

# Application News

Gas Chromatography

No.G265

## Analysis of Gas Sample Using Single-Oven MDGC

A multidimensional GC (MDGC) system is a type of GC system with an integrated switching system which includes two or more columns, so that substances which cannot be sufficiently separated using a single capillary column are heart-cut using flow line switching technology and routed to a separate column with a dissimilar phase, thereby obtaining the required chromatographic resolution. MDGC analysis employing dual ovens for providing freedom in setting column temperatures is now quite common; however, high resolution can also be obtained with a single-oven type system, depending on the complexity of the sample. Here we introduce an example of analysis of a gas sample using a single-oven type

MDGC. A switching program can easily be created with special software that can be downloaded from the Shimadzu website free of charge.

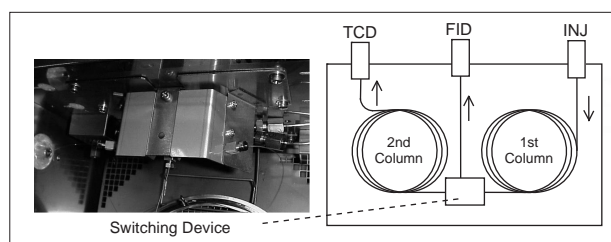


Fig. 1 Device Configuration for Single Oven MDGC

### ■ Analysis of Gas Sample Using Rtx-1 and Molsieve 5A

A gas sample consisting of a mixture of C1 - C5 hydrocarbons and an inorganic gas was analyzed by single-oven MDGC using an Rtx-1 non-polar liquid phase capillary column in conjunction with the Molsieve 5A PLOT column. The injected sample was routed to the TCD until elution of methane was

completed, after which it was routed to the FID to allow detection of the hydrocarbon species. While the hydrocarbons are eluting from the Rtx-1 column, separation of methane and the inorganic gasses is continued on the Molsieve 5A PLOT column with detection on the TCD.

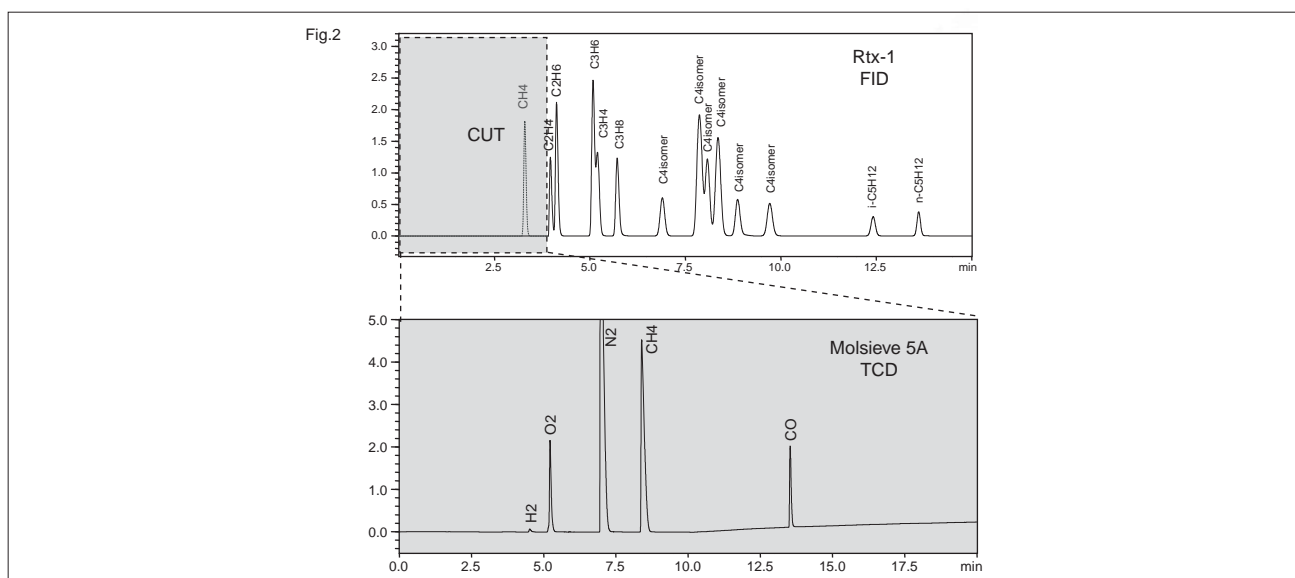


Fig. 2 Chromatograms Obtained Using Rtx-1 and Molsieve 5A Columns

Table 1 Analytical Conditions Used in Single-Oven MDGC

Instrument	: GC-2010 Plus	Injection Port	: 150 ° C
Column	: 1st Rtx-1 (30 m × 0.32 mmI.D. df = 5 μm) 2nd Molsieve 5A (25 m × 0.32 mmI.D. df = 30 μm)	Injection Method	: Split Split Ratio: 1:15
Column Temp.	: 35 ° C (10 min) - 20 ° C/min - 250 ° C (9.25 min)	Detector	: TCD: 280 ° C (65 mA) Make-up: He 20 mL/min FID: 280 ° C H <sub>2</sub> : 40 mL/min Air: 400 mL/min Make-up: He 30 mL/min
Carrier Gas	: He (210 kPa)	1st Restrictor (FID side)	: 0.5 m × 0.15 mmI.D.
Switching Press.	: 180 kPa (= 2nd Column inlet press.)		

### ■ Detector-Switching Analysis

Use of a switching device as a detector switching tool instead of using a second column allows sample constituents to be routed to the most appropriate detector.

Here, using a micro-packed column as the analytical column, we conducted analysis while switching between the FID and TCD detectors.

since it is a packed column, the carrier gas linear velocity cannot be calculated for display. In this case, the pressure - flow rate conversion table provided by the manufacturer (Shinwa Chemical Industries Ltd.) is used to check the column flowrate based on the difference between the inlet pressure and switching pressure.

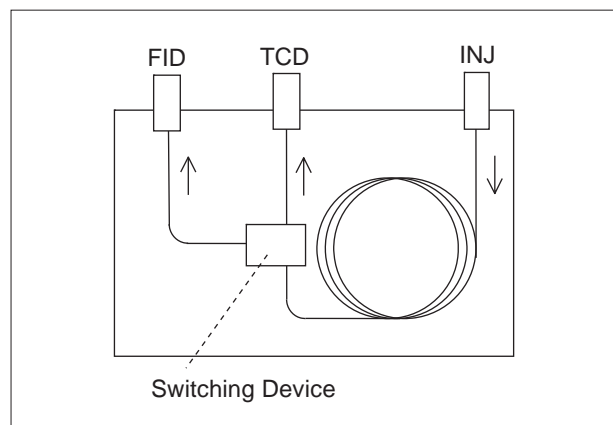


Fig. 3 Device Configuration for Detector-Switching Analysis

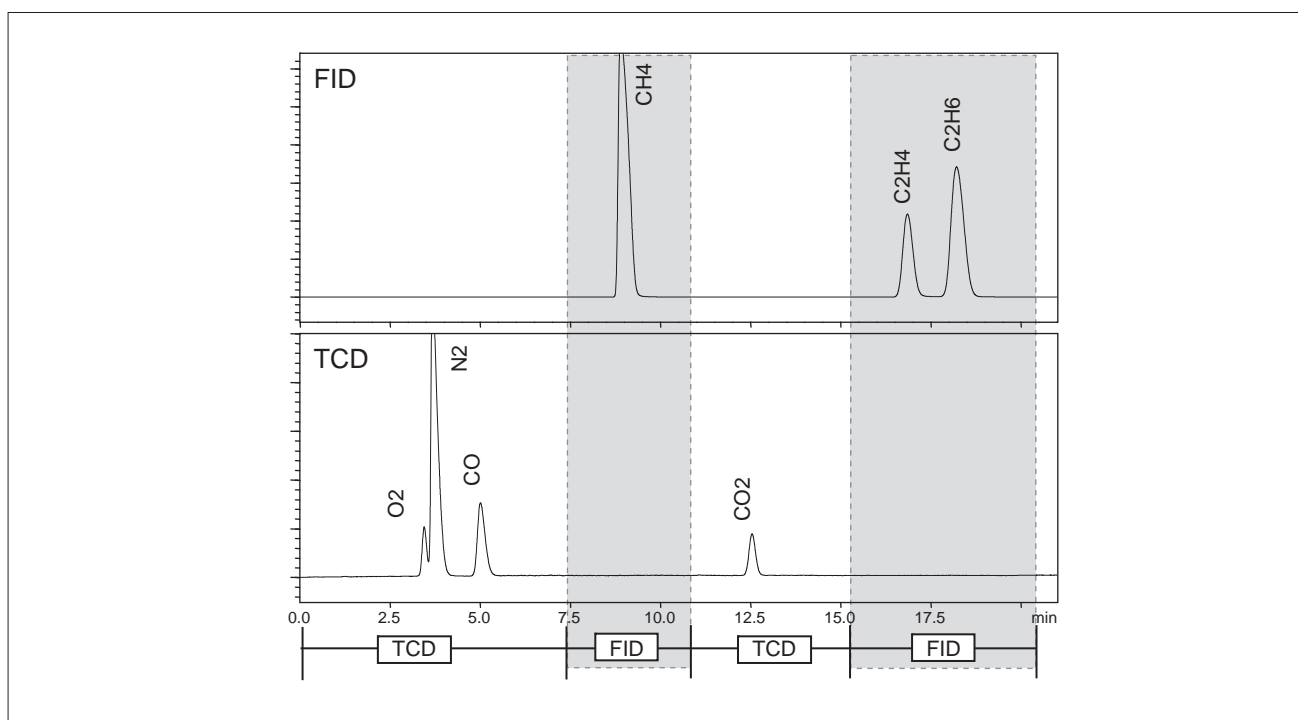


Fig. 4 Analysis using TCD - FID Switching

Table 2 Analytical Conditions for Detector-Switching Analysis

Instrument	: GC-2010 Plus	Injection Method	: Split Split Ratio: 1:4
Column	: Micropacked ST (2 m × 1 mmI.D.) (SHINCARBON-ST 80/100 mesh manufactured by Shinwa Chemical Industries Ltd.)	Detector	: TCD: 200 °C (75 mA), Make-up: He 20 mL/min, FID: 300 °C, H <sub>2</sub> : 40 mL/min, Air: 400 mL/min, Make-up: He 30 mL/min
Column Temp.	: 35 °C (5 min) - 20 °C/min - 250 °C (10 min)	1st Restrictor (TCD side)	: 0.5 m × 0.18 mmI.D.
Carrier Gas	: He (250 kPa)	2nd Restrictor (FID side)	: 0.5 m × 0.15 mmI.D.
Switching Press.	: 150 kPa		
Injection Port	: 150 °C		