

Global Analyser Solutions

Process Gas Analysis in Textile and Waste Recycling



- Maximise product yield
- Optimise reactor performance
- Reduce off-spec production
- Promote the sustainable use of raw materials

Get ready for ***tomorrow's analytics***

Global Analyser Solutions

GAS offers custom configured GC analysers for many application fields for over 50 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, highly productive instruments with an optimal return on investment.

Advanced recycling technologies convert waste streams, including textiles and plastics, into valuable fuels and chemical building blocks. Through thermochemical processes such as gasification and pyrolysis, waste materials can be converted into product gas containing syngas and aromatic hydrocarbons such as BTX (benzene, toluene and xylenes). Accurate, real-time gas analysis is essential for optimising process conditions, maximising product yields and monitoring process efficiency. By recovering valuable resources from waste, these technologies contribute to a more circular economy and the sustainable use of raw materials.

CompactGC$^{4.0}$ for analysing reactor gases

The figure shows an example configuration for analysing the reactor gases produced during the gasification of waste textiles. Three TCD channels are used to analyse permanent gases, light hydrocarbons and DME, while a FID channel measures DME, methanol, ethanol and BTEX. For other conversion processes, different detectors and separation columns can be selected to suit the application.

All channels operate in parallel, enabling simultaneous sample injection and component detection. Backflush columns prevent high-boiling compounds from entering the analytical columns and help reduce analysis time. Each column is independently temperature-controlled to optimise separation performance and analysis speed.

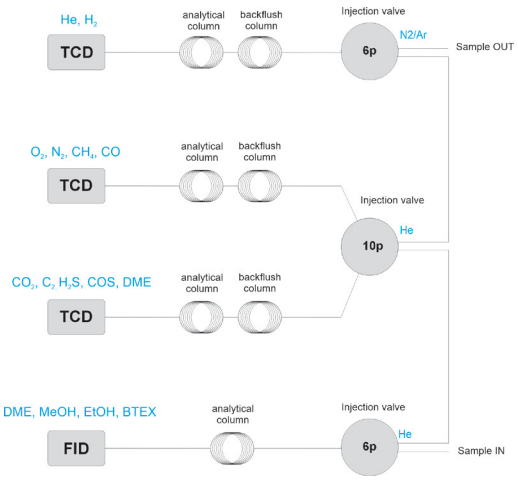


Figure 1. Diagram CompactGC$^{4.0}$

Multiple sampling points

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

Robust & flexible

Robust diaphragm process valves guarantee unattended operation for many years (figure 10). Columns are replaced by the user in a minute, providing low operational costs and high flexibility.

Target Applications:

- Waste gasification plants
- Biomass conversion facilities
- Chemical recycling facilities
- Waste-to-chemicals technology developers



Figure 2
4- channel CompactGC$^{4.0}$.



Figure 3.
CompactGC$^{4.0}$ for on-line gasanalysis in a reactor setup

Results

Figures 4–7 show example chromatograms obtained using different separation columns. Although these are not necessarily based on the configuration shown in Figure 1, they illustrate the range of separation columns that have been used for this application. Please provide a list of the components you need to analyse, and we will propose a suitable analyser configuration.

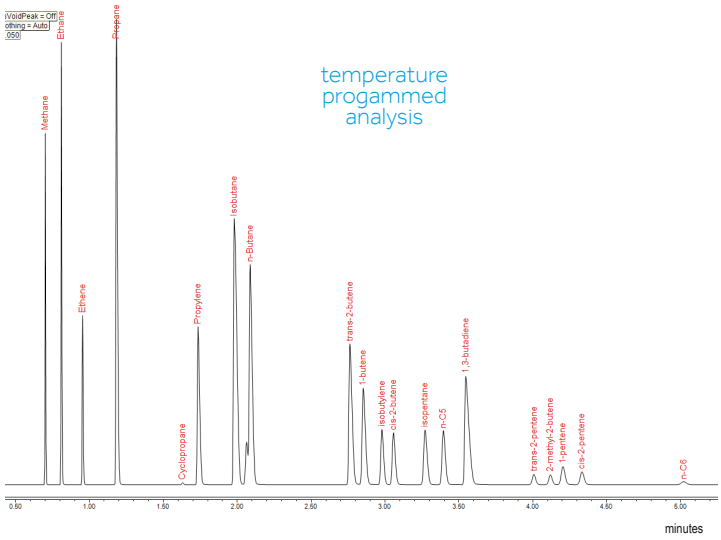


Figure 4. Hydrocarbons on MXT-Alumina-MAPD (50-200 °C) / FID

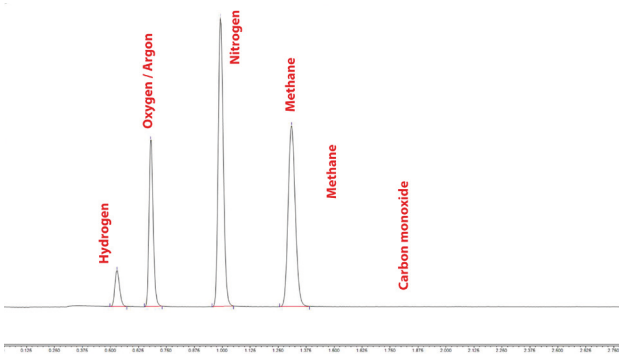


Figure 6. Permanent gases on Molsieve

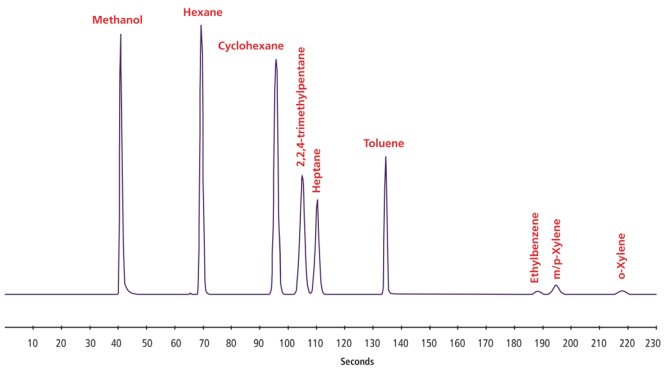


Figure 5. Hydrocarbons, aromatics and oxygenates on Rtx-1 / FID.

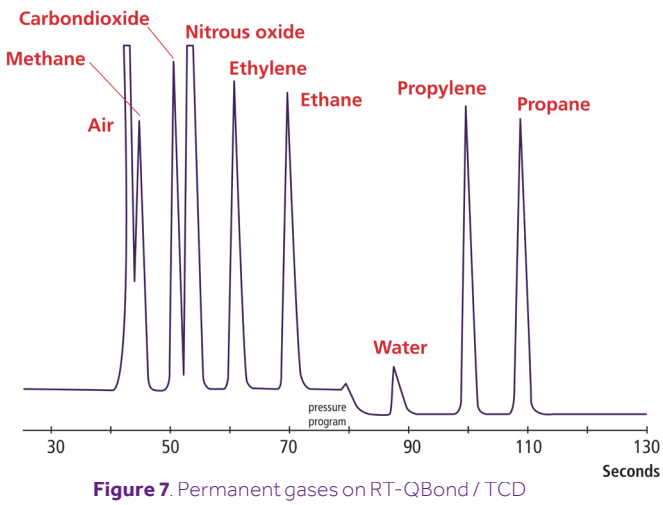


Figure 7. Permanent gases on RT-QBond / TCD

Specification and options

Application:	Custom configured analyser for the analysis of reactor gases. For gaseous samples containing hydrocarbons, permanent gases, sulphur components, oxygenates, aromatics and others
Configuration:	1-4 channel analyser based on GAS CompactGC[4.0]
Available detectors:	TCD, FID. Optional: PFPD, PDD, ePD, MS, VUV LUMA
Column ovens:	Isothermal or temperature programmed
Optional:	- stream selection valve (figure 8) - stop flow valve - option for small volume sampling (requires only 1 ml) - Cabinet enclosure (figure 9) - Custom IT solutions
Sample tubing:	Sulfinert® tubing for inert sample path (sulphur analysis)
Sample requirements:	See our pre-installation guide for additional requirements
Analysis time:	depends on application; typical 2-5 minutes
Minimum detectability:	(dependent on sample matrix, component and retention time) TCD < 5 ppm FID < 0.1 ppm PFPD <25 ppb PDD < 10 ppb MS <1 ppb (AEI) VUV LUMA <50 ppb
Accuracy:	Dependent on external calibration and repeatability
Repeatability:	< 1 % RSD



Figure 8
Stream selector for analysing multiple streams



Figure 9
Cabinet enclosure with 2 CompactGC's, data system and sampling option



Figure 10
Robust diaphragm valve with internal purge for millions of error-free injections

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Global Analyser Solutions

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