

VARIAN, INC.

240-MS

ION TRAP MASS SPECTROMETER



VARIAN, INC.

Leading the Way in GC/MS Analysis

The Varian 240-MS Ion Trap, together with the Varian 450-GC, delivers unparalleled capabilities for both research and routine applications with reliability you expect from an industry leader.

The Varian 240-MS Provides:

- Unsurpassed sensitivity (200 femtogram OFN)
- Less maintenance and high reliability to deliver maximum productivity
- Accurate identification and quantification of trace analytes
- A unique choice of configurations with internal and/or external ionization
- Intuitive software that makes operation simple
- Powerful MS/MS and CI options

The 240-MS offers a range of advanced ionization and scanning techniques to enhance selectivity and limits of detection. MS/MS and MSⁿ reduce matrix influences and provide more detailed structural information. Take advantage of positive or negative chemical ionization for compound confirmation and enhanced selectivity.

The Varian 450-GC completes the 240-MS package. It offers the flexibility of up to three injectors and three GC detectors, such as FID, ECD or PFPD, in addition to MS detection. A choice of autosamplers and other sample introduction devices, such as headspace, purge and trap, and ITEX (In-Tube Extraction) are available.

Varian offers a large selection of industry-leading capillary columns. Our FactorFour™ ultra-low bleed columns are ideally suited for MS detection.

Varian is committed to providing high performance, reliable analytical instruments to satisfy the current needs and future requirements of our customers. In addition, a worldwide team of application specialists and field support engineers are ready to provide technical assistance to ensure that you get the maximum productivity possible from our instruments.



The Varian 240-MS comes with the 450-GC and a choice of autosamplers. Shown here with a Combi PAL™ autosampler from CTC Analytics.

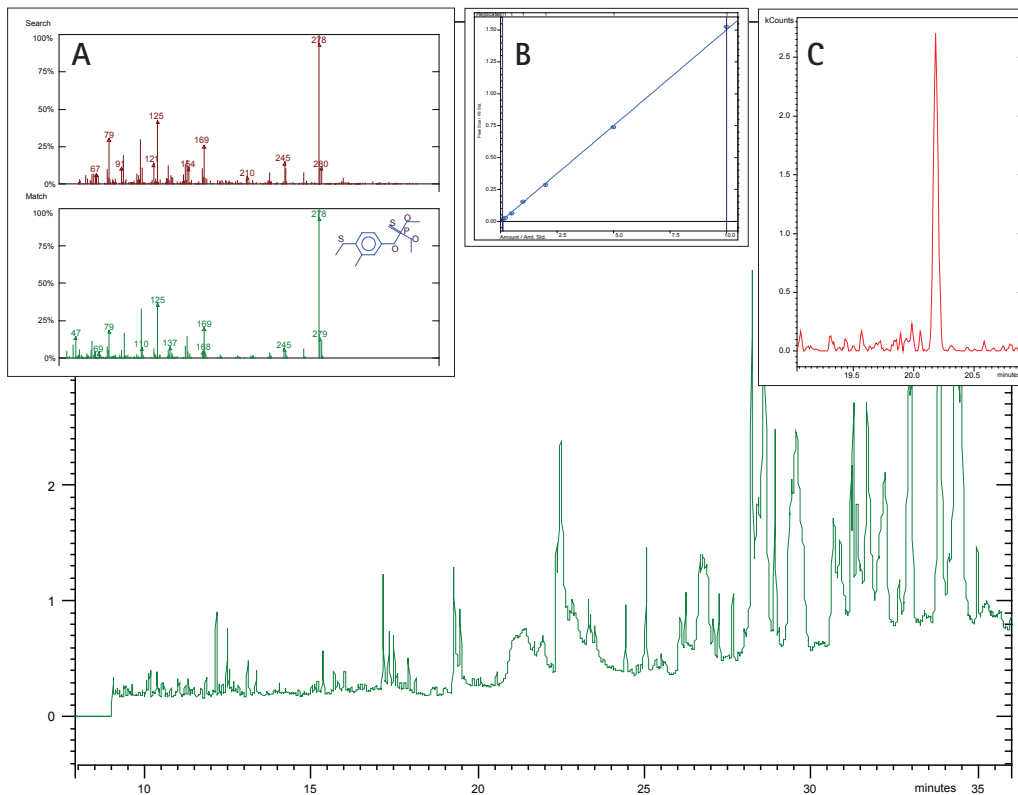
From Research to Routine

GC/MS Solutions For Every Application

The 240-MS is the perfect tool to carry out trace analysis in full scan mode, as shown below. You can easily quantify and accurately identify target analytes in complex matrices at very low levels.

Application Solutions Include:

- Environmental analysis
- Food analysis
- Flavor and fragrance applications
- Industrial measurements
- Forensic investigation
- Toxicology



Total ion current chromatogram (TIC) of 100 pesticides at 5 ppb level in an extract of peaches, oranges, mandarins, green peppers and lettuce measured in less than 40 minutes. Confident identification at 20 ppb was achieved using the NIST library for fenthion, demonstrated in insert A. Calibration was performed in extract, ranging from 5-500 ppb, delivering excellent linearity with $r^2 = 0.9995$ and %RSD at 7.8, as shown in insert B for fenthion. Despite the heavy matrix, detection at 5 ppb is readily accomplished, as shown in insert C by the fenthion (in extract) calibration ion plot.

VARIAN, INC.

The Benchmark in GC/MS Performance

Unrivalled Capabilities

The 240-MS is the most sensitive full scan GC/MS system available. The inherent sensitivity of ion trap detectors is further enhanced with a patented Triple Resonant Scan function and uni-directional ion ejection. The widest range of ionization and scanning modes offer truly information-rich detection: the best qualitative and quantitative results that a benchtop system can offer. All of this comes in a package that also delivers robust operation and extended uptime.

Quantitative Information

The 240-MS delivers excellent sensitivity, wide dynamic range and outstanding reproducibility. The combination allows users to accurately quantitate multiple components in mixtures that may be present in widely different concentrations.

Qualitative Information

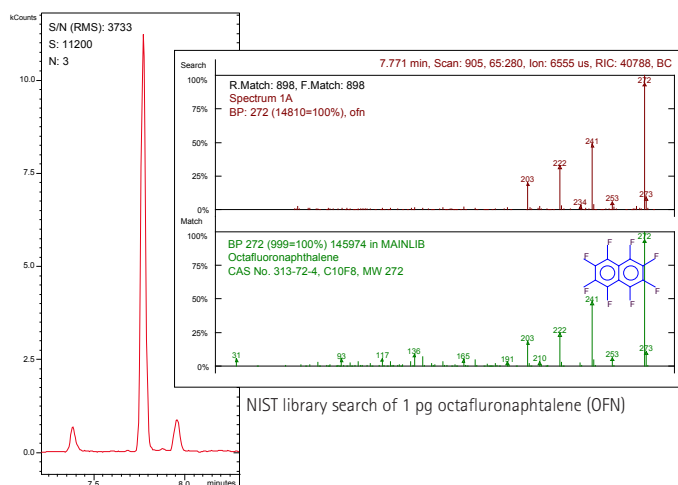
The spectral information and selectivity delivered by full scan EI are complemented by positive and negative CI and MS/MS, even MSⁿ, to gain the most comprehensive qualitative information. The sensitivity of the 240-MS allows you to take advantage of both extensive commercial libraries and user-generated libraries to aid identification, even for trace analyses.

Reliability

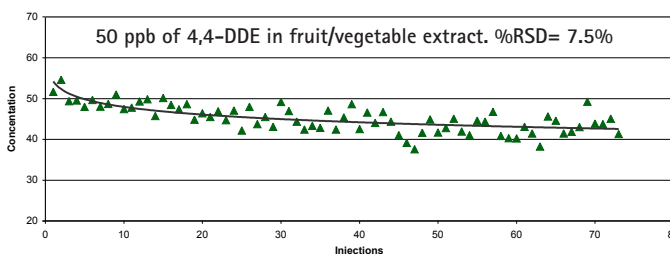
The simple "sourceless" nature of the internal ionization configuration increases the reliability of the system. In the external configuration, the patented pulsed ionization feature assures low-maintenance operation and will keep the source clean month after month.

Convenience

The 240-MS is available with an optional Varian IDP-3 Dry Scroll Pump as the foreline pump to deliver oil-free vacuum. The oil-free design eliminates the possibility of oil contamination in the vacuum system, and the inconvenience of oil filling, disposal, and cleanup.



1 pg octafluoronaphthalene (OFN) injected in internal mode. Excellent signal-to-noise and reliable library search were obtained at this level.



Results of over 70 injections of the orange, mandarin, peach, green pepper and lettuce extract, spiked with 50 ppb pesticides. Remarkable stability of response was demonstrated for all analytes, injection after injection.

Robust, Flexible Design

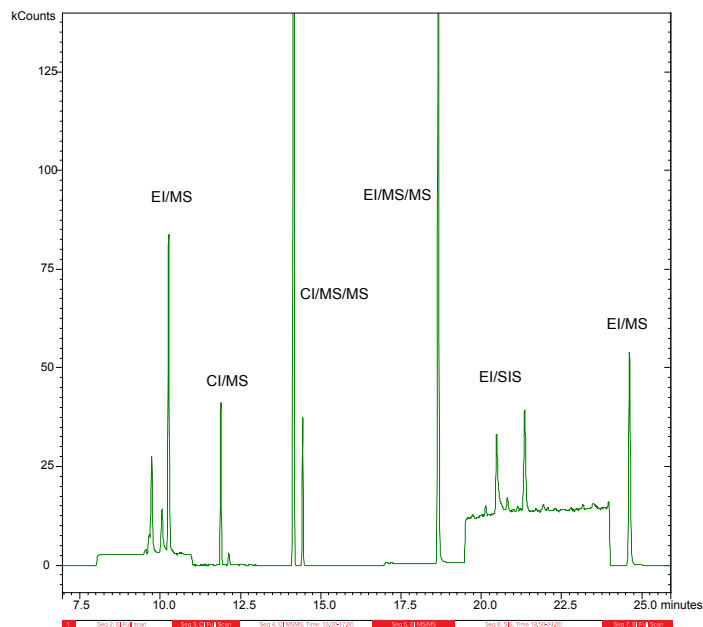
Multiple Configurations

The Varian 240-MS can be configured to best suit your analyses.

- Choose internal and/or external ionization configuration
- Full scan operation at >10,000 Da/s.
- SIS (Selected Ion Storage) operation, greatly reduces interferences, but still allows library searching.
- Positive CI and EI modes available within the same run in internal mode – take advantage of the optimum ionization mode for every analyte in a sample.
- In external mode, the EI and CI runs can be executed on sequential samples with an innovative automated switch while maintaining vacuum.

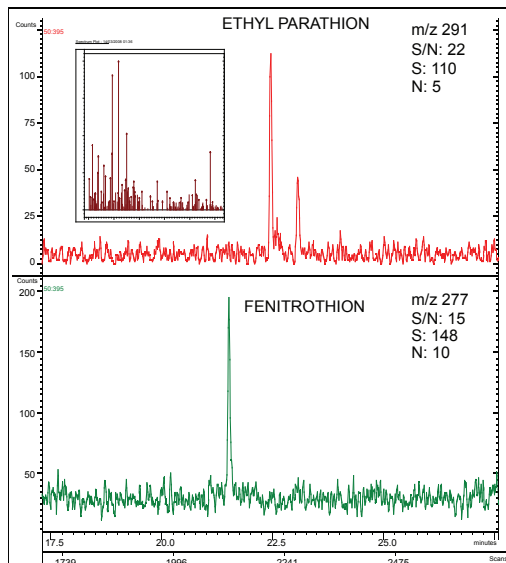
The MS/MS option, available in all modes, offers the most selective background and matrix elimination to provide unambiguous identification even in very challenging samples. Complementary resonant and non-resonant dissociation can be initiated to generate the desired product ion spectrum.

External ionization provides performance you expect in EI, PCI, and NCI with excellent uptime and ease-of-use.

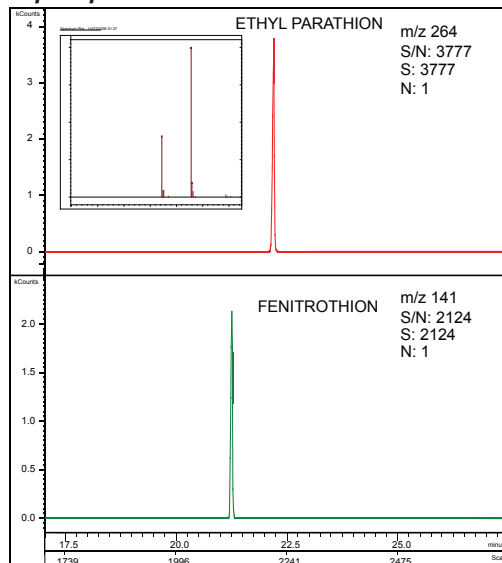


Different ionization (EI and CI) and scanning options (Full scan, MS/MS and SIS) can be utilized, even in the same run, to enhance both the qualitative and quantitative information content of the results.

EI full scan



CI/MS/MS



The advantages of the combination of CI and MS/MS (right) over standard EI full scan (left) are illustrated by the enhanced specificity and sensitivity for the detection of selected environmental contaminants (ethyl parathion and fenitrothion) present at 10 ppb.

The reduced noise significantly enhanced the detection level of these two analytes as demonstrated by >100-fold signal-to-noise increase.

Ultimately, the higher selectivity achieved with the CI/MS/MS method allows more reliable quantitation in complex matrices and facilitates data interpretation.

Convenient and Effortless

Single Point Control

Varian MS Workstation Software offers convenient and effortless single point control of the 450-GC, the 240-MS system and related accessories, while providing easy operation for both expert users and novice operators. It provides:

- Intuitive navigation to simplify processing and reviewing results
- Simultaneous collection of GC and MS data allowing detection of specific compound classes, e.g. sulfur or halogens
- Full-featured network compatibility for convenient file management, printing and remote access.
- Sequential, automated library search of up to 16 libraries for compound identification (NIST, PMW, Wiley and more)
- Extensive diagnostics to report on vital instrument functions

The software also includes a selection of standard and custom reporting capabilities designed to fulfill specific needs:

- EnviroPro™ for general and EPA-specific report requirements
- ToxPro™ Plus includes three-ion ratio reports for toxicology applications
- MultiCompound for general extended reporting
- Quick Access™ optimizes workflow for multi-user, high-throughput laboratories
- Access control and audit trail software for 21 CFR Part 11 compliance
- Automatic Mass Spectral Deconvolution and Identification System (AMDIS)

The image displays three overlapping screenshots of the Varian MS Workstation software interface. The top screenshot is a 'ToxProPlus Multi-Compound Report' showing chromatograms for Amphetamine-d10, Amphetamine, Phenmetamine, and Phenypropandamine. The middle screenshot is a 'Target Compound Report' for Amphetamine-d10, showing a mass spectrum and a list of identified compounds. The bottom screenshot is a 'Labeled Chromatogram Report' showing a full chromatogram with peaks labeled and a table of results.

Compound	Scan #	Conc.	R.T.
4 Acetylphenanthrene-d10	564	1.00	8.77
11 Acetylphenanthrene-D10	567	1.00	12.52
28 Chrysen-D12	1810	1.00	25.93
32 Phenylene-D12	2186	1.00	31.75
1 Benzene, 1,3-bis(methyl-2-nitro-	417	0.73	6.73
2 Hexachlorocyclopentadiene	481	0.15	7.62
3 Benzene, 2-nitroethyl-1,3-dinitro-	542	0.36	8.46
5 Benzene, 1-methyl-2,4-dinitro-	587	0.39	9.08
6 Benzene, 2,4-dimethyl-1-nitro-	625	0.47	9.34
7 Benzene, hexachloro-	724	0.21	10.98
8 Simulane	745	0.21	11.27
9 Alanine	752	0.46	11.27
10 Lindane	779	0.70	11.74
12 Methobun	902	0.21	13.43
13 Alachlor	915	0.17	13.61
14 Heptachlor	909	0.19	13.93
15 Methidathion	1014	0.30	14.98
16 Cyanazine	1026	0.05	15.28
17 Aldrin	1026	0.09	15.28
18 Heptachlor epoxide	1147	0.26	16.79
19 cis-Chlorane	1220	0.23	17.76

The image displays two screenshots of the software interface. The top screenshot is a 'SEMIVOLATILE MDL AND RSD SUMMARY' report showing a table of results for various compounds. The bottom screenshot is a 'Control Chart: Area Precision' showing a line graph of area precision over time.

Compound	F1	F2	F3	F4	F5	F6	F7	Average	RSD	MDL
Acetylphenanthrene-d10	0.16	0.20	0.20	0.21	0.21	0.21	0.22	0.21	0.21	0.21
Hexachlorocyclopentadiene	0.041	0.044	0.046	0.043	0.046	0.042	0.043	0.043	5.1%	0.027 ppm
2,4-Dichlorobenzene	0.039	0.047	0.048	0.041	0.047	0.041	0.043	0.044	7.2%	0.050 ppm
2,4-Dichlorobenzene	0.040	0.039	0.042	0.042	0.041	0.039	0.041	0.041	3.7%	0.035 ppm
Phenanthrene	0.040	0.040	0.040	0.041	0.041	0.041	0.041	0.041	3.3%	0.030 ppm
Hexachlorobenzene	0.046	0.051	0.047	0.053	0.049	0.051	0.050	0.050	5.2%	0.038 ppm
Simulane	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Alanine	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
Lindane	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
Methobun	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Alachlor	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Heptachlor	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Methidathion	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Cyanazine	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Aldrin	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Heptachlor epoxide	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
cis-Chlorane	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
trans-Chlorane	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Acetylphenanthrene-d10	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Acetylphenanthrene-D10	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Chrysen-D12	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Phenylene-D12	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040

The Complete Solution

A Varian GC with a choice of inlets, detectors, autosamplers, and columns creates a complete configuration.

Our Most Flexible GC

Varian's 450-GC provides the flexibility and performance to suit the widest range of applications needs. It is:

- Easily modified or expanded as requirements change
- Capable of either manual or completely unattended operation
- A very versatile platform, with up to three injectors and three GC detectors
- Simple to use via the advanced local user interface or the Varian MS Workstation
- Designed for reliable operation around the clock

Unparalleled Configuration Flexibility

Up to three detectors can be mounted on the 450-GC at one time; add the 240-MS to make four.



Inlets

- **1177 Split/Splitless (S/SL) Injector** employs a dual vent design to provide superior performance in the hot split or splitless modes.
- **1079 Programmable Temperature Vaporizing Injector (PTV)** delivers large volume injections with minimal sample preparation, increased throughput and better sensitivity.
- **ChromatoProbe™ Sample Introduction Device** allows rapid analysis of solids and liquids without sample preparation.

Detectors

- FID (Hydrocarbon)
- ECD (Halogen Specific)
- TCD (Universal)
- TSD (N,P Specific)
- PFPD (S,P Specific plus 26 additional elements)
- PID (Aromatic/Unsaturated Hydrocarbon Specific)

Autosamplers

- **CP-8400 and CP-8410** are precise, versatile autosamplers delivering reliable results, with capacity for 100 samples using liquid, ambient headspace, or optional Solid Phase Microextraction (SPME) sampling modes.
- **Combi PAL™ autosampler** offers outstanding flexibility and productivity whether in liquid, headspace, In-Tube Extraction (ITEX) or SPME mode.

GC Valves and Columns

- **Custom plumbed valves** are available for a wide range of applications
- **QuickSwitch™ Valve** allows the instant connection of different columns to the MS detector manually or automatically.

GC Columns

- **FactorFour™** low bleed columns deliver faster separations without sacrificing resolution. You'll enjoy greater accuracy and increased instrument uptime. Some applications include:
 - Clinical Research and Toxicology** - FactorFour columns deliver robust and reproducible results at the lowest possible detection limits.
 - Pesticide Analysis** - FactorFour VF-1701ms columns are highly inert resulting in better response and peak symmetry for trace compounds such as pesticides, herbicides and sterols.
 - Food, Fragrances and Beverages** - VF-WAXms™, the latest addition to the FactorFour GC column range is ideal for polar compound analysis using MS, as well as other modes of detection.

Gas Clean Filters

Varian's Gas Clean Filter system prevents contaminants entering your GC, which could result in damage to the column, loss of sensitivity and instrument downtime. Filters available: Oxygen, Moisture, Charcoal and GC/MS.

VARIAN, INC.

240-MS

ION TRAP MASS SPECTROMETER

Varian, Inc. – Supporting Customers Worldwide

All products are eligible for on-demand support from a worldwide network of specialists who can assist with any need. Varian, Inc. offers:

- **Comprehensive programs** that include a full range of services – from minor repairs, to complex applications development and training.
- **Factory-qualified** Field Support Representatives and Specialists, specifically chosen for each installation.
- **Global support** teams strategically located around the world.

To learn more about Varian's industry-leading customer support, visit our Web site at www.varianinc.com/support

Varian, Inc. – Serving Industries Worldwide

Biosciences

Pharmaceuticals

Clinical Research and Forensics

Food and Agriculture

Chemical Analysis

Environmental

Fuels and Energy

Material Sciences

Quick Access, ChromatoProbe, QuickSwitch, FactorFour, VF-WAXms, EnviroPro, ToxPro, Varian and the Varian logo are trademarks or registered trademarks of Varian, Inc. in the U.S. and other countries. Combi PAL is a trademark of CTC Analytics AG.

© 2008 Varian, Inc.

Varian, Inc.

www.varianinc.com

North America: 800.926.3000, 925.939.2400

Europe The Netherlands: 31.118.67.1000

Asia Pacific Australia: 613.9560.7133

Latin America Brazil: 55.11.3238.0400

Other sales offices and dealers throughout the world– check our Web site.

GC • LC • MS • GPC/SEC • AA • ICP • ICP-MS • UV-Vis-NIR • FT-IR • Fluorescence • Dissolution • NMR • MRI • FTMS • Consumables • Data Systems

