Gas Chromatograph

YL6500 GC

YOUNG IN Chromass

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The **iDEA** makes **iDEAL** !

YL6500 GC, 5th generation GC of Young In Chromass, has been a legacy line in a GC market. With strongly enhanced APC (Advanced Pneumatic Control), installation of three units of inlet and detector for each enables to extend the various GC configurations to perform complex analysis.
YL6500 GC provides substantially reliable and precise data by every single part from the stable inlets to the extremely sensitive detectors as well as the innovative haptic touch pad strengthening user interface with a finger-tip. Moreover, an intuitive chromatography data system with user-friendly interface improves the ease of instrument control.

Key Features

View

- **Enlarged haptic color LCD (5.7”)** showing all factors at a glance
- Classic and lab-suitable design
- Intuitive and user-friendly view by chromatography data system

Verification

- High speed data process by network (**LAN**) communication
- **Enhanced APCs for all modules**
  - Increased precision in gas pressure and flow rate for more reliable results
  - Automatic compensation for temperature & pressure in installation condition
  - Pressure setpoint increment : **0.001 psi**
  - Column flow control modes: Constant pressure/ Constant flow
  - Shockproof design and stable structure against oven temperature changes
  - Up to six APCs can be installed and up to **18 channels** of APC
- Upgraded column oven
  - Programming ramp/plateaus : **25 / 26**
  - Thermal stability : ± 0.01 ℃

Variety

- Maximum no. of inlet / detector installation : **3**
- Various inlets available
  - Capillary Inlet (Split/Splitless Inlet)
  - Packed Inlet
  - On-Column Inlet (Temperature programming up to 5 steps)
- Various detectors with high sensitivity available
  - Flame Ionization Detector (FID)
  - Thermal Conductivity Detector (TCD)
  - Micro-Thermal Conductivity Detector (μTCD)
  - Nitrogen Phosphorus Detector (NPD)
  - Flame Photometric Detector (FPD)
  - Electron Capture Detector (ECD)
  - Pulsed Discharge Detector (PDD)
  - Pulsed Flame Photometric Detector (PFPD)
  - Photoionization Detector (PID)
  - Mass Spectrometer

Value

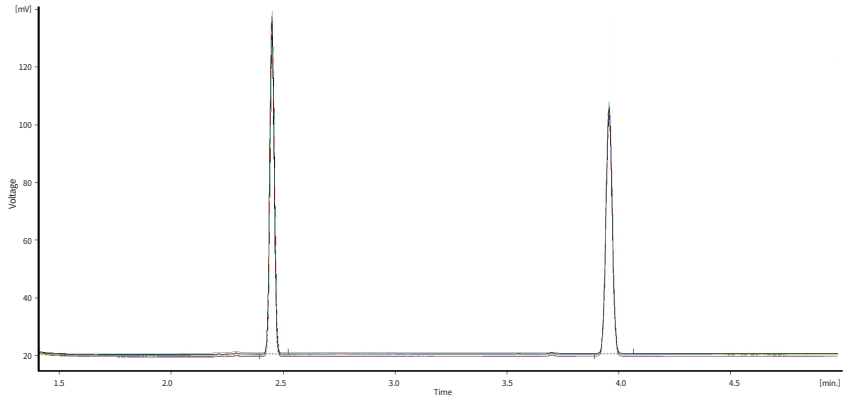
- Saving user's valuable time with a high throughput autosampler
- Improved column conditioning function:
  Automatic set of split flow up to 5 ml/min on column conditioning
- Prevention of oven malfunction (Over heating)
- Automatic stop when an oven door gets
  opened during operation.

Feel the Difference

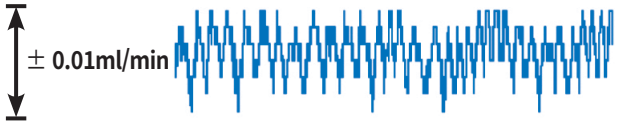
Exceptional Reproducibility

The strongly enhanced APC with increased precision of gas pressure and flow rate assures an accurate result, especially in the reproducibility. The following chromatograms overlaid 11 times of injections verify the superior reproducibility in retention time.

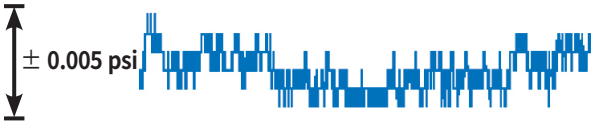
Number of Injection	1	2	3	4	5	6	7	8	9	10	11
RT (min) of Peak 1	2.4541	2.4538	2.4519	2.4531	2.4526	2.4544	2.4531	2.4525	2.4542	2.4531	2.4525
RSD (%)	0.0334										
RT (min) of Peak 2	3.9576	3.9569	3.9565	3.9579	3.9559	3.957	3.9572	3.9555	3.9582	3.9571	3.9576
RSD (%)	0.0207										



Flow Stability

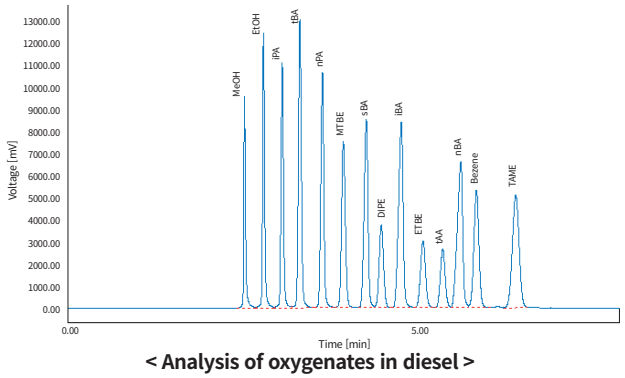


Pressure Stability



The Ultimate in Gas Chromatography

The powerful programming function of oven temperature, pressure and flow rate enables to shorten retention time and reduce decomposition and loss of samples. Moreover, the swift and accurate control of valve switching time in settable point up to 0.01 min allows analyzing complex samples containing various components that can not be separated by one column or detected by one detector reversing column flow precisely (Backflush) with no loss of peak area values.



< Analysis of oxygenates in diesel >

Analysis condition

- Column: HP-1, 30 m x 0.53 mm
  TCEP μ-packed column, 56 cm x 1/16"
- Injector : 230 °C
- Column flow : 3.5ml/min, Split ratio : 20 : 1
- Oven : 60 °C (6.8 min) → 8 °C/min → 120 °C (10 min)
- FID : 250 °C
- 1st column switching time(backflush) : 0.23 min
- 2nd column switching time : 6.65 min
- Valve Temp : 100 °C

Dedicated Applications

Our accumulated experience in gas chromatography and devotion for customers' satisfactions led to supply one stop solution for various dedicated applications. You only need to let us know what to analyze, and then every single component that is required to analyze your sample will be configured right away.

Why is it called "dedicated applications" ?

We provide all you need

- Properly configured GC (Inlets, Detectors, Valves, Methanizers, etc.)
- Suitable sample preparation system/accessories
- Standard solutions
- Chromatography data system with saved methods
- Analytical columns
- Accessories (Traps, Syringes, etc.)
- Related application notes

Residual Solvent Analysis

Organic residual solvents used in the manufacture of pharmaceuticals and found in the inks used for the printing of packaging materials for food and drug products are known to be hazardous to human health if ingested. Residual Solvent Analyzer can accurately and efficiently detect and quantify residual solvents.

Fatty Acid Analysis

In the food industry, the quality management for products is conducted by analyzing esterified fatty acids to determine the ratio of saturated fatty acids and unsaturated fatty acids in fat. For fatty acids have many isomers to be separated, they are commonly analyzed by gas chromatograph after esterified to Fatty Acid Methyl Esters (FAMEs) to avoid peak tailings in a direct injection of fatty acid and column clogging. It's very important to set an oven program because the polar or moderately polar capillary columns used in this analysis have low temperature limit. The order of peaks must be indentified first for the eluted peaks of fatty acids are different in the use of polar or moderately polar capillary columns. Fatty Acid Analyzer is suitable to analyze various fatty acids and provide all the solution from the preparation to the method set-up.

Refinery Gas Analysis

Refinery gas is a mixture of gases generated during refinery processes which are used to process crude oil into various petroleum products. Analyzing refinery gas has been getting very important in environmental fields because there are several components or chemicals in it that can potentially harm the environment if released unchecked. Due to the fact of installation detectors and inlets up to 3, Refinery Gas Analyzer can configure several columns, switching and sampling valves as well as the appropriate detectors to analyze the complex and difficult refinery gas samples.

TOGA (Transformer Oil Gas Analysis)

Oil based transformer insulating fluids are known to release combustible gases, which can decrease the efficiency of the insulating fluid while creating a dangerous situation. TOGA System is a state of the art system for efficiently and accurately monitoring the buildup of combustible gases in the insulating oils of transformer. Such monitoring can prevent an accident from occurring, as well as ensure that the insulating oil is functioning under optimal conditions.

VOC Analysis

VOC Analyzer accurately tests the presence of VOCs and measures their concentration. The analyzer contains all necessary reagents and equipment for conducting the analysis including detailed procedures and protocols for conducting the tests. These protocols are in full compliance with approved U.S. EPA methods.

Pyrolysis GC Analysis

Pyrolysis-GC system is a state of the art system for obtaining information on the ingredients found in various non-volatile and low-soluble polymers such as nylon, wax, paint, film, wood and plastic products. The targeted material or sample is heated to be fragmented into its individual constituents, which are then separated and identified by the GC System.

Natural Gas Analysis

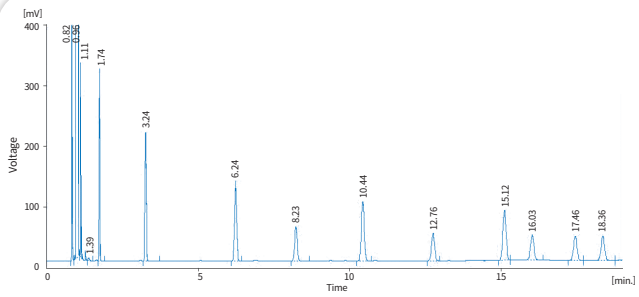
Analysis of natural gas requires a very complicating configuration because it contains low level of oxygen (< 3%), isomers and compounds more than C4 which are not needed for analysis results. Natural Gas Analyzer can be configured in ideal with accurate valve switching venting unnecessary components and collecting significant things in time to the appropriate columns and detectors.

See the Performance

Newly designed and highly sophisticated electronic board for each detector reduces a noise level 2~5 times lower than traditional Young In Chromass's detectors. In addition, powerfully enhanced electronic circuit enables to detect weak signals for improvement of data process of samples in trace level.

Flame Ionization Detector (FID)

A Flame Ionization Detector measures the quantity of ions which are produced when a sample coming out from a column is flamed by hydrogen and air. So, this is to be used to detect any organic compounds which can be ionized by hydrogen/air flame. With linear dynamic range of seven orders, the function of auto ignition can start an ignition automatically at a setting temperature. In addition, a unified interconnector with high conductivity delivers very stable signals to electronic parts to maximize the sensitivity.



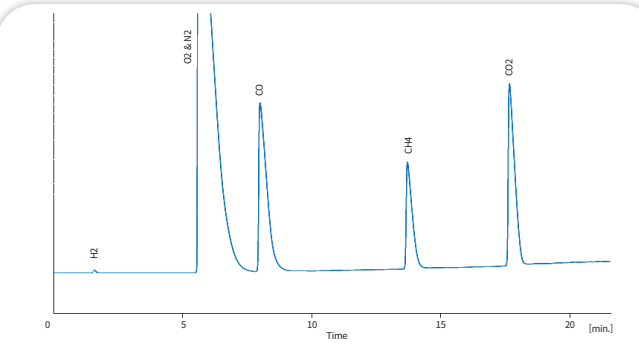
< Analysis of Fatty Acid Methyl Esters >

Analysis Condition

- Column : Innowax, 30 m x 0.32 mm x 0.5 µm
- Oven : 100 °C (5 min) → 4 °C/min → 240 °C (10 min)
- Injector : 250 °C
- Detector : 280 °C

Thermal Conductivity Detector (TCD)

A Thermal Conductivity Detector is introduced as a universal detector because it can detect every compound which has different thermal conductivity from that of carrier gas. It is recommended to use carrier gas such as hydrogen (H_2) or helium (He) that has a big difference of thermal conductivity from that of sample components. The especially stabilized design of TCD against shock with superior thermal conductivity creates extremely stable baseline as well as minimized noise level. Also, Young In Chromass's unique filament protection reduces its maintenance substantially.

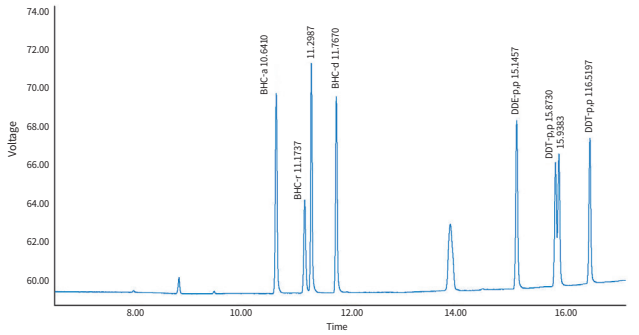


Analysis Condition

- Column : Carboxen1000, 1/8", 15 ft, 60/80 mesh
- Oven : 35 °C (5 min) → 10 °C/min → 225 °C (5 min)
- Carrier gas : He, 25 ml/min
- Injector : 120 °C
- Detector : TCD (120 °C), Sens 6
- Injection Volume : 1 ml

Electron Capture Detector (ECD)

An Electron Capture Detector is used for detecting electron-absorbing components such as halogenated compounds. Our remarkably advanced ECD structure maximizes electron capture efficiency and the micro-volume cell increased detecting performance as well as sensitivity.



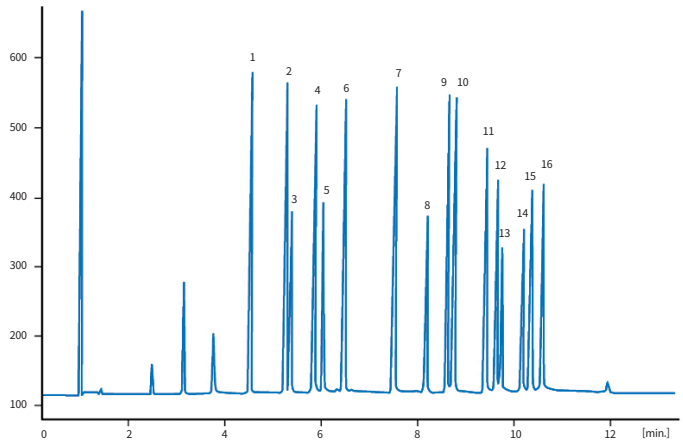
< Analysis of Residual pesticides >

Analysis Condition

- Column : HP-5, 30 m x 0.32 mm x 0.25 µm
- Oven : 80 °C (2 min) → 10 °C/min → 280 °C (8 min)
- Injector : 280 °C
- Detector : 300 °C
- Make up gas : 40 ml/min

Pulsed Discharge Detector (PDD)

PDD has two different modes, one is PDECD and the other is PDHID. The PDECD is a selective detector for monitoring high electron affinity compounds such as freons, chlorinated pesticides, and other halogen compounds. For this type of compound, the minimum detectable quantity (MDQ) is at the femtogram (10^{-15}) or picogram (10^{-12}) level. The PDD is similar in sensitivity and response characteristics to a conventional radioactive ECD, and can be operated at temperatures up to 400°C. For operation in this mode, He and CH_4 are introduced just upstream from the column exit. The other mode, the PDHID is an universal, non-destructive, high sensitivity detector. The response to both inorganic and organic compounds is linear over a wide range. Response to fixed gases is positive (increase in standing current), with an MDQ in the low ppb range.



1. α- BHC
2. γ- BHC
3. β- BHC
4. Heptachior
5. δ- BHC
6. Aldrin
7. Heptachior epoxide
8. Endosulfan I
9. 4, 42 - DDE
10. Dieldrin
11. Endrin
12. 4, 42 - DDD
13. Endosulfan II
14. 4, 42 - DDT
15. Endrin aldehyde
16. Endosulfan sulfate

Analysis condition

- Column : HP- 608, 30 mm x 0.53 mm x 0.5 µm
- Oven temp : 100 °C (2 min) → 12 °C/min → 280 °C
- Detector : PDECD, D-2, 300 °C
- Carrier : Helium, 8 ml/min
- Injector : 1 µl, split 15 : 1, 280 °C

Nitrogen Phosphorous Detector (NPD)

A Nitrogen Phosphorous Detector is a specific detector which gives a strong response to organic compounds containing Nitrogen or Phosphorus. The detector is based on the principle of ionization of the analyte in presence of a heated alkali source.

Micro-Thermal Conductivity Detector (µ-TCD)

A Micro-Thermal Conductivity Detector is operated in a same principle as TCD but a smaller cell to improve sensitivity. The detector cell includes two separate nickel/iron filaments, capable of independent or referenced (differential) operation. Cell volume and geometry are optimized for capillary chromatography and enhanced sensitivity at low flow rates. (Recommended total flow rate: 2-10 ml/min.) Thermal stability is maintained to ±0.02°C, resulting in a stable and noise-free signal.

Flame Photometric Detector (FPD)

A Flame Photometric Detector is similar to the FID in that the sample exits the analytical column into a hydrogen diffusion flame. But FPD analyzes the spectrum of light emitted by the compounds as they luminescence in the flame and detects selectively substances containing Sulfur or Phosphorous.

Pulsed Flame Photometric Detector (PFPD)

A Pulsed Flame Photometric Detector is to selectively analyze compounds containing Sulfur or Phosphorous but provides more than 10 times higher sensitivity and selectivity compared to a traditional FPD. It also requires low gas consumption ensuring detector stability for minimized maintenance.

Photoionization Detector (PID)

Photoionization Detector (PID) is a uniquely-designed GC detector that selectively responds to aromatic and olefinic hydrocarbons in the presence of alkanes and other saturated hydrocarbons.

Technical Specifications

Column Oven

YL6500 GC Oven System Module	- Usable volume : 14 L - Cooling down option : - 80 °C ~ 450 °C (with LN_2 cryogenic cooling) - 40 °C ~ 450 °C (with LCO_2 cryogenic cooling) - Temperature set-point : 0.1 °C - Temperature programming : 25 ramps/26 plateaus - Maximum heating rate : 120 °C/min - Maximum run time : 9,999 min - Temperature program method : Maximum up to 20 - Temperature stability : ±0.01 °C (Isothermal), ±0.1 °C (Gradient)

Inlet

Packed Inlet	- Maximum Temperature : 450 °C - Total flow setting range : 0.01~ 100 ml/min	- Pressure setting range : 0.001 ~ 100 psi - Pressure stability < ± 0.005 psi - Temperature stability < ±0.1 °C - Flow stability < ±0.05 ml/min - Temperature setpoint : 0.1 °C
Capillary Inlet (Split/Splitless Inlet)	- Maximum Temperature : 450 °C - Total flow setting range : 0.01 ~ 400 ml/min N_2 0.01 ~ 1000 ml/min He/H_2 - Splitless time setpoint : 0.01 min	
On-Column Inlet	- Maximum Temperature : 450 °C - Temperature programming up to 5 steps	

Detector (Data Acquisition Rate : 200 Hz)

	Maximum Temp.	MDL	Others
Flame Ionization Detector	450 °C	1.5 pg carbon/sec	Linearity : 10^7
Thermal Conductivity Detector	400 °C	2.5 ng/ml (Standard) 400 pg/ml (uTCD)	- Flow through cell : 4 Rhenium-Tungsten filaments - Filament protection
Electron Capture Detector	400 °C	10 fg/sec	Linearity : > 10^4
Nitrogen Phosphorous Detector	400 °C	< 0.2 pg N/sec (Azobenzene) < 0.02 pg P/sec (Parathion methyl)	Linearity for N : > 10^4 Linearity for P : > 10^4
Flame Photometric Detector	300 °C	< 1.0 pg S/sec < 0.2 pg P/sec	Linearity for S : Calibration curve is compulsory Linearity for P: > 10^5
Pulsed Discharge Detector	400 °C	**(PDHID) :** - Organic compound : low ppb - Permanent gas : low ppm **(PDECD) :** 10^{-15}	(PDHID) : Linearity 10^5 (PDECD) : Linearity 10^5

Autosampler

Liqid Sample Autosampler

- Syringe Volume: 0.5, 1, 5, 10, 25, 50 and 100 µl
- Tray Capacity
  - YL3050A : 18 vials, 2 ml
  - YL3000A : 121 vials, 2 ml
  - ChroZen PAL LSI : 648 vials, 2 ml
- Electrical Control : LAN and TTL, RS232 (Option)
- Filling/Injection Speed : 1~100 µl/sec
- Internal Standard Volume : as low as step of 0.1 µl
- Washing Solvent Capacity :
  - 6 x 10 ml vials (YL3000A)
  - 4 x 10 ml vials (ChroZen PAL LSI, YL3050A)

ChroZen PAL RSI/RTC System All the Sampling Techniques Available in ONE Unit

- Liquid Operation
  - Tray capacity: 648 vials, 2 ml
  - Repeatability: < 0.60 % RSD
  - Carry Over: < 0.004 %
- Headspace Operation
  - Tray Capacity: 180 Vials (10/20ml)
  - Syringe Temperature: 40 - 150 °C
  - Carry Over: < 0.05 %
  - Repeatability: < 1.00 % RSD
- SPME (Arrow)
  - Trace level sensitivity
  - High mechanical robustness

YL2000H/YL2100H Headspace Autosampler

- Tray Capacity
  - YL2000H : 42 Vials (20 ml) (Optional :6 and 10 ml)
  - YL2100H : 14 Vials (20 ml) (Optional : 10 ml)
- Syringe Sizes: 2.5 (standard) ; optional ; 1 and 5 ml
- Sampling Repeats: Up to 15
- Sampling Volume: Steps of 0.01 ml
- Injection Speed: 0.5 – 100 ml/min

YL2800T/YL2850T all in All in One Unit

- Liquid Operation
  - Tray capacity: 121 vials, 2 ml
- Headspace Operation
  - Tray Capacity: 42 vials (20ml); optional: 6 and 10 ml
  - Syringe Temperature: 40 - 150 °C
- SPME (Fiber) as option
  - Fiber cleaning station (Temperature: 210-300 °C)

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