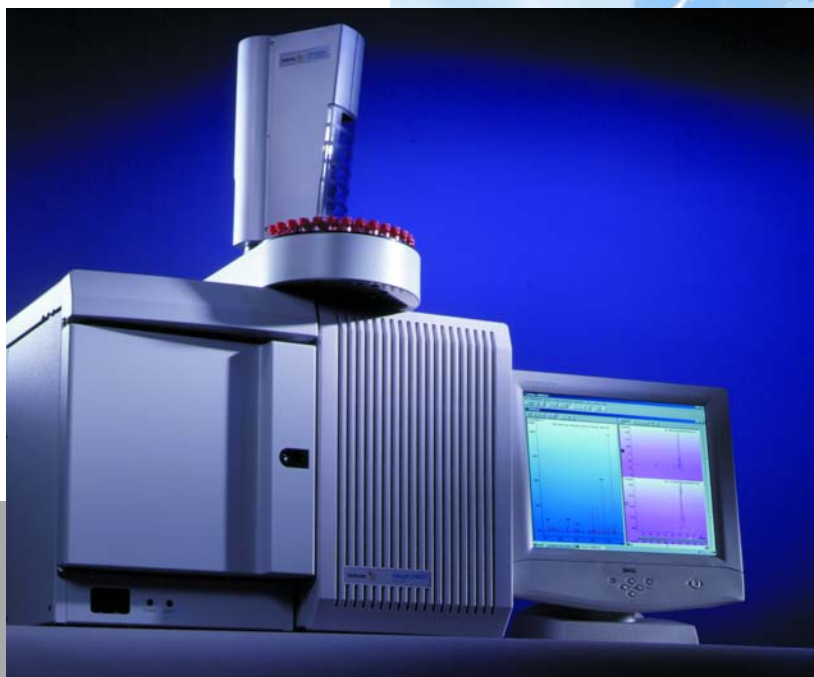


Saturn 2100



VARIAN

GC/MS

GC/MS Evolution Continues — Saturn® 2100 for every laboratory and every budget!

Today's budgets must be used wisely. Can you afford a GC/MS?

Your workload requires another GC/MS. How do you fit it into your crowded lab?

If you purchase a low cost GC/MS today, will you be locked out of upgrades tomorrow?

Varian's Saturn 2100 GC/MS provides new and better answers for all of these questions. The very small footprint is obvious. The 2100 occupies little more than 24 inches/62 cm of bench space. This streamlined, efficient GC/MS translates into a lower price for a complete system. But the reduced size and lower price do not translate into less performance. With state-of-the-art design throughout, GC and MS performance are superb. Nothing is compromised or sacrificed.

There is more to this GC/MS than just its compact size. The absence of an ion source and lenses means this ion trap MS rarely needs cleaning, so productivity is increased. Plus, the Saturn 2100 offers the full range of MS performance options including MS/MS, Selected Ion Storage (SIS), and Liquid Reagent Chemical Ionization. These ion trap technologies can be added now . . . or later, as an upgrade.

Whether you are purchasing your first or your tenth GC/MS, Saturn 2100 is the perfect fit!



A GC designed for mass spectrometry

- Electronic Flow Control (EFC) of carrier gas and split flow for optimized injections, separations, and MS stability
- CP-1177 Split/Splitless Injector with optimized flow profile
- Compact oven designed for standard 7 inch/17.5 cm diameter capillary columns
- Roll-back cover for simplified injector maintenance
- Rapid-MS™ column technology for reliable, shorter analyses

Saturn MS – the performance standard for benchtop mass spectrometry

- Highest sensitivity EI analyses at installation and after years of routine use
- Accurate library searches with commercial databases: NIST, Wiley, and PMW
- Documented environmental, toxicology, and industrial applications
- "No tools" removal of the analyzer
- Vacuum options: 2100T with turbomolecular pump or 2100D with Peltier-cooled diffusion pump

A truly complete workstation

- Single point control for the AutoSampler, GC, and MS
- QuickStart interface for simple, routine use
- Qualitative analysis with a choice of library search algorithms: NIST or INCOS
- Wide array of standard reports with user-tailored formats
- Custom report packages for environmental and toxicological analyses
- Automated switching from EI to CI and between all MS modes (full-scan, SIS, MS/MS)

Versatile, reliable autosampler or autoinjector

- CP-8400 AutoSampler: 100 x 2 mL vials
- CP-8410 AutoInjector with fixed tray: ten 2 mL, six 5 mL or five 10 mL vials
- Unique injector alignment mechanism for trouble-free operation
- Three large solvent wash vials with one unlimited waste drain
- Three syringe options: 5 μ L, 10 μ L, 100 μ L
- Pre-programmed and user-defined injection modes

Powerful and practical MS options

- Selected Ion Storage (SIS) for high sensitivity library searches in complex sample matrices
- MS/MS and MSⁿ – selectivity beyond MS, applications beyond Negative Ion CI, and simplicity for routine use
- CI with the sensitivity and operational simplicity of EI
- SilChrom inert analyzer for sensitivity and ideal peak shape of polar analytes



Proven Performance . . . Guaranteed Results

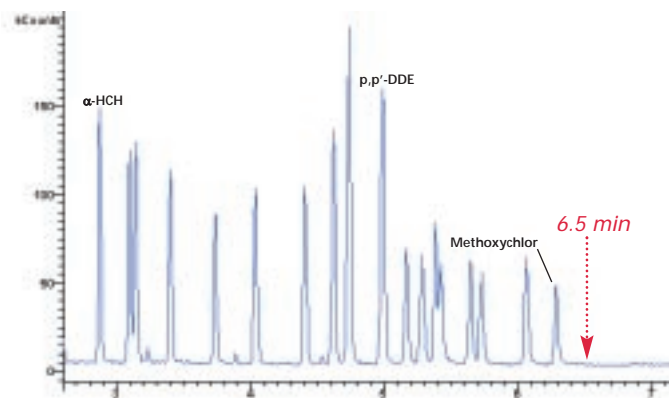
With thousands of satisfied Saturn users and hundreds of published articles referencing Saturn technology, both we and our customers know the 2100 GC/MS works well—very well! All of the key components, such as the EFC, the CP-1177 Split/Splitless Injector and Saturn MS have passed the most rigorous test of real applications. Ask for copies of the Varian Application and Advantage Notes. Check the information in the Saturn Bibliography. Or, speak with one of Varian's many satisfied customers.

Meet with Varian today and discuss—

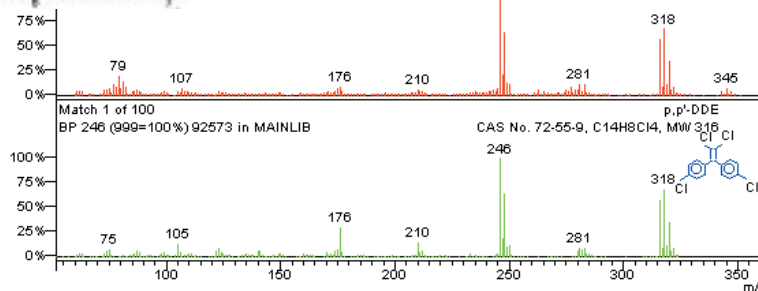
- qualitative results, spectral quality, and library search accuracy
- quantitative results, detection limits, linearity, and precision

As with all of our products, Varian guarantees satisfaction. Let Saturn 2100 handle all of your application needs.

Organochlorine Pesticides

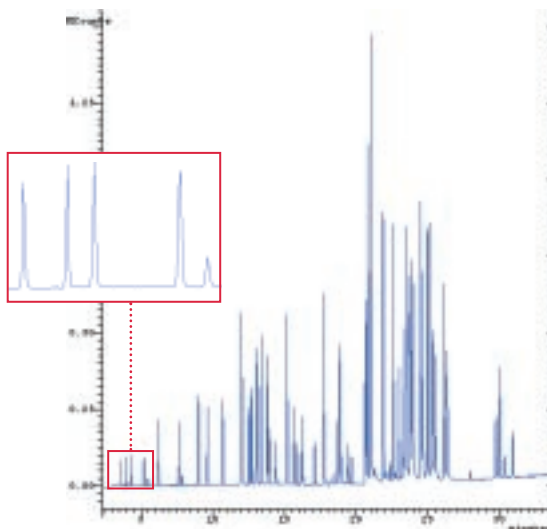


Rapid-MS column technology. The vacuum of the MS makes low pressure separations a reality, leading to shorter analysis times and higher sample throughput.



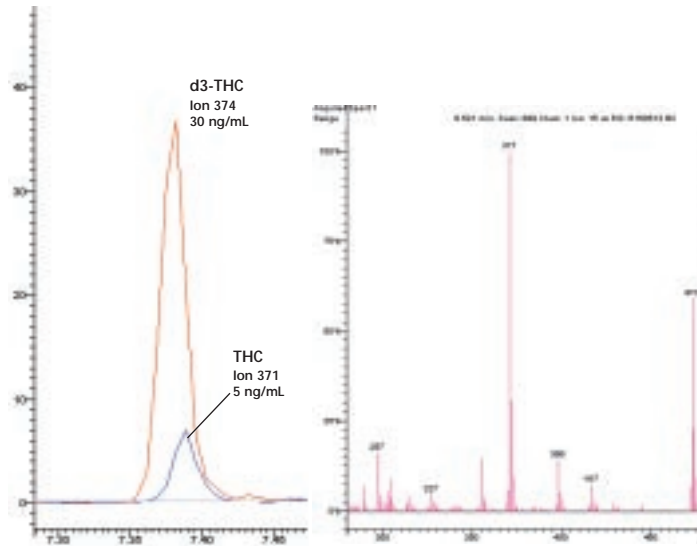
Commercial libraries. Searches against commercial databases such as NIST and Wiley prove the quality of Saturn spectra.

EPA Method 524.2, VOC's



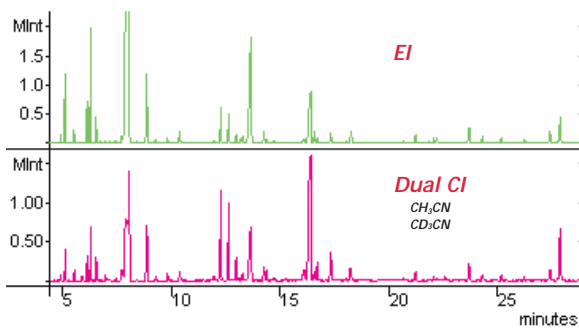
Standard environmental methods. Ion trap technology is referenced in current US EPA methods from volatiles to semi-volatiles and from water to air to waste. Detection limits, linearity, and precision are superb. The Saturn Environmental Methods Manual assures quick set up for common methods.

Cannabinoids in Urine



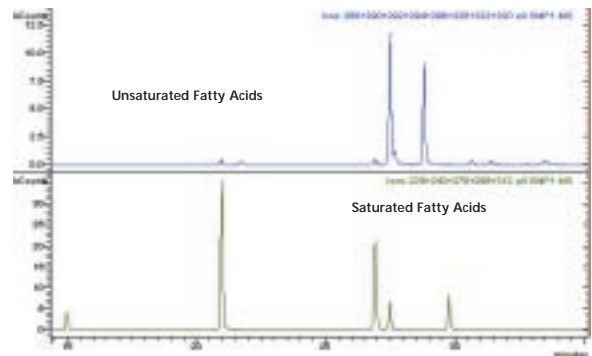
Drug analysis. *Low detection limits are essential to certain drug analyses. The inherent sensitivity of ion trap MS guarantees the lowest possible detection limits, the highest quality spectra, and precise ions ratios.*

Rosemary Oil



Flavor and Fragrance. *Combining Saturn's library searchable EI spectra with CI spectra for molecular weight confirmation give the chemist a powerful tool for product analysis and comparison. Varian Application Note No. 58.*

Animal Feed Extract



Industrial Products. *Quality control during manufacturing processes requires monitoring components, often at trace levels. Saturn's EI and CI modes both allow product monitoring over wide concentration ranges. Varian Application Note No. 48.*

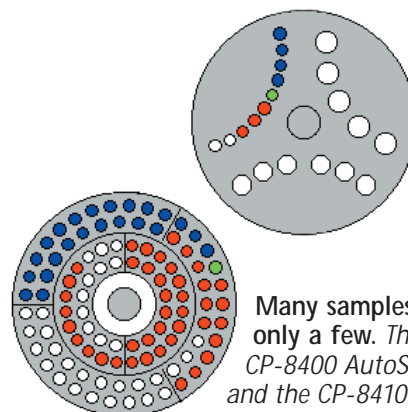
A GC Designed for the World's Simplest MS Analyzer

Easy maintenance and all the performance you need

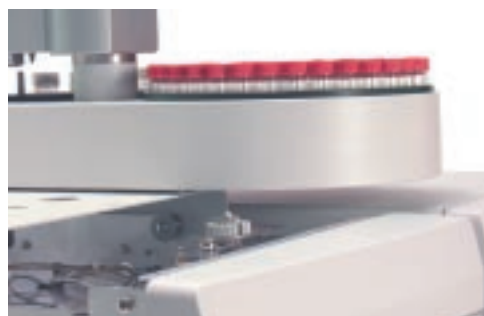
Successful GC/MS applications require the GC to excel in two areas:

- sample introduction must be accurate, precise and free of mass discrimination
- flow and thermal precision must guarantee highly reproducible retention times

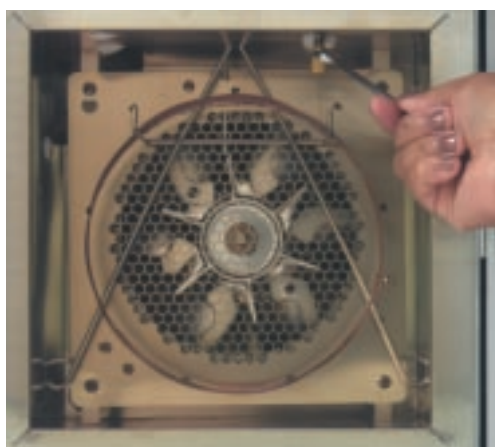
Busy laboratories need a reliable, precise autosampler, and all operators want convenient access to the septum, insert, and column. From the features of the CP-8400/8410 AutoSamplers to the convenience of the roll-back cover, Varian's new GC platform delivers the benefits that you routinely use and the performance that you absolutely must have. Even coupled to the MS, the system occupies little of your precious lab space. And, it requires less of your laboratory budget.



Many samples or only a few. The CP-8400 AutoSampler and the CP-8410 AutoInjector deliver accurate, precise injections of small or large samples without sample carryover.



Roll-back cover. The new roll-back cover means just one thing. Convenience! Access for routine maintenance is outstanding.



Standard capillary columns. Use your existing columns with our compact oven.

Retention Time Precision

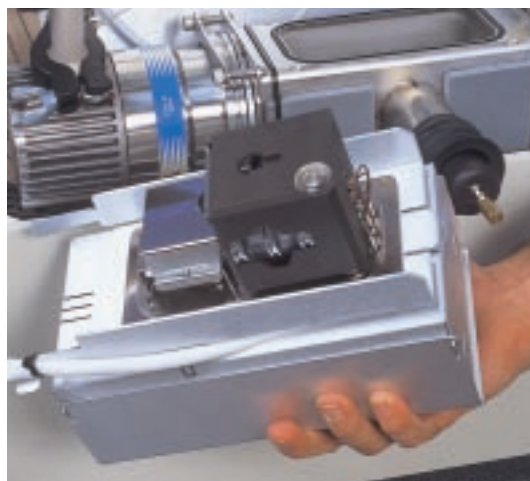
Time (min)	Std Dev	% RSD
6.208	0.002	0.0385
10.952	0.002	0.0208
19.068	0.002	0.0109
32.511	0.004	0.0118
38.760	0.008	0.0218

Superb performance. Electronic Flow Control and oven performance combine for optimal retention time precision.

Awarding Winning MS Analyzer

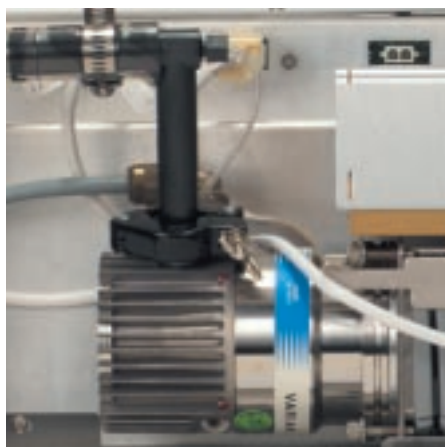
The revolutionary design of this mass spectrometer has been praised by Varian users worldwide. Perhaps the best praise has been this short statement: "It's too simple to be a mass spec."

Only two standard tools are required, yet for many steps, hands alone can do the work. There are no small parts, no intricate assembly steps and no critical alignment procedures. Since Saturn 2100 does not have the lenses and other components of an external source, frequent cleaning is just not required. The simplicity and ruggedness of the 2100 can make you forget that this is a very sophisticated and powerful mass spectrometer.



Analyzer removal in 98 seconds. We back our claim with videos on the Saturn Maintenance CD. After you have seen the analyzer removed in less than 2 minutes without tools, we are confident that you will agree, Saturn 2100 truly is the simplest MS you will ever use.

Saturn 2100T and Saturn 2100D



Saturn 2100T
Varian's high performance V-70 turbo-molecular pump delivers the fastest pump down.



Saturn 2100D
The Varian AX-65 diffusion pump provides high efficiency vacuum at the lowest possible cost. The custom-built Peltier cooler assures contamination-free vacuum.

A Complete Workstation – That Works Full-Time for You

The Saturn 2100 fully exploits advances in high performance PCs and Windows®-based software. Every function is under Workstation control. In fact, if it were not for adjustment of the calibration gas and CI reagent flows, you might forget the hardware even exists.

The 2100 Workstation is intuitive, comfortable, and efficient. It has to be to satisfy both new users and high throughput laboratories. Within a few days from installation, Varian's GC/MS Workstation will become your favorite lab assistant.

See our Saturn CD Brochure for detailed software tutorials. Better yet, ask for a demonstration of our software today.


Complete Workstation Control

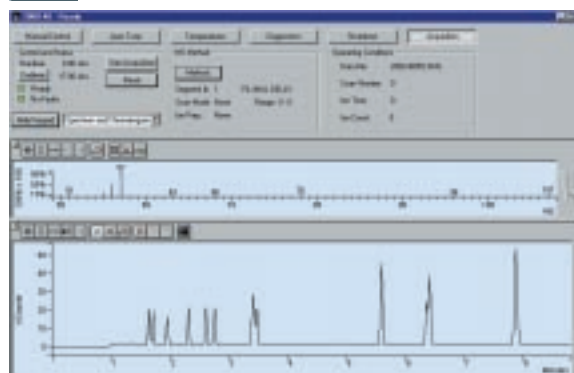
- Easy set up of all autosampler, GC, and MS components
- Streamlined automation for a single sample or large batches
- Superior qualitative and quantitative analyses
- Extensive standard and custom reporting

Saturn CD Brochure




System Control/Automation

 This screen links to system set up functions and allows real-time monitoring of analysis.



View/Edit Methods

 Direct access to all data collection, analysis and reporting parameters.

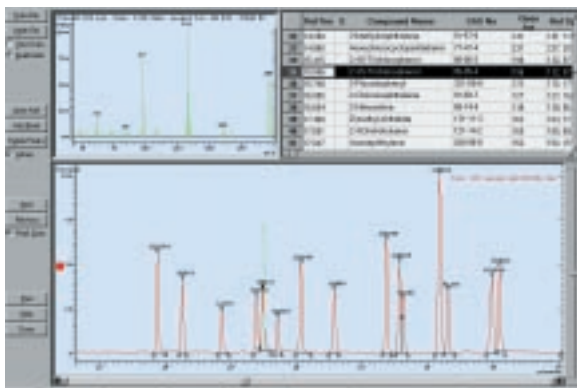


Review/Process MS Data

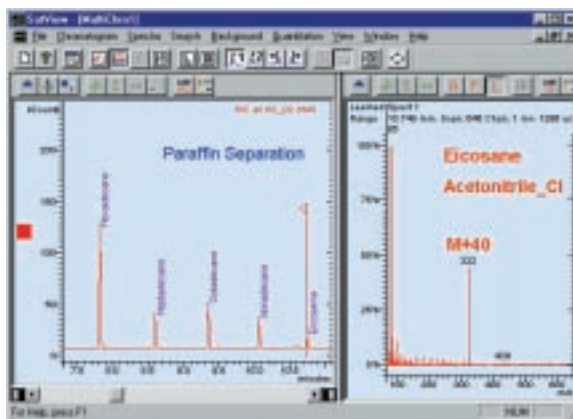


Versatile, intuitive icons within this window facilitate initial evaluation of ion chromatograms or spectra and links to additional qualitative and quantitative tools.

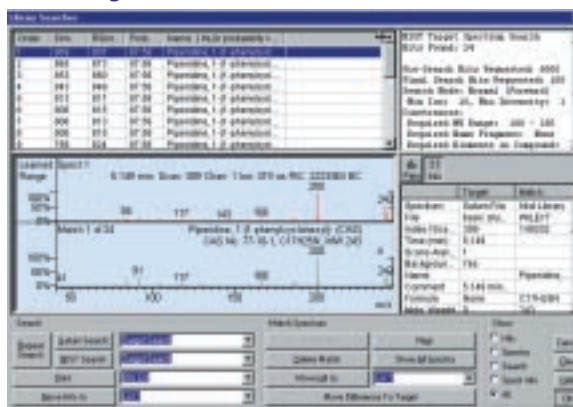
Compound Table



SaturnView

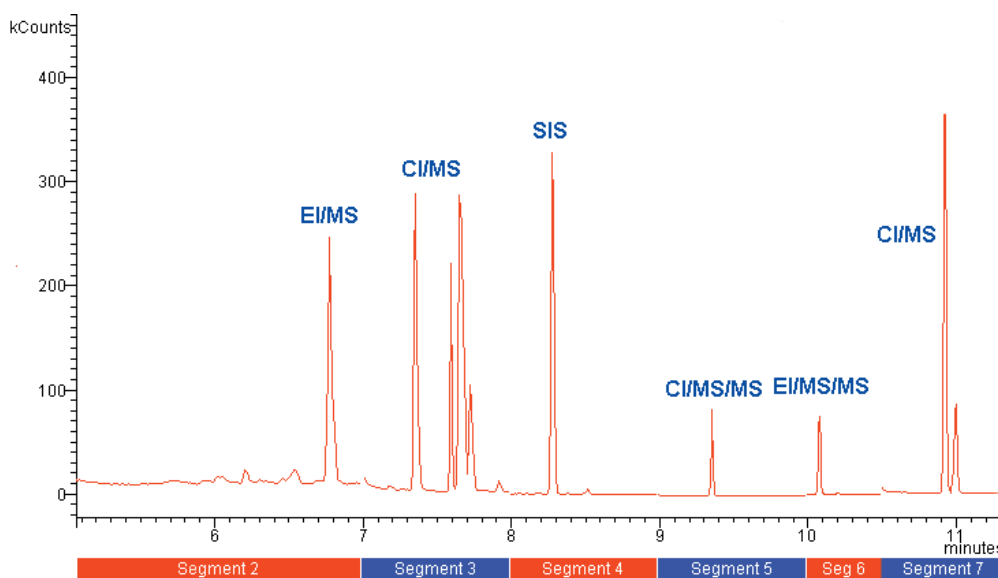


Library Search



Total Automation of All MS Technologies

Varian's GC/MS Workstation control is truly unique! With just the PC, move easily and automatically between standard and optional MS technologies within a single run. Every Saturn technology is accessed, optimized and time-programmed from the PC. Start with the simplest mode, EI full-scan.



Then, to improve selectivity or sensitivity, program MS/MS, SIS, or CI into the same method – even for one peak at a time. Every MS technology is routine with Workstation control.

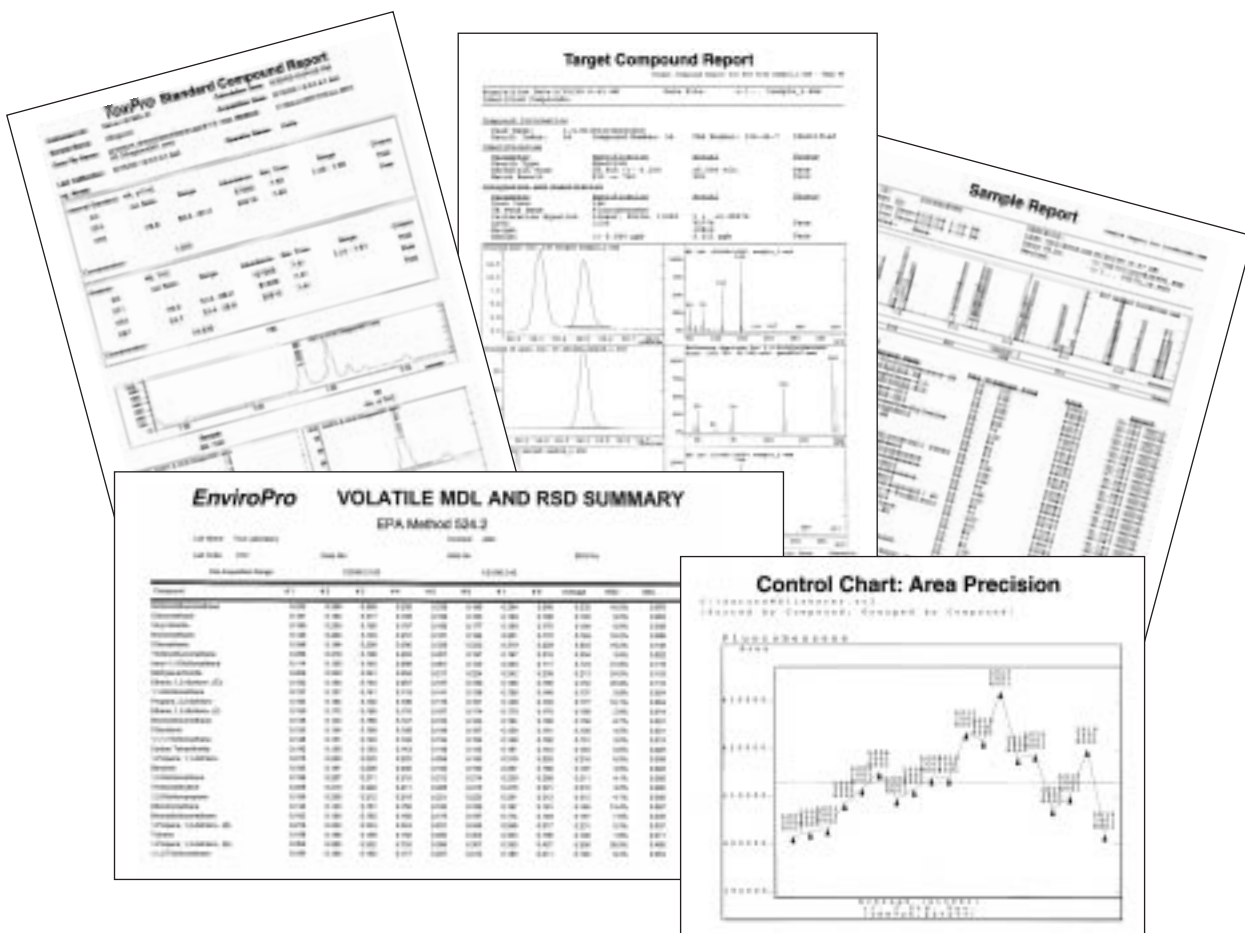
Reports, Reports, and More Reports

Information-rich detectors like the 2100 MS generate vast amounts of data. Reports address qualitative, quantitative, QC/QA, and GLP issues. A great MS workstation helps run your samples and analyze your data, and puts you in full control of report formats. The Saturn Workstation, with its wide array of reports, lets you focus quickly on the critical aspects of your data. Use 'standard' or 'custom' reports to tailor the presentation of results for your "customers." All reporting is completely automated so you can spend time on other tasks.

Standard Reports. Reports and control charts may be printed in a variety of formats or archived as ASCII files.



Custom Reports. For applications with specific reporting requirements, Custom Reports such as EnviroPro and ToxPro meet your needs with minimal effort.



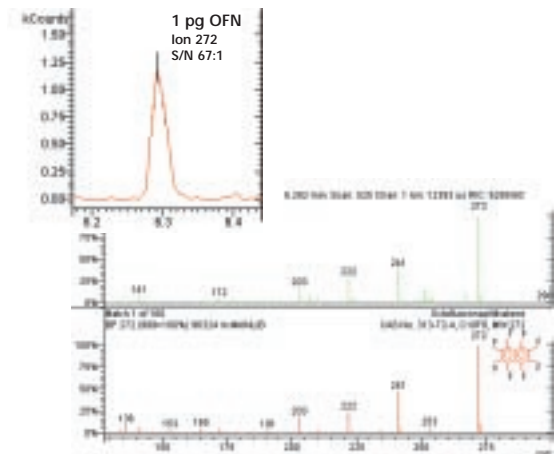
Saturn MS Technology – Ionization plus storage efficiency = superior performance

Varian's better-built mass spectrometer maximizes ion creation, manipulation, and detection. Saturn replaces the traditional ion source with an internal ionization design that is ideal. Ions are created and immediately stored within the analyzer. This process translates into real, analytical value:

- no mass discrimination
- guaranteed high sensitivity due to storage and collection efficiency
- minimal performance loss from contamination build-up

Saturn's RF-only quadrupole field assures remarkable mass stability. Transmission quadrupoles require mass calibration daily, while Saturn is stable over weeks and months. Our MS is simple, stable, rugged and always at top performance. You enjoy high quality, high sensitivity spectra at installation and for the life of your system.

Superior Signal-to-Noise for Trace Analysis

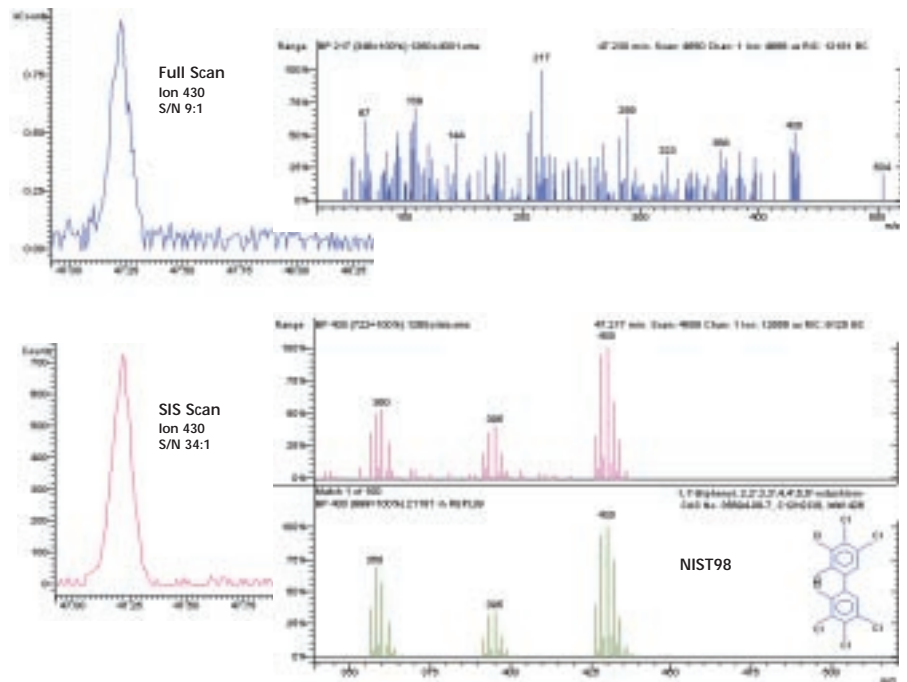


Searchable spectra at picogram levels. *Superb signal-to-noise is equally essential for qualitative analysis.*

Selected Ion Storage for Improved Library Searches in Complex Matrices

Arochlor 1260 in Transformer Oil

EI Scan applications can be extended with Saturn's SIS technology. When other analyzers must focus on two or three ions to maintain signal-to-noise, SIS continues to generate library searchable spectra – even near the limits of detection.



MS Technology Options – MS/MS for more selectivity when full-scan, SIM, and SIS are not enough

Thousands of routine and research laboratories have experienced exceptional Saturn MS/MS performance since its introduction by Varian in 1994. Why should you consider adding MS/MS to the 2100 system? Consider the comments of Saturn users noted below.

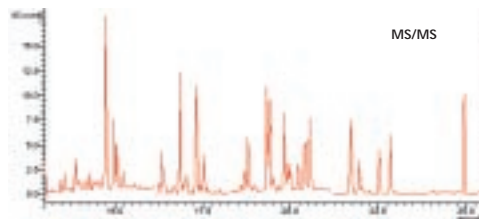
MS/MS delivers enhanced selectivity, especially in complex samples, and improved detection limits, especially in dirty matrices. With its low price, the 2100 with MS/MS is the next logical step in improved, routine MS. MS/MS is easy to set up and even easier to use. Add the MS/MS option now or later as an upgrade.

Comments from MS/MS Users

"Results for the CID MS/MS technique were reproducible, with very little reduction in sensitivity or spectral quality during the analyses of all test samples. MS/MS data acquisition was initiated after calibration using 2-1500 pg standards and three to four selected ions in each MS/MS spectrum. The responses were linear for all ions calibrated."
D. J. Hayward. *Organohalogen Compounds* 23 (1995) 119-124.

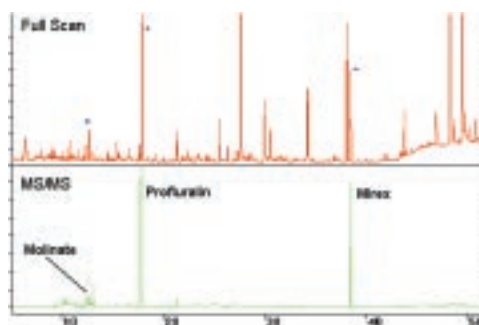
"The selectivity of the detection procedure was considerably increased by using EI-MS/MS instead of EI-MS. Contrary to what is sometimes suggested, MS/MS is a user-friendly technique that does not require special knowledge."
R.J.C.A. Steen, I.L. Freriks, W.P. Cofino, and U.A.Th. Brinkman. *Analytica Chimica Acta* 353 (1997) 153-163.

Dioxins in Fly Ash

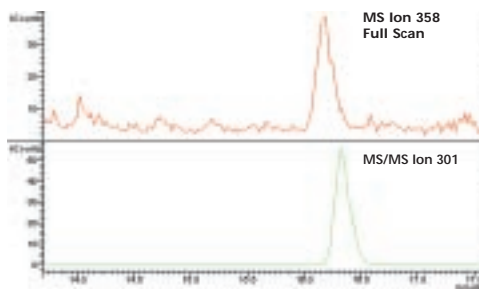


"Because HRMS [High Resolution MS] is a very expensive technology ..., low resolution mass spectrometry remains essential for the development of a dioxin laboratory."
C. Brochu, G. Hamelin, and S. Moore.
Ministère de l'Environnement du Québec.
Varian Application Note No. 32

Pesticides in Marine Samples



Steroids in Urine

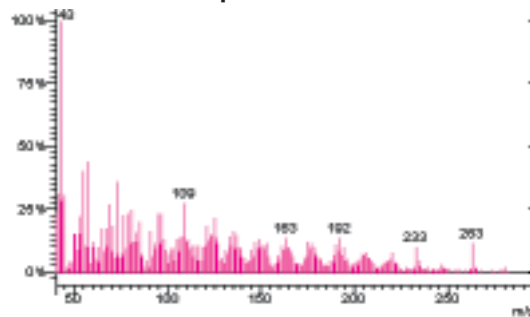


"The analytical method used is highly sensitive, accurate and reliable, easy to optimize, specific in confirming the anabolic substances and makes it possible to save time in routine sample analysis. Therefore GC-MS-MS is a valid alternative to the GC-MS method for analyzing anabolic compounds."
J. Munoz-Guerra, D. Carreras, C. Soriano, C. Rodriguez, and A.F. Rodriguez. *Journal of Chromatography B* 704 (1997) 129-141.

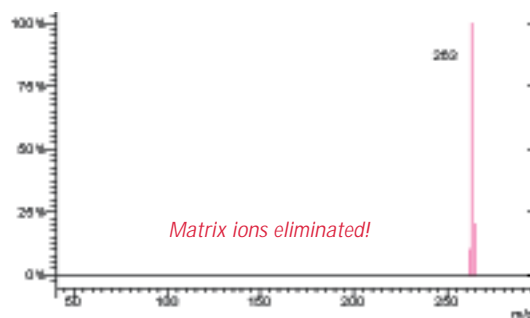
MS/MS in the Mass Spectrometer

Sample matrix often obscures the analyte spectrum – even after background correction. Also, the matrix is a primary source of background noise. The initial isolation step in MS/MS virtually eliminates matrix artifacts. After Collision-Induced Dissociation (CID), each product ion spectrum is measured against a noise-free background. The unique selectivity of the product ions generated by MS/MS and the elimination of matrix artifacts give you superior chromatographic and spectral results.

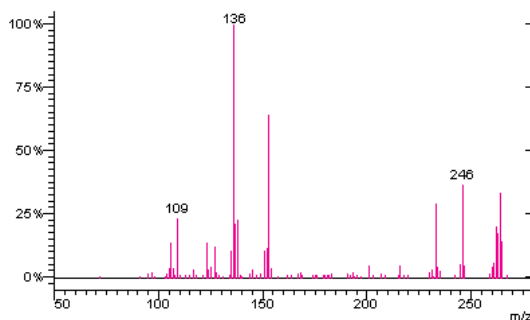
I. Ionization — EI Spectrum



II. Isolation — Precursor Ion



III. Dissociation — Product Ion Spectrum



MSⁿ = (Solutions)ⁿ

MS/MS is often considered alongside Negative Ion Chemical Ionization as the “ultimate” analytical solution in GC trace analysis. While both techniques have utility, MS/MS is clearly easier to use and more widely applicable as shown in the table below.

EI MS/MS Benefits		
	EI MS/MS	Negative Ion CI/MS
Halogenated compounds	Yes	Yes
Non-halogenated compounds	Yes	No
Reagent gas needed	Never	Always
Source change	Never	System Dependent
Mode selection automated	Yes	System Dependent
Multi-ion spectrum for structural confirmation	Often	Seldom

“The major advantage of the ion trap MS/MS over the existing methods, electron capture negative ionization mass spectrometer or electron capture detector,

is its excellent selectivity. Interference from other organochlorines can virtually be eliminated. Therefore, the developed MS/MS method may be used as a reliable alternative to high resolution mass spectrometry for measurement of toxaphene in environmental samples with relatively low-cost instrumentation.” H.M. Chan, J. Zhu, and F. Yeboah, Chemosphere 36 (1998) 2135-2148.

MS Technology Options

PCI – Positive Ion CI, the perfect partner to Saturn EI

The advantage of the 2100's internal ionization analyzer is further established by the remarkable performance of its unique, low pressure PCI process.

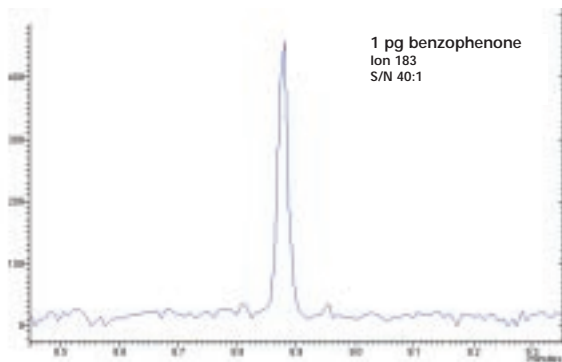
- If you think CI means low sensitivity, you haven't used Saturn PCI
- If you consider CI to be troublesome or complex, you haven't tried Saturn PCI using liquid reagents

If you have never applied the many benefits of PCI to your samples, you must take a careful look at PCI on the Saturn 2100. The PCI option gives you performance, convenience, and is always available as an upgrade for MS or MS/MS systems.

Liquid CI Reagents



Methanol PCI

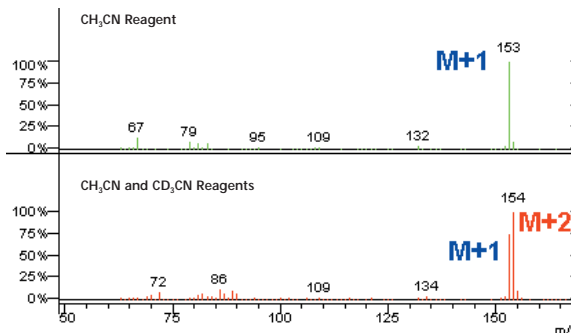


The PCI sensitivity benchmark. *Saturn* is the sensitivity standard for all benchtop systems, and only *Saturn* delivers this performance with gases or safe, inexpensive liquids.

PCI - EI's Partner

- No hardware changes from EI to PCI
- No loss of calibration from EI to PCI to EI
- Rapid equilibration of reagent pressure
- Contamination-free operation using low pressure reagents
- Superb sensitivity in either mode
- Routine EI and routine PCI with trouble-free performance

Acetonitrile PCI



Better than low intensity adduct ions! A mixture of acetonitrile and its inexpensive, deuterated analogue generate an intense doublet ($M+1$ and $M+2$) to confirm the molecular ion of vanillin.

Varian Chromatography and Spectroscopy Supplies Performance, Selection, and Value

Varian's 50-plus years of continuous innovation in analytical instrumentation assures you the best in high performance products. Varian is committed to providing analytical products and supplies at affordable prices supported by superior customer service.

To maximize Saturn 2100 performance, select the best value in analytical supplies ranging from sample vials and sample preparation products to CP-Sil Low-Bleed/MS capillary columns. Call today to request your free Varian Chromatography and Spectroscopy Supplies catalog.



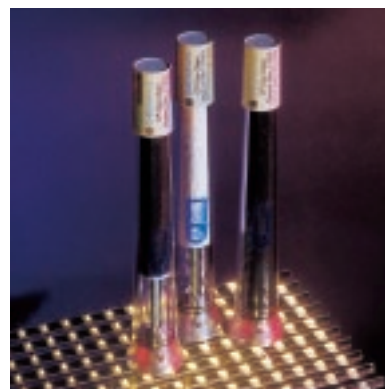
Varian injection septa and liners. *Products proven to meet the exacting performance the Saturn 2100 delivers.*

Autosampler and autoinjector vials. *Vials with septa manufactured from materials specifically designed to eliminate GC/MS system contamination.*



CP-Sil Low-Bleed/MS capillary columns. *These columns are available in all the popular polarities. Low column bleed means higher precision, especially for trace analysis.*

CP-Gas Clean Filters. *Extremely efficient filters remove moisture and oxygen to extend column life and improve system performance.*



**Varian Analytical Instruments,
serving worldwide markets in:**

Agriculture

Basic Chemical

Biotechnology

Clinical

Electronics

Environmental

Photonics

Toxicology

Pharmaceutical

Food and Beverage

Metals and Mining

Petroleum and Petrochemical



• **Varian Sales Offices**



*Varian is committed to a
process of continuous
improvement which
demands that we
understand and then meet
or exceed the needs and
expectations of our
customers — both inside
and outside the company —
in everything we do.*



VARIAN

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