

## SPECIFICATIONS

### GC HARDWARE

- Standard Methods:** GPA 2261, 2177, 2186, 2286; ISO 6974; ASTM D1945 and D1946.
- Configuration:** 1-3 channel instrument based on Thermo Trace or Focus GC, or on CompactGC.
- Optional:** liquid sample valve, additional channel for helium/hydrogen, capillary channel, stop flow valve, back pressure regulator, stream selection valves
- Sample tubing:** Sulfinert® tubing for inert sample path (H<sub>2</sub>S analysis).
- Application:** Custom configured analyser for the analysis of gaseous and liquefied natural gas samples, containing hydrocarbons, permanent gases and sulfur (H<sub>2</sub>S). Backflush configuration for C<sub>6</sub>+ composite hydrocarbon peak.
- Sample requirements:** See our pre-installation guide for additional requirements.
- Analysis Time:** Depending on configuration, 2-20 minutes.
- Minimum detectability:** Better than 0.01% for all individual components. H<sub>2</sub>S: 0.05%.
- Dynamic Range:** Four decades for all components.
- Accuracy:** Dependant on external calibration and repeatability.
- Repeatability:** Depending on configuration.

### SOFTWARE

- BTU calculation:** Calculation of calorific value (sup. and inf.), mean molecular weight, compression factor, relative density, Wobbe index.

For more information:

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APPLICATION NOTE 202WA0711B

## Natural Gas Analysers

## Introduction

GAS offers custom configured GC analysers for complex separations, data processing and reporting. We have over 30 years of experience in designing and building turnkey analysers for many application fields. We invite you to take advantage of our latest hardware, software and column technologies to accomplish the best possible results. Our analysers are designed to meet many accepted standard methods (like ASTM, UOP, ISO, etc) in the Oil and Gas industry. The efficient hardware configurations are based on proven GC technology, resulting in rigid instruments with an optimal return on investment.

Natural gas analysis is performed by many companies, from large gas suppliers to small end users. Since profits are a main concern, high quality analysis is essential. Small differences in the BTU value have a large effect on profits, because large volumes of natural gas are involved.

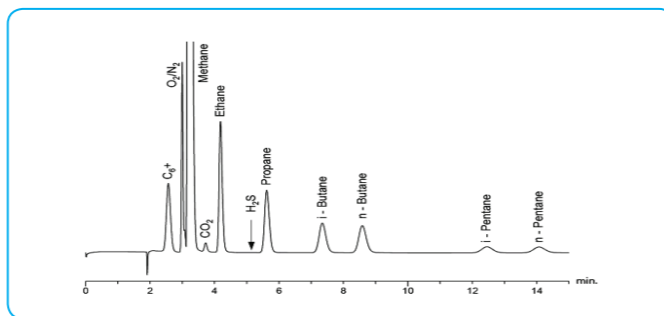
Natural gas analysers are used in many different configurations, from single valve/detector instruments to complex multi-channel analysers. The optimal design depends on the number of components to be analysed, the required accuracy and the analysis time. Our analysers comply with standardised methods from GPA (2261, 2177, 2186, 2286), ISO (6974) and ASTM (D1945 and D1946).

## Analyser configurations

The comprehensive line of Natural Gas Analysers from GAS has 3 basic configurations:

### NGA 1

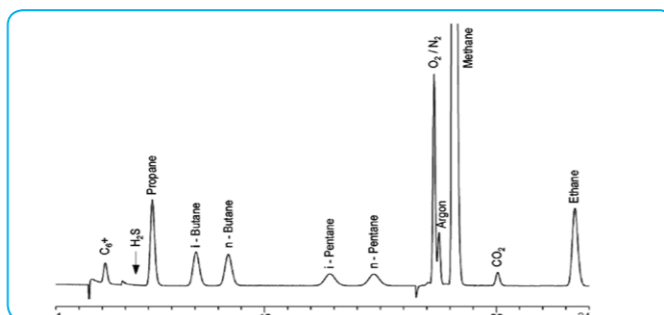
Analyser NGA 1 utilizes a single valve/TCD setup. On two silicon D200/500 columns, C<sub>6</sub> and higher boiling hydrocarbons are analysed as a single peak, while C<sub>1</sub>-C<sub>5</sub>, CO<sub>2</sub> and H<sub>2</sub>S are separated individually. Build on the Thermo FocusGC, this is a very cost effective analyser, occupying little laboratory space due to its small foot print.



Chromatogram NGA 1 analyser

### NGA 2

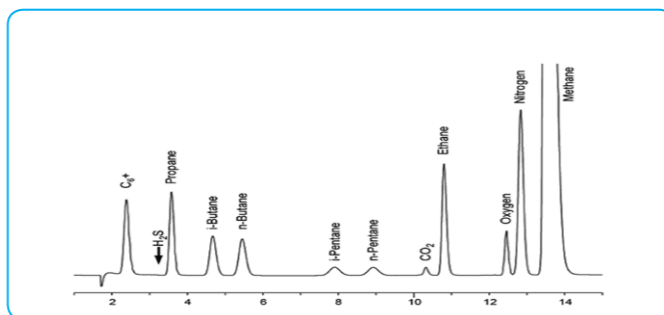
NGA 2 is, compared to NGA 1, extended with an additional valve and partitioning column (Porapak). This results in an enhanced air/methane/carbon dioxide separation, and therefore a more accurate determination of the caloric value (f.i. in case of high carbon dioxide content). This configuration is also available with micropacked columns and the Res-Sil C column packing, providing low helium consumption and the analysis of neo-pentane as well. See the relevant application note of this configuration for the CompactGC.



Chromatogram NGA 2 analyser

### NGA 3

Analyser NGA 3 contains another additional valve and separation column for the non-condensable gases, in case the analysis of oxygen, helium and hydrogen is required as well.



Chromatogram NGA 3 analyser

## Data processing and Calorific value calculation

### Data processing and BTU analysis

Two chromatography data systems are available: EZChrom Elite / ChromQuest and ChromCard. Both systems offer dedicated calculation of the Gross heating values, based on analysis of the individual components in natural gas.

Component name	Mol% 15C	Mol% 0C	RT	Area
propane	0.980%	0.983%	3.78	11486560
2-methylpropane	0.340%	0.343%	5.70	2446929
n-butane	0.220%	0.222%	7.22	2790853
2-methylbutane	0.000%	0.000%	12.27	827486
n-pentane	0.060%	0.061%	14.68	858846
carbon dioxide	0.680%	0.680%	17.45	1770084
ethane	3.500%	3.503%	19.13	26646660
n-hexane	0.000%	0.000%	32.45	955442
nitrogen	1.750%	1.749%	37.45	1013870
methane	92.470%	92.458%	39.47	214153600
carbon monoxide	0.000%	0.000%	43.70	186920
Totals	100.00%	100.00%		

Combustion at 15C, Metering at 15C and 101,325 kPa  
For the REAL DRY gas

Superior calorific value 919.08 [kJ/mol] 52.59 [MJ/Kg] 38.96 [MJ/m3]

Inferior calorific value 829.08 [kJ/mol] 47.44 [MJ/Kg] 35.14 [MJ/m3]

Mean molecular weight= 17.478

Compression Factor= 0.9977

Relative Density= 0.6046

Density [kg/m3]= 0.741

Wobbe index [MJ/m3]= 50.10

Calorific value calculation report

## Options

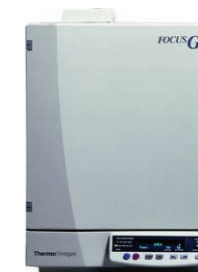
### NGA options / extended analysis

On the mentioned basic configurations, different options are available:

- C Liquid sample valve for natural gas liquids.
- C Additional channel with carrier gas argon or nitrogen for more accurate helium and hydrogen analysis.
- C Additional channel with capillary column and FID for extended hydrocarbon analysis.
- C Stop flow valve or back pressure regulator to control the pressure in the sample loop (precise and repeatable sample volume).
- C Stream selection valve for analysing different samples and calibration gases.

### GC instruments

The GAS Natural Gas Analysers are based on the Thermo Trace Ultra and Focus GC's, and on the Interscience CompactGC. All systems are fully automated and integrated, with independent heated valve/column ovens. Depending on the required basic configuration and extensions, the most suitable GC type is chosen, resulting in an efficient and cost effective analyser.



3 GC platforms for optimal NGA configurations