

Natural Gas Analyzer by Multidimensional Gas Chromatography

Zack Ji, GS-Tek.

NaiZhong Zou, Beijing Chromtech Institute

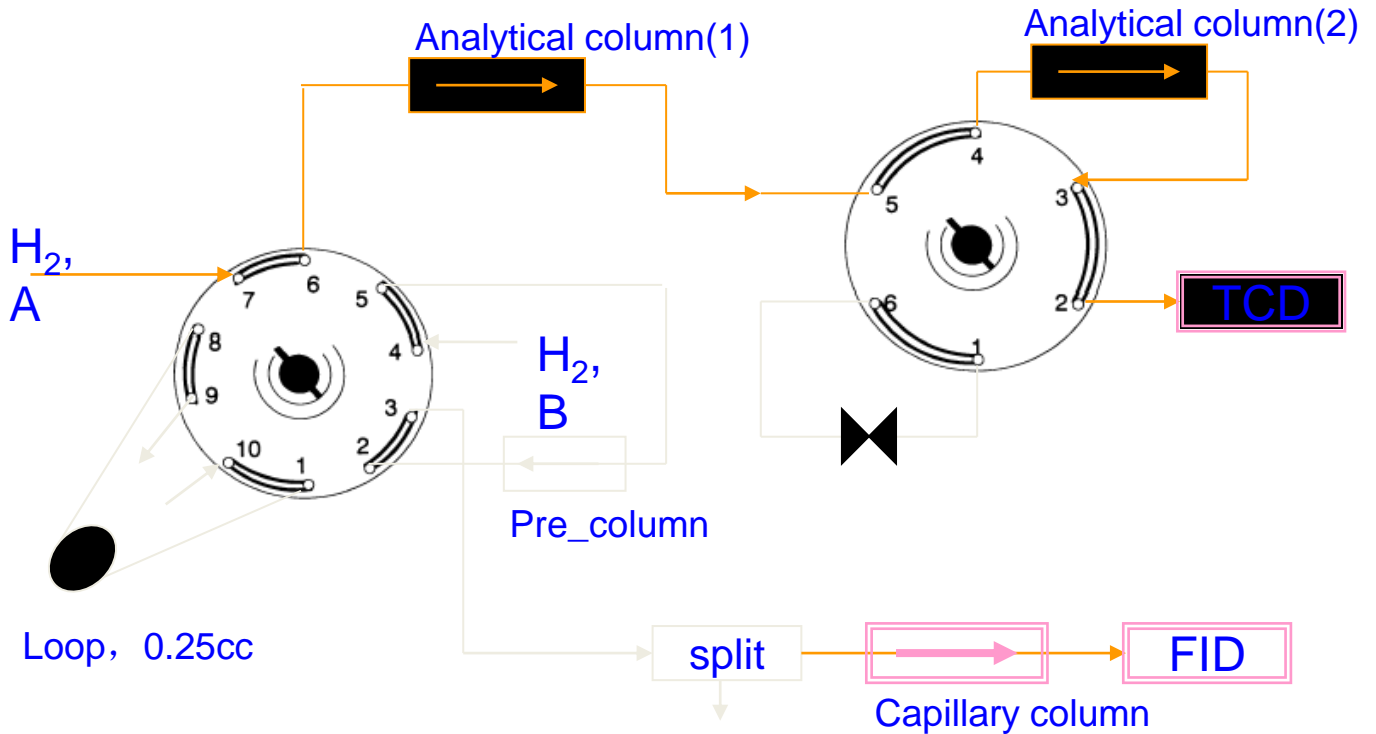
Introduction

- Natural Gas Analyzer (NGA) are developed based on Agilent-6890/6820 GC. This system employs multidimensional GC technique to analyze components in the sample such as O₂, N₂, CO, CO₂, H₂S, C₁-C₁₂ Hydrocarbons. The system is equipped with two valves, three packed columns and one capillary column.
- The analyzer produces good repeatability and fast analysis.
- The physical properties of natural gas are calculated by a software.

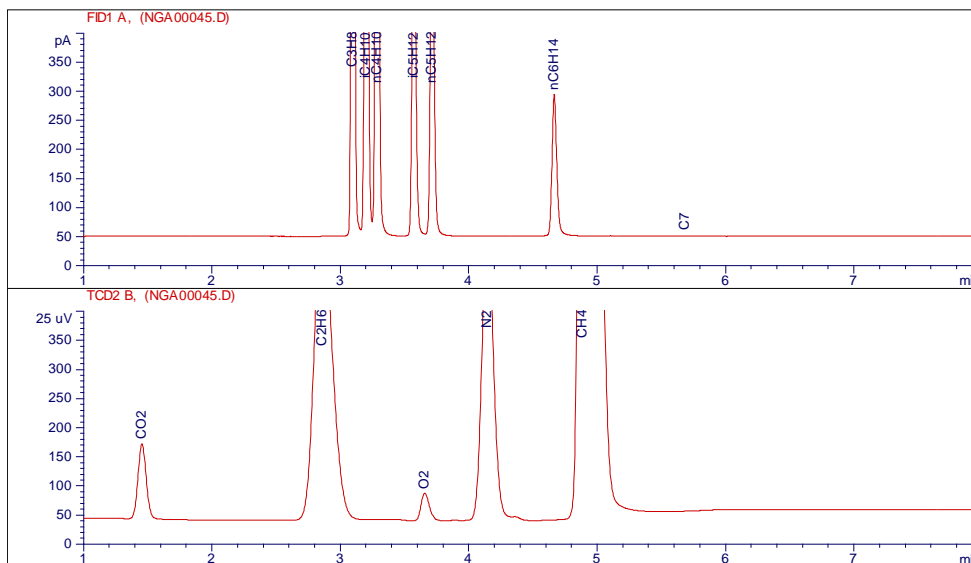
System Configuration

- 1、 Agilent 6890 N (or 6820) GC Mainframe
- 2、 2070AA Multi-Function ChemStation
- 3、 FID with EPC
- 4、 TCD with EPC
- 5、 Purged-packed Inlet with EPC
- 6、 Split/Splitless Capillary Inlet with EPC
- 7、 Two automated valve box
- 8、 Capillary Column (PONA column)
- 9、 Packed column kit
- 10、 System installation kit
- 11、 Valve Options (Refer to Valve Flow Diagram)

Valve Flow Diagram



Standard sample Chromatogram



C3H8 : 6.0
iC4 : 3.0
nC4 : 3.0
iC5 : 1.0
nC5 : 1.0
nC6 : 0.5 (Mol%)

CH4 : 69.0
C2H6 : 9.0
CO2 : 1.0
O2 : 0.5
N2 : 6.0 (Mol%)

Chromatogram: Sample

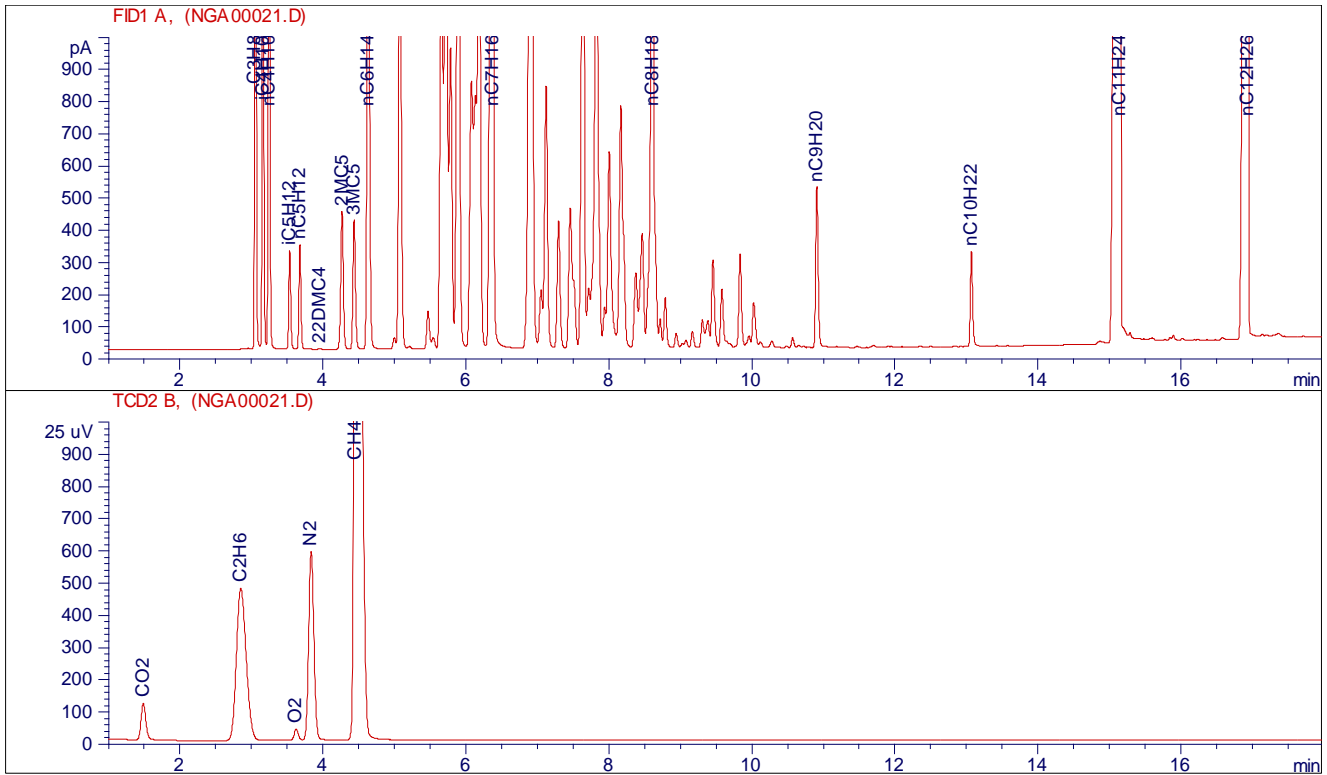


Table1 Repeatability

Mo1%	CH4	C2H6	C3H8	I-C4	N-C4	I-C5	N-C5
41	91.926	3.168	0.711	0.127	0.186	0.042	0.051
42	91.829	3.184	0.709	0.127	0.186	0.042	0.051
43	91.803	3.194	0.710	0.127	0.186	0.042	0.051
44	91.800	3.226	0.713	0.128	0.187	0.043	0.051

Table2 Repeatability

Mol %	22DMC 4	2-MC5	3-MC5	nC6	N2	CO2	AIR
41	0.003	0.012	0.005	0.016	3.678	0.035	0.057
42	0.003	0.012	0.005	0.016	3.639	0.033	0.062
43	0.003	0.012	0.005	0.015	3.664	0.035	0.112
44	0.003	0.012	0.005	0.015	3.636	0.030	0.066
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Physical Properties

	Compressibility Factor	Superior Calori Kj/M ³	Inferior Calori Kj/M ³	Density Kg/M ³	Relative Density	Wobbe index Kj/M ³
41	0.99737	40220.5	36304.8	0.77711	0.60107	51878.3
42	0.99733	40428.4	36498.3	0.78093	0.60402	52018.9
43	0.99733	40399.9	36472.1	0.78073	0.60387	51988.9
44	0.99733	40425.7	36495.7	0.78078	0.60390	52020.5

Summary

- Multidimensional GC is configured with packed and capillary columns
- Only two valves are needed instead of the use of three valves
- Packed columns: high capacities for analyzing permanent gases component such as O₂, N₂, CO, CO₂, H₂S
PONA column: high efficiency for analyzing C₁-C₁₂ Hydrocarbons or higher
- EPC: produces the good stability, repeatability and easier to operate
- Fast analysis (less 20 min to C₁₂)
- The physical properties of natural gas are calculated by a software.