C184-E019A

Access to your success
SHIMADZU

GC-2010 Plus

With Advanced Flow Technology

Shimadzu
Capillary
Gas Chromatograph System

For speed, precision and accuracy,

the GC-2010 Plus has just raised the bar....again!

GC-2010 Plus

With Advanced Flow Technology

CAPILLARY GAS CHROMATOGRAPH SYSTEM

The Shimadzu GC-2010 Plus represents a new generation in top end capillary GC analysis, redefining sensitivity limits for trace analysis, fast GC applications, and easy, robust operation. Advanced Flow Technology (AFT) capability further extends the applications scope of the instrument allowing multidimensional GC, capillary backflush, and other specialized flow applications. AFT additionally enables reduced analysis times, enhanced chromatographic resolution, and application-specific configurations without compromising key performance features. The new detector line-up, featuring sensitivity specifications among the highest in the industry, ensures quality data across a broad range of applications.

Advanced Flow Technology

- Multi-dimensional system
- Backflush system
- Detector splitting system

Leading Sensitivity

- Best-in-class*high-sensitivity detectors

Enhanced Productivity

- High-speed analysis
- Backflush
- Rapid oven heating/ cooling
- Gas saver function
- Excellent repeatability
- Carrier gas constant linear velocity mode
- Dual-injection system

Data Management [GCsolution]

- Easy operation
- Improves productivity
- GLP/GMP compliant
- Network compliant

Easy Operation

- Large LCD display
- Self diagnostic functions

Applications

- Thermal decomposition analysis
- Liquid Injection/ Headspace/ SPME Analysis system
- Pyrolysis system
- Simulated distillation analysis
- PONA analysis

Contents

*Per survey result 2009-04

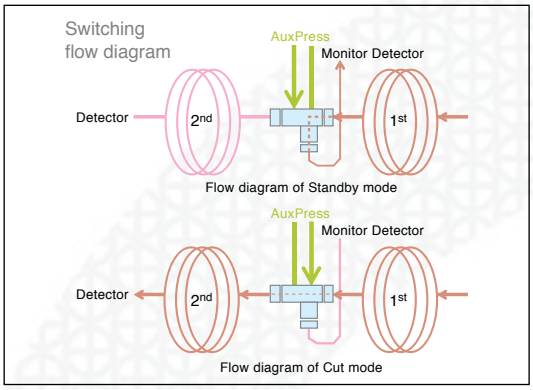
Advanced Flow Technology

Advanced Flow Technology is Shimadzu´s solution to provide enhanced separation power and operational efficiency for applications with complex sample matrices. This enhanced capability is based on the high precision Advanced Flow Control (AFC) of the GC-2010 Plus.

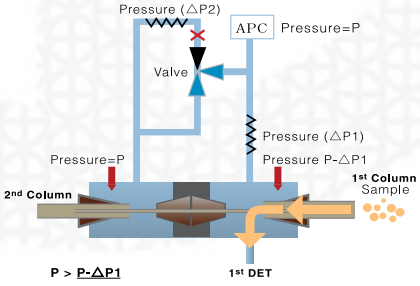
Advanced Flow Technology for high-performance separation

Multi-dimensional GC/GCMS System MDGC/GCMS-2010

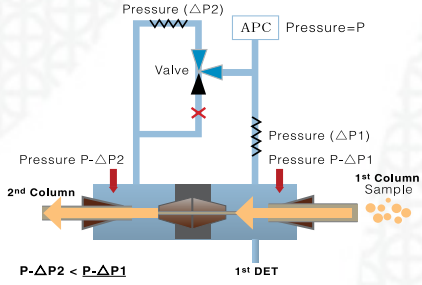
A multi-dimensional GC/GCMS system performs separations using two columns that have different chromatographic selectivity. When components of interest are insufficiently separated on the first column, they can be selectively introduced ("heart-cut") to a second chromatographic column with different selectivity. This enables enhanced chromatographic separation that cannot be attained in conventional single-column analysis. In addition, the precise flow-switching technology, which is supported by a high-precision digital flow controller, ensures heart-cut analysis with the high level of reproducibility demanded of complex capillary GC separations.



· Standby Mode

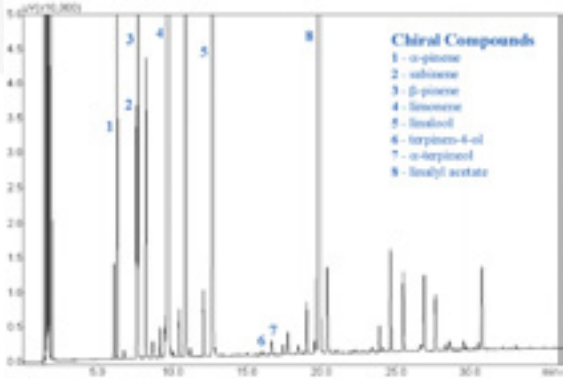


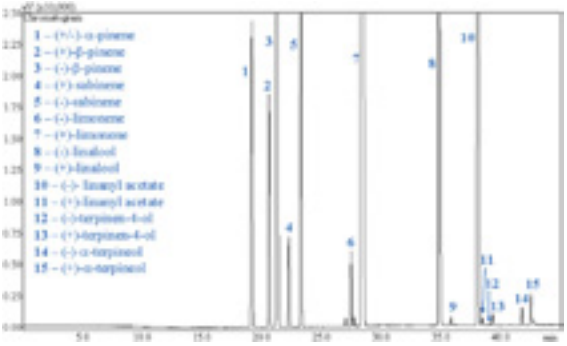
· Cut Mode



Multi-Deans' Switching

In the past, multidimensional GC has been accomplished using a switching mechanism known as Deans' Switch. However, this system results in such problems as a reduced recovery (sample loss) and fluctuations in retention time after column switching. The MDGC/GCMS-2010 system incorporates multi-Deans switching, a new mechanism that significantly reduces the likelihood of fluctuations in the retention times of components eluted after column switching, even when column switching is performed several times.





Multi-Switching Analysis of Essential Oil

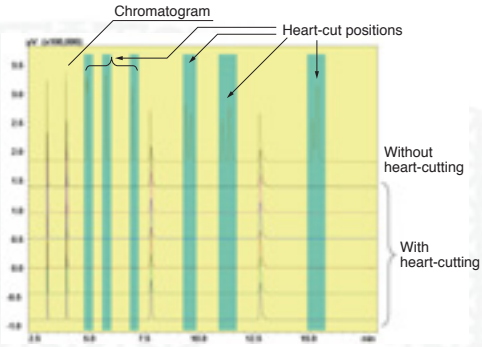
1st Column : MEGA SE-52 0.25 x 25 m df=0.25 µm
Oven temp : 50 °C - 280 °C (3 °C/min)
Injector : 250 °C
Split ratio : 1 : 100
Monitor FID : 290 °C
H_2: 50 mL/min, Air: 400 mL/min, Make-up: 0 mL/min
Switching : 8 times
2nd Column : MEGA DetTBuSilIlBeta 0.25 x 25 m df=0.25 µm
Oven temp : 45 °C (12.00 min) - 180 °C (2 °C/min)

1st GC Chromatogram
8 compounds are switched onto the 2nd column.

2nd GC Chromatogram
8 compounds are separated into 15 peaks.

Data by
Universita degli Studi di Messina
Prof. Luigi Mondello
Alessandro Casilli
Peter Quinto Tranchida
Danilo Sciarrone

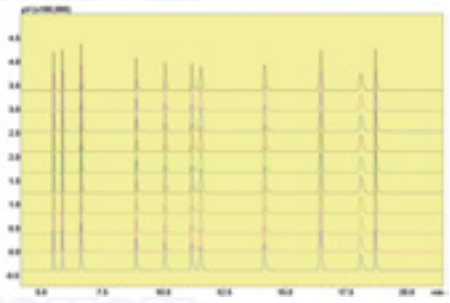
Chromatogram Obtained with 1st Column



Reproducibility of 1st Column

	Area		Retention Time	
Compound	MeOH	tAmOH	MeOH	tAmOH
1	174308	435368	3.008	12.712
2	171031	427495	3.009	12.712
3	173117	433085	3.009	12.712
4	174715	438180	3.009	12.712
5	172315	430744	3.008	12.712
6	174633	436304	3.008	12.712
7	175269	439073	3.009	12.712
8	175863	441410	3.008	12.711
9	172717	430224	3.008	12.712
10	172002	435496	3.008	12.712
Average	173597	434738	3.008	12.712
STDEV	1582	4347	0.00052	0.00032
CV(%)	**0.912**	**1.000**	**0.017**	**0.002**

Chromatogram Obtained with 2nd Column



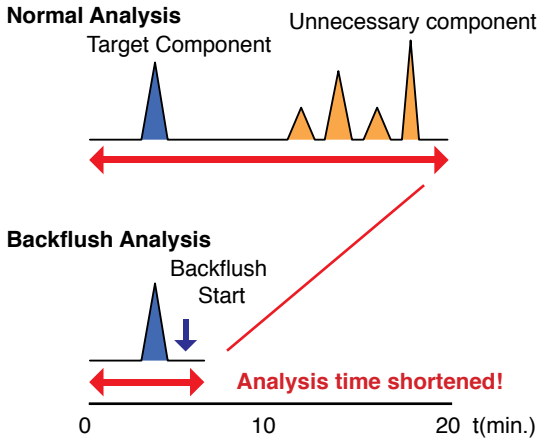
Reproducibility of 2nd Column

	Area						Retention Time					
Compound	Acetone	IPA	ETBE	Bz	TAME	nBuOH	Acetone	IPA	ETBE	Bz	TAME	nBuOH
1	241902	258122	322917	584033	302735	341100	5.515	5.880	11.563	16.501	18.137	18.733
2	237073	253283	316835	572472	296948	334684	5.516	5.880	11.565	16.501	18.136	18.734
3	240294	256361	321149	580369	301337	339373	5.516	5.881	11.565	16.503	18.138	18.733
4	242492	259231	324511	587335	304680	343516	5.515	5.881	11.565	16.502	18.136	18.732
5	238727	254946	318735	576768	299044	337067	5.515	5.880	11.563	16.500	18.136	18.733
6	242091	258606	323204	584763	303246	342028	5.515	5.880	11.563	16.503	18.137	18.732
7	243402	260304	325211	588083	305140	344235	5.515	5.880	11.563	16.502	18.135	18.731
8	241572	260384	326286	588626	301903	337481	5.515	5.880	11.563	16.501	18.135	18.732
9	239256	255374	319324	576796	299153	336898	5.515	5.880	11.563	16.501	18.135	18.733
10	238508	254885	319167	576955	299617	337750	5.515	5.880	11.564	16.502	18.137	18.730
Average	240532	257150	321734	581620	301380	339413	5.515	5.880	11.564	16.502	18.136	18.732
STDEV	2067.56	2506.10	3159.04	5706.12	2662.17	3170.38	0.00037	0.00049	0.00067	0.00076	0.00108	0.00106
CV	**0.860**	**0.975**	**0.982**	**0.981**	**0.883**	**0.934**	**0.007**	**0.008**	**0.006**	**0.005**	**0.006**	**0.006**

Advanced Flow Technology for Enhanced

Backflush System

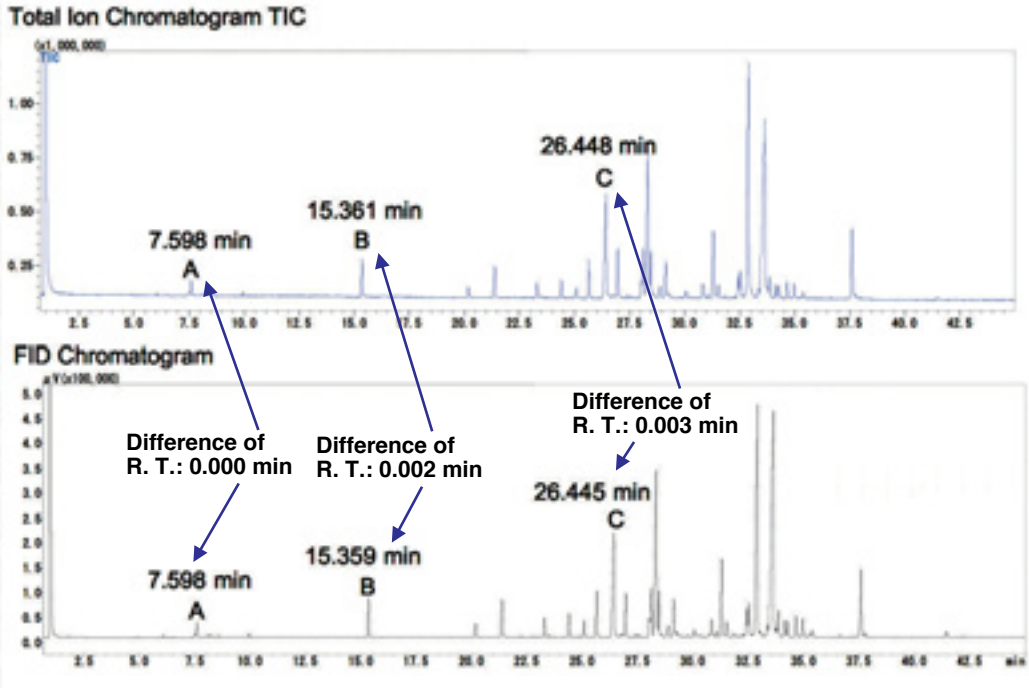
The backflush system reverses the carrier gas flow after the target compounds have eluted, to discharge residual late eluting components in the column through the injection port split vent.
Backflush shortens the analysis time and improves productivity. In addition, high-boiling point components are discharged efficiently to reduce the bakeout time (elution time), and thus prevent column deterioration, contamination, and retention time shifts.



Detector Splitting System

Compounds eluting from an analytical column may be split to multiple detectors to obtain multiple chromatograms. Offering abundant information in a single analysis, this system saves time and money. In addition, with concurrent use of selective detectors, confidence in peak identity is improved. We recommend this system to GCMS users wanting to confirm compound classes using detector selectivity.

For analysis of natural products such as flavor compounds, it is efficient to use a combination of FID and MS. FID has a wide dynamic range for quantitative analysis, while MS has unmatched capability for qualitative identification. Using the detector splitting system, a TIC (Total Ion Chromatogram) and an FID chromatogram of the same pattern can be obtained simultaneously with one analysis.



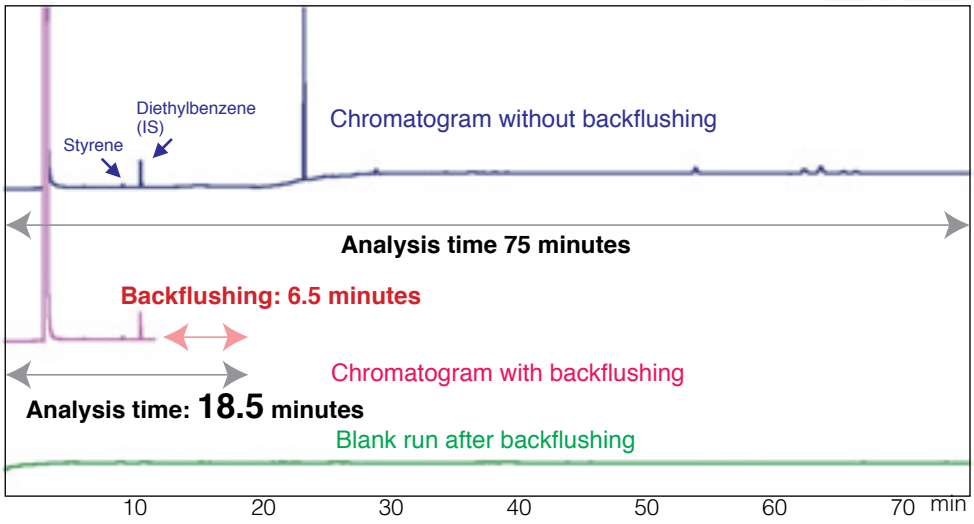
Qualitative analysis by MS

Quantitative analysis by FID:
Wide quantitation response range

Productivity and Confident Identification

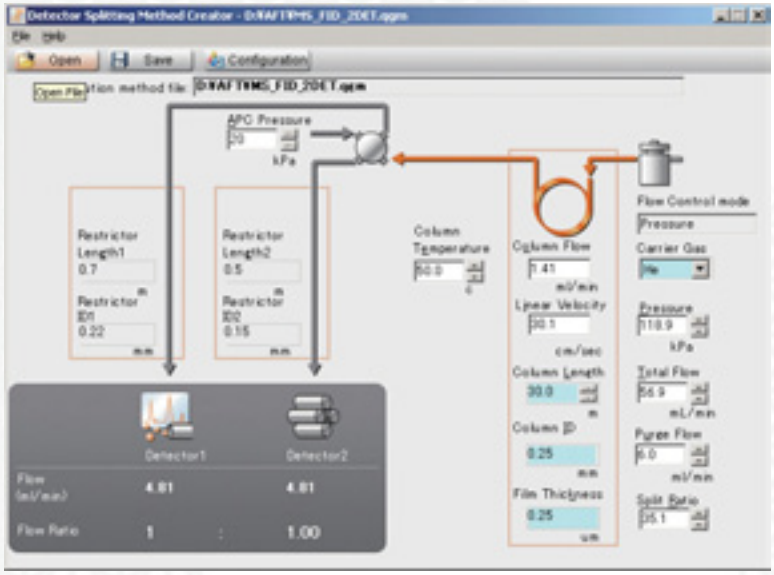
AFT Software

The Intuitive and easy-to-use Advanced Flow Technology Software is included with each AFT system. Both the backflushing and detector splitting systems are controlled with this software.



Analysis of Volatile Compounds in Polystyrene

Backflushing was started 12 minutes after target substances were eluted. Analysis time, including the time for discharging unwanted substances, could be reduced from 75 minutes to 18.5 minutes.



Advanced Flow Technology software download site
http://www.shimadzu.com/products/lab/gc/index.html

Industry Leading Detector Sensitivity

Responding to the ever increasing demands for trace level analysis, our new detectors boast the highest sensitivity in the industry. The new Flame Photometric Detector (FPD) and Flame Ionization Detector (FID) show significantly increased sensitivity.

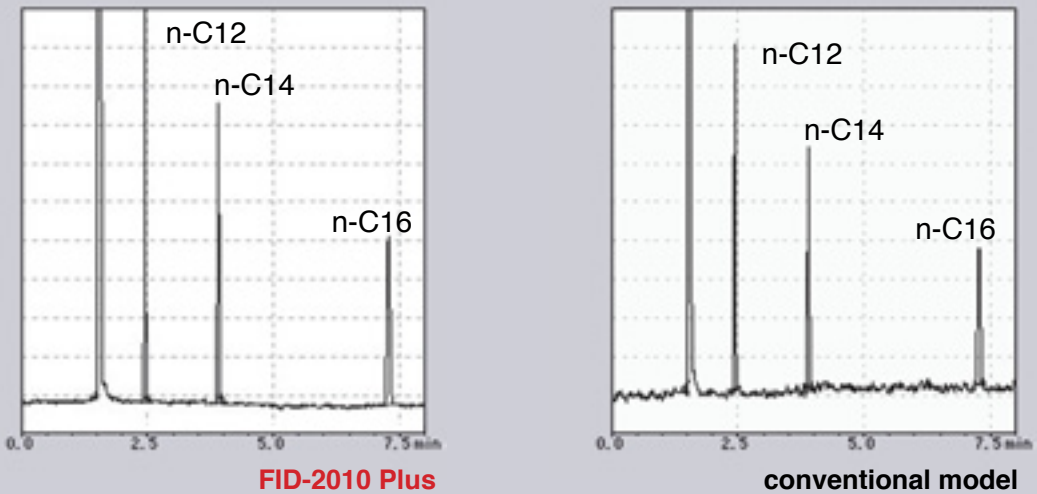
Flame Ionization Detector

FID-2010 Plus

FID-2010 Plus gives you the world's highest FID sensitivity with clean detector gas flows and the latest noise reduction technology.

Minimum Detected Quantity:1.5 pgC/s*

Analysis of n-C12, 14, 16 / n-heptane solution



FID-2010 Plus | conventional model

- High-sensitivity has been achieved by thorough cleaning of detector gas lines and the latest noise-reduction technology.
- Automatic ignition, re-ignition, and flame extinguishing functions
- Feedback function reduces gas supply pressure to zero when the hydrogen flame is extinguished.
- Hydrogen connector joints have reverse threads to prevent incorrect pipe connections.
- Optional flame monitor can be mounted.

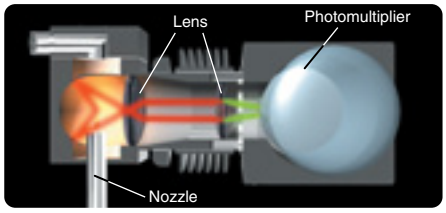
*For high sensitivity analyses, high purity air (Impurity of hydrocarbons <1 ppm) is required. (Tubing and gas pressure regulator must be compliant with high-purity gas use.)

Flame Photometric Detector

FPD-2010 Plus

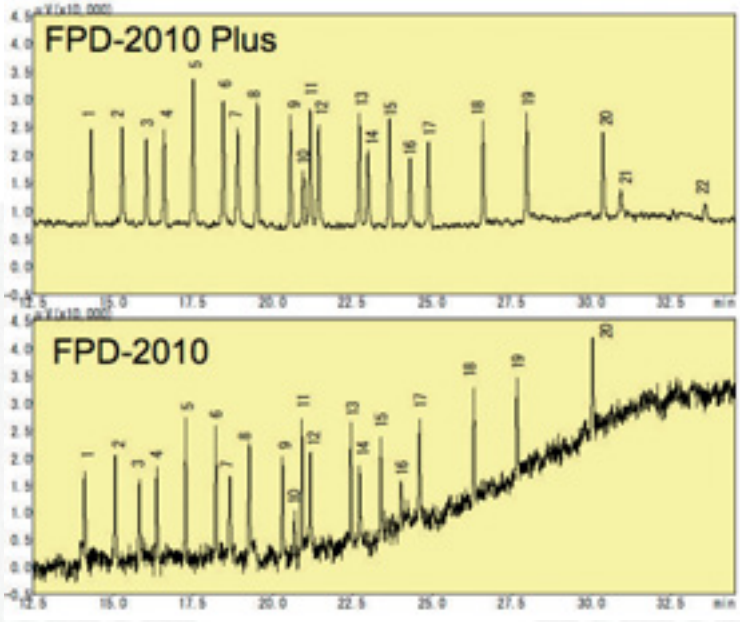
A new FPD design featuring improved flame stability and double focusing optics has produced an FPD with the world's highest sensitivity. This has all been achieved in a compact design that fits within the detector bay.

The dual-focus system adds a lens to the interference filter for efficient light collection at the photomultiplier light receptor.



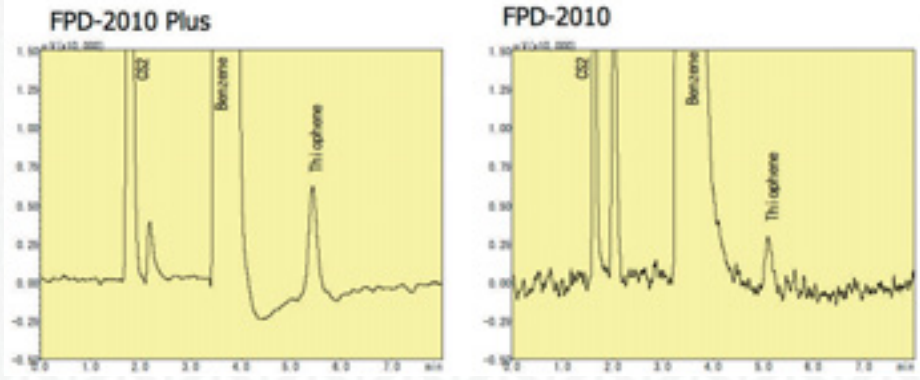
Minimum Detected Quantity:
55 fgP/s (phosphorus compounds)
3 fgS/s (sulfur compounds)

P mode: Analysis of 5 ppb Organo-Phosphorus Pesticides



1.Ethoprophos
2.Phorate
3.Thiometon
4.Terbufos
5.Etrimfos
6.Dichlofenthion
7.Dimethoate
8.Tolclophos-methyl
9.Chlorpyrifos
10.Formothion
11.Fenthion(MPP)
12.Fenitrothion(MEP)
13.Isofenphos
14.Phenthoate(PAP)
15.Prothiofos
16.Methidathion(DMTP)
17.Butamifos
18.Sulprofos
19.Fensulfothion
20.EPN
21.Phosmet
22.Pyraclofos

S Mode: Analysis of 20 ppb Thiophene in Benzene



Industry Leading Detector Sensitivity

Electron Capture Detector*

ECD-2010 Plus

- A highly sensitive and selective detector for the analysis of electrophilic compounds.
- Top class sensitivity results from upgraded cell insulation and a cell/flow line design to reduce contamination.
- Compact design achieves shorter stabilization times.
- ECD cell is common with that for GC-2010 (ECD-2010).

Minimum Detected Quantity:6fg/sec

*In some countries, registration with the appropriate authority for regulation of radioisotopes is required before purchasing or using this detector. (Contact your Shimadzu representative for details.)

Flame Thermionic Detector (NPD)

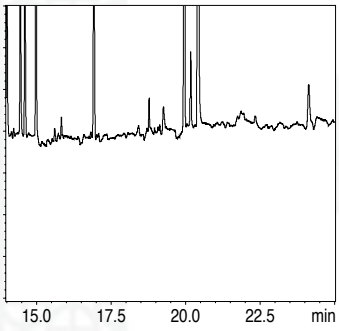
FTD-2010 Plus

- For analysis of organo nitrogen and phosphorus compounds, such as residual pesticides.
- Improved collector design reduces negative peaks from impurity components.
- No tools needed for collector replacement.
- Alkali source regeneration kit (option) reduces operational costs.
- Hydrogen connector fittings have reverse threads to prevent pipe connections.

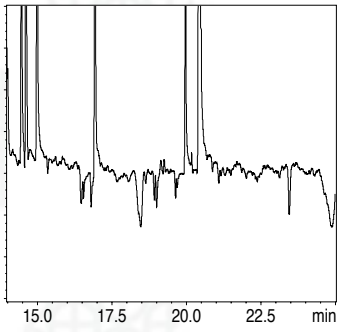
Minimum Detected Quantity:0.1pgN/sec

Improved Collector of FTD-2010 Plus Reduces Negative Peaks.

Improved collector – zoom



Standard collector – zoom



Thermal Conductivity Detector

TCD-2010 Plus

- For analysis of gases and concentrated organic compounds.
- Microvolume cell optimized for capillary column analysis.
- Short stabilization time.

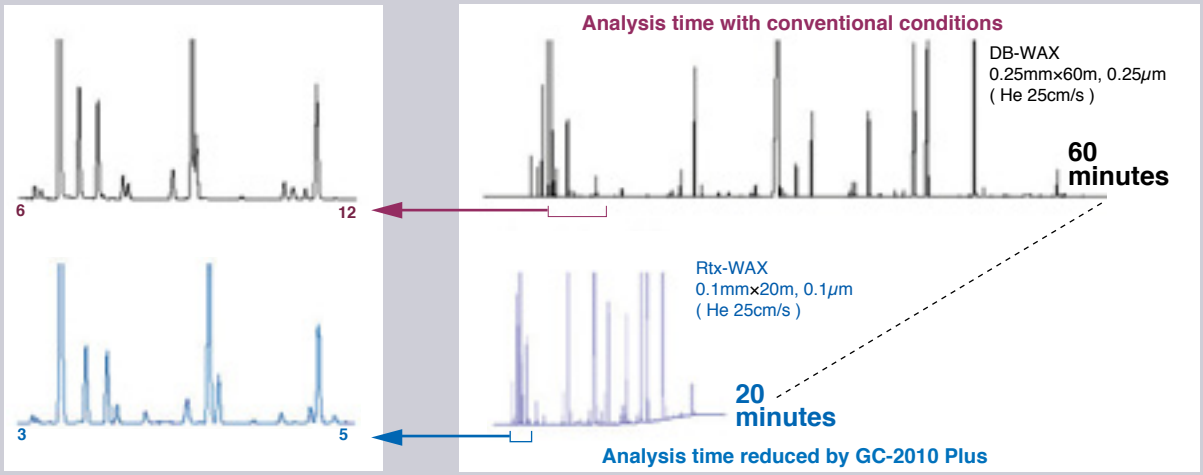
Sensitivity: 20000mV·mL/mg (decane)

Highly Evolved Design Delivers Analytical Productivity

High-Speed Analysis

High-speed analysis with narrow bore capillary columns reduces analysis time and improves sample throughput. The new-generation digital flow rate controller (AFC) provides 970 kPa maximum operating pressure and 1200 mL/min total flow to support high-speed analysis.

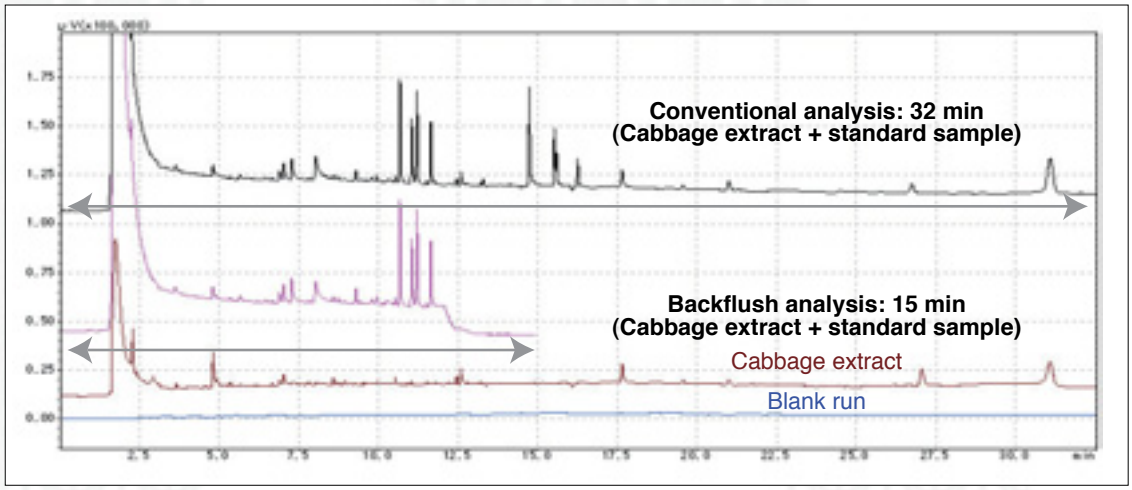
High-Speed Analysis of Coffee Flavoring



Backflush Reduces Analysis Time

The Backflush technique is effective in capillary GC analysis when early-eluting target compounds occur in a sample along with higher boiling components not of interest to the analysis.

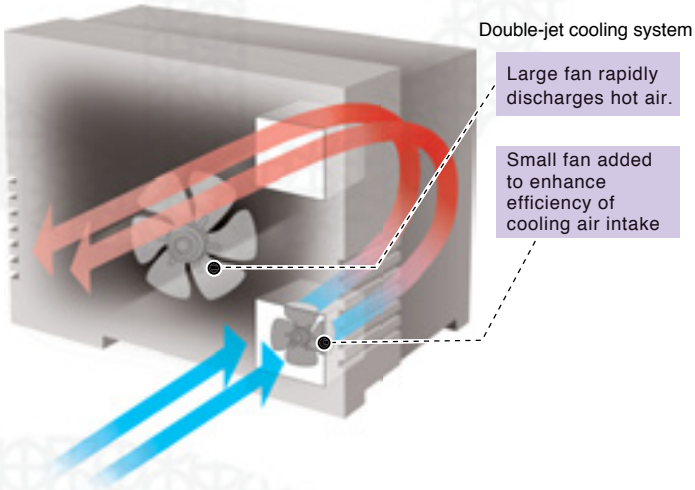
Analysis of Pesticides in Cabbage

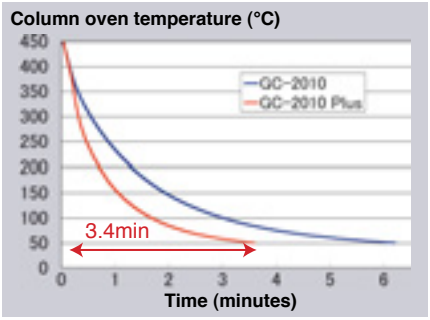


Reduction of analysis time by 53%

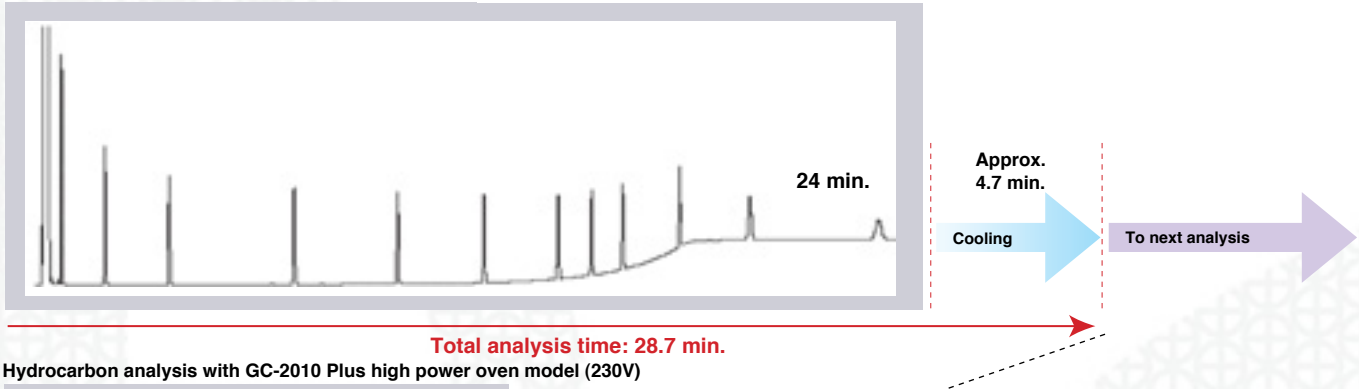
Rapid Oven Heating*/ Cooling

The GC-2010 Plus incorporates a double-jet cooling system, consisting of an exhaust fan to discharge hot air and an intake fan to draw in cooling air. The system enables the reduction of cooling time from 450°C to 50°C in 3.4 min.

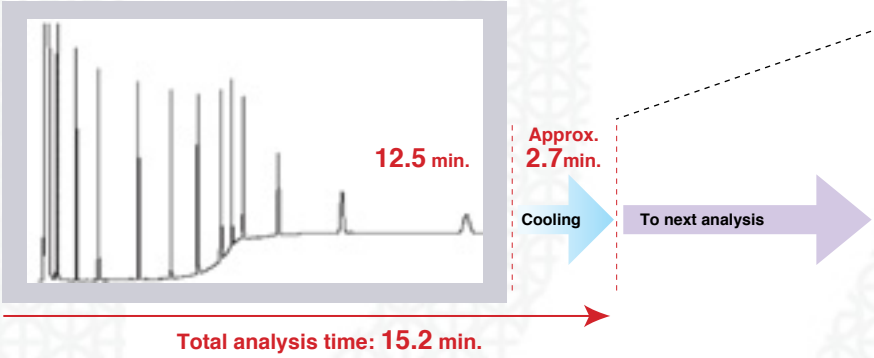




Hydrocarbon analysis in conventional mode



Hydrocarbon analysis with GC-2010 Plus high power oven model (230V)



*Rapid oven heating is available with the high power oven (230V model) only.

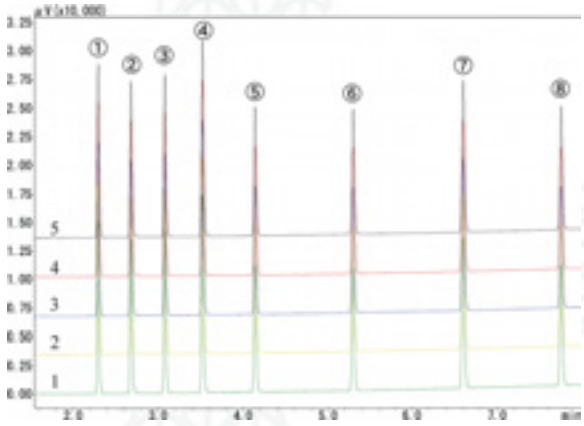
Gas Saver Function Reduces Carrier Gas Usage

The GC-2010 Plus features a gas saving function that considerably reduces carrier gas consumption. In the split/splitless sample injection mode, the split ratio can be reduced after injection and during stand-by.

Repeatability Resetting the Limits

All units including the column oven, flow controller, and sample injection unit are comprehensively optimized at the design stage to achieve world-class precision.

Analysis of Grob Test Mixture (Solvent: acetone, each 100 ppm)



The large vaporization capacity ensures excellent precision, even when using solvents that are highly volatile upon injection, such as acetone. Long-term stability of retention time is realized by the new room temperature compensation technology built into each AFC (Advanced Flow Controller).

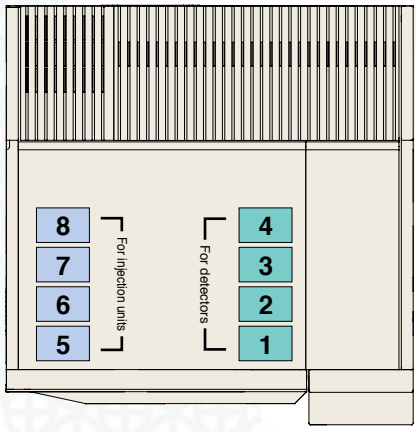
Repeatability of Retention Time and Area

	Average RT	CV% RT	Average Area	CV% Area
1. n-Decane	2.29436	0.0043	23429.8	0.1870
2. n-Octyl Alcohol	2.68199	0.0031	22252.9	0.3020
3. n- Undecane	3.08074	0.0023	23997.2	0.2236
4. 2,6-Dimethylaniline	3.52498	0.0045	29616.6	0.2502
5. Methyl n-Nonanoate	4.14567	0.0041	20563.3	0.2262
6. Methyl n-Caprate	5.30144	0.0042	21484.8	0.0744
7. Dicyclohexylamine	6.60017	0.0017	28067.3	0.1894
8. Methyl Laurate	7.75542	0.0024	22759.5	0.1638

Simultaneously install up to three injection units and up to four detectors

Select from three injection units and five detector types to suit the needs of your analysis. Options such as injection units, detectors and autoinjectors can easily be retrofitted.

Top of GC-2010 Plus



Split/Splitless Injector

SPL-2010 Plus

- New design reduces the possibility of carry over.
- Standard configuration supports high-speed GC with narrow bore capillary columns.
- Gas saver function reduces split gas consumption.
- Permits high-pressure injection mode.

On-Column/Programmed Temperature Vaporization Injector

OCI/PTV-2010

- Configured for either cool, on-column injection (OCI) or programmed temperature vaporization (PTV) injection mode.
- Uses inert quartz PTV inserts.
- An optional OCI insert allows connecting a narrow-bore capillary column directly to the injector without a 0.53mm pre-column.
- Supports analysis of very high-boiling compounds (alkanes up to C_{100}).

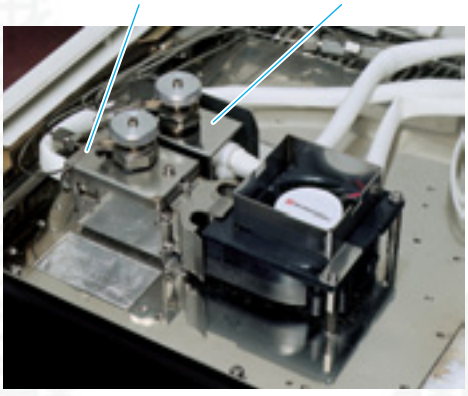
Direct Injection Unit

WBI-2010 Plus

- Septum purge flow channel prevents solvent tailing.
- Uses the same glass inserts as splitless analysis to simplify use. (Patented)
  * Easily modified for packed column use.

SPL-2010 Plus

OCI/PTV-2010 WBI-2010 Plus



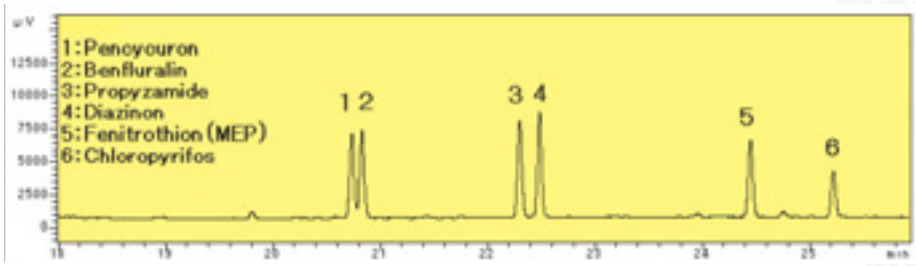
Dual Injection System

A dual injector system can be configured with a combination of two AOC-20i injectors and one AOC-20s sample carousel. Two-line simultaneous injection doubles the sample throughput to improve productivity.

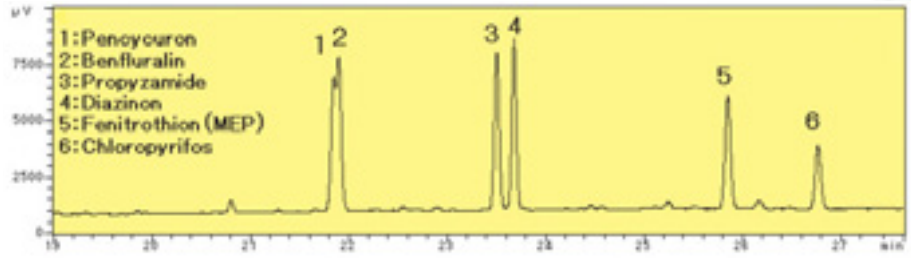
Constant Linear Velocity Mode Quickly Determines Separation Conditions

Shimadzu's approach to carrier gas control is based on the carrier gas linear velocity, which directly correlates to the separation performance. Method transfer from GC to GCMS or helium to hydrogen carrier is greatly facilitated.

Constant linear velocity



Constant column inlet pressure

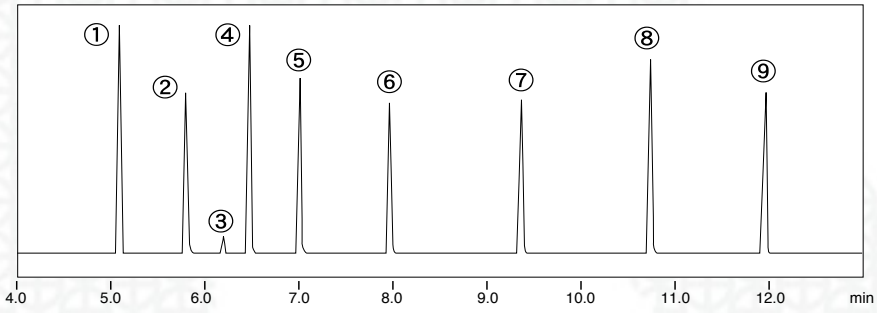


Comparison of chromatograms with constant linear velocity (top) and constant column inlet pressure (bottom) (pesticides analysis)

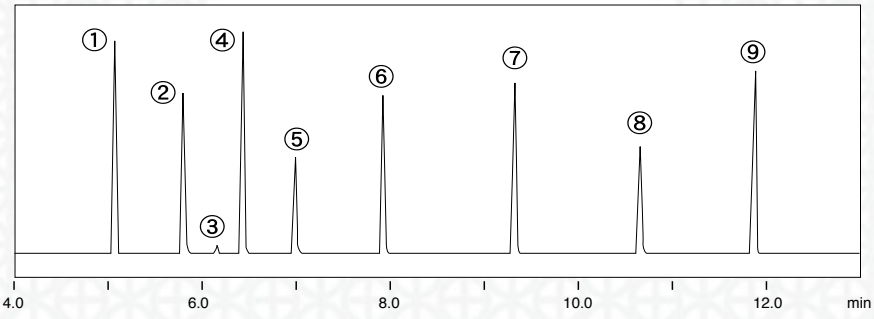
Using the same type of column and setting the same carrier gas linear velocity values results in a virtually identical separation profile for GC and GCMS.

Comparison of GC-FID and GC/MS-TIC Chromatograms (Grob Test Mixture Analysis)

GC-FID



GC/MS(TIC)



Shimadzu Gas Chromatograph Work

Features of GCsolution Ver.2 (Windows Vista Compatible)

Easy Operation

- Common operation and layout with other LabSolution software, such as Assistant Bar and Data Explorer, ensures an intuitive common user interface that can be easily learned. GCsolution Ver.2 realizes further simple operation.
- Manipulation function is improved and simple operation with versatile functions are realized.

Better Analysis Productivity

- Handles control and data processing for up to four GC systems
  (GC-2010 Plus, GC-2010, GC-2014, GC-17A, or GC-14B)
- Supports simultaneous processing of two samples on a single instrument and dual injection system for the ultimate in high throughput analyses.

Comprehensive Basic Functions

- Inherits the popular, proven and robust Chromatopac and CLASS-GC10 integration algorithm.
- Comprehensive functions for peak identification, quantitation, and data comparison.
- Flexible report generation functions with operation similar to MS-Word.
- Summary report output is possible.

GLP/GMP Compliance

- Full support of user management functions and GC-2010 Plus self-diagnostic functions to enhance data reliability. Supports rigorous GLP/GMP requirements, including audit-trail functions for all method parameters.
- 21 CFR Part 11 compliance support functions are equipped as standard.

Network-compatibility

- Effective use of the network environment, such as in-office data analysis and remote access from the office is possible.
- CLASS-Agent provides file sharing and centralized data management.

Customization of User Interface

- OLE automation capability allows custom programming to accommodate customer specific workflow requirements. Custom programming may incur additional fees.

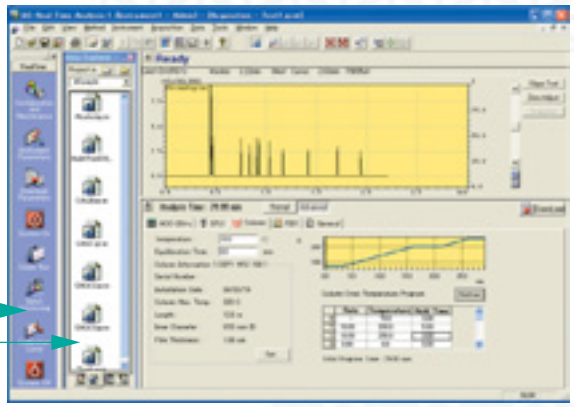
Station

User Interface

The latest Windows technologies offer multifunctionality and simple operation.
User interface including drag-and-drop and right-click menus offers quick and intuitive operation.

Easy-to-operate Assistant Bar and Data Explorer

- Navigate operations with Assistant Bar. Even novices can easily conduct analysis or re-analysis simply by sequentially clicking on icons.
- Data Explorer displays a list of files by type. Intuitively handle file operations by double-clicking or drag-and-drop.

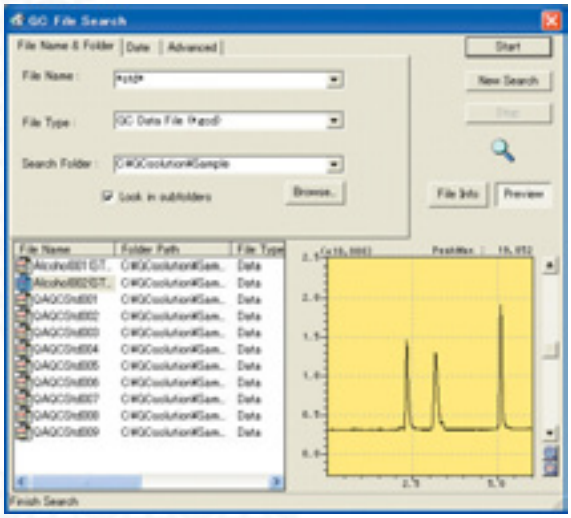


Batch Table Wizard Simplifies Consecutive Analyses

- Easily create batch tables for consecutive analysis of multiple samples using the Wizard.
- Simply fill in the prompts in the Wizard to create multi-point calibration curves and batch tables for repeated analyses.

File Search Function offers Convenient Previews

- Search any data file or method file.
- Search by file name, date, operator's name, sample name, or sample ID.
- Use the preview function to check the chromatogram in the searched data files before opening the file.



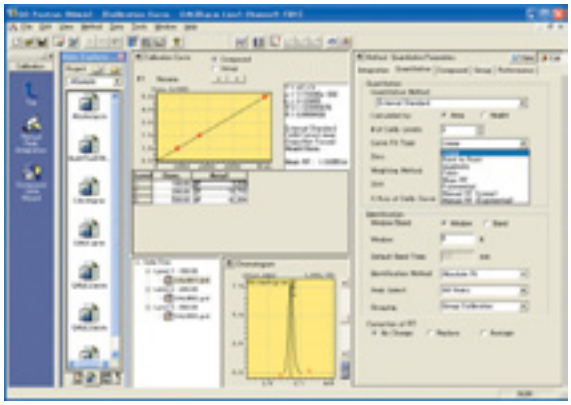
Shimadzu Gas Chromatograph Work

Data Analysis / Report Generation

Builds on the popular Chromatopac and CLASS-GC10 basic functions, including integration algorithms. Offers comprehensive functions for identification, quantitation, data comparison, and report generation.

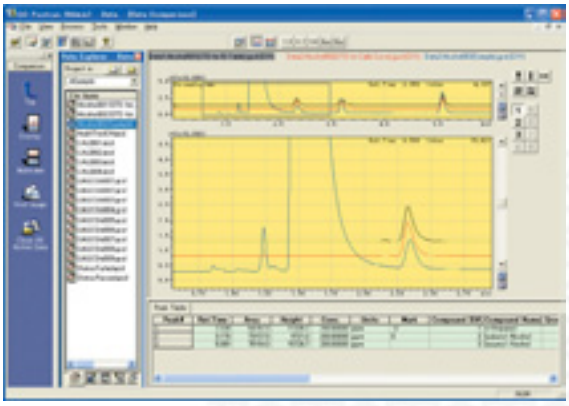
Identification and Quantitation Functions using Various Types of Calibration Curves

- Support for six quantitation methods, such as external and internal standard methods, and seven types of calibration curves, including linear, point to point and polynomial fits, ensures compatibility with an extensive range of requirements.
- Calibration curves can be created by dragging and dropping data files into the calibration window.



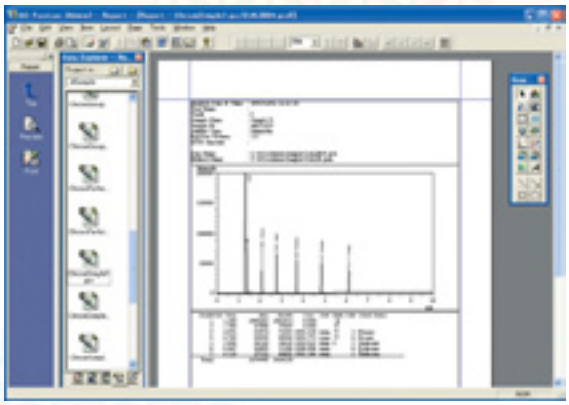
Data Comparison Function

- Display and compare up to eight chromatograms.
- Convenient for comparison of previous data and investigation of changes in time-course data.
- Select superimposed or split-screen display.
- Conduct detailed analysis using addition, subtraction, differential, and second-order differential operations.



Flexible Report Generation Functions

- Highly flexible report generation.
- Paste and freely edit chromatograms and peak tables.
- Save report formats as templates.



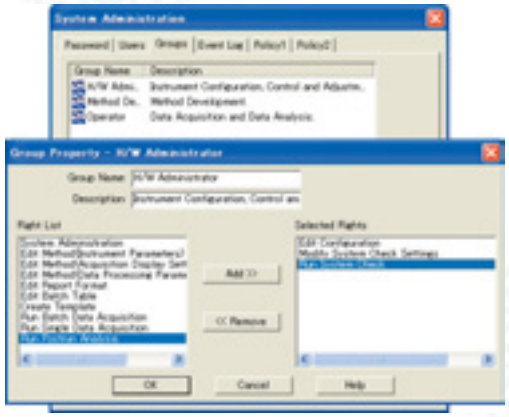
Station

GLP/GMP-Functions

To be compliant with management requirements and regulations such as GLP/GMP, a variety of sophisticated demands related to: analyzer reliability, method development, analysis method validation, and electronic file management must be satisfied to ensure data integrity. GCsolution strongly supports GLP/GMP with various validation functions, user management functions and so on. Also, 21 CFR Part 11 compliance support functions are equipped as standard.

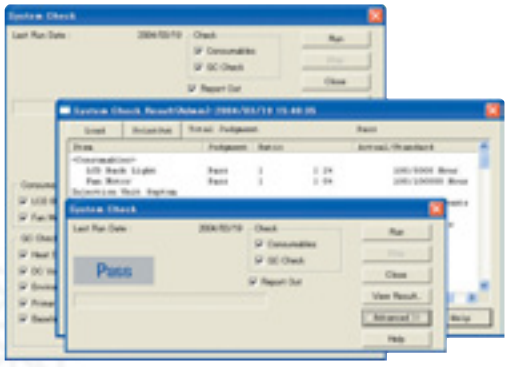
User Management Functions to Control User Access

- Limit user access to operations by setting operation restrictions for the Administrator, Method Developer, and Operator default user groups.
- Add or edit groups to create security that matches your laboratory work format.



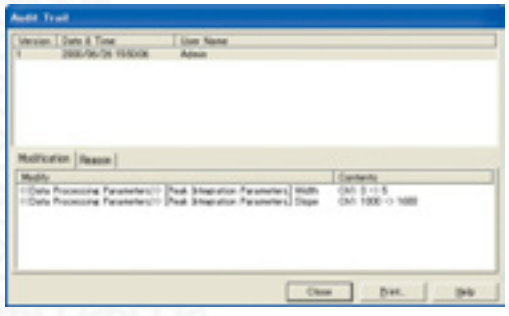
Validation Support - fully supports GC-2010 Plus self-diagnostic functions

- Fully supports the GC-2010 Plus self-diagnostic functions. Periodic checks of the GC status support superior analysis and greater confidence in your results.
- Includes software-validation functions to check for software modifications.
- QA/QC functions offer pass/fail evaluation based on repeatability of component concentrations, recovery rate, or check of concentration upper/lower limit.

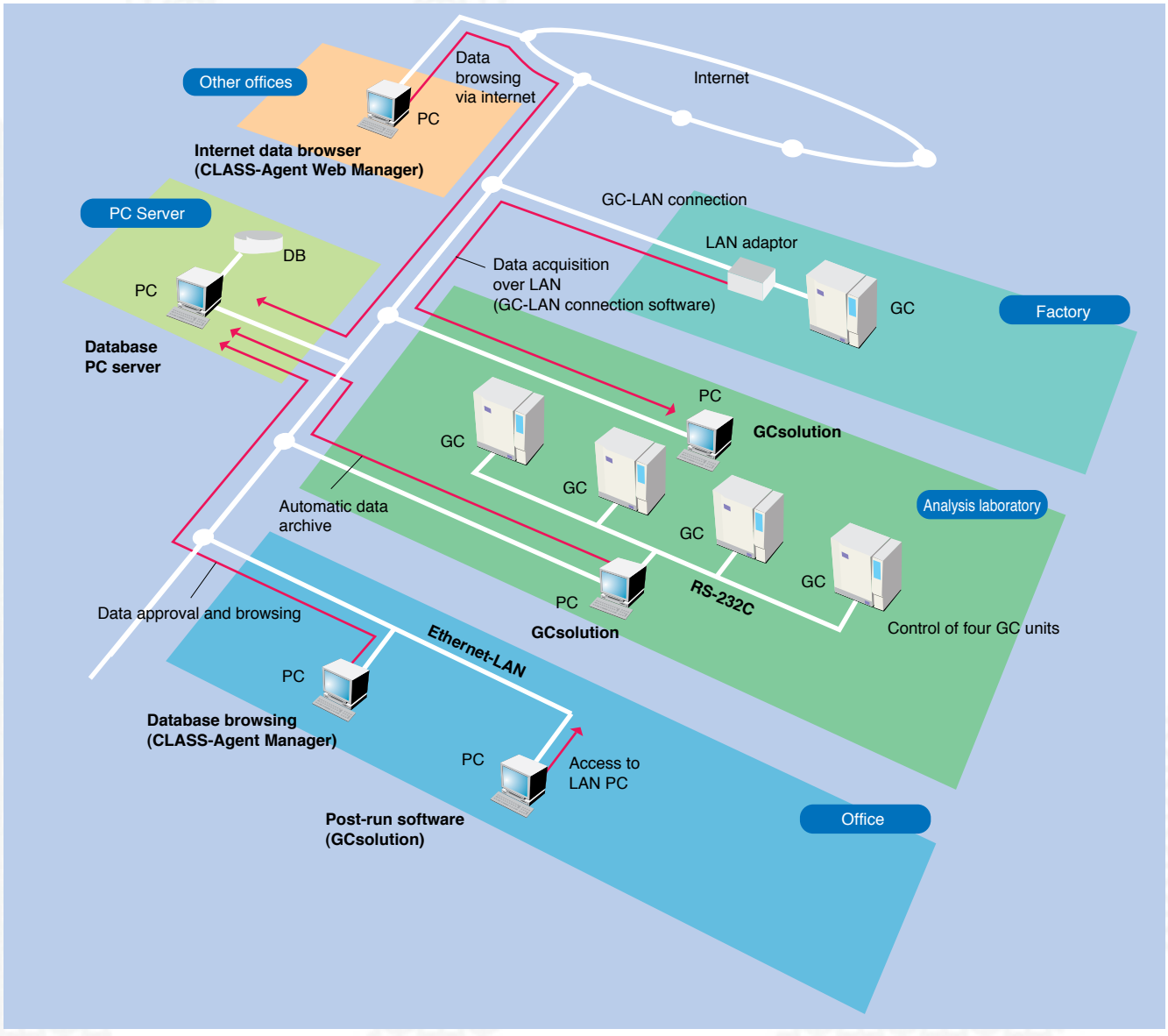


Audit Trail including Parameter Setting Log

- The changes and the reasons for the changes to instrument parameters and data-processing parameters can be saved to confirm the traceability of consecutive analysis results.
- Data files contain the method used for data acquisition and the latest data, allowing data to be reverted to the pre-analysis state.



Network-compatibility



CLASS-Agent for Centralized Data Control

CLASS-Agent Data Management System

- Software for centralized data management.
- Measured data automatically saved in the database.
- Browsing software easily finds target data.
- Browse data over the Internet.
- Compatible with Oracle, Access, and SQL databases.

GCsolution Post-run Software

Install the secondary license software in a separate PC on the LAN to allow data analysis in the office.

GC-LAN connection software

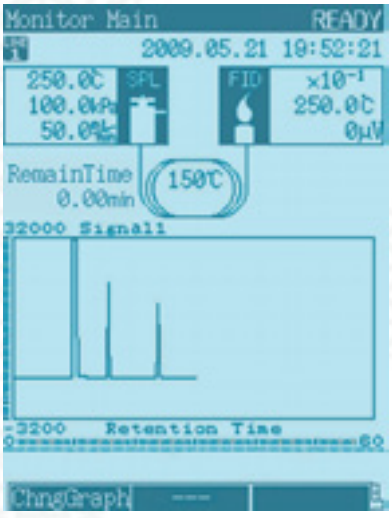
- Offers remote GC control and data acquisition in a LAN environment.
- Connects the GC instrument to PCs over a LAN using a LAN adaptor.

Large Display

Features a large, information-rich display.
The text and graphic screen lets you set the analysis conditions quickly and easily.
The built-in help functions make operation training almost unnecessary after the instrument is installed.
Digital setting of all parameters, including temperatures and flow rates, allows accurate reproduction of the analysis conditions.

Large Display

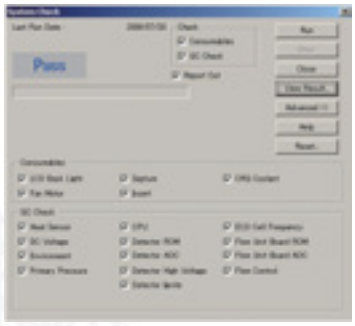
Graphic user interface.
Text display.
Built-in help functions.
Chromatogram display.

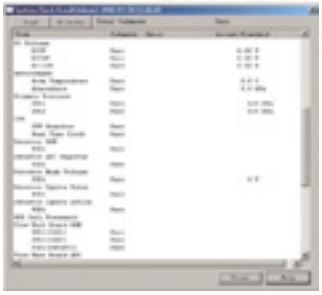


Intelligent Self-diagnostic Functions

Extensive self-diagnostic functions check that the instrument is functioning correctly.
These functions conduct a detailed diagnosis that includes the septum and glass insert operating status, temperature sensor errors, supplied gas pressure, control status for each gas, ignition operation, DC voltage, and AD converter.
Regular diagnosis prevents unexpected downtime.

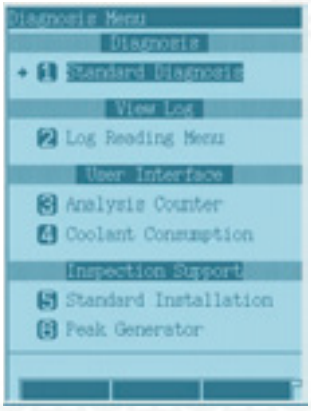
Self diagnostic function at GCsolution's screen.





Self-diagnostic Functions

Unit control check.
Hardware diagnosis.
Save and check diagnosis log.



Application systems respond to your analytical needs.

Advanced Flow Technology
Backflush System
Detector splitting system
Multi-dimensional GC/GCMS System MDGC/GCMS-2010 Series

Application Systems
Thermal Desorption System
Liquid Injection/ Headspace/ SPME Analysis System
Pyrolysis System
Distillation GC System
PONA Analysis System

Application Systems

Thermal Desorption System

- Used to analyze gas sample tubes – organic vapors are collected on sample tubes at a sample site by drawing a large volume of air thru the tube over a long period of time.
- Sample tubes are thermally desorbed on the Thermal Desorption System to introduce the organic vapors into the GC.

System Configuration

- GC-2010 Plus + TD-20

Analysis Applications

- Measurement of air pollutants
- Measurement of gases generated from parts or materials (outgassing)
- Measurement of fragrance components

Liquid Injection/ Headspace/ SPME Analysis System

- Liquid, Large volume, Headspace and SPME injection in one single instrument.
- Used to analyze the volatile components in solid or liquid samples.

System Configuration (GC with headspace sampler)

- GC-2010 Plus + AOC-5000

Analysis Applications

- Measurement of residual solvents in pharmaceuticals
- Measurement of flavor components in foods
- Upgradable to SPME mode (solid micro extraction)

Pyrolysis System

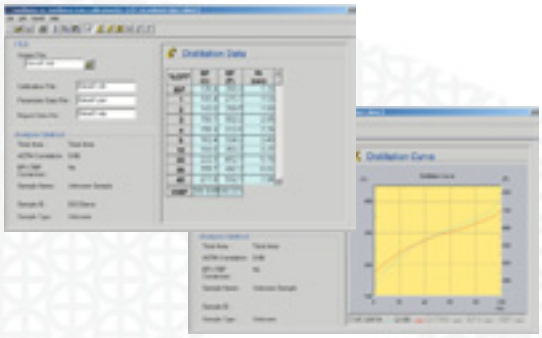
- Decomposes samples at high temperatures and analyzes the pyrolytic decomposition products.
- Used to analyze high molecular weight compounds such as polymers, forensic samples etc.

System Configuration (GC with double-shot pyrolyser)

- GC-2010 Plus + PY-2020iD
- Autosampler and cryotrap accessories available.

Analysis Applications

- Characterization of high molecular weight compounds
- Measurement of outgassing from inorganic samples, such as ceramics



Distillation GC System

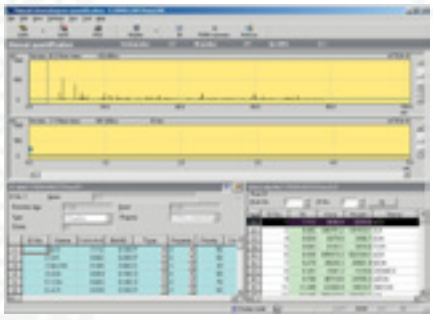
- Measures the boiling point distribution of petroleum fractions using the relationship between retention time and boiling point.
- Prints formatted reports after analysis of distillation characteristics.

System Configuration (Distillation GC)

- GC-2010 Plus + WBI-2010, or OCI-2010 + GCsolution + distillation GC software
  (Select sample injection unit and column to suit the target sample.)

Analysis Applications

- Petroleum fractions



PONA Analysis System

- Separates gasoline or other hydrocarbon compounds; identifies the peaks; classifies them by carbon number, paraffin, olefin, naphthene, aromatic series and oxygenates. Outputs quantitative results.

System Configuration (PONA GC)

- GC-2010 Plus + CRG-2010 + GCsolution + PONAsolution + MS Excel
  (Select sample injection unit and column to suit the target sample.)
  OCI and high-power oven (230V) are required for high-boiling point component analysis.

Analysis Applications

- Categorization of naphtha, gasoline and gasoline-based materials by carbon number and quantitation by type.
  (Also offers calculation of mean specific gravity, mean molecular weight, and octane value.)

JQA-0376

Founded in 1875, Shimadzu Corporation, a leader in the development of advanced technologies, has a distinguished history of innovation built on the foundation of contributing to society through science and technology. We maintain a global network of sales, service, technical support and applications centers on six continents, and have established long-term relationships with a host of highly trained distributors located in over 100 countries. For information about Shimadzu, and to contact your local office, please visit our Web site at **www.shimadzu.com**

SHIMADZU

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