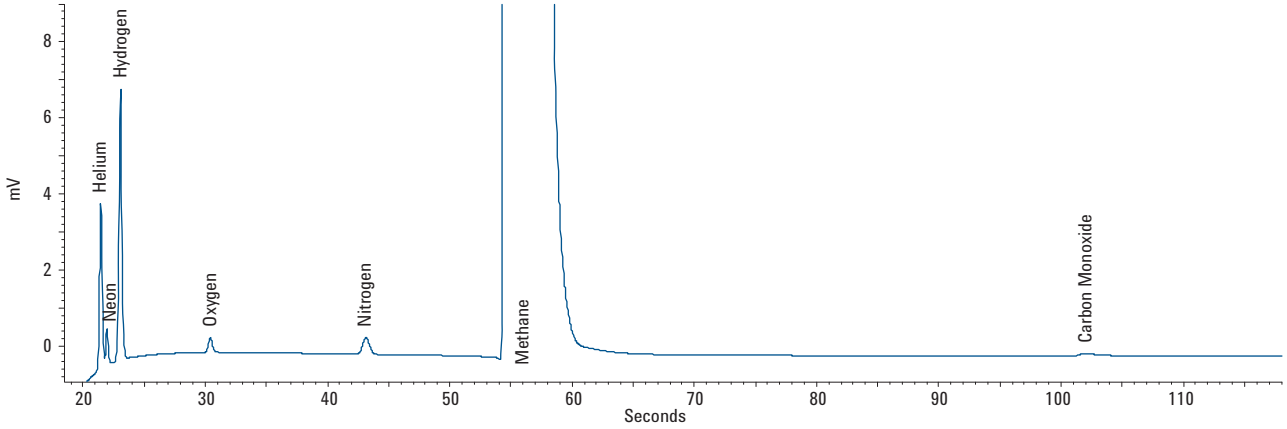


**Figure 25** Universal Gas Calibration standard analyzed with the CP-Molsieve 5A channel on Analyzer B Extended

# 3 Tuning the Backflush Time

## Tuning the Backflush Time on CP-Molsieve 5A, PoraPLOT U, or CP-Sil 5 CB

Tuning the backflush time is necessary for each new CP-Molsieve 5A channel, PoraPLOT U channel, and 4 meter CP-Sil 5 CB channel. This chapter describes how to tune the backflush time for these channels.

- The goal for tuning the CP-Molsieve 5A is to get all methane on the column while later-eluting components such as moisture, carbon dioxide, ethane, and higher hydrocarbons are backflushed.
- The PoraPLOT U is tuned on the propane peak while all other components that elute after propane are backflushed.
- The 4 meter CP-Sil 5 CB is tuned on the n-pentane while all other hydrocarbons that elutes after n-pentane are backflushed.

### Tuning procedure for the backflush time

1. Set the backflush time to 0 seconds and analyze the checkout sample or a proper sample for the specific channel. The goal of this is to identify the components in the calibration standard.
2. Change the backflush time to 10 seconds and perform a run. The following can be observed:
   - When the backflush time is set too early, the peaks of interest are partially or totally backflushed.
   - If the backflush time is set too late, the unwanted components are not backflushed and show up in the chromatogram.
3. Perform runs with different backflush times until there is no huge difference in the peak of interest. To fine tune the backflush time, set smaller steps (for example 0.10 seconds) until you find the optimal backflush time.

Figure 26 shows a simple example of tuning the backflush time for the CP-Molsieve 5A channel.

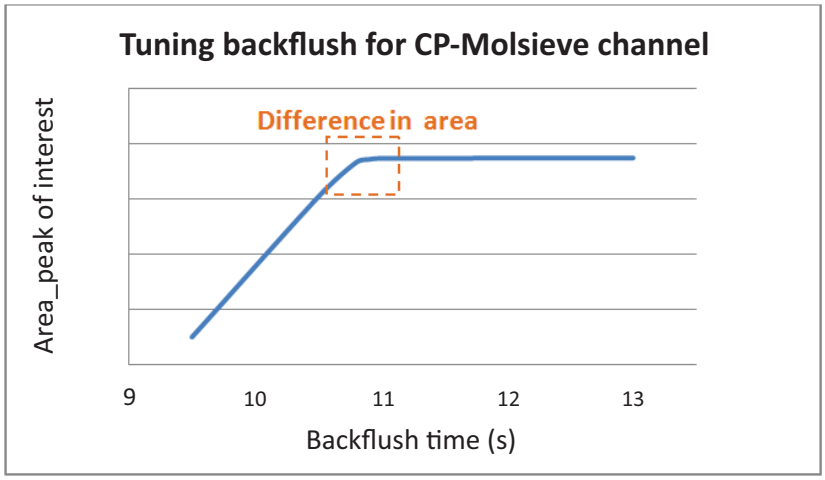


**Figure 26** Effect of the backflush time on the peak of interest

# Tuning the Backflush Time on a HayeSep A

For each new HayeSep A channel, with a backflush option, it is necessary to tune the backflush time properly. The tuning procedure of the HayeSep A channel is different than the tuning procedure of a CP-Molsieve 5A, PoraPLOT U, or 4 meter CP-Sil 5 CB channel.

This section describes how to tune the backflush time for the HayeSep A channel. The goal for tuning the HayeSep A channel is get all peaks of interest, components up to propane, on the HayeSep A column while all unwanted peaks that elute after propane are backflushed.

## Tuning procedure for HayeSep A channel

1. Set the backflush time of the HayeSep A channel to 0 seconds.
2. Set an appropriate run time for the first analysis (for example 300 seconds or longer).
3. Analyze the NGA Gas Calibration standard and identify all components in the calibration standard.
4. When all peaks of interest are identified, select a proper backflush time after propane peak.

Figure 27 shows an example of the tuning procedure of HayeSep A channel. In this example the propane peak elutes around 90 seconds, proper backflush time for the HayeSep A here is around 120 seconds.

Consider that the total run time must be sufficient to backflush all unwanted components from the column. The ideal total run time is approximately twice the backflush time or higher. So in this example, a total run time of 240 seconds is sufficient to backflush all unwanted components from the HayeSep A channel.

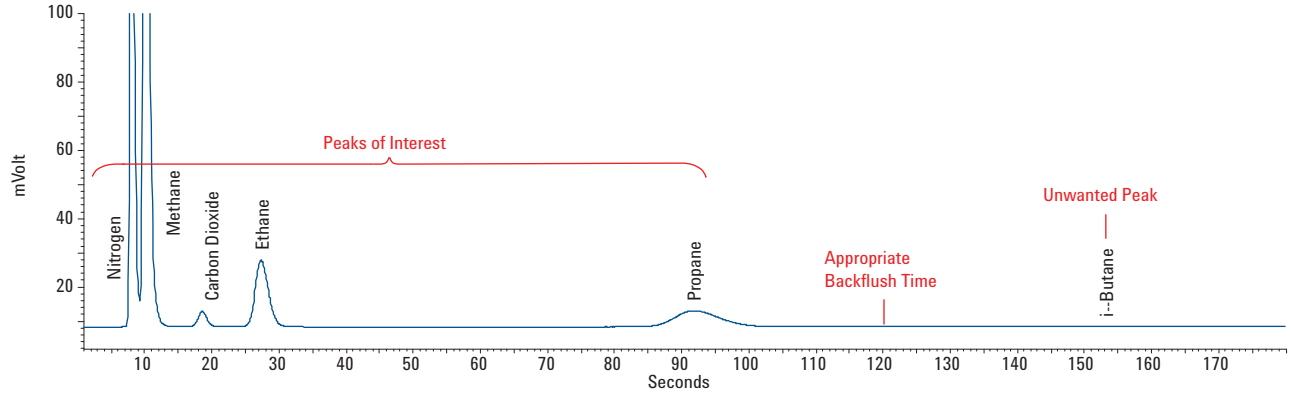


**Figure 27** Selecting backflush time for a HayeSep A channel

# Appendix A: Certificate of the NGA Gas Calibration Standard

Part number: 5184-3536

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## Certificate of Analysis

### NGA Gas Calibration Standard

**Agilent Part No:** 5184-3536, 5184-3542 **Sample Lot No:** 031111N

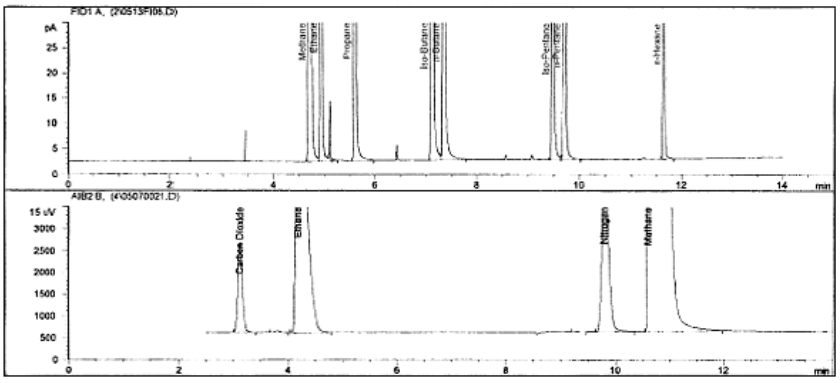
**Concentrations (±mole%):**

| | |
|---|---|
| Nitrogen | 5.16% (±5%) |
| Methane | Balance |
| Ethane | 8.98% (±5%) |
| Carbon Dioxide | 1.49 (±5%) |
| Propane | 6.04% (±5%) |
| Isobutane | 3.04% (±5%) |
| n-Butane | 2.00% (±5%) |
| Isopentane | 0.500% (±5%) |
| n-Pentane | 0.500% (±5%) |
| n-Hexane | 0.100% (±5%) |
| Water content | <5 ppm |
| Other impurities | <1 ppm |
| BTU value | 1257 |

**Traceability:**
This standard was produced gravimetrically following Specialty Gas Work Instruction #15. Balances used are calibrated per POIS 2.140, traceable to NIST. Concentrations were verified on an Agilent model 6890 gas chromatograph, using a Wasson valve switch, Variable Pressure Control and multiple packed/capillary columns

**Standards Used:**
Praxair NGA Primary Standard Source Gas, serial #155624D

**Analytical GC Chromatograms:**
Analytical columns: Agilent MS-5A PLOT, U-PLOT
TCD: 1.0 ml loop; He carrier at 35 ml/min; oven temp = 90degC
FID: 0.1 ml loop; He carrier at 30 ml/min; split ratio=25:1; Ramp 75degC for 6 min to 180degC for 3.75 min at 20degC/min




Date of Release: 11 March, 2011
Expiration Date: 11 March, 2013

Analyst: John J. Goddard
Senior Chemist

# Appendix B: Certificate of the Universal Gas Calibration Standard

Part number 5184-3541

Agilent Technologies
Innovating the HP Way

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## Certificate of Analysis

### Universal Gas Calibration Standard

**Agilent Part No:** 5183-4800, 5184-3541 **Sample Lot No:** 021510U

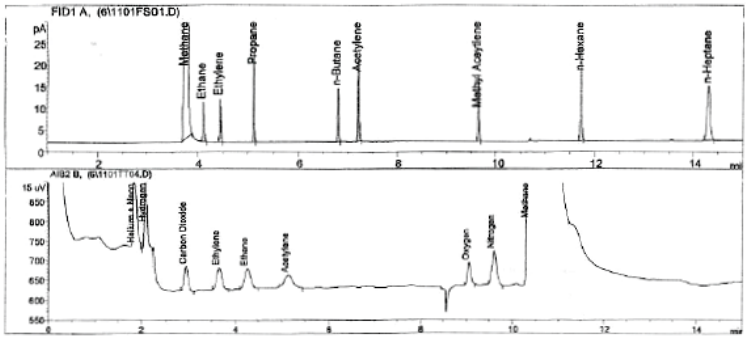
**Concentrations (±mole%):**

| | | | |
|---|---|---|---|
| Helium | 0.1000% (±5%) | n-Hexane | 0.0500% (±5%) |
| Neon | 0.0496% (±5%) | n-Heptane | 0.0500% (±5%) |
| Hydrogen | 0.0988% (±5%) | Water content ($H_2O$) | <5 ppm |
| Oxygen | 0.0500% (±5%) | Other impurities (HC's) | <1 ppm |
| Nitrogen | 0.1000% (±5%) | | |
| Methane | Balance | | |
| Ethane | 0.0497% (±5%) | | |
| Ethylene | 0.0497% (±5%) | | |
| Carbon Dioxide | 0.0500% (±5%) | | |
| Carbon Monoxide | 0.0995% (±5%) | | |
| Acetylene | 0.0494% (±5%) | | |
| Propane | 0.0501% (±5%) | | |
| Methyl Acetylene | 0.0501% (±5%) | | |
| n-Butane | 0.0501% (±5%) | | |

**Traceability:**
This standard was produced gravimetrically following Specialty Gas Work Instruction #15. Balances used are calibrated per POIS 2.140, traceable to NIST. Concentrations were verified on an Agilent model 6890 gas chromatograph, using a Wasson valve switch, Variable Pressure Control and multiple packed/capillary columns.

**Standards Used:**
Praxair UGS Primary Standard, serial # CC309710

**Analytical GC Chromatogram:**
Analytical columns: Agilent MS-5A PLOT, U-PLOT
TCD: 1.0 ml loop; He carrier at 35 ml/min; oven temp = 90degC
FID: 0.1 ml loop; He carrier at 30 ml/min; split ratio=25:1; Ramp 75degC for 6 min to 180degC for 3.75 min at 20degC/min




Date of Release: 15 February, 2010
Expiration Date: 15 February, 2012

Analyst: John Goddard
Senior Chemist

# Appendix C: Typical Method Settings for Natural Gas Analyzers

Typical method settings for the Natural Gas Analyzers are given in Tables 1 - 4.

**Table 1** Method for Agilent 490 Micro GC - Natural Gas Analyzer A

| Method settings* | HayeSep A | CP-Sil 5 CB_6m |
|---|---|---|
| Carrier gas | Helium | Helium |
| Injector temperature (°C) | 110 | 110 |
| Injection time (ms) | 40 | 40 |
| Column temperature (°C) | 60 | 70 |
| Pressure (kPa) | 260 | 150 |
| Sample line temperature (°C) | 110 | 110 |

* For more details of the method, see the pdf-method file available on the Natural Gas Analyzer CD.

**Table 2** Method for Agilent 490 Micro GC - Natural Gas Analyzer A Extended

| Method settings* | HayeSep A | CP-Sil 5 CB_4m | CP-Sil 5 CB_8m |
|---|---|---|---|
| Carrier gas | Helium | Helium | Helium |
| Injector temperature (°C) | 110 | 110 | 110 |
| Injection time (ms) | 20 | 40 | 40 |
| Backflush time (s)† | 120 | 12 | - |
| Column temperature (°C) | 90 | 60 | 150 |
| Pressure (kPa) | 340 | 150 | 200 |
| Sample line temperature (°C) | 110 | 110 | 110 |

* For more details of the method, see the pdf-method file available on the Natural Gas Analyzer CD.

† The backflush time must be tuned for each new CP-Molsieve 5A, PoraPLOT U, 4 meter CP-Sil 5 CB, and HayeSep A channel.

**Table 3** Method for Agilent 490 Micro GC - Natural Gas Analyzer B

| Method settings* | PoraPLOT U | CP-Sil 5 CB_6m |
|---|---|---|
| Carrier gas | Helium | Helium |
| Injector temperature (°C) | 110 | 110 |
| Injection time (ms) | 40 | 40 |
| Backflush time (s)† | 17 | - |
| Column temperature (°C) | 60 | 70 |
| Pressure (kPa) | 175 | 150 |
| Sample line temperature (°C) | 110 | 110 |

* For more details of the method, see the pdf-method file available on the Natural Gas Analyzer CD.

† The backflush time must be tuned for each new CP-Molsieve 5A, PoraPLOT U, 4 meter CP-Sil 5 CB, and HayeSep A channel.

**Table 4** Method for Agilent 490 Micro GC - Natural Gas Analyzer B Extended

| Method settings* | CP-Molsieve 5A | PoraPLOT U | CP-Sil 5 CB_6m |
|---|---|---|---|
| Carrier gas | Helium | Helium | Helium |
| Injector temperature (°C) | 110 | 110 | 110 |
| Injection time (ms) | 40 | 40 | 40 |
| Backflush time (s)† | 11 | 17 | - |
| Column temperature (°C) | 80 | 60 | 70 |
| Pressure (kPa) | 200 | 175 | 150 |
| Sample line temperature (°C) | 110 | 110 | 110 |

* For more details of the method, see the pdf-method file available on the Natural Gas Analyzer CD.

† The backflush time must be tuned for each new CP-Molsieve 5A, PoraPLOT U, 4 meter CP-Sil 5 CB, and HayeSep A channel.

# Appendix D: Carrier Gas Type Configuration

The Agilent 490 Micro GC - Natural Gas Analyzers are factory tuned using the carrier gas helium. When analysis of helium is required, the carrier gas must be changed to argon.

Instruments with the dual carrier option are typically configured as shown in Figure 28.

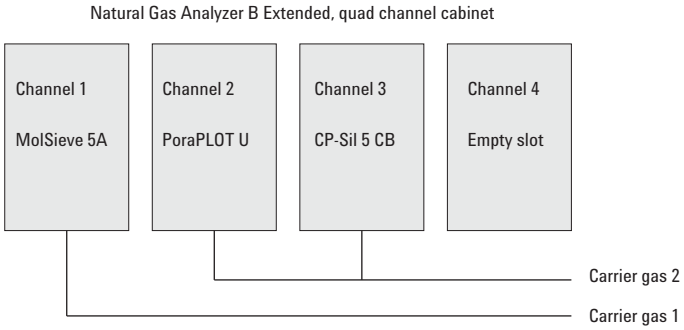



**Figure 28** Typical configuration of a dual carrier instrument

# Procedure to Change the Carrier Gas Type

If you are using Agilent OpenLAB CDS EZChrom edition, use the following procedure to change the carrier gas type.

1 In the Agilent OpenLAB Control Panel **Navigation** pane, select the instrument.

2 In the **Actions** toolbar, select **Configure Instrument**. See Figure 29.

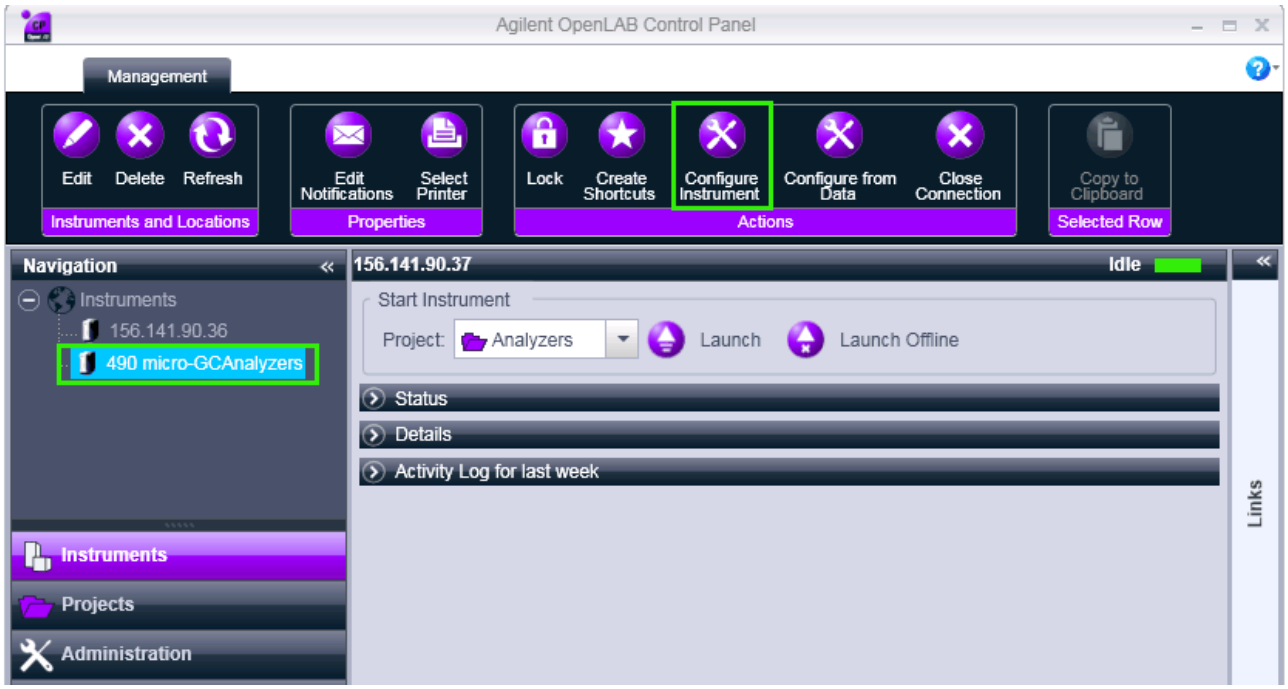



**Figure 29** OpenLAB Control Panel

3 Double-click **Agilent 490 Micro GC**. See Figure 30.

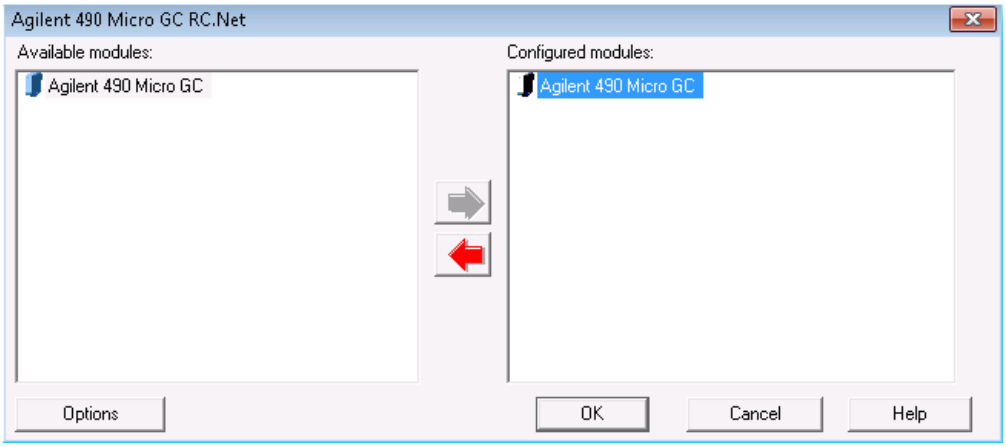



**Figure 30** Configuration window Agilent 490 Micro GC

4 In the **EZChrom Configuration** dialog box, select the **Instrument configuration** tab.

5 In the **Carrier gas** list, select **Argon**. See Figure 31.

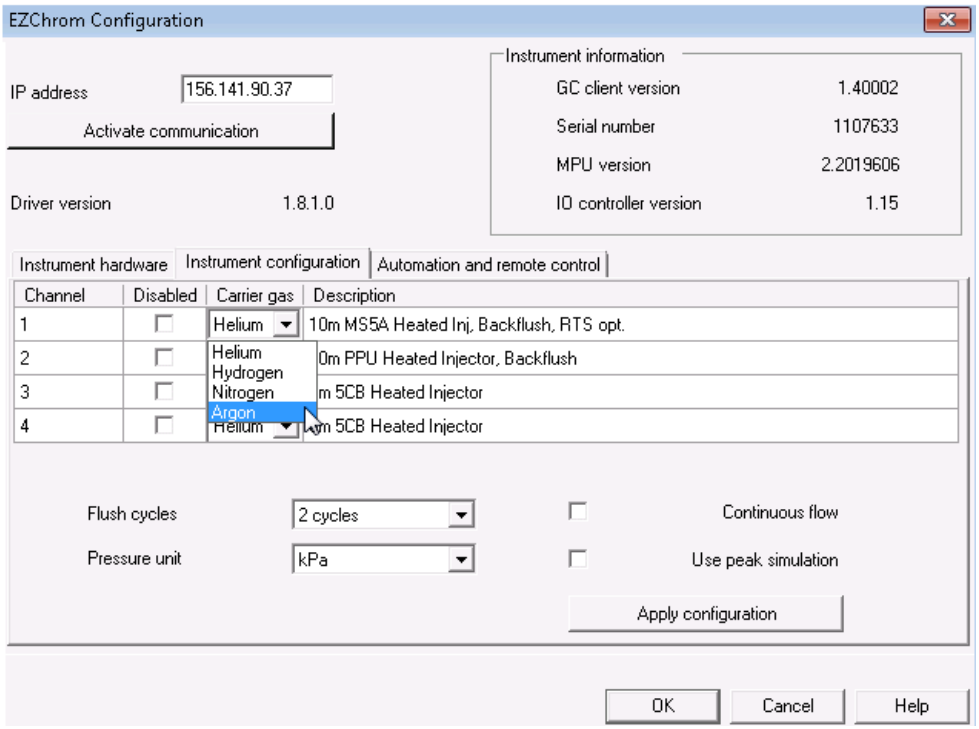



**Figure 31** The Instrument configuration tab

6 Select **Apply Configuration**. The new configuration is sent to the instrument as shown in Figure 32

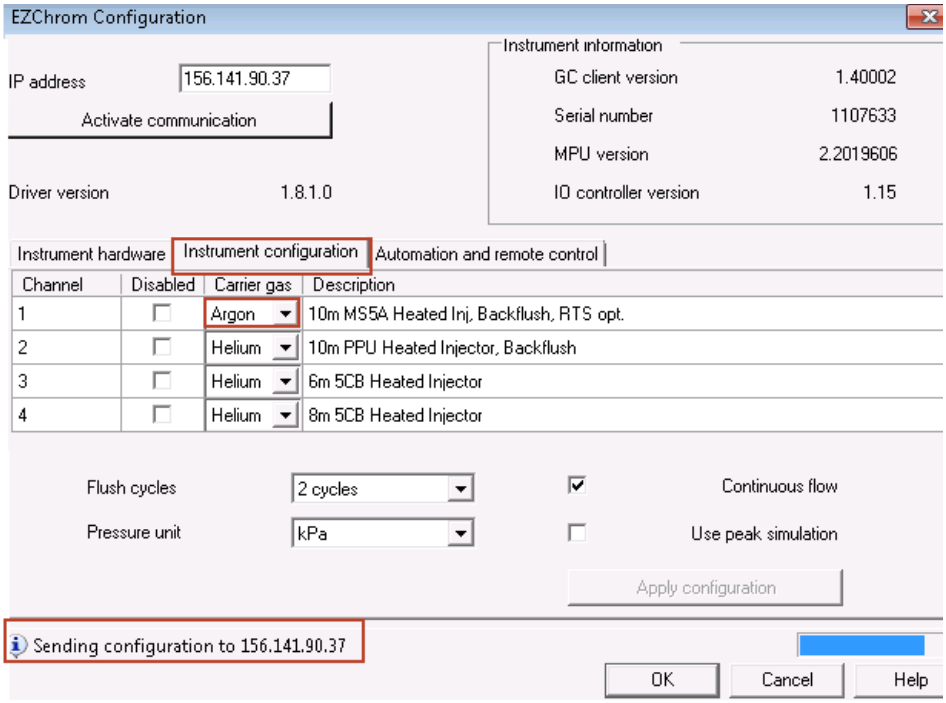



**Figure 32** Sending configuration to instrument

7 When the configuration is complete, in the **Reboot Instrument** dialog box select **OK**. See Figure 33

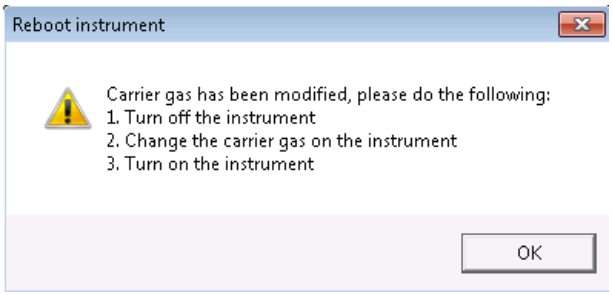



**Figure 33** Request after configuration change

8 Turn off the instrument.

9 Change the carrier gas on the instrument.

10 Restart the Agilent 490 Micro GC - Natural Gas Analyzer.

The Agilent 490 Micro GC is now configured for carrier gas Argon.

# Appendix E: Method for CP-Molsieve 5A Channel with Carrier Gas Argon

Typical method setting for analysis of helium and hydrogen on the CP-Molsieve 5A channel.

**Table 5** Method setting for analysis of helium with Natural Gas Analyzer B Extended

| Method settings | CP-Molsieve 5A |
|---|---|
| Carrier gas | Argon |
| Injector temperature (°C) | 110 |
| Injection time (ms) | 40 |
| Backflush time (s) | 11 |
| Column temperature (°C) | 80 |
| Pressure (kPa) | 200 |
| Sample line temperature (°C) | 110 |
| Invert signal | Yes |

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