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Application Data Sheet

No.8

GC
Gas Chromatograph

High-Sensitivity Simultaneous Analysis of Inorganic Gases and Light Hydrocarbons

With conventional analytic methods, the high-sensitivity detection of CO, CO2 and light hydrocarbons requires a Methanizer plus a flame ionization detector (FID), while the detection of inorganic gas components requires a thermal conductivity detector (TCD). This requires a system with a complicated flow channel configuration. However, if the appropriate analysis column can be selected utilizing a barrier discharge ionization detector (BID) as the detector, then a mixed gas sample containing inorganic gases and light hydrocarbons can be simultaneously analyzed with high sensitivity.

This Data Sheet introduces an example of the high-sensitivity simultaneous analysis of inorganic gases and light hydrocarbons utilizing the Shimadzu Tracera High-Sensitivity Gas Chromatograph system.

Instruments Used and Analysis Conditions

Instruments Used	
Software	GCsolution
Gas chromatograph	Tracera (GC-2010 Plus A + BID-2010 Plus)
Gas sampler	MGS-2010
Analysis Conditions	
Column	Micropacked ST
Column temperature	35 ℃(2.5min) - 20 ℃ /min - 250 ℃(0min) - 15 ℃ /min - 270 ℃(5.42min) Total.20min
Carrier gas controller	Pressure
Pressure program	250kPa(2.5min) – 15kPa/min – 400kPa(7.5min) (He)
Injection mode	Split (1:5)
Injection port temperature	150 ℃
Detector temperature	280 ℃
Discharge gas volume	70mL/min
Injection volume	1mL

Results

Fig. 1 shows the chromatogram for a standard gas sample containing inorganic gases and light hydrocarbons (5 ppm each, He balanced). It is evident that a high-sensitivity simultaneous analysis of inorganic gases and light hydrocarbons is possible with a simple instrument configuration.

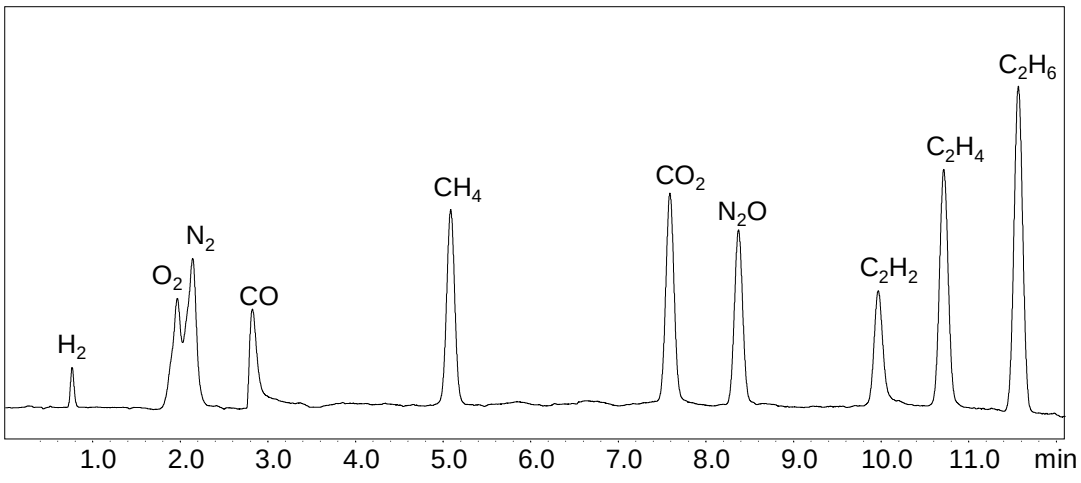

Fig. 1: Chromatogram for 5 ppm Components in He Standard Sample

Note: With baseline calibration

The inorganic gas and light hydrocarbon standard gas sample (5 ppm each, He balanced) was analyzed successively, and the peak area measurements were repeated to confirm repeatability. The overlapping chromatograms are shown in Fig. 2, and the peak areas and repeatability for each component are shown in Table 1.

Favorable repeatability was obtained, with a relative standard deviation (RSD%) of 2 % max.

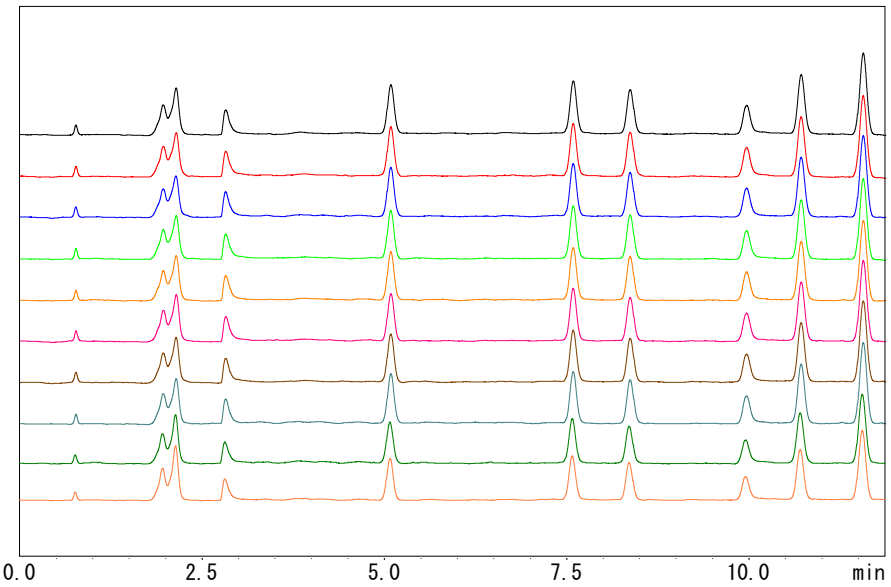

Fig. 2: Chromatograms from 10 Sequential Analyses

Note: With baseline calibration

Table 1: Area Value (μV × sec) Repeatability

	H_2	CO	CH_4	CO_2	N_2O	C_2H_2	C_2H_4	C_2H_6
1	2263	10988	24335	26144	22263	14507	32211	45399
2	2240	10936	23998	26184	22043	14466	32808	44402
3	2280	10932	24752	26537	22435	14781	32986	44883
4	2336	10462	24032	26413	22250	14705	32386	45049
5	2237	11009	23660	26413	22515	15210	32312	45202
6	2216	11058	24172	26348	22398	14915	32909	44878
7	2230	10949	23955	27004	22604	14941	32838	45059
8	2291	10956	24687	26642	22659	14992	32871	45295
9	2253	11011	24379	26550	22426	15246	33058	45515
10	2237	11189	24741	26679	22685	15075	32792	45751
Ave.	2258	10949	24271	26491	22428	14884	32717	45143
RSD%	**1.57**	**1.71**	**1.54**	**0.95**	**0.90**	**1.80**	**0.92**	**0.84**

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