

**DANI**

# Master

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DYNAMIC HEADSPACE SAMPLER

**A DYNAMIC APPROACH TO HIGH  
SENSITIVITY HEADSPACE ANALYSIS**

INCREASED SENSITIVITY WITH NO SAMPLE MANIPULATION

ANALYSIS OF A WIDER RANGE OF ANALYTES

HIGHEST PRODUCTIVITY, RELIABILITY AND EASE OF USE

INCREASED ANALYTICAL PERFORMANCE



# Master DHS

DYNAMIC HEADSPACE SAMPLER

## A DYNAMIC APPROACH TO HIGH SENSITIVITY HEADSPACE ANALYSIS

### Extending Sensitivity for a deeper characterization of samples

DANI Master DHS Dynamic Headspace Sampler provides you with the most sensitive and versatile system for headspace analysis. In Dynamic Headspace Sampling technique, samples containing volatile organic compounds are placed in a closed vial and after thermostating and initial molecules' partition the headspace is purged by a constant flow-rate of inert gas for a fixed time. Volatiles are swept from the headspace and transferred to an adsorbent trap where they are cryofocused and concentrated. At the end of the concentration step, the trap is rapidly heated, the volatiles are desorbed in back-flush mode and sent to the GC column.

When compared to Static Headspace sampling, Master DHS presents two main advantages:

1. the extraction step is no longer dependent on the thermodynamic equilibrium between the liquid/solid phase and its headspace. It means that extraction is less affected by the sample matrix. This benefit is particularly evident for compounds that show high solubility in the matrix and consequently low sensitivity when the Static Headspace approach is applied.
2. Increased sensitivity for all analytes as a larger amount is extracted from the sample, concentrated and injected, compared to the Static Headspace approach where only a fixed volume of gas is sampled from the vial.

Master DHS can be used for both liquid and solid samples. Furthermore, it provides analysis of sample "as is", without requiring the use of solvents for extraction and concentration purposes. This increases the sensitivity and eliminates any concern about solvent toxicity and solvent disposal problems when compared to a liquid extraction technique.

### INCREASED SENSITIVITY WITH NO SAMPLE MANIPULATION

### ANALYSIS OF A WIDER RANGE OF ANALYTES

### HIGHEST PRODUCTIVITY, RELIABILITY, AND EASE OF USE

### INCREASED ANALYTICAL PERFORMANCE

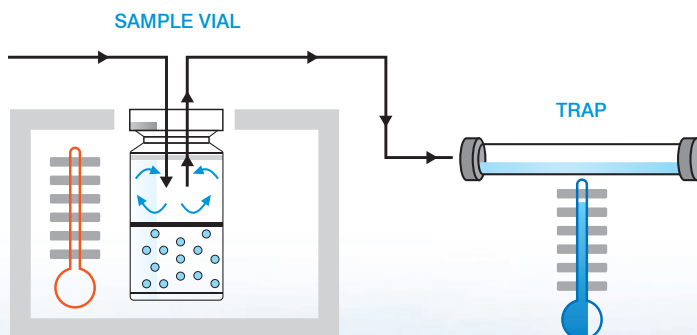


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## INCREASED SENSITIVITY WITH NO SAMPLE MANIPULATION

Unmatched sensitivity is obtained through the constant sweeping of the thermostatted sample, promoting the enrichment by cryofocusing of the volatile compounds on the sorbent trap.

The use of a precise flow of inert gas through a specifically designed dual-needle enables the volatiles to be swept from sample headspace and focused in a sorbent trap. Using selected sorbent materials and temperature settings, a suitable concentration of trace level analytes is achievable over a wide range of volatility. Analytes are then thermally desorbed and introduced into the gas chromatographic column. The highest recovery of the volatiles and the fast desorption process produce a narrow band at the inlet preserving chromatographic efficiency and resulting in unmatched sensitivity.



Master DHS is designed to lodge standardized headspace vials and can be used on samples that require a high level of sensitivity like food matrix, soils or liquid samples like beverages or biological fluids.

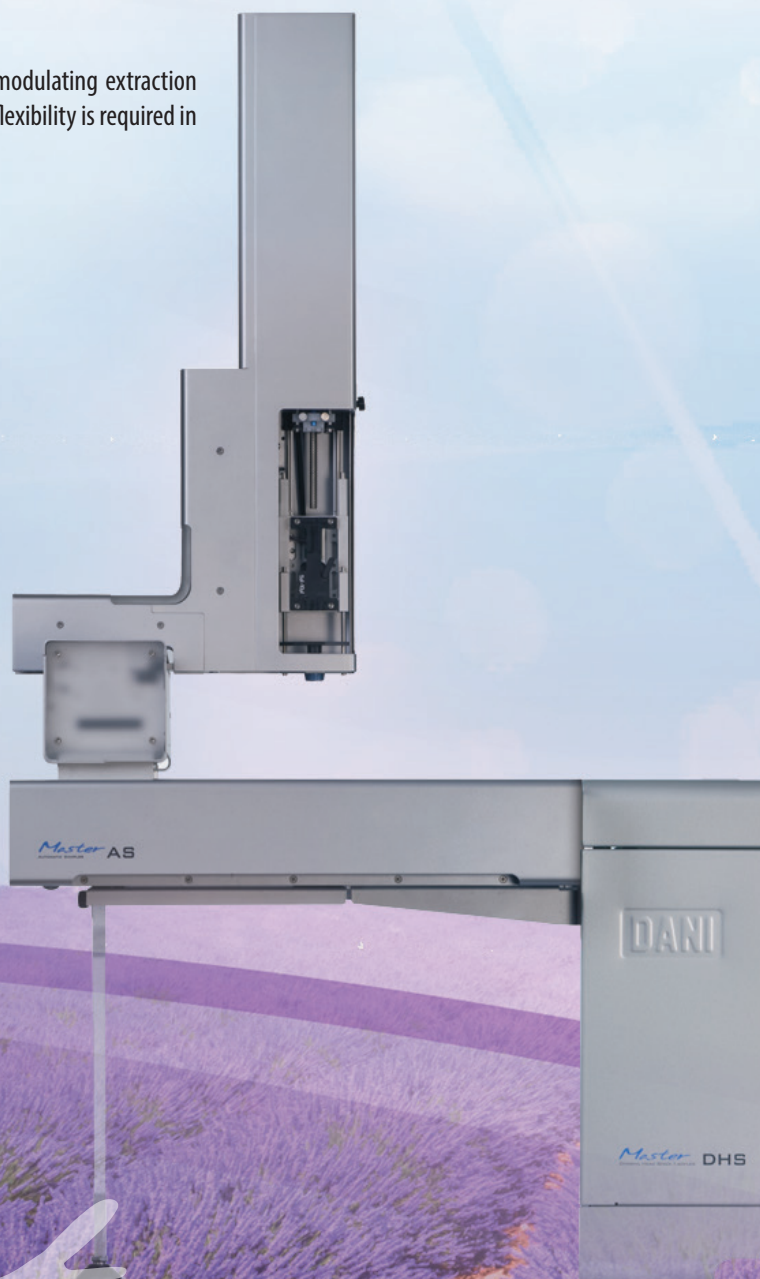
The technology allows a wide range of sample types due to the capability of modulating extraction parameters, making this the technology of choice whenever analytical approach flexibility is required in the laboratory workflow.

## INCREASED PRODUCTIVITY

Master DHS Dynamic Headspace Sampler can be combined with the Master AS Automatic Sampler to increase automation capacity and optimize system productivity.

In combination with the Master AS, Master DHS allows overlapping of thermostating providing constant sample incubation time and so increasing laboratory productivity and sample throughput. The system automatically controls that the next sample is thermostatted while the current one is analyzed. This mode of operation allows to maintain excellent analytical throughput and laboratory productivity even when samples, requiring long thermostating times, are processed.

Furthermore, the system delivers the complete automation of the standard addition to enhance analytical precision. The addition of up to 6 standard solutions directly into the vial can be programmed by the user.



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## SAMPLE INTEGRITY

Master DHS provides superior efficiency of volatile extraction. In this way it is possible to minimize or reduce the thermal stress for samples, specifically those sensitive to thermal degradation.

Lower temperature and longer extraction time can be easily applied to obtain an accurate representation of sample composition.

The sample flow path is entirely chemically inert preventing carryover effects, eliminating sample loss caused by adsorption and reactivity. In addition, the entire sample flow path undergoes an automated cleaning cycle during the baking phase allowing high reproducibility of results 24/7. The baking phase takes place during the GC run and does not affect analytical throughput.

Liquid or solid samples are placed in sealed vials and thermostatted in a temperature-controlled oven. Shaking of the vials is also available to speed up the extraction step and increase its efficiency. A leak check test is performed prior the volatile extraction to ensure full sample integrity.

## HIGHEST RELIABILITY AND EASE OF USE

The accurate and precise control of the entire sampling process ensures superior analysis performance fulfilling the requirements of both routine analyses and research applications over a wide range of sample types.

Every single step is automated and settings are electronically controlled. Analytical method parameters include all the flows during sweeping and desorption processes as well as the temperatures in the different zones and timing of the operations.





## COMPLETE AND INTUITIVE MASTER DHS CONTROL

The Master DHS can be controlled directly from the built-in touch screen through a comprehensive and intuitive user interface. In addition, full control from Data Apex Clarity Chromatography Software is available as well as by using the standalone software DANI DHS Manager.

All the above mentioned control modes offer a straightforward method and sequence set up enabling automated analyses.

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

## OPERATING IN PURGE & TRAP MODE

The Master DHS sampler allows operations in Purge & Trap mode for liquid samples. With a specific upgrade kit, the system can perform a "in-vial" purging of volatiles, matching and exceeding the results obtained by commercially available purge & trap systems.

In this configuration the lower tip of the dual-needle operates below the level of the liquid sample. The continuous stream of carrier gas creates a bubbling facilitating the extraction of volatiles.

The switching from DHS to P&T can be easily done by the user in minutes without the intervention of specialized service people and without disconnecting the unit from the GC. This unique capability further expands the range of applications of the Master DHS.

KEY TECHNICAL POINTS			
Compatible with most commercially available GCs on the market		Samples	standard 20mL headspace vials with crimped or screw magnetic caps and PTFE coated silicone rubber septa
Mass Spectrometry compatible		Methods	Up to 25 storable methods
Easy switchable operating mode from DHS to P&T		Oven	Temperature: 40° to 300°C, increment 1°C Time: 0 to 999 min, increment 0.01 min Shaking modes: no, slow, fast
Proprietary Dew Stop device to minimize negative effects caused by humidity		Switching Valve	Temperature: 40° to 300°C, increment 1°C
Capacity	up to 65 samples with Master AS 18 seats electrically driven thermostatted carousel	Focusing Trap	Packed Focusing Trap
		Sorbent Material	Tenax GR (different materials on request)
		Stripping Temperature	10°C above ambient to 40°C, increment 1°C
		Dry step Temperature	10°C above ambient to 40°C, increment 1°C
		Injection Temperature	40° to 450°C, increment 1°C

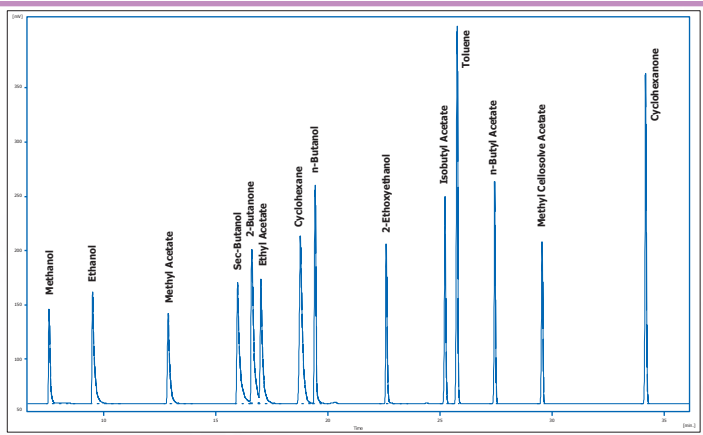
**UNPRECEDENTED SENSITIVITY OVER A WIDE RANGE OF APPLICATIONS**

**FOOD PACKAGING MATERIALS ANALYSES**

Packaging materials may represent a source of contamination of the food they are intended to protect.

Two analytical approaches are usually followed: the control of the packaging production process and the control of the migration of chemicals into foodstuffs.

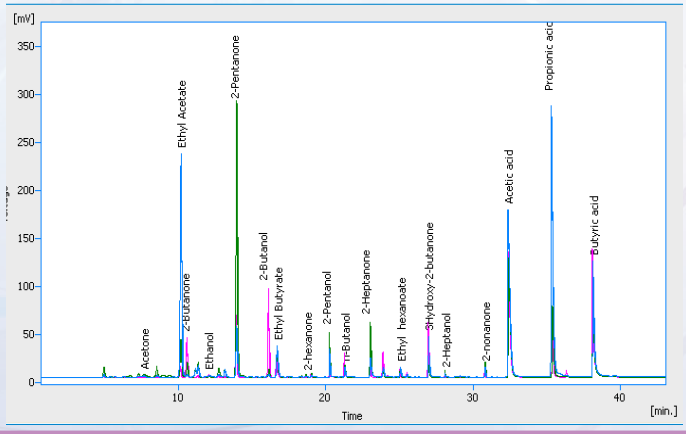
Master DHS delivers outstanding sensitivity to detect traces of residual solvents and/or toxic compounds coming from the manufacturing process or migrated into the foodstuffs.



**ANALYSIS OF VOLATILES IN FOODSTUFF**

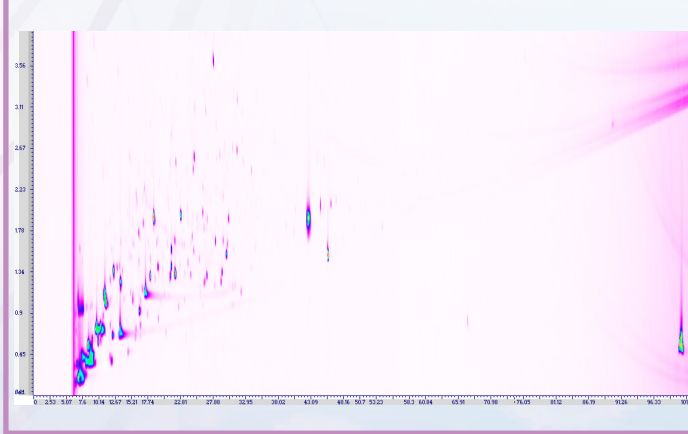
The automated Dynamic Headspace technique is an effective extraction method for a comprehensive flavor profiling including molecules contained in a broad range of volatility and polarity at trace level. Figure on the right shows three overlapped chromatograms of the volatile components in cheese samples.

The chromatogram shows the presence at low concentration of organic acids like acetic propionic and butyric which are hardly extracted by static headspace technique.



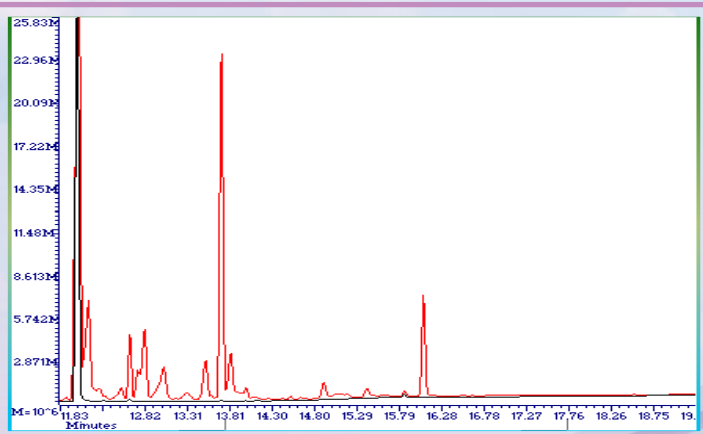
**DIRECT AND COMPLETE ANALYSIS OF COFFEE ROASTING PRODUCTS**

Coffee aroma is a very complex mixture of volatile components, the quality of which depends on the species and on the geographical origin of the green coffee beans, as well as on the post-harvesting treatments, among which the roasting is one of the most important processes. Master DHS, equipped with a triple layer trap, allows automated extraction and concentration of species generated during coffee roasting prior subsequent analysis by GCxGC-TOF MS. Figure on the left shows 2D GCxGC mapping relative to 3 coffee beans roasted directly in the vial at 200°C.



**DETERMINATION OF SEMIVOLATILE COMPOUNDS (SVOC) IN ENVIRONMENTAL MATRICES**

Automatic extraction and analysis of Semi-Volatile Organic Compounds (SVOCs) is possible with Master DHS due to the ability to operate at high temperatures like 300°C during extraction and sweeping phase.





A SCENT OF FUTURE

AUTHORIZED DEALER

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