

THE NEW CONCEPT OF HIGH SPEED TOF-MS IGH SPEED TOF-MS

1aster

EXTREMELY COMPACT DESIGN

HIGH SAMPLE THROUGHPUT

NHANCED SENSITIVITY AND RESOLUTION



Master TOF
TIME OF FLIGHT GC/MS
PLUS



A NEW CONCEPT OF HIGH SPEED TOF-MS FOR THE LATEST GC TECHNIQUES GENERATION

WHEN PRODUCTIVITY IS THE NAME OF THE GAME, MASTER TOF-MS PLUS IS THE ANSWER

Productivity has become of vital importance in most modern laboratories.

The automated and unattended processing of a larger number of samples per day is the real challenge to increase productivity and reduce costs/analysis.

Additionally, Fast GC has resulted in a very effective way to address this challenge providing a significant decrease in the analysis time.

However, when a positive identification is mandatory and mass spectrometric detection is needed, Time of Flight Mass Spectrometry (TOF-MS) is the only technology capable of properly describe very narrow chromatographic peaks due to its fast acquisition rate, independently on the mass range of interest.

DANI Master TOF Plus MS detector performs the fastest acquisition rates (1000 spectra/s) and the widest dynamic range (106) available on the market.

DANI Master TOF-MS Plus is now even more sensitive to match demanding analytical requirement. Approaching the SIM mode sensitivity of common quadrupoles, the new Master TOF Plus is extremely suitable to detect analytes at trace levels, keeping the additional benefits of the full mass spectra information always available.

These capabilities are offered in a truly affordable and extremely compact bench-top instrument. In combination with the Master GC, the system is the ideal solution for Fast GC and GCxGC analyses to obtain improved productivity and performance.

THE NEW CONCEPT OF HIGH SPEED TO FIMS GH SPEED





HIGH SAMPLE THROUGHPUT

The use of autamated instrumentation and Fast GC methods are the right approach for modern laboratories to enhance their productivity, reducing the run and increasing the accuracy and precision of their analyses.

The master TOF-MS Plus Time of Flight GC/MS system fullfills all the stringent requirements that Fast GC imposes to the analytical instrumentation, including the fast heating and cooling rate of the GC oven, the high pressure limit of the gas control and, finally, the fast acquisition rate of the MS detector.

THE FASTEST MS DETECTION AVAILABLE ON THE MARKET



The Master TOF Plus provides an acquisition rate up to 30,000 spectra/s offering the fastest MS detection available on the market, up to 1,000 saved-to-disk spectra/s. Such high speed of acquisition assures always the optimum number of data points required to correctly describe chromatographic peaks, even in case of a signal as fast as tens of milliseconds.

Fast Detection Capability over the full mass Range



In addition, the TOF-MS technology allows the fast detection capability over the full mass range: in fact, all the ions generated in the ion source are continuously pulsed into the analyzer and no filtering of selected masses is applied.

No Spectral Skewing Effect



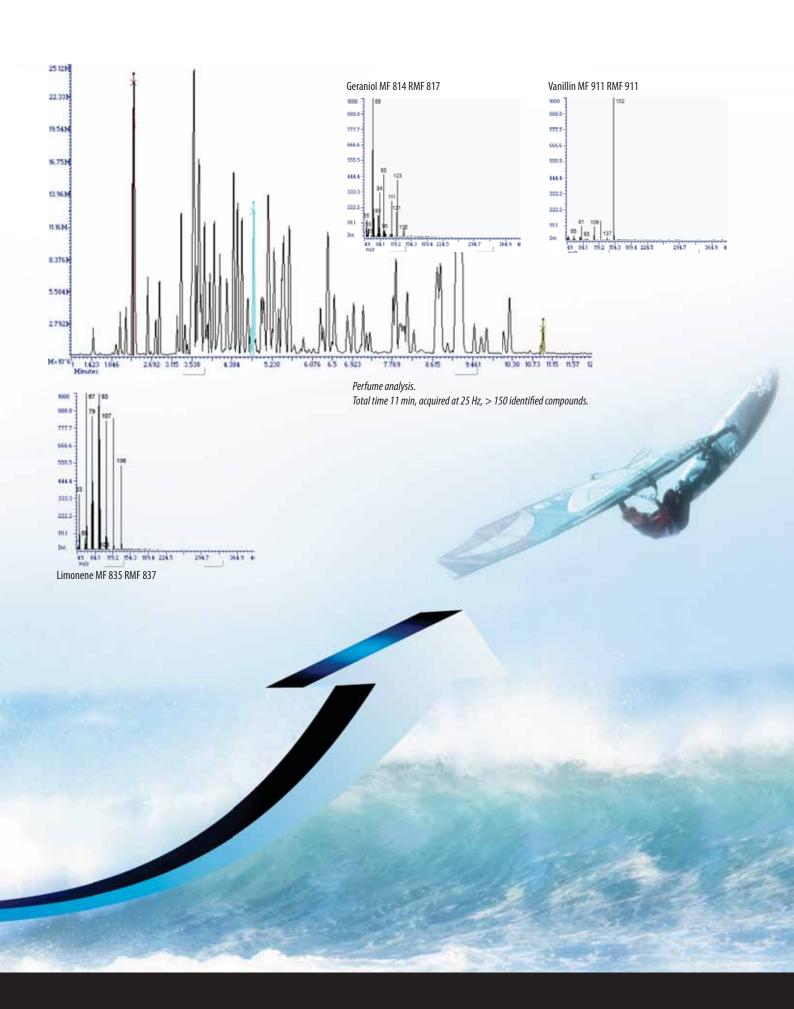
The entire mass range is available independently on the acquisition speed and without any spectral skewing effect likely produced by scanning instruments during acquisition of fast transient signal.

Easy Data Handling



In addition, the system offers an outstanding dynamic range with a linearity exceeding 5 orders of magnitude, remarkably reducing sample preparation steps, e.g. dilutions and concentrations, as well as the number of analyses.





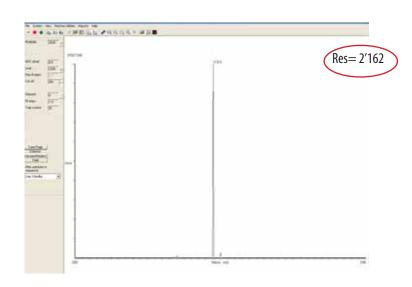


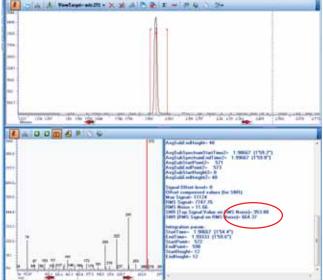
ENHANCED SESITIVITY AND RESOLUTION

IMPROVED RESOLUTION

A very good resolution over 2000 (FWHM) is also achieved considering the short flight path. Any possible ion energy variation generated into the source, can be efficiently compensated through the orthogonal acceleration design, in which ions are accelerated in a pulsed mode into the flight tube perpendicularly to the primary continuous beam direction from the source.

Besides, an efficient ion package refocusing is also assured by the action of the reflectron which acts as an electrical field mirror for flying ions, doubling the ions flight path.





ENHANCED SENSITIVITY

Enhanced sensitivity is achieved through the use of differential pumping, enabling improved vacuum conditions.

Therefore, an elongated ion mean free path is achieved, avoiding collision on their transit through the flight tube to the detector, increasing even more the transmission efficiency of the analyzer.

NOT ONLY TARGET COMPOUNDS BUT ALSO YET-TO-BE-DISCOVERED CONTAMINANTS AT YOUR FINGERTIP

The New Master TOF-MS Plus is able to approach the sensitivity of a quadrupole working in SIM mode, but without compromises on mass spectra information. Unlike scanning quadrupole MS, the TOF-MS technology allows to expand the detection and the identification to a larger number of unknown contaminants without the need of prior knowledge.

Besides, the mass spectra information always available, gives the user the possibility of data post-processing for the detection of upcoming new toxic compounds without the need of re-injection, cutting additional work and higher costs.









In today's world economy, even analytical laboratories have to deal with the increasing cost of their work environment; consequently, their choices are often restricted by a limited space.

For this reason, the compactness of the instrumentation is increasing of importance and manufactorers have to pay special attention to this specification.

The New Master TOF-MS Plus is still featuring the extremely compact design of the previous platform, continuing to be the smallest bench-top instrument of its class.

In a minimal benc space, Master TOF-MS Plus includes the baking pump thus providing a highly handy and noise-free instrument.

EASY MAINTENANCE

The simplicity of the Master TOF-MS Plus design permits the user to easily access the ion source. Fast, uncomplicated, and efficient maintenance procedures can be carried out requiring just an Allen wrench and low labor input.

For extra convenience, the Master TOF-MS Plus is equipped with a double filament assembly. In case of filament damage, the second filament can be used proceeding with the analyses without stopping the work schedule of the laboratory.





A COMPLETE LINE FOR TOTAL SOLUTIONS

In combination with the Master GC, the Master TOF-MS Plus is the ideal solution for Fast GC and GCxGC analyses to obtain improved productivity and performance. In addition, the Master TOF Plus benefits of the complete DANI Master Autosamplers line for volatile and semivolatile organic compounds extraction.



DANI Master GC is uniquely designed to perform conventional and fast gaschromatographic analyses fulfilling the demands of routine and research.

The Master GC features a maximum heating of up to 140°C/min and a typical colling time of 4 min. The system can be equipped with an array of inlet systems and a wide selection of detectors, engineered with fast electronics to handle sharp peaks generated in Fast GC; data acquisition rates of up to 300 Hz are performed.

The instrument integrates leading-edge technology with total system control delivering outstanding reliability, repeatability, and performance.



DANI Master SHS Static Headspace Sampler is the most flexible system that delivers the highest performance to overcome daily new challenges and supplies trustworthy and enhanced results. Among its benefits: limited or no sample preparation, no contamination risk, diminished inlet or column maintenance, completely automated analysis, easy-to-use, robust and trouble-free design.

The 120-position vial tray, designed to lodge any headspace vials, along with the unmatched oven capacity (18 vials simultaneously), assures the highest sample capacity and maximum sample throughput to meet any productivity requirement. Constant control of sample temperature, constant incubation time, the Valve & Loop technique and the entirely chemical inert flow path provide reliable results and exceptional repeatability.



DANI Master DHS/P&T Dynamic Headspace and Purge&Trap Sampler provides you with the most versatile, state-of-the art system for headspace analysis. It combines the high sensitivity of the dynamic headspace technique with the productivity, ease of use, and flexibility of a completely automated solution. In addition, the Master DHS/P&T can process liquid samples in purging mode thus further lowering the detection limits and featuring the capabilities of a Purge&Trap system.

Master DHS/P&T represents a dynamic approach to high sesnsitivity headspace analysis.



DANI Master TD Thermal Desorber offers superior sensitivity, versatility, and productivity for the extraction of volatile and semivolatile compounds from air and solid matrices. The excellent analytical performance of the system is guaranteed by the two-stage thermal desorption process and suported by the patented "Instant Desorption" of the trap.

The design assures the fastest transfer of the analytes and preserves chromatographic resolution and accuracy.





WALKAWAY AUTOMATION

In combination with the Master AS, a robotic X-Y-Z sampling system, the Master TOF-MS Plus system delivers complete automation of all operation steps, including standard addition. Hence, the complete system increases sample throughput allowing unattended sequences up to 160 samples with enhanced precision and accuracy, improving analysis performance.

The simple and intuitive Master LAB Software offers the proper tool for a reliable control of the entire system, from MS autotuning procedures to GC and sample sequences management. The Master LAB software delivers complete system control through an user-friendly interface without requiring high experienced operator skills.

FULL INSTRUMENT CONTROL AND POWERFUL DATA MANAGEMENT

The maximum productivity is obtained through the full automation of all the process, starting from sampling, to acquisition, data processing and reporting.

Methods and sequences can be easily created, edited, stored, and uploaded to the instruments.

A full diagnostic is also included and provides information on the instrument status.

In addition to the local control, DANI is also capable to provide a remote control function based on an internet connection. The online support connection allows the DANI service staff to remotely operate on the instrument located at customer site.

DANI remote control service permits basic diagnostic tests and quicker flow of information from the specialist to the user.

Minimized dead times and reduced on-site service costs add a further improvement to the gain of high productivity.





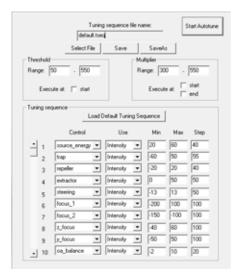
INNOVATIVE MASTER LAB SOFTWARE SOLUTION

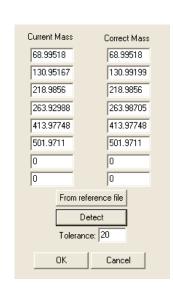
The proprietary Master LAB Software solution is based on an innovative platform for acquiring and processing mass spectral data. The software ensures high level performance and maximized productivity, while delivering the flexibility and robustness required in laboratories with high sample throughput. The instrument control and acquisition page as well as the reprocessing main screen are intuitive for minimum leraning efforts. All the commands are readily available on the same screen which layout can be fully customized according to the user needs.

AUTOTUNING AND MASS CALIBRATION

The autotuning and mass calibration procedures are fully automated in order to rapidly optimize the operation conditions of the machine. A manual tuning procedure is also available to customize tuning conditions which could fit specific analytical requirement.

The tuning file can be saved and stored along the tuning report.

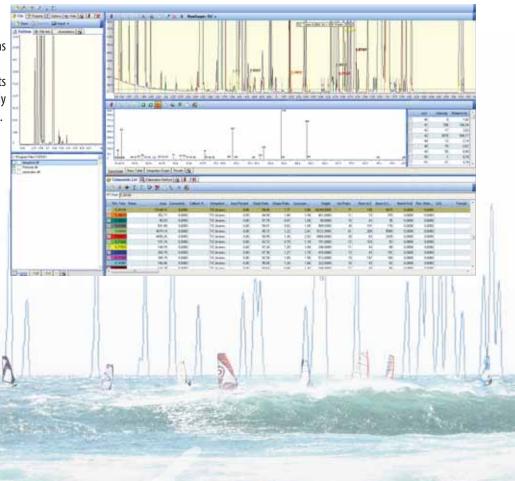




DATA EXPORT

Acquired data can be automatically exported as open data formats, e.g. .netCDF and .txt files.

The qualitative and quantitative results summarized in the Compound Table can be easily exported as .xls worksheet for further elaboration.





TAKE ADVANTAGES FROM FASTER ANALYSIS WITH DECONVOLUTION

Analytical challanges today are more frequently related to complex samples for which co-elutions of analytes and the matrix interferences are prone to occur, especially when the analysis run time is reduced.

Master LAB software includes an automatic deconvolution algorithm capable to recognize different co-eluted compounds by reconstructing the mass spectra according to only a slight different retention time of each single ion peak.

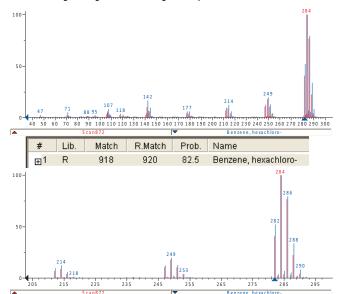
Then the reconstructed spectra are used for the identification by library matching. The software supports the NIST of mass spectral library and all other libraries compatible to NIST compatible format.

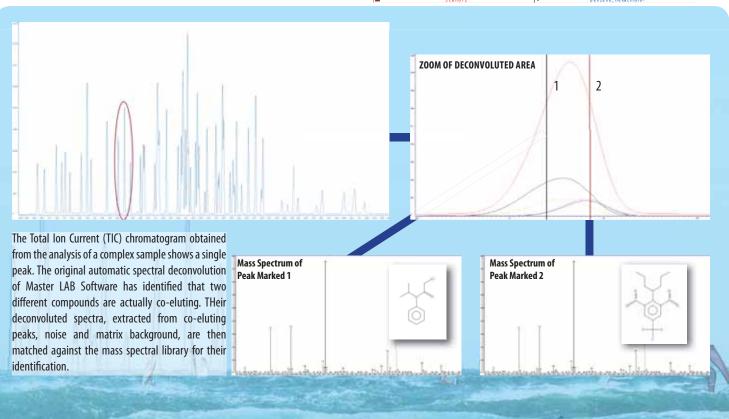
With deconvolution improved effectiveness and confidence in the identification and screening of target and nontarget compounds is achieved.

SPECTRA QUALITY

The Master TOF Plus is delivering high spectra with very high library similarity matching for reliable identification on unknown and confirmation of targets.

A 70eV El ion source is producing typical fragmentation reported in common MS spectra libraries.







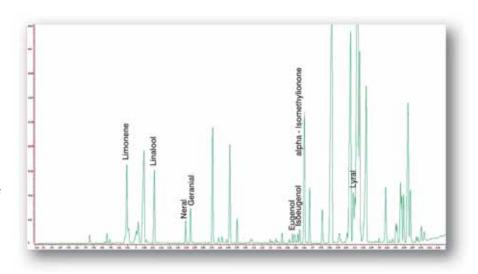
MASTER TOF PLUS: THE RIGHT TOOL FOR DEMANDING GC-MS ANALYSIS IN ANY APPLICATION FIELD

The combination of the Master GC and the Master AS hyphenated to the Master TOF-MS is the right solution for your daunting analytical tasks and is adequate for a broad range of applications.

COSMETIC AND TOILETRIES (C&T)

The investigation of allergens in C&T matrices is of utmost importance for safety evaluation procedures. Allergens are strictly regulated and maximum residue limits for leave-on and rinse-off cosmetic products are of 10 ppm and 100 ppm respectively.

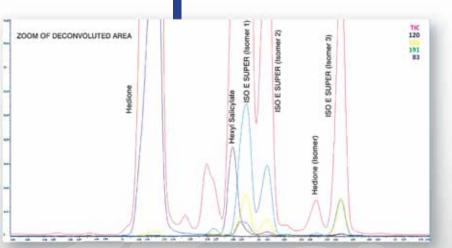
The Master GC-TOF-MS Plus system permits reliable allergens mass spectral identification due to automatic deconvolution in a total analysis time of less than 7 minutes.



FLAVOR AND FRAGRANCES (F&F)

Fragrance materials are composed of a wide range of compounds blended to create sophisticated perfumes. As it is well known, the use of modern analytical methods boosted the achievement of higher perfumery raw material knowledge and GC has been widely employed in perfumery industries. Perfume profile for Home & Personal Care Products is of primary importance for perfume industry for quality assessment, perfume formulation, competitors benchmarking, trace analysis of markers. In the F&F application field faster analysis, rapid and reliable peak assignment are continuously required. The Master TOF MS Plus system fulfills these productivity requirements.

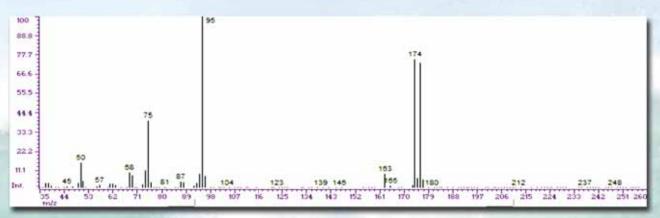
The TIC chromatogram obtained from the Fast GC analysis of a perfumery raw material shows several co-eluting peaks. The constant ion abudance ratios across the chromatographic peak, the high acquisition rates, and the unskewed mass spectra are uniquely produced by the Master TOF-MS Plus and support the deconvolution algorithm for the peak picking of the components. Productivity and accurate peak identification are obtained simultaneously.





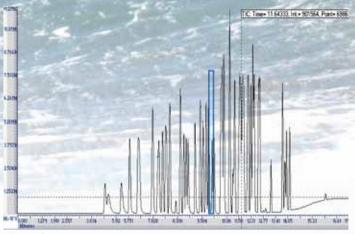
ENVIRONMENTAL MONITORING

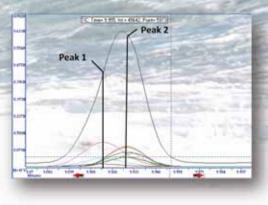
Analysis of volatile and semi volatile organic pollutants in environmental matrices is of increasing interest due to critical environment contamination from several sources as gasoline, oil spills and industrial solvents. Especially for drinking water, possible contamination is of great concern for potential human health effect. Strict officila guidelines establish analytical procedures along with detection limits and instrumentation requirements. The Master TOF Plus has been validated in full compliance with the EPA ion ratio criteria and proven without the need of dedicated instrument tuning. Default autotuning procedures can be regularly performed before any new calibration sequence.



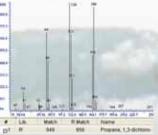
lon m/z	EPA 524 Ion Ratio Criteria	Master TOF Plus % Relative Intensity	Pass / Fail
50	15-40 % of mass 95	15.7	√ Pass
75	30-60% of mass 95	39.1	√ Pass
95	Base Peak	100	√ Pass
96	5-9 % of mass 95	7.1	√ Pass
173	< 2 % of mass 174	1.8	√ Pass
174	> 50 % of mass 95	74.6	√ Pass
175	5-9 % of mass 174	7.8	√ Pass
176	95-105 % of mass 174	97.0	√ Pass
177	5-10 % of mass 176	6.6	√ Pass

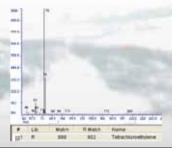
BFB Spectrum compliance with EPA method 524





VOC Analysis: 52 compounds in 14.3 min







MASTER YOUR TIME WITH THE DANI MASTER TOF MS PLUS ANALYZERS



The ability to provide the proper configuration to meet the most challenging analytical demands comes from a long and proven experience and a deep industry knowledge. As requirements are constantly changing, even a highly reliable instrumentation could not be enough to succeed in getting trustworthy results: complete and guaranteed solutions are essential to comply with the latest industry standards and specifications.

After a long working relationship with its customers to know and to best match their real needs, DANI Instruments has developed key analytical solutions that cover a broad array of applications, requirements and protocols in key markets.ss

DANI MASTER TOF MS PLUS ANALYZERS are preconfigured, pre-assembled and factory-tested systems specifically designed for specific analyses. The analyzers include the hardware, the software, columns and consumables, the optimized analysis method, the analytical conditions, and the documentation to run up your analysis from day one.

MASTER TOF MS PLUS ANALYZERS

PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS

The installation process is faster than ever before and all the startup procedure is oversimplified ensuring immediate analytical performance and results.

HARDWARE AND SOFTWARE

DANI Analyzers are pre-engineered systems based on the versatility, flexibility and robustness of the proven Master Line hardware. All the parameters are set prior the shipment.

COLUMNS AND CONSUMABLES

No more doubts about the proper column, parts and supplies. DANI Analyzers are delivered with all you may need for your analysis.

OPTIMIZED ANALYSIS METHOD

Analytical methods are pre-loaded to be immediately used. Whenever possible, reduction of analysis time and amounts of toxic solvents are considered. Method development time and costs are thus dramatically reduced.

ANALYTICAL CONDITIONS

DANI Analyzers are designed to perfectly accomplish the analytical conditions of interest.

DOCUMENTATION

A getting started manual, calibration and method files, and all the information for a quick startup are included.





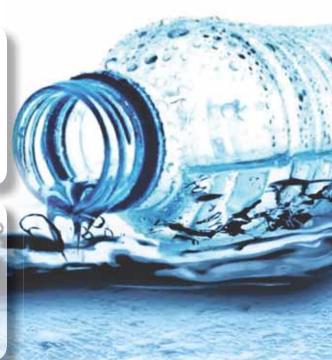
FOOD & BEVERAGE

FLAVORS AND FRAGRANCE ANALYZER

Flavors and Fragrances analysis benefit from the use of faster instrumental configurations for both research and quality control purposes. The GC approaches to speed up analysis include the utilization of shorter capillary columns with decreased column internal diameter and thinner stationary phase film thickness, higher carrier gas velocities, and faster GC oven temperature programming rates. Moreover, the Master TOF Plus has the necessary technology to provide high speed acquisition rate to collect sufficient information (15-20 points/peak) for reliable reconstruction of these very narrow peaks over the entire mass range. Thereby the Master Flavors and Fragrance Analyzer enables accurate recognition and quantification of unknown and co-eluting peaks, even in trace-level concentrations.

DRINKING WATER ANALYZER

The Drinking Water Analyzer employs the flexible Master Dynamic Headspace and Purge&Trap Sampler working in purging mode as a valide alternative to traditional Purge&Trap autosamplers. The system is able to highlight the several benefits of this approach in terms of extended automation, overlapping incubation time capability and absence of cross-contamination between samples. In addition, the Master TOF Plus as detector offers the possibility to discriminate even between coeluted compounds exploiting the deconvolution allgorithm of Master Lab Processing Software.



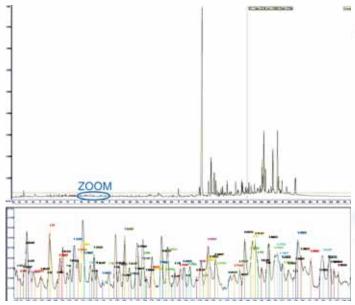
Analysis of 561 pesticides in 25 minutes.

PESTICIDES SCREENING ANALYZER

Pesticides residues analyses in agricultural products are generally carried out by using Gas Chromatography (GC) in combination with selective detectors, such as Nitrogen - Phosphorous Detector (NPD) or Electron Capture Detector (ECD). Adding to these well-known selective detectors the Master TOF Plus capabilities, it is possible to obtain a complete solution for the analysis of any type of pesticide.

Fast Gas Chromatography drasticaly reduces analysis time and spectra deconvolution permits reliable compound identification.

Combining these qualities, the Master Pesticides Screening Analyzer provides unprecedent precision in peak assignment and structural elucidation.



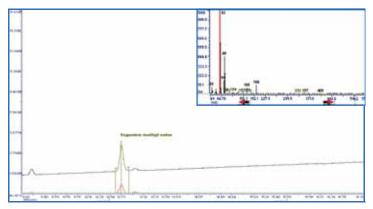
Tomato extract sniked with nesticides at 250 nnm acquired at 50 spectra/s





LIFE SCIENCE

FORENSIC ANALYZER



Analysis of Ecgonine Methyl Ester, a typical metabolite of Cocaine thet remains detectable in urine and plasma 4-6 times longer than cocaine.

DANI Master Forensic Analyzer is an accurate, and precise turn-key solution for the forensic application field.

Through the hyphenation of the Master SHS Static Headspace Sampler, the Master GC Fast Gas Chromatograph, and the Master TOF Plus Time of Flight GC/MS, the analyzer is able to reduce the time required for method development and sample analysis of drugs and their metabolites in biological matrices.

PHARMA RESIDUAL SOLVENTS - USP 467 ANALYZER

As it is well known, solvents used in the manufacture of pharmaceutical products must be eliminates before human consumption. The USP <467> (United States Pharmacopoeia) describes how to quantify the different solvent classes and requires a Valve&Loop system for the quantification of OVIs (Organic Volatile Impurities).

The Master SHS Static Headspace Sampler is fully compliant with these requirements providing exciting results in terms of sensitivity and precision. In addition to the Master SHS in the Pharma Residual Solvents - USP 467 Analyzer, the use of the Master TOF Plus allows faster screening and identification of



VOC AIR ANALYZER TO-14, TO-15, TO-17

Monitoring Volatile Organic Compounds (VOCs) in air is a complex technical task, due to their presence in a large amount of varieties often at very low concentrations (tipically from low ppb to high ppt).

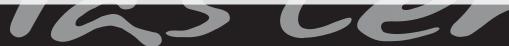
The VOC in Air Analyzer offers an accurate, sensitive, and robust solution for the measurement of VOCs in Air.

The collection of large sample volumes and the use of an enrichment step is required to reach high sensitivity, while a multidimensional gas chromatographic configuration is able to resolve complexity of the analysis.

THe Master Air Sampler, with the Master TD THermal Desorber, permits the automated extraction of 53 VOCs.

The Analyzer features minimum detectable levels well below currently recommended limits.

7	Rev. Match Find	Match Find	Compound Name	1
-	923	923	Dichlorodifluoromethane	Γ.
~	978	875	Chloromethane	
- 1	949	949	Ethene, chiloro-	
	962	962	Ethyl Chloride	1
	967	967	Trichloromonofluoromethane	
4	956	953	Ethane, 1,1,2 trichloro-1,2,2 trifluoro-	
٦	974	974	Trichloromethane	
1	971	963	Dhane, 1,1,1-trichloro-	
4	979	977	Trichloroethylene	
1	986	960	Ethane, 1,1,2 trichloro-	
m				1 1
1				1 1
				1 1
٦				1 1
1				
100			12.1	14.3
	100		1.0	
1				
	1.		1	1
4			1	





CHEMICAL MATERIAL

PACKAGING MATERIAL ANALYZER

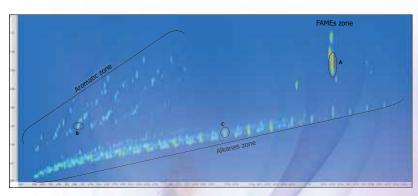
Monitoring packaging material is becoming one of the most important target analyses.

DANI Master SHS Static Headspace Sampler permits the completely automatic sampling into the analytical system: the determination of the residual solvents is obtained at minimum detectable levels below those currently recommended by the norms.

The Master GC Fast Gas Chromatograph coupled to the Master TOF Plus Tlme of FLight GC/MS delivers the high selectivity and sensitivity needed for a reliable identification and quantitation of the substances that from the external surface of the food packaging can possibly be transferred into the food stuff.



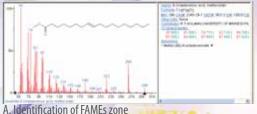
[PETRO] CHEMICAL MATERIAL SCREENING ANALYZER



GCxGC-TOF/MS chromatogram of R20

In the chromatogram, it is possible to distinguish three well separated zones; two of them represent the alkanes and the aromatic compounds contained in the petroleum fuel, while the third is the one of FAMEs, typical of the Biodiesel.

MasterLAB software is used to generate the 2D chromatogram: an innovative and original capability provides the formation of blobs through the association of mass spectra with a high similarity; once blobs are formed, each mass spectrum is compared with NIST library, and the substance is identified.



B. Identification of Aromatics

The state of the state of

Petro-Chemical samples are among the most complex matrices to be analyzed, due to the heterogenity of the species contained.

The DANI Master (Petro)Chemical Material Screening Analyzer provides a very high resolving power in the analysis of petrochemical material, characterizing very complex samples when a second chromatographic dimension is added to the analytical procedure.

Thanks to this advanced and tried-and-true approach to recognize blobs and its high acquisition rate, the Analyzer couples in a unique solution the reliable identification of chromatographic peaks with an accurate quantitative capability characteristics of FID detector.



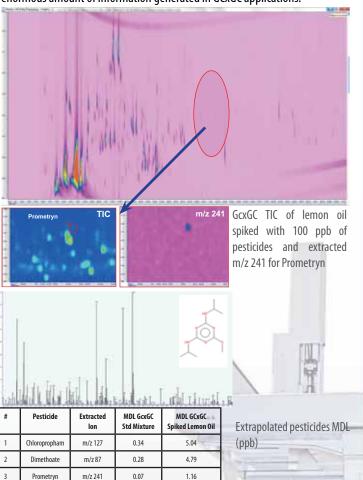


GCXGC-TOF/MS

THE MOST POWERFUL TOOL FOR VOLATILE AND SEMI-VOLATILE ANALYTES

Comprehensive two dimensional GC is the most suitable technique to address the most complex matrices. GCxGC employs two capillary columns in series with different specifity. Between the two columns, a modulator traps refocuses fractions of sample eluted from the first column; after the refocusing, the portions of the compound are periodically sent to the second column (2D) through the same modulator. The entire sample is hence subjected to two indipendent separations characteristics. The technique provides not only increased capacity, but also a 2D chromatogram of chemically-similar compound patterns.

The hyphenation of a TOF to a GCxGC setup adds a third analytical dimension to the system guaranteeing reliable peak assignment and quantification. Furthermore, it is worth noting that the high acquisition rate of Master TOF Plus allows to obtain a major number for peak for an accurate quantification. In addition to this, Master TOF Plus is the only system able to handle the enormous amount of information generated in GCxGC applications.



1.90

m/z 252

DANI Master GCxGC-TOF/MS Advantages

Highest separation power to unravel complex mixtures

Highest sensitivity for trace determination thanks to the focusing of the modulator

Highest amount of analytical information/unit of time thanks to the 2D chromatogram structured according to the chemical/physical properties of the sample

GCxGX facilitates peak identification as each single compound is characterized by two retention times

GCxGC is compatible with all types of injection systems and sample handling techniques used in GC

Reduction of sample preparation time thanks to the enhanced separation power which can isolate target compounds from the matrix of heavy interferences

LN2 cryogenic modulator for the best cryofocusing and enhanced sensitivity

The most performing TOF/MS on the market in terms of speed of acquisition

Wider linear range

Highest acquisition speed for powerful deconvolution capability

Full mass spectra for reliable identification

Quantitative analysis for target compounds

Fast data storing and reprocessing

The advent of GCxGC has enabled a deeper insight into several matrices and revealed unexpected complexity for several samples. Coupling a Fast MS detection as third dimension, unprecedent amount of information can obtain from a single analysis, opening new opportunities for even more performing analytical approaches.

The Master GCxGC-TOF Plus meets the requirements of most challenging analytical needs in major vertical markets as Environmental, Petrochemical, Food&Beverage, Forensic/Tox.







AUTHORIZED DEALER

Disclaimer

The contents of this brochure are for reference and illustrative purposes only. Information, descriptions and specifications in this publication are subjected to change without notice. DANI Instruments S.A. assumes no responsability and will not be liable for any arrors or omissions contained herein or for incidental, consequential damages or losses in connection with the furnishing, performance or use of this material.