

Gas Chromatograph Mass Spectrometer

chrozen GC/MS

More Than You Expect



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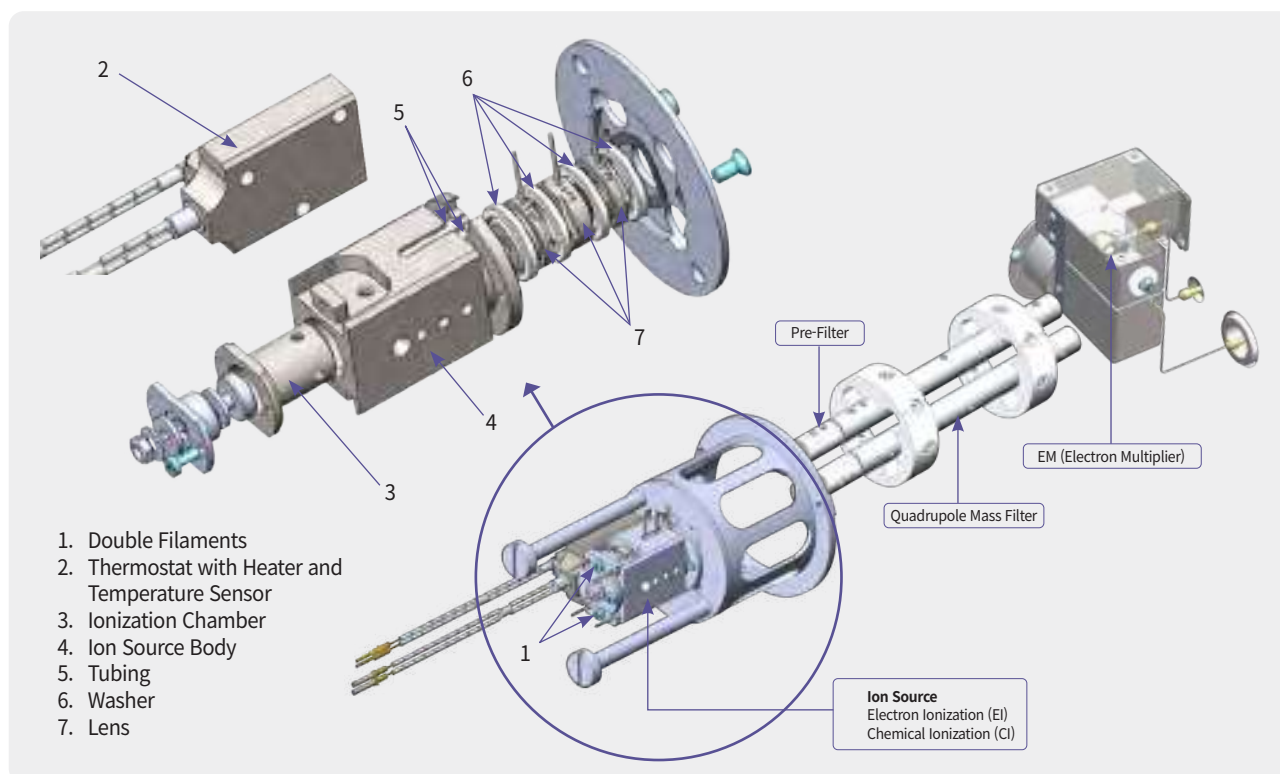


What Would Be More Needed Than This?

ChroZen GC/MS is an innovative single quadrupole mass spectrometer to carry out qualitative and quantitative analysis for unknown or complex samples in trace level. With its extraordinary ultra-inert ion source, UEIS (Ultra Efficiency Ion Source), it optimizes the ionization and ion beam focusing to ensure both ideal repeatability and sensitivity, and efficiently works for toxicology, food safety and geochemical applications, where samples can be polluted higher. The large capacity of standard vacuum pump (240L/s) stabilizes the system faster and 300L/s of vacuum pump is also available optionally. It also provides the widest mass range (1.4~1,200 amu) as well as very low instrument detection limit (less than 10 fg of OFN).

Innovation Creates Greater Efficiency

The newly designed innovative ion source, UEIS (Ultra Efficiency Ion Source), effectively prevents ion source contamination, thus, there are more ionized molecules transferred to the detector to give superior sensitivity and the detector lifetime gets extended. The individually connected double filaments and structural modification of ion source make the maintenance cost less expensive and more efficient.



More Than Sensitivity

- UEIS (Ultra Efficiency Ion Source) with each enhanced part such as lens and pre-filters to maximize efficiency of ionization for superior sensitivity
- EM (Electron Multiplier): Six spiral multiplier channels to increase linear output current for excellent sensitivity (SNR 2,500:1, IDL < 10 fg)

More Than Performance

- Wide mass range: 1 ~ 1,200 amu
- Rapid scan speed: Up to 20,000 amu/s

More Than Reliability

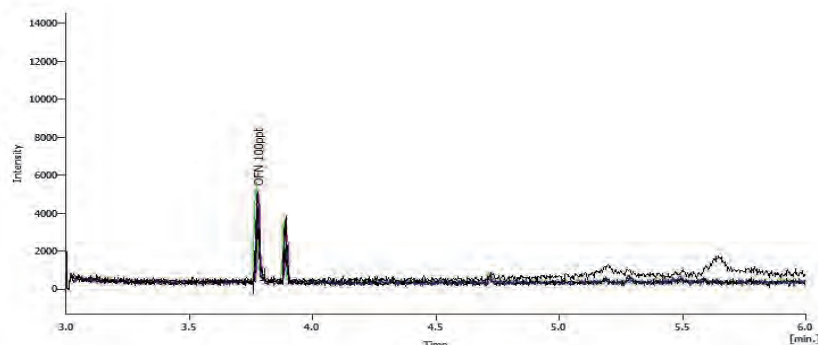
- High capacity of turbo pump: 240L/s of standard vacuum system for fast stabilization
- Double filaments: Uninterruptible and stable analysis to minimize instrument downtime
- Ultra-inert ion source, pre-filter and quadrupole to reduce contaminations

More Than Variety

- EI as standard and CI (PCI & NCI) as option
- Scan, SIM, Simultaneous Scan/SIM mode
- Various library support depending on application

High Performance of ChroZen GC/MS

ChroZen GC/MS offers very low instrument detection limit (IDL) less than 10 fg in the SIM mode by 100 fg OFN injected. A deflecting electrode eliminates neutral particles reaching the detection system, so it allows you to improve the sensitivity for the trace level analysis and enhance signal to noise ratio.



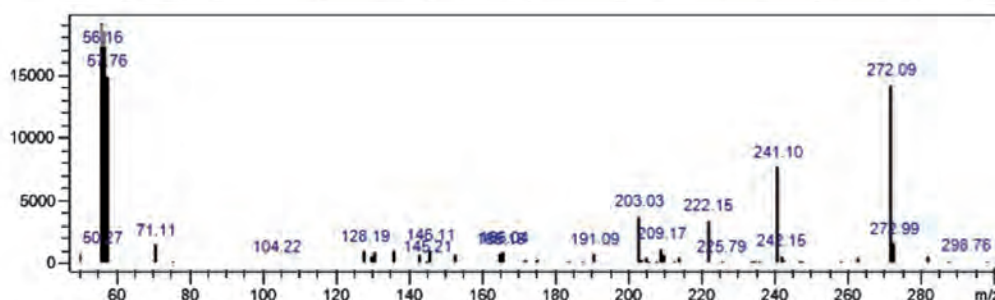
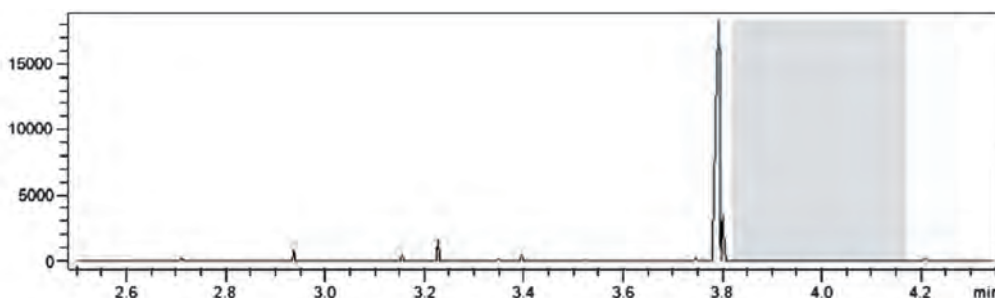
Evaluated Active Component Name: OFN 100ppt Calculate by: EP (56)				
X	SST	Chromatogram	Retention Time [min.]	Area [mV.s]
		Lower Limit		
		Upper Limit		
		%RSD Limit	1.00	3.30
		Mean	3.774	4228.125
		RSD [%]	0.09	1.94
		Parameter Result		
✓	00000001 - SIM		3.777	4233.250
✓	00000002 - SIM		3.780	4130.750
✓	00000003 - SIM		3.773	4202.500
✓	00000004 - SIM		3.770	4233.250
✓	00000005 - SIM		3.773	4120.500
✓	00000006 - SIM		3.770	4376.750
✓	00000007 - SIM		3.773	4246.063
✓	00000008 - SIM		3.773	4261.937

8 times injection of 100 fg OFN
Area RSD(%) = 1.94, IDL < 10 fg (240 L/s)

$$IDL^m = t_{a,n-1} \cdot \%RSD \cdot \frac{m}{100\%} = 2.998 \cdot 1.94\% \cdot \frac{100 \text{ fg}}{100\%} = 7 \text{ fg}$$

ChroZen GC/MS ensures signal to noise ratio higher than 2,500:1 by 1 pg injection of OFN in scan mode.

Chromatogram and spectrum



Calculation result

Signal/Noise : 10,679.90
Mass : 272.10
Retention Time : 3.793
Height : 18,245

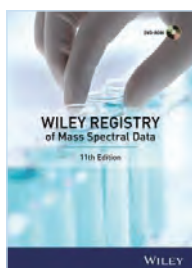
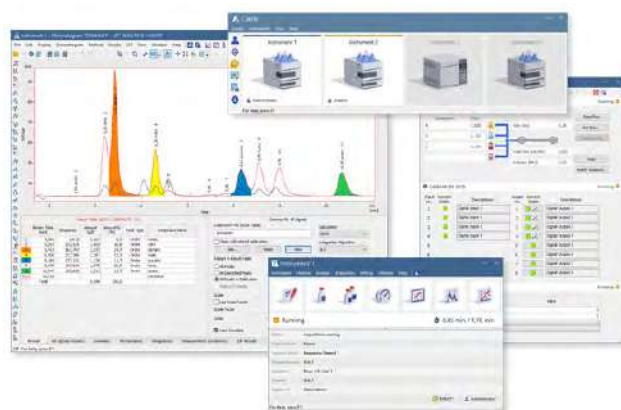
Base Line : 100 scans
Noise Range : 3.82-4.17
Average Value : 1.17
RSD : 1.71

Chromatogram	Retention Time (min)	Peak Height (Abs.)	Signal/Noise	Noise Range (min)
13-19-47 0004	3.775	14,863	8,700	3.05-3.39
13-33-16 0005	3.797	14,538	4,032	2.64-2.99
13-44-41 0006	3.793	17,681	6,037	3.98-4.33
13-54-25 0007	3.793	18,245	10,680	3.82-4.17
14-03-10 0008	3.790	20,039	8,336	3.12-3.48

Powerful Control by YL-Clarity Software

YL-Clarity

YL-Clarity is a powerful and intuitive software which offers easy control of the mass spectrometers and supports the full compatibility with Wiley and NIST mass spectral library automatically to identify and name compounds. The software allows the MS to be run on scan mode and SIM mode simultaneously in one chromatographic analysis.



GC/MS Library: Wiley

The Wiley Registry of Mass Spectral Data, now in its 11th edition, is the most comprehensive spectral library available. Identification of unknowns begins with untargeted analysis and this library provides researchers with the most assurance that their untargeted spectral search is the broadest available. Wiley's broad and field-tested spectral libraries save time, increase instrument efficiency and boosts staff productivity.



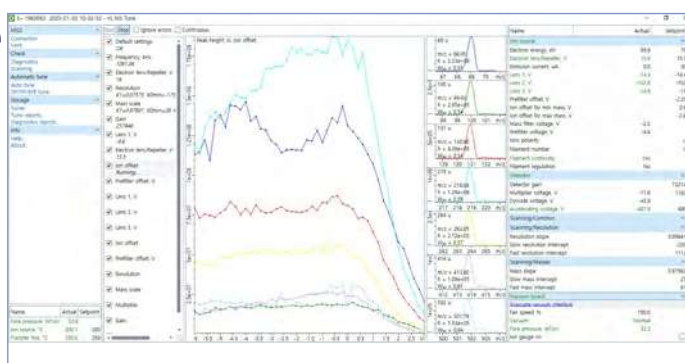
GC/MS Library: NIST

NIST 2017 is the most compatible available, containing multiple instrument formats. Including NIST MS search, it's made up of three libraries, an Electron Ionization (EI) mass spectral library, a MS/MS library, and a GC Retention Index library.

GC - MS Data		
Library	Wiley Registry 11 th Edition	NIST 2017
Spectra	775,550	306,622
Chemical Structures	741,000	262,157
Compounds	599,700	262,157

Easy and Intuitive Tune Software

The easy-to-use automatic tune enhances sensitivity, stability and reproducibility of MS results, which means it makes sure of achieving lower detection limits for trace-level compounds. A manual tune for customization supports to change tune setting values to achieve higher levels of sensitivity required by certain specific analysis.



Sample Preparation/Introduction

Liquid Autosampler



YL3000A Series

YL3000A series autosampler offers both reliability and superior performance for all GC/GC-MS applications with the sample capacity.



ChroZen PAL LSI

Ensuring superior repeatability, ChroZen PAL LSI system provides liquid sample injection with enlarged sample capacity (648 positions of 2 mL vial).

All in One Autosampler



YL2800T Series

YL2800T is a single unit combining static headspace analysis, liquid sample injection and SPME (Solid Phase Micro-Extraction) as an option.



ChroZen PAL RSI/RTC System

ChroZen PAL RSI/RTC system can be adapted or extended to provide the combined injection techniques such as static headspace injection, liquid injection, SPME (Solid Phase Micro Extraction) and ITEX (In-Tube Extraction) dynamic headspace in one instrument.

Purge and Trap (VOC Sampling)



Lumin

The Lumin Purge and Trap Concentrator (PTC) is a sample preparation instrument used to remove Volatile Organic Compounds (VOCs) out of aqueous or solid sample types using He or N₂ and concentrate the samples to enable the analysis at trace level.



AQUATek LVA

The AQUATek LVA is a Purge and Trap (P&T) Autosampler that automates the sample preparation steps for the analysis of liquid samples via purge and trap.



Atomx XYZ

The Atomx XYZ is the second generation combined soil/water autosampler and purge and trap concentrator system to analyze VOCs.

Headspace Autosampler



YL2000H Series

The YL2000H with a heated gas-tight syringe eliminates tubing, dead volume and sample absorption for system robustness while maintaining the superior repeatability.



HT3

The HT3™ combines Static and Dynamic Headspace analysis techniques into one easy-to-use unit, saving you time, bench space and money.

Pyrolyzer



Pyroprobe 6000 series

Pyrolyzer coupled with ChroZen GC/MS allows you to analyze large complex molecules without extractions or derivatizations but thermal energy for qualitative and quantitative information.

Direct Inlet Probe (DIP)



With DIP option, you can utilize the MS as stand-alone by injecting liquid or solid samples directly into the MS. Switching from GC/MS injection to DIP/MS injection takes only a couple of minutes.

Injection Mode	Direct Injection Probe	Direct Exposure Probe
Sample State	Solid or liquid samples	Labile liquid and solid samples
Temperature Range	50 ~ 450 °C (Cuvette heating nozzle)	~ 1000 °C or above (Filament heating nozzle)
Maximum Heating Speed	250 °C/min (Cuvette heating nozzle)	250 mA/s (250 °C/s) (Filament heating nozzle)

Dedicated Analyzer by GC/MS

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.

VOC Analyzer

VOC analyzer optimized to analyze VOCs in aqueous samples that can have a bad long-term influence on human health accurately analyzes trace level of VOCs (ppt level by P&T or SPME Arrow). It equips all necessary configuration for the analysis including detailed procedures and protocols, which are in full compliance with approved U.S. EPA methods.

GC Condition

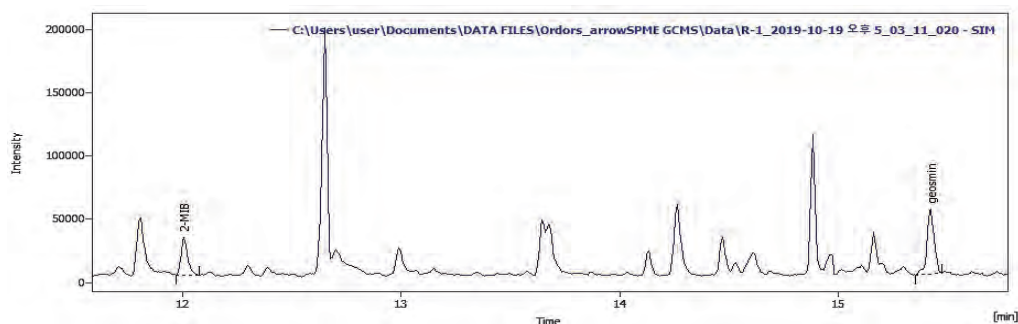
Oven	Rate [°C/min]	10
Program	Final Temp. [°C]	270
	Final Time [min]	2
	Init Temp. [°C]	60
	Init Time [min]	5
Split Mode		Splitless
Purge on Time [min]		0.1
Column		YL-5ms
Capillary Temp. [°C]		250

SPME Condition

Preconditioning Time [min]	10
Incubation Time [min]	2
Sample Extraction Time [min]	30
Extraction Temp. [°C]	60
Sample Desorb Time [min]	5

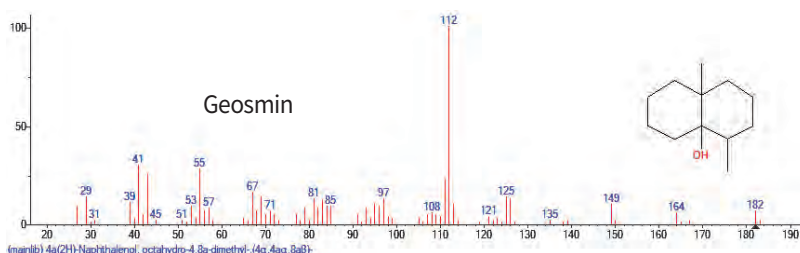
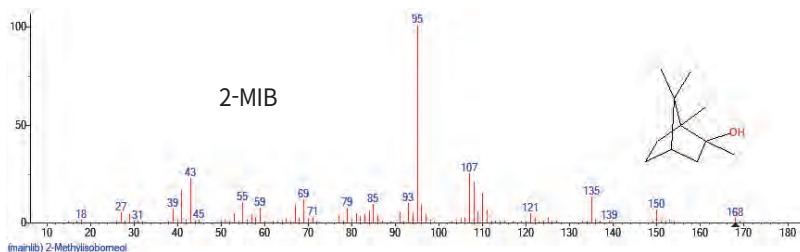
MS Condition

Ion Source [°C]	250
Transfer Line [°C]	280



<10 ppt of 2-MIB & Geosmin>

<Spectra>



Residual Pesticide Analyzer

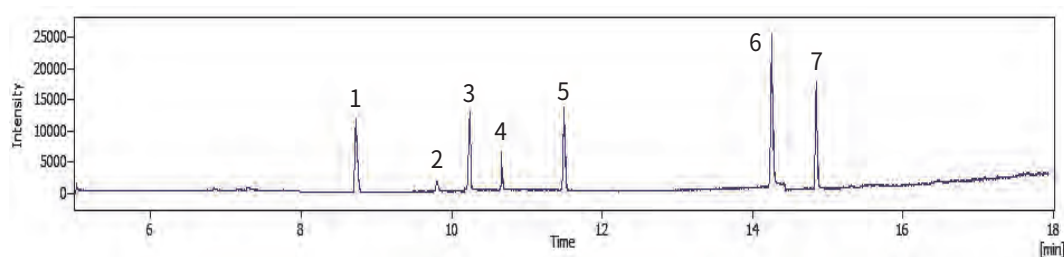
Residual Pesticide Analyzer equipped with ECD or NPD is the optimized system to separate complex mixture of compounds containing organophosphorus and organochlorine pesticides and to run EPA methods. We also provides the analyzer equipped with GC/MS for quantitation of pesticides at trace levels.

GC Condition

Oven	Rate [°C/min]	10
Program	Final Temp. [°C]	300
	Final Time [min]	0.5
	Init Temp. [°C]	120
	Init Time [min]	1
Split Mode	Pulsed Splitless	
Column	YL-5ms	
Capillary Temp. [°C]	280	
Capillary Flow Rate [mL/min]	1	

MS Condition

Ion Source [°C]	250
Transfer Line [°C]	280

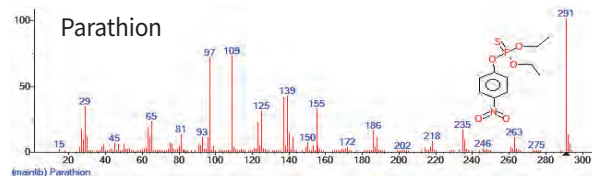
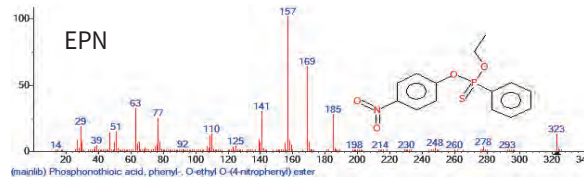
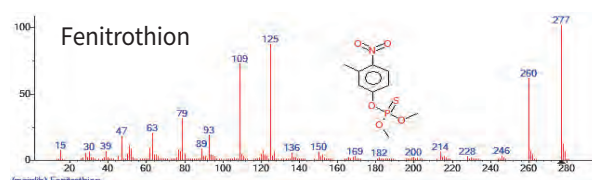
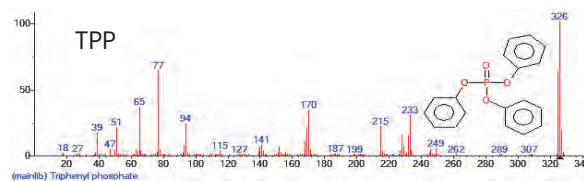
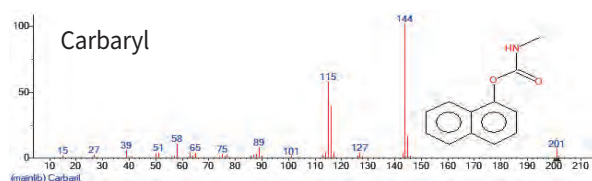
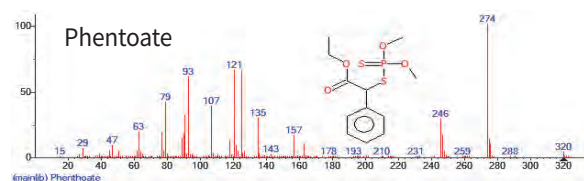
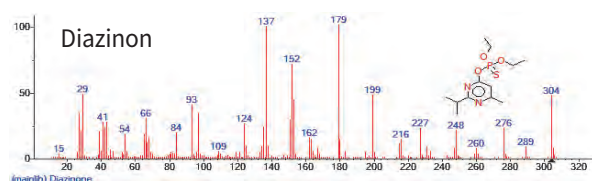


<100 ppb of Residual Pesticides>

Compound

- 1 Diazinon
- 2 Carbaryl
- 3 Fenitrothion
- 4 Parathion
- 5 Phentoate
- 6 TPP
- 7 EPN

<Spectra>



Phthalate Analyzer

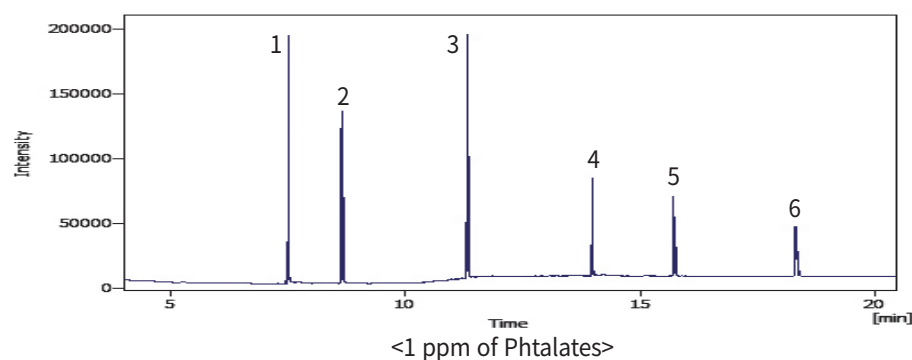
Phthalate Analyzer excels at detection and quantitation of regulated phthalates that became concern and into force in restrictions on the use of certain substances such as children's toys, medical devices and food packaging, which are directly related to the human health.

GC Condition

Oven	Rate [°C/min]	15
Program	Final Temp. [°C]	260
	Final Time [min]	10
	Init Temp. [°C]	80
	Init Time [min]	0.5
Split Mode	Splitless	
Column	YL-5ms	
Capillary Temp. [°C]	280	
Capillary Flow Rate [mL/min]	1	

MS Condition

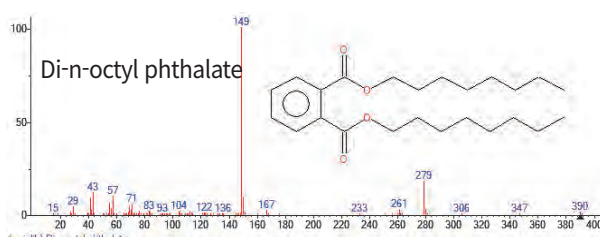
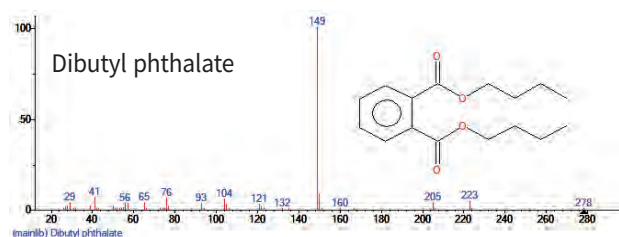
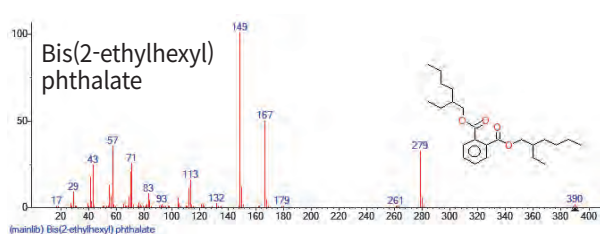
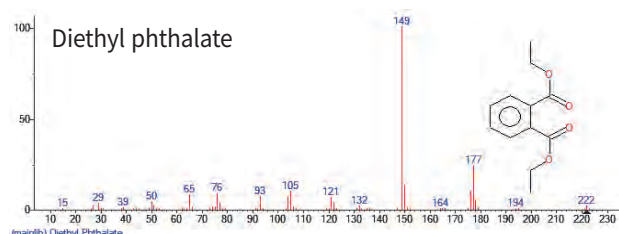
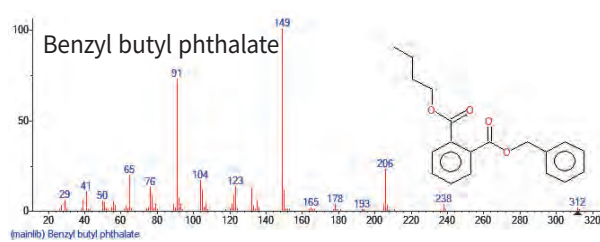
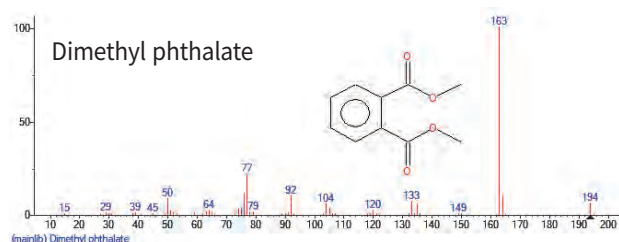
Ion Source [°C]	250
Transfer Line [°C]	290



Compound

- 1 Dimethyl phthalate
- 2 Diethyl phthalate
- 3 Dibutyl phthalate
- 4 Benzyl butyl phthalate
- 5 Bis(2-ethylhexyl) phthalate
- 6 Di-n-octyl phthalate

<Spectra>



Residual Solvent Analyzer

Residual Solvent Analyzer coupling with headspace autosampler can accurately and efficiently detect and quantify residual solvents found in the inks used for the printing of packaging and raw materials for food and drug products, which are known to be hazardous to human health if ingested.

GC Condition

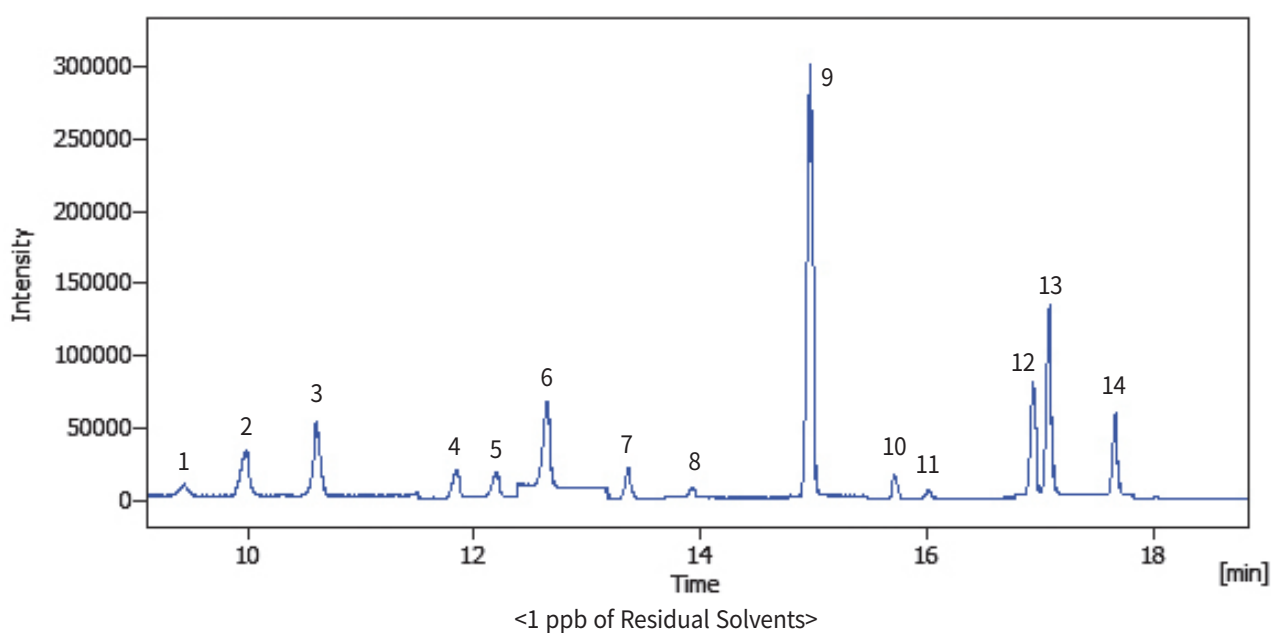
Oven	Rate [°C/min]	10
Program	Final Temp. [°C]	240
	Final Time [min]	9
	Init Temp. [°C]	60
	Init Time [min]	3
Split Mode		Splitless
Column		DB-624
Capillary Temp. [°C]		250
Capillary Flow Rate [mL/min]		1

HS Condition

Agitator Standby Temp. [°C]	40
Syringe Standby Temp. [°C]	50
Incubation Time [min]	20
Incubation Temp. [°C]	80
Agitator Speed [rpm]	250

MS Condition

Ion Source [°C]	200
Transfer Line [°C]	250



- | | | |
|--------------|-----------|-----------------|
| 1 1,1-DCE | 6 TCE | 11 Ethylbenzene |
| 2 DCM | 7 BDCM | 12 m,p-Xylene |
| 3 Chloroform | 8 Toluene | 13 o-Xylene |
| 4 1,1,1-TCE | 9 PCE | 14 Bromoform |
| 5 Benzene | 10 DBCM | |

Technical Specifications

Ion Source	El, CI (Option)
Mass Range	1 – 1,200 amu
Resolution	0.5 to 2.0 amu (FWHM)
Electron Energy	Adjustable from 0 eV to 170 eV (241.5 eV – optional)
Max Scan Rate	20,000 amu/s
Mode	Scan, SIM (Selected Ion Mode), Simultaneous (Scan/SIM)
Mass Stability	±0.1 amu/48 h
Ion Source Temperature	up to 350 °C
Transfer Line Temperature	up to 400 °C
Turbo Pump	240 L/s, 300 L/s (Option)
Sample Inlet	GC, Direct Inlet Probe (Option)
Signal to Noise Ratio 1uL of 1pg/uL OFN, Scan Mode	2,500 : 1 and more (@240 L/s), EI Mode
Instrument Detection Limit (IDL) Eight sequential splitless injections, 100 fg OFN, m/z 272, SIM Mode	<10 fg
Library	Wiley: 775,550 Spectra NIST: 306,622 Spectra
Power Supply	220/230 VAC ±10 %, 50/60 Hz
Dimensions	340 x 560 x 465 mm (W x D x H) (MS only)
Software	YL-Clarity for GC/MS



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recognition of their excellent technologies and
the product quality.