CO - CO_2 Analyser

- Robust analyser with high uptime
- Reliable diaphragm valves
- Modular detectors
- UOP 603-13
- Limit of detection: 50 ppb

AN9WA0125B

GAS offers custom configured GC analysers for many application fields since 40 years. GAS analysers are designed to meet many standardised methods from GPA, ASTM, UOP, ISO, EN and others. The efficient configurations are based on proven GC technology, resulting in robust instruments with an optimal return on investment.

The GAS CO-CO_2 analyser is the customised solution for analysing CO, CH_4 and CO_2 in several gas matrices like hydrogen, hydrocarbon streams and industrial gases. A typical application is the analysis of sub-ppm levels in ethylene or propylene. The analyser complies with UOP 603-13. Various options are offered for extending the application range.

Analysed Components

Diagram 1 shows the principle of the CO-CO_2 analyser. The instrument includes a high performance diaphragm valve for injection and backflush, two packed columns, a methaniser to convert CO and CO_2 in methane, and a FID (Flame Ionisation Detector). Column 1 separates the components of interest from the bulk, which is effectively backfushed in this way.

Robust diaphragm valves

The CO-CO_2 analyser uses robust diaphragm valves with internal purge, mounted in an independently heated valve oven. These valves offer 5 times longer lifetime compared to rotary valves, with reduced maintenance costs as a result.

Benchtop GC or Micro GC

The GAS CO-CO_2 analyser is available on Thermo Trace 1600/1610 benchtop GC, which offers unique InstantConnect injector and detector modules that can be exchanged by the user in minutes. The CO-CO_2 analyser is also offered on GAS CompactGC$^{4.0}$, the 19" micro GC with fast analysis time.

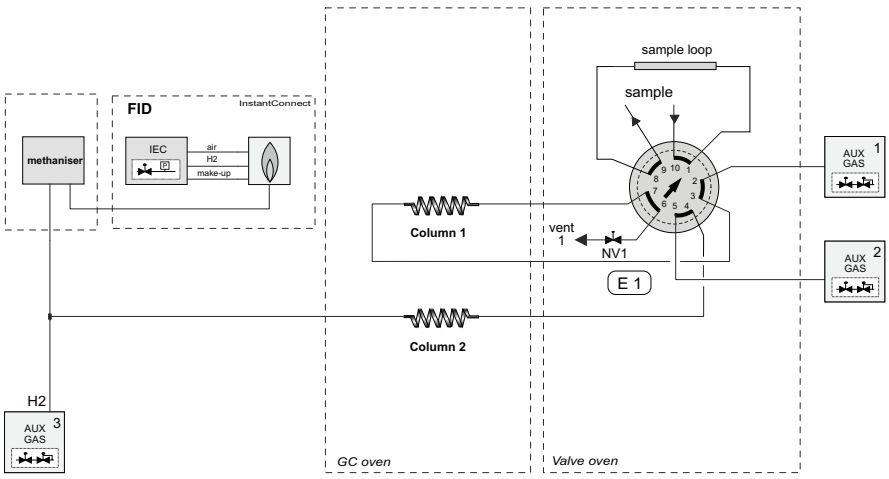

Figure 1. Diagram CO-CO2 analyser

Results

Figure 2 shows a typical chromatogram of the calibration standard containing 5 ppm CO, CH_4 and CO_2 in N_2. The limit of detection is 50 ppb.

Chromatography Data Systems

Powerful, easy to use data systems offer a high level of automation and reporting. The CO-CO_2 analyser is available with Chromeleon or OpenLab.

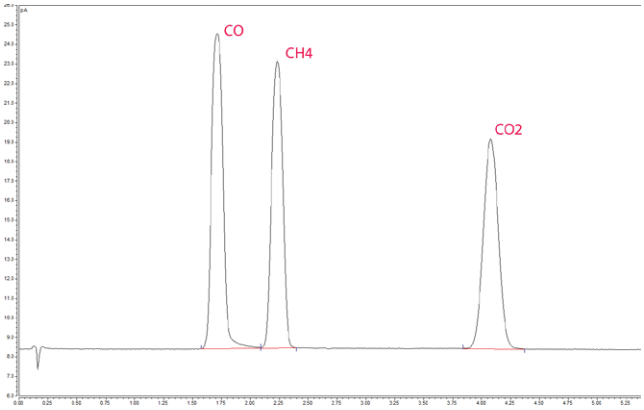

Figure 2. Chromatogram CO-CO_2 analyser, methaniser- FID detection, 5 ppm concentration level.

Options:

- Heartcut valve for high methane levels

Samples containing high methane levels can cause carbon build up in the catalyst. An optional valve is available to vent the high methane content.

- Additional separation column in case of high O_2 levels

Hydrocarbon streams like ethylene and propylene normally contain low levels of oxygen, which do not interfere on methaniser-FID. In case of high oxygen content, for instance when analysing industrial gases, CO detection will be disturbed. To overcome this, an additional valve and separation column are offered.

- Vaporiser

A vaporiser is available for liquid C_3 and C_4 samples.

- Low level CO-CO_2 on CompactGC$^{4.0}$

CompactGC$^{4.0}$ with methaniser-FID is offered for fast analysis of CO and CO_2 at sub-ppm levels in only 60 seconds. Robust diaphragm valves are used in a compact 19" industrial standard enclosure.

Inj. No.	Injection Name / Selected Peak:	Type	Area pA*min FID_Back CO	CH4	CO2
10	Reproducibility FID Back	Unknown	1.851	1.679	1.586
11	Reproducibility FID Back	Unknown	1.840	1.677	1.584
12	Reproducibility FID Back	Unknown	1.841	1.674	1.591
13	Reproducibility FID Back	Unknown	1.849	1.675	1.593
14	Reproducibility FID Back	Unknown	1.851	1.671	1.596
15	Reproducibility FID Back	Unknown	1.840	1.667	1.582
16	Reproducibility FID Back	Unknown	1.840	1.665	1.582
17	Reproducibility FID Back	Unknown	1.817	1.664	1.579
18	Reproducibility FID Back	Unknown	1.828	1.670	1.589
19	*Reproducibility FID Bac*	*Unknown*	*1.824*	*1.660*	*1.587*
Maximum			1.851	1.679	1.596
Average			**1.838**	**1.670**	**1.587**
Minimum			1.817	1.660	1.579
Standard Deviation			0.012	0.006	0.005
Relative Standard Deviation			**0.64%**	**0.38%**	**0.33%**

Figure 3. Excellent repeatability at 5 ppm level.

Figure 4. UOP 603-13 analyser based on GC Trace 1600 with valve oven

Specifications:

Standardised method:	UOP 603-13
Configuration:	1 channel instrument with gas injection and methaniser-FID
GC instrument:	Thermo GC Trace 1600 or GAS CompactGC$^{4.0}$
Optional:	- Heartcut valve for high methane levels - Extra column (Molsieve) in case of high (%) oxygen levels - Sample stop flow valve for accurate results - Selector valve for multiple stream analysis - Vaporiser for LPG samples
Sample tubing:	Sulfinert® tubing for inert sample path
Application:	Custom configured analyser for the analysis of gaseous and liquefied samples containing CO, CH_4 and CO_2. The instrument is factory tuned for the specific application intended.
Sample requirements:	See our pre-installation guide for additional requirements
Analysis Time:	< 5 minutes
Minimum detectability:	50 ppb for CO, CH_4 and CO_2 (100 ppb for CO when additional Molsieve column is used)
Dynamic Range:	Four decades for all components
Linearity:	10^4
Methaniser conversion efficiency:	within 5% relative to methane
Accuracy:	Better than 1 % RSD
Repeatability:	Better than 1 % RSD

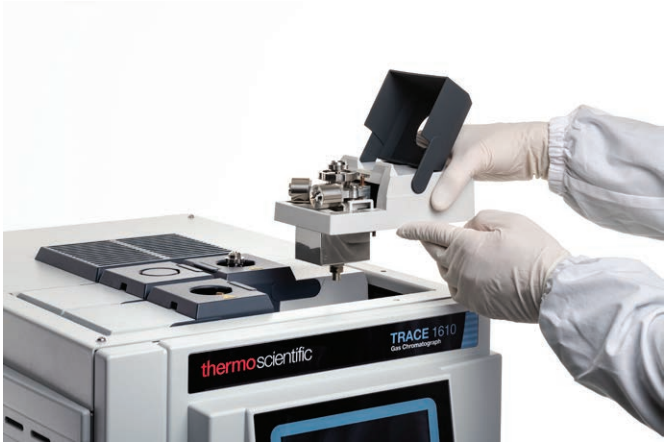

Figure 5. iConnect injectors and detectors: flexible; low maintenance costs

Figure 6. UOP 603-13 on CompactGC$^{4.0}$

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