

DANI

Master
TOF MS
A-PLUS

SPEED IS KNOWLEDGE

Master

TOF MS

A-PLUS

SPEED IS KNOWLEDGE



www.thermo.com

EXPLORE HOW ACQUISITION SPEED IS KEY TO ACHIEVE ACCURATE RESULTS IN GC/MS

The DANI Master TOF MS A-Plus has been designed for gas- chromatography/mass spectrometry applications, bringing the analyst capabilities so far unachievable with quadrupole technology.

High Sensitivity over the entire mass range, for every single spectrum, for hundreds of spectra per second brings an entire new dimension of information to the analytical process.

Fast acquisition speed allows generating high-density data points chromatograms and plenty of spectral information to play with.

The operations of DANI Master TOF MS A-Plus allow generating high-quality spectra, with no discrimination between low and high masses and reliable library search process.

Its best-in-class dynamic range in the chromatographic and in the spectral domain allows quantification with speed, accuracy, and repeatability.

FAST ACQUISITION SPEED: KNOWLEDGE THROUGH QUALITATIVE AND QUANTITATIVE FIDELITY

The DANI Master TOF MS A-Plus protects your investment providing both target and non-target analysis information, in some cases projecting the analytical workflow ahead of the regulations while at the same time allowing retrospective investigations.

Master

SPEED IS KEY FOR ACCURACY

The DANI Master TOF MS A-Plus allows the acquisition of the entire mass range for each pulse. As such, it is ideal to perform routine analysis on target compounds as well as to explore potential presence of non target molecules.

TOF MS is acquiring spectra during the entire run, for a better confirmation of compounds' identities as well as for identification of newly defined targets retrospectively, at later stage of research.

Dani Master TOF MS A-Plus is the ideal tool to combine routine quantitation and to search for unexpected molecules. All of this without affecting the workflow, the analytical sensitivity, the processing time.

SPEED IS KEY FOR HIGH DENSITY DATA POINTS

With up to 1,000 acquired spectra per second, the total ion chromatogram has plenty of data points for an absolutely accurate definition of the chromatographic peak, allowing an accurate measure of the peak area, even on very narrow peak bandwidths.

Since every mass is acquired, every extracted ion chromatogram will have as many points as the total ion chromatogram.

The fast acquisition rate across the entire spectrum ultimately provides accuracy of results for all selected masses.

Master

EXTENDED DYNAMIC RANGE

The extended dynamic range over five orders of magnitude is assured by a specifically designed electron multiplier. Since it operates in the analog domain, its dynamic range is best-in-class at 10^5 .

Five orders of magnitude of linearity are available not only in the chromatographic domain, but also in the spectral domain.

This performance is very important to provide accurate isotopic ratio for accurate library search and compound identification/confirmation.

Linearity across the entire mass range allows the use of any ion/mass for a quantitative analysis.

The DANI Master TOF MS A-Plus belongs to the class of the short flight tube Time Of Flight Mass Spectrometers.

As such, in the DANI Master TOF MS A-Plus Time of Flight technology is used for fast acquisition rate coming from a continuous stream of ions formed in the electronic impact source and focused on the TOF repeller. DANI Master TOF MS A-Plus repeller is capable to pulse thousands times per second. For each pulse, ions of different fragments will start travelling through the TOF flight tube at different speed based on their mass. The accuracy of this process is facilitated by the use of a reflectron and ions complete their path hitting a specifically designed electron multiplier detector operating in analogue mode. As a result of this process, spectra corresponding to each repeller pulsation are acquired and temporarily stored on the buffer of the memory of the instrument.

QUALITATIVE FIDELITY QUALITATIVE FIDELITY

The TOF Technology provides many advantages vs quadrupoles.
Fast acquisition rate for All the Masses, All the Times.

Fast acquisition enables spectral consistency and continuity across the whole chromatographic peak, for the best use of spectral information.

Every mass can be picked to re-build a chromatogram with the same number of high density data points.

Every chromatographic data point of any extracted ion has its own spectrum.

Accurate peak deconvolution and the ability to identify co-eluted compounds are possible thanks to the high number of spectra/sec.

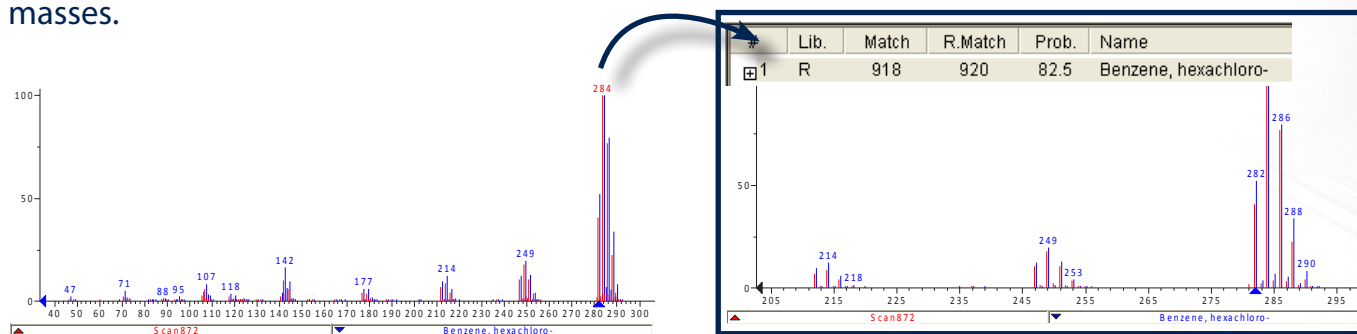
Analyst, since all spectra are available, can do target analysis and can also investigate for potential unexpected contaminants even after a long period of time when new information becomes available.

QUALITY OF SPECTRA QUALITY OF SPECTRA

The DANI Master TOF MS A-Plus does not skew spectra. This means
High Spectral Accuracy across Entire Mass Range.

Accurate and effective library search process is available. Typically NIST searches are providing very high hits when dealing with DANI Master TOF MS A-Plus data;

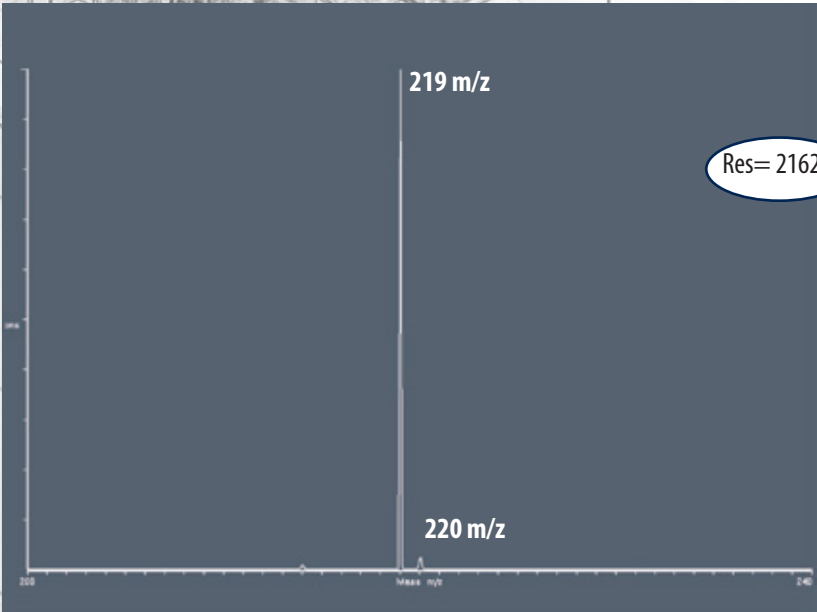
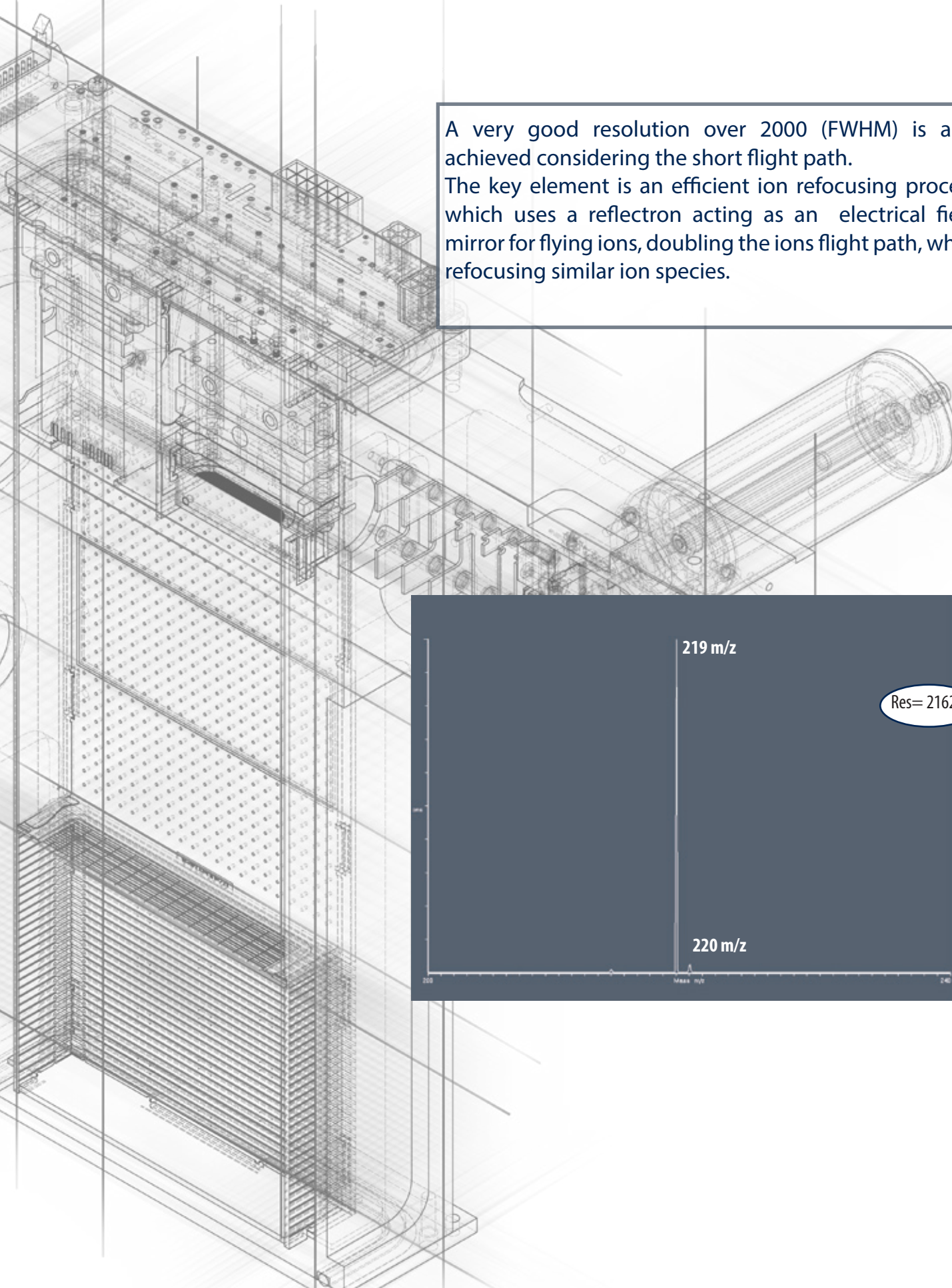
An excellent sensitivity on high masses is also provided as TOF technology does not discriminate masses.



The Master TOF A-Plus is delivering high spectral quality with very high library similarity matching for reliable identification of unknowns and confirmation of targets. A 70eV EI ion source is producing typical fragmentation reported in common MS spectral libraries. Cluster profile of polyhalogenated fragments are perfectly matching the NIST library references, as required for PCBs and PBDEs compounds.

IMPROVED RESOLUTION

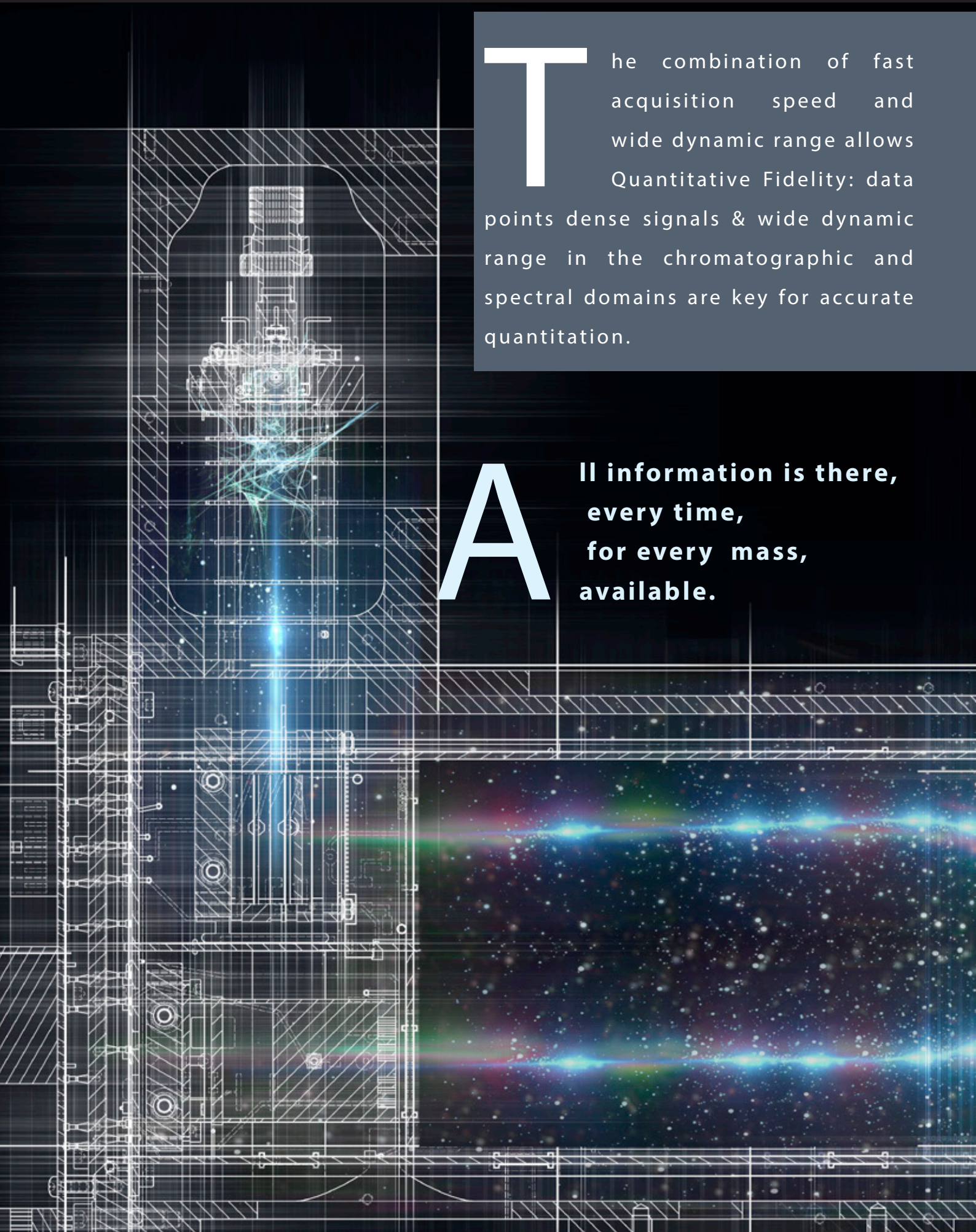
A very good resolution over 2000 (FWHM) is also achieved considering the short flight path. The key element is an efficient ion refocusing process which uses a reflectron acting as an electrical field mirror for flying ions, doubling the ions flight path, while refocusing similar ion species.



QUANTITATIVE FIDELITY

The combination of fast acquisition speed and wide dynamic range allows Quantitative Fidelity: data points dense signals & wide dynamic range in the chromatographic and spectral domains are key for accurate quantitation.

All information is there,
every time,
for every mass,
available.



Quantitative fidelity is not necessarily available in scanning system. Scanning takes time and also can discriminate low molecular and high molecular weight species.

Low scanning rate means fewer points per peak, meaning more mathematic and processing to rebuild chromatographic signal. All of this is detrimental for accuracy and peak shape, affecting, ultimately, quantitative results.

In addition, fewer points per peak can affect chromatographic resolution and partially co-eluted peaks can be missed. This means missing information and potential inaccuracies in quantitative results.

ENHANCED SENSITIVITY ENHANCED SENSITIVITY

The DANI Master TOF MS A-Plus shows sensitivity comparable with most of SIM acquisitions performed with a single quad, but it is **High Sensitivity in Full Spectra Acquisition, for all Masses.**

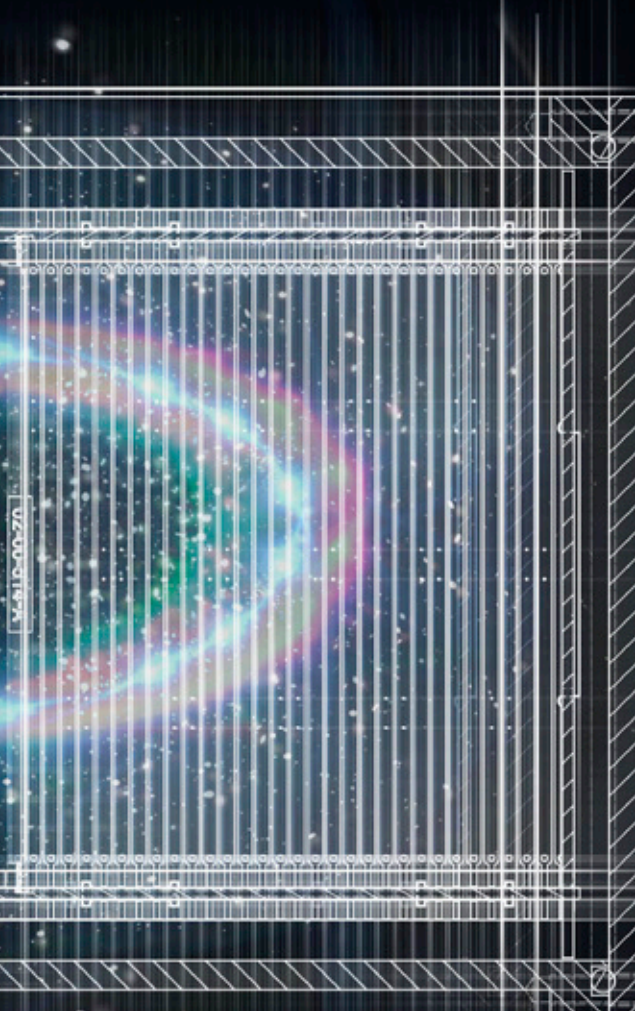
The analyst will be able to play with trace analysis while at the same time acquiring all other masses. This is important because:

Allows to check for other ions of the target compound for a full confirmation of its ID.

Allows to check for other unexpected compounds immediately or in a re-evaluation of an acquired sample after gaining new information. No information gets lost.

Allows to collect a full spectrum of the background that can be used to improve signal to noise / sensitivity.

Allows to perform deconvolution calculation to discover co-eluted compounds.



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aster TOF MS A-Plus : the right tool for demanding analyses.

FLAVORS & FRAGRANCES

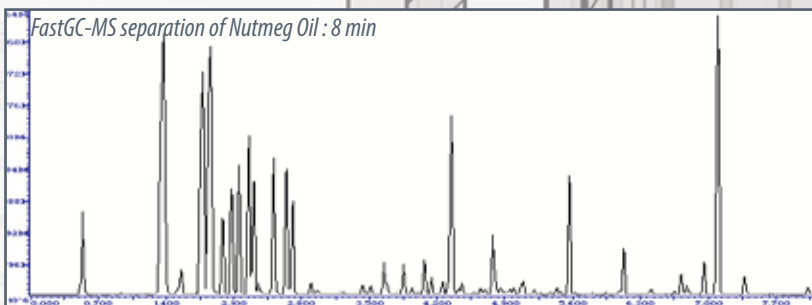
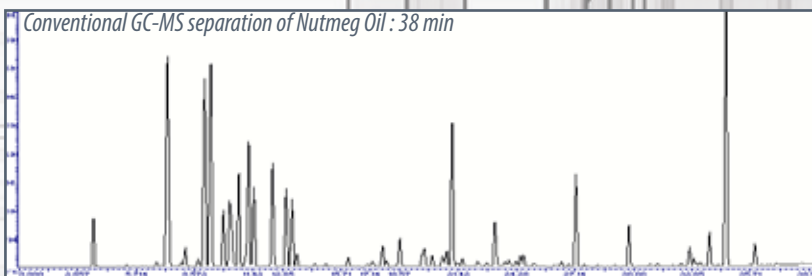
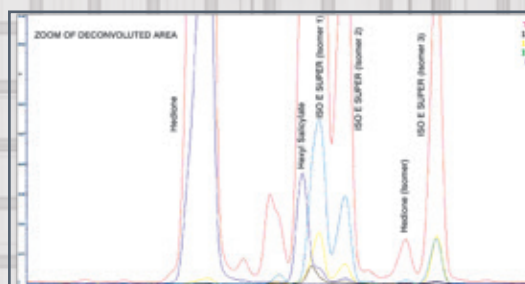
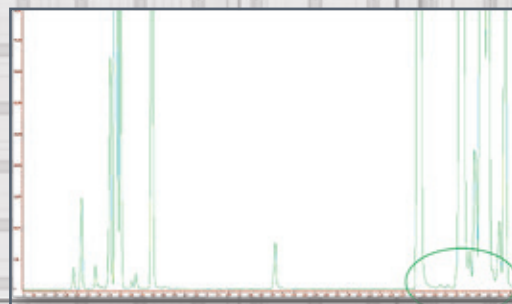
Improve quality brand performance and efficiency of process.

Fragrance materials are composed of a wide range of compounds blended to create sophisticated perfumes. Perfume profile is of primary importance for the fragrance industry for quality assessment, perfume formulation, competitors benchmarking, trace analysis of markers.

DANI Master TOF MS A-Plus, thanks to its speed of acquisition, allows to unravel complex samples with fast chromatography and peak deconvolution for comprehensive information. Accurate definition of chromatographic peak and accurate results are guaranteed by the high density data points signals.

Since all the spectra are acquired and recorded across the entire mass range, it is possible to identify the composition of perfume raw material, taints and off-flavors and fingerprints potentially related origin / specific ingredients.

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

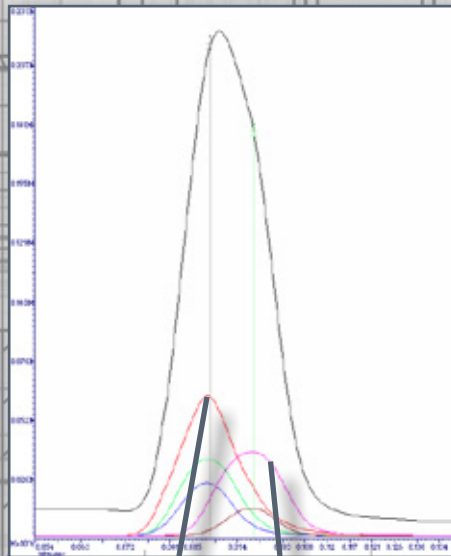


Fast GC-MS analysis allows to significantly reduce the analysis time and match the increasing demand of high sample throughput in quality laboratories. Conventional analytical methods for essential oil profiling generally produce analyses times of about 30-50 min. Exploiting the Fast GC approach, it is possible to gain e.g. 6-fold reduction of the run time, maintaining the required resolution, precision and accuracy of the data.

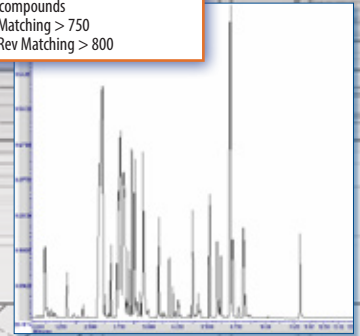
The fast separation of the Nutmeg Oil maintains the chromatographic profile.

High acquisition rate enables a more effective application of the deconvolution procedure, in case of co-elution and matrix interferences. Acquisition rate can be increased without sacrificing the selected mass range and without losing spectral information, hence achieving very high quality matching.

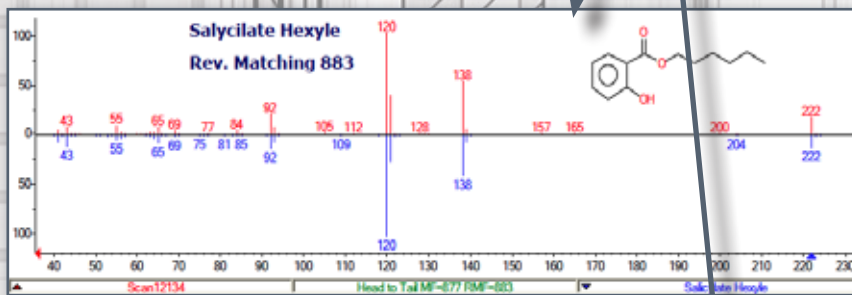
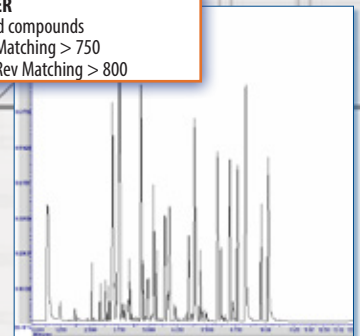
Example of deconvolution of two co-eluted compounds and reconstructed MS spectra.



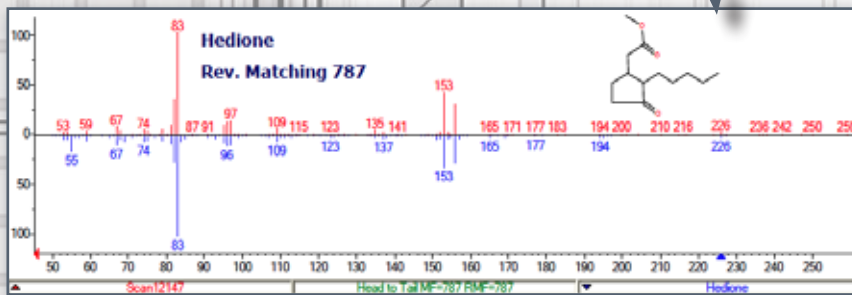
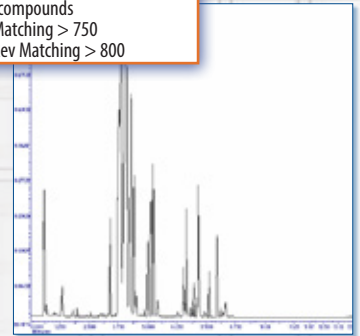
INCENSE
115 identified compounds
51 with : Matching > 750
Rev Matching > 800



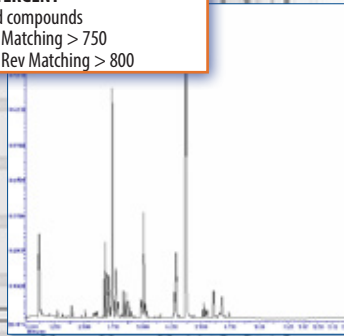
CONDITIONER
113 identified compounds
55 with : Matching > 750
Rev Matching > 800



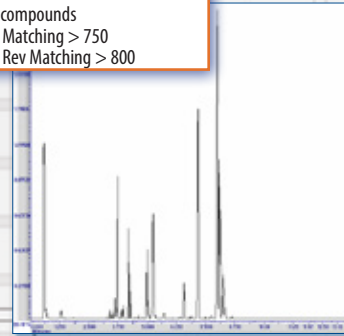
AMBIENT DEODORANT GEL
79 identified compounds
31 with : Matching > 750
Rev Matching > 800



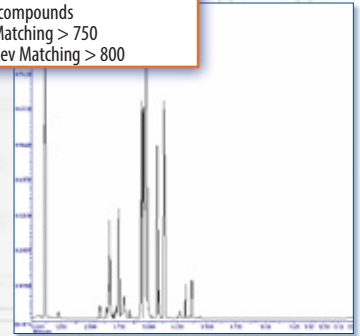
DISHES DETERGENT
93 identified compounds
43 with : Matching > 750
Rev Matching > 800



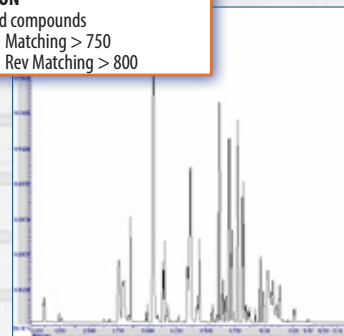
SOAP CAKE
80 identified compounds
34 with : Matching > 750
Rev Matching > 800



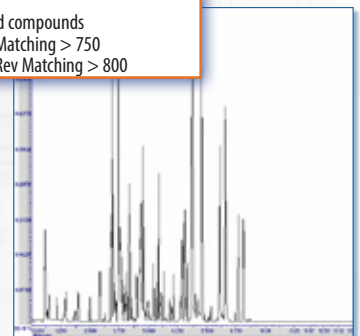
TOOTH PASTE
64 identified compounds
29 with : Matching > 750
Rev Matching > 800



BODY LOTION
74 identified compounds
41 with : Matching > 750
Rev Matching > 800



SHAMPOO
122 identified compounds
67 with : Matching > 750
Rev Matching > 800

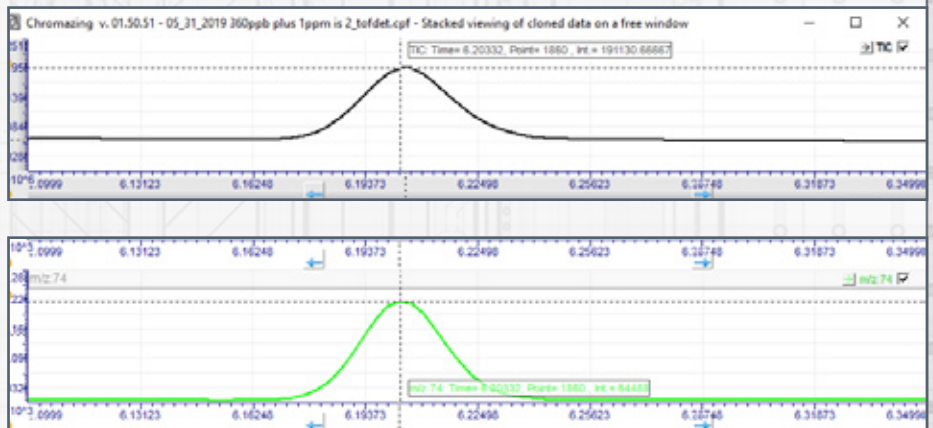
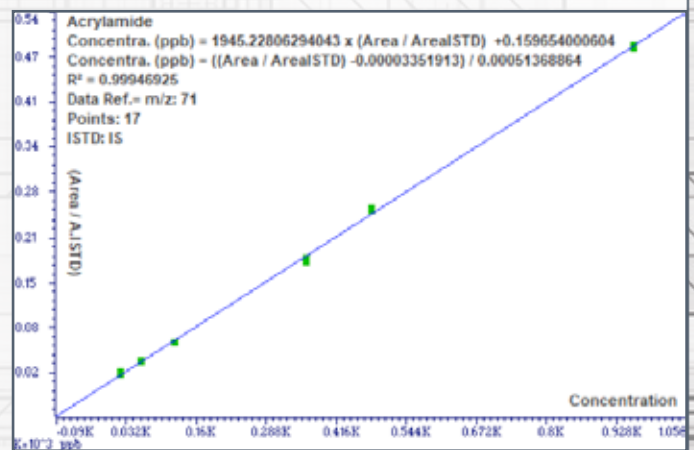


Examples of Home and Personal Care samples. The complete characterization of HPC fragrances takes less than 10 minutes, for all the samples. For each one the number of compounds identified with high matching (>750) against a dedicated database is reported, showing that the spectral quality is maintained during peak compression.

FOOD & BEVERAGE

Acrylamide in food

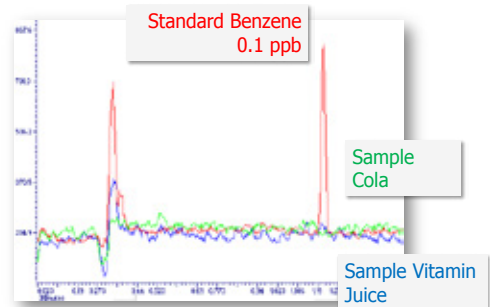
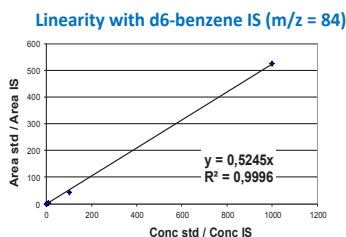
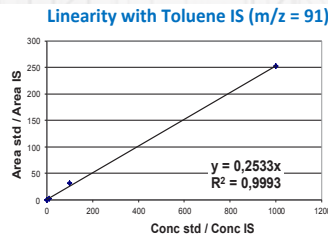
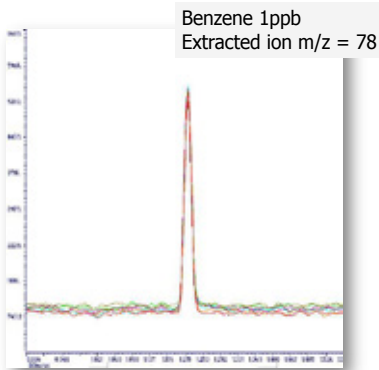
Acrylamide is formed mainly in food by the reaction of the amino acid asparagine with reducing sugars (particularly glucose and fructose) as part of the Maillard reaction. This compound is classified as "probable carcinogen to humans" (Group 2A) by the International Agency for Research on Cancer (IARC), based on animal studies. Using Master GC and Master TOF MS A-Plus it is possible to meet analytical requirements to detect acrylamide in food. In this example, the standard working solutions were prepared by serial dilution and calibration levels were: 20ppb, 60ppb, 120ppb, 360ppb, 480ppb, 960 ppb in methanol/water 50/50, and containing 1ppm of isotopically C13-acrylamide. A SPE-based sample purification is performed before GC-MS analysis. Pictures show analysis of sample of potato chips.



Benzene contamination in Beverages

It's demonstrated that the combination of benzoate salts with ascorbic acid produces low levels (ng/g) of benzene. Benzoates are widely used as food preservatives and beverages especially suffer for benzene formation. Using Master SHS, Master GC and Master TOF MS A-Plus it is possible to detect low levels of benzene in different food matrices (<0.1 µg/kg). Full spectra information from the TOF MS detector assures high specificity for unequivocal identification of the target analyte.

7 replicates of spiked Cola drink
RSD% = 2.6



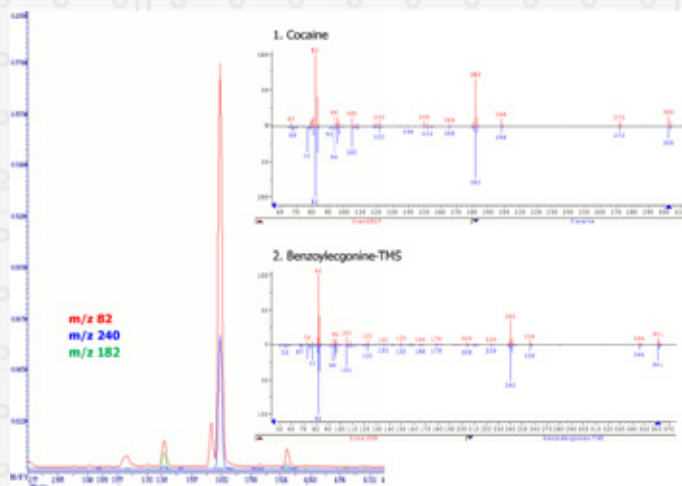
5 points calibration in the range 0.1 - 1000 µg/Kg

The standards have been prepared in a benzene-free cola matrix

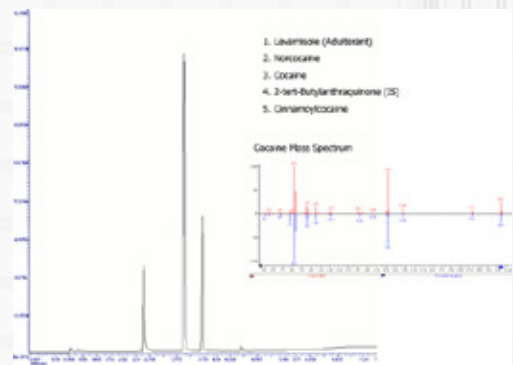
The extrapolated limit of detection (SNR=3) for benzene is 0.004 ng/g evaluated in the spiked Cola sample.

FORENSIC & TOXICOLOGY

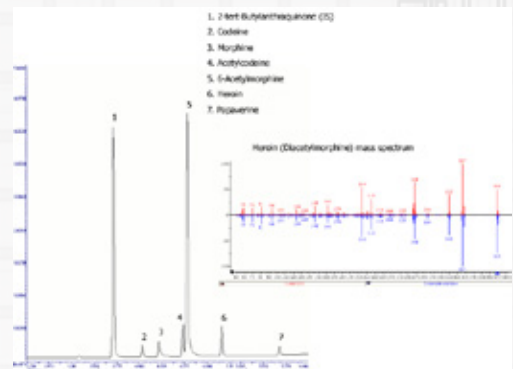
Exploiting the benefits of the Fast GC-MS approach, it is possible to obtain accurate results in shorter time for quick analytical response. This feature can be applied to street drugs characterization and adulterants identification in seized material as well as drug of abuse metabolites identification in extracts of biological samples as blood, urine and hair.



Post Mortem Blood Extract



Street Cocaine Sample



Street Heroin Sample

A COMPLETE LINE FOR GC-MS SOLUTIONS A COMPLETE LINE FOR GC-MS SOLUTIONS

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

The DANI Master TOF MS A-Plus is designed for the DANI Master GC.

The functionalities of the Master TOF MS A-Plus are designed to deliver a perfect synergy with the performance of the Master GC.

The combination of the two devices makes the Master GC-TOF a powerful quantitative machine for customers looking for throughput in target and non-target analysis.

MASTER GC

FAST GAS CHROMATOGRAPH

A BREAKTHROUGH IN FAST GC PERFORMANCE

- Fastest oven heating/cooling rate;
- Proprietary Digital Flow Control with best-in-class performance;
- High-Speed Acquisition (300 pt/sec - all analog detectors);
- Multiple injectors and detectors;
- Up to 3 injectors and 3 detectors plus MS installed simultaneously;
- Suited for Narrow bore GC Columns (>50 μm i.d.);



Master

MASTER SHS

STATIC HEADSPACE SAMPLER

- Largest sample capacity (up to 120 vial positions) and unlimited priority vials;
- Maximum compatibility with different headspace vial formats to accommodate different workflows;
- No carryover thanks to the fully chemically inert sample path;
- Bar code reader for sample identification and validation, ensuring data traceability;
- Sample Tray Cooling Device to preserve sample integrity;
- Compliance with Pharmacopeia & Forensic Regulatory requirements;
- Compatible with any kind of vaporizing injectors and GC/GCMS systems;



HSS 86.50 PLUS

STATIC HEADSPACE SAMPLER

AFFORDABLE EXCELLENCE

- High precision with exceptional simplicity and robustness;
- Well established "Valve&Loop" sampling technique;
- Easy method set-up and optimization;
- 44-seat sample tray;
- Constant incubation time and sample overlapping capabilities;
- Simple and fast installation on any GC;
- High system popularity supported by a very large installed base;
- Standalone control software available.



MASTER DHS

DYNAMIC HEADSPACE SAMPLER

ULTIMATE VERSATILITY

- Sensitivity 10-50 fold compared with Static Headspace
- Wide polarity range thanks to trap sorbent material options;
- No loss of high volatile compounds with the Peltier optional device (trapping @-10°C);
- Multiple extraction capabilities for sensitivity enhancements.



MASTER P&T

PURGE & TRAP SAMPLER

COMPLIANT INNOVATION

- Innovative dual needle technology;
- Use of disposable vials instead of conventional vessel;
- One step less of sample manipulation;
- Automatic recondition of the sample path at the end of every analysis;
- Inert material of the entire sample flow path;
- Highly thermostatted sample path to avoid sample condensation;
- Small volume trap for superior chromatographic separation;
- Exclusive dew stop device for efficient water removal;
- Compatible with any of GC and GCMS system;



MASTER TD

THERMAL DESORBER

EXTENDED SAMPLING,

OUTSTANDING SENSITIVITY

- 100-1000 fold higher sensitivity than a liquid extraction;
- Two-stage thermal desorption process with packed sorbent trap;
- Patented "instant desorption" device;
- Extraction of VOC and SVOC up to C44;
- Tube reconditioning during sample analysis;
- "Air Sampler" device for continuous monitoring or automatic sampling from canister / air bags.





AUTHORIZED DEALER

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