

Catalysis Reaction Gas Analyser

CR110



- Analysis of permanent gases, hydrocarbons, volatile sulphur
- Optional channels for aromatics, oxygenates, ammonia, etc.
- Highly robust
- Detectors: TCD and FID
optional: PFPD, PDD, ePD, MS, VUV Luma

Get ready for tomorrow's analytics

Catalysis Reaction Gas Analyser

For monitoring catalyst reaction gases, fast analysers capable of detecting a wide range of components are essential. Flexibility is highly valued, as the list of required components may change over time. The GAS Catalysis Reaction Gas Analyser is a proven and widely used solution for these applications.

Principle of operation

Figure 1 illustrates the operating principle of the Catalysis Reaction Gas Analyser. In the first channel, hydrogen (H_2), oxygen (O_2), nitrogen (N_2), methane (CH_4), and carbon monoxide (CO) are analysed using a Molecular Sieve column. Carbon dioxide (CO_2), ethylene, ethane, acetylene, and hydrogen sulphide (H_2S) are separated on a second column (Hayesep). Carbonyl sulphide (COS) can also be measured. The first Hayesep column is used to backflush propane and higher-boiling components to vent. Detection is performed using a Thermal Conductivity Detector (TCD), see figure 2.

The second channel with FID detection provides detailed separation of hydrocarbon isomers up to C_{10} (figure 3). Depending on the used column, heavier hydrocarbons and other component groups like oxygenates can also be analysed. Both channels operate in parallel, allowing simultaneous injection and detection of all components.

Instrument configuration

- Thermo GC1600 with InstantConnect TCD and FID
- Three micropacked columns, one capillary column
- Heated valve oven (see front page) with one 10-port and two 6-port diaphragm valves (rotary valves optional)
- Runtime: 6 minutes

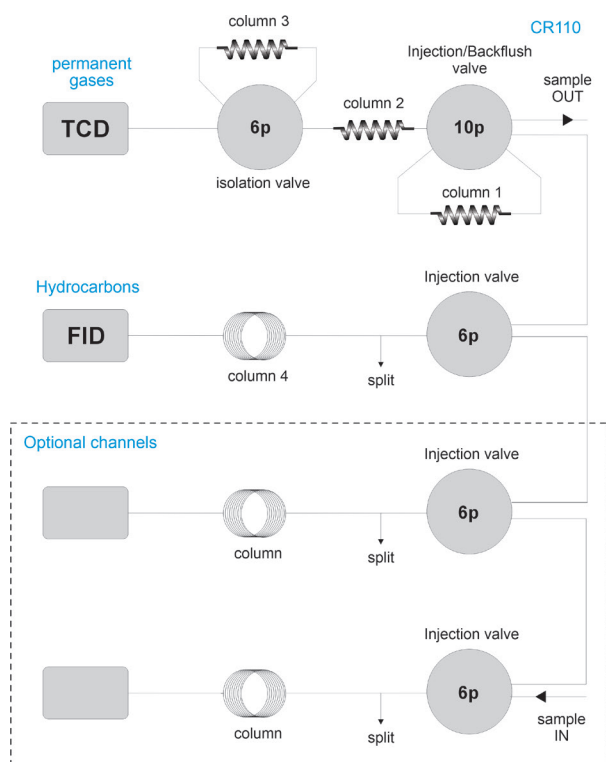


Figure 1 Diagram CR110 analyser

Results

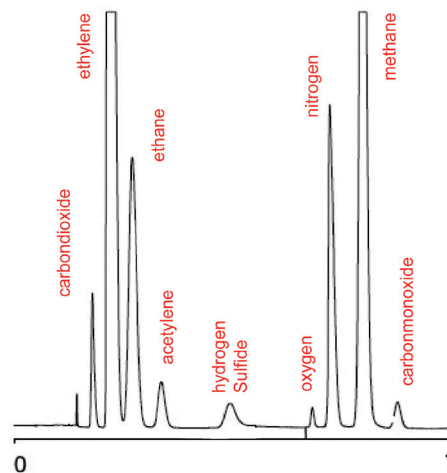


Figure 2 Chromatogram TCD.

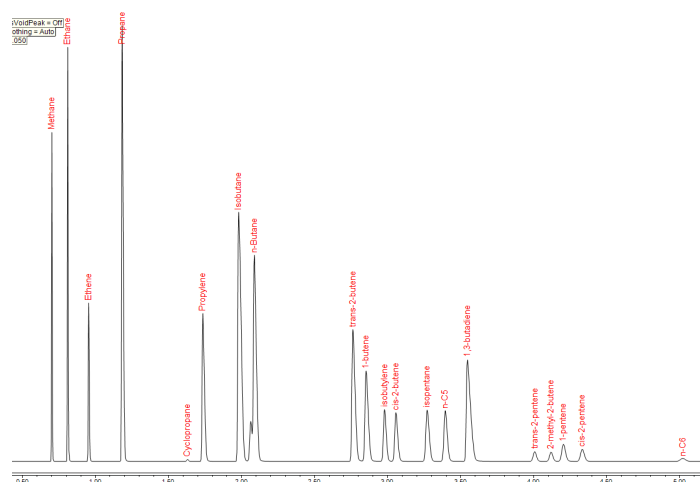


Figure 3 Chromatogram FID using Aluminium Oxide column

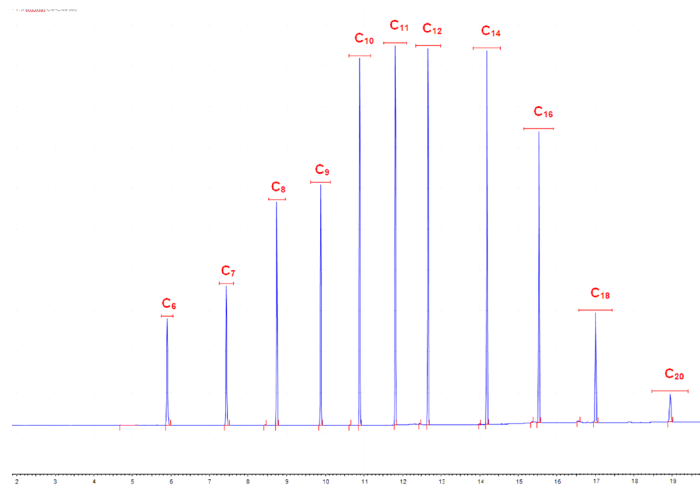


Figure 4 Chromatogram FID using Rtx-1 columns

System Extensions

Additional channels

The Catalysis Reaction Gas Analyser based on Thermo Trace GC 1600 is a flexible, high-performance gas chromatograph designed for the analysis of complex gas mixtures in research, catalysis, and process applications. With the XXL valve oven (figure 6), the system supports up to four analytical channels, enabling simultaneous measurement of a wide range of components with excellent sensitivity and selectivity. When a wider range of components needs to be analysed than described for the two-channel Catalysis Research Gas Analyser, the instrument can be extended with optional additional channels (see Figure 1). Each channel has an injection valve, separation column, and detector, enabling fast, parallel, and straightforward analysis. Examples are:

- Additional channel with FID detection for higher-boiling components.
- Additional channel with FID detection for alcohols, aldehydes and aromatic components (figure 7).
- Additional channel with FPD or PFPD for sensitive and selective detection of sulphur components down to low ppb level (figure 5).
- Additional channel with PDD, extending TCD sensitivity down to the low-ppb level.

Other available detectors are: ePD (Enhanced Plasma Detector), VUV LUMA (Photo Diode Array detector, Figure 9), and MS (Mass Spectrometer).

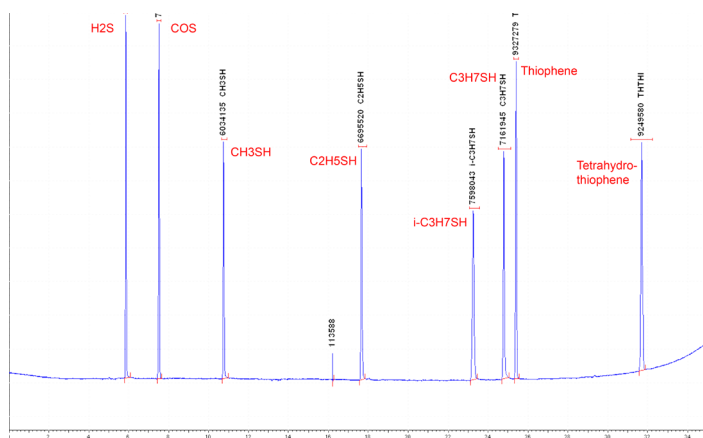


Figure 5 Sulphur components on PFPD

Sampling from small volume / low pressure samples

In research experiments, low pressure or small volume reactors are used frequently, making accurate sampling challenging. The GAS vacuum sampling option provides sampling from low pressure and/or small volumes by vacuuming the sample loops down to 4 mbar. In this way, only a few millilitres of the available sample are required, and carry-over is avoided.

Multiple sampling points

Multiple sampling streams from different reactors or catalysts can be analysed by a single instrument by using a stream selector valve, see figure 8. The sequence is programmed flexibly by the Chromeleon data system.

Robust, accessible & flexible

Robust diaphragm process valves guarantee unattended operation for many years. Columns are easily replaced by the user, providing low operational costs and high flexibility.

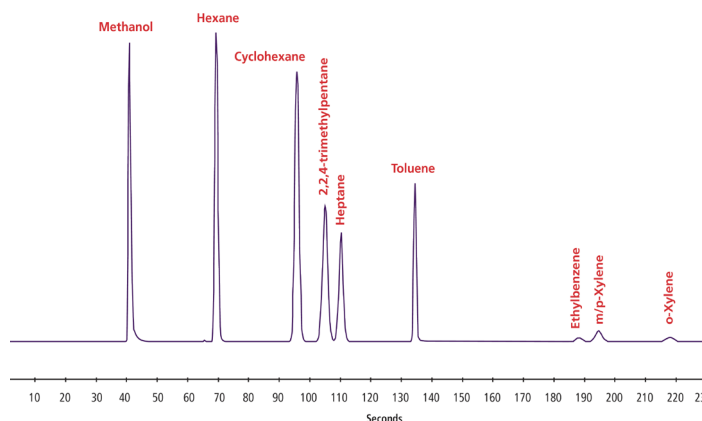


Figure 7 Chromatogram showing hydrocarbons, oxygenates and aromatic components



Figure 6 TraceGC 1600 with XXL large valve oven and 4 detectors



Figure 8 Sample stream selector



Figure 9 VUV LUMA UV detector

Ordering information CR11X - ABCDE - FOR THE ABOVE MENTIONED EXTENSIONS CONTACT US AT info@gas-site.com				
code X	0	1	2	3
GC model, power	1600, 230V	1610, 230V	1600, 115V	1610, 115V

For the selection of options ABCDE (e.g. valve type and passivation, pump and vacuum sampling, rotameter and sample connections, pressure and moisture sensors, hydrogen sensor for safety shut-off, power plug type and more), [see the options table in the order guide.](#)

About GAS

Global Analyser Solutions provides GC & GC-MS solutions for Energy, Refinery, Chemical and Environmental markets. Our analysers address a broad spectrum of measuring requirements with high precision and reliability. Please reach out for more information on our website. www.gassite.com