

# The Best Analysis Begins with the Best Preparation

Thermal desorption solutions





# Introducing the Ultimate Sample Introduction Technology for Gas Chromatography

Thermal desorption (TD) allows you to introduce volatile and semivolatile organic compounds from a wide range of sample matrices directly into a GC or GC/MS instrument. Versatile, highly sensitive, and fully automated, TD has become the preferred methodology for use in environmental testing, material emissions analysis, and flavor/fragrance profiling.

Now, Agilent is partnering with Markes International, which has advanced TD technology to an unprecedented level. Think of Agilent as your single source for sales, service, and support of TD-GC/MS systems.



## TD technology offers significant advantages over solvent extraction:

- Increased sensitivity
- Compatible with solid, liquid, and gaseous samples
- Fully automated
- Greater than 95% recovery

## UNITY-xr

Markes' UNITY-xr provides a versatile platform for all TD applications. Perfectly suited for increasingly rigorous laboratory demands, the UNITY-xr combines single-tube desorption with cryogen-free analyte refocusing and full compatibility with a variety of autosampler options.

### Key features of UNITY-xr include:

- **Quantitative sample re-collection** of all the split flows enables repeat analysis of critical samples and easy method validation, and overcomes the one-shot limitation of conventional TD systems.
- **Electrically cooled sorbent trapping** to -30 °C offers quantitative retention of ultravolatile components and reduces running costs.
- **An inert, optimized flowpath** allows quantitative recovery of C2 to C44, including reactive and thermally labile species. Analyze from percent to sub-ppt concentrations.
- **Fully compatible with TubeTAG RFID devices.** It allows an individual TubeTAG to remain with a specific sample tube throughout its life, recording tube history and facilitating sample tracking between field and laboratory.
- **Fully method-compliant**, including stringent leak testing without heat or gas flow applied.
- **Fully upgradable** to multi-tube, multi-canister, and/or online automation.
- **Time-saving overlap mode** allows desorption of a subsequent sample to begin while GC analysis of a previous sample continues.
- **Electronic pneumatic control of carrier gas** and optional electronic mass flow control of split and desorption flows.
- **Intuitive control software** running alongside MassHunter and OpenLab CDS.



UNITY-xr



**Air Server-xr**  
Round-the-clock online air/gas monitoring

## Automation options for UNITY-xr

### Air Server-xr and CIA Advantage-xr

Automated canister analysis and round-the-clock online air/gas monitoring.

- Connect to any UNITY-xr thermal desorption system
- Controlled flow of whole-air or gas, delivered directly into the electrically cooled focusing trap of UNITY-xr
- Cryogen-free system reduces costs and maintenance, while offering optimum analytical performance/sensitivity
- Compact design, especially useful for installation in mobile labs
- The CIA Advantage-xr offered by Agilent has capacity for up to 14 canisters, as well as built-in internal standard addition

### ULTRA-xr

A mechanically simple TD autosampler for UNITY with onboard read/write of electronic tube tags.

- Internal standard addition capabilities available as an option
- Simple field upgrade for existing UNITY systems
- Unattended thermal desorption of up to 100 capped tubes

## TD100-xr

Markes' TD100-xr is optimized for automated desorption of up to 100 tubes with or without RFID tags. It complements Markes' state-of-the-art modular UNITY-based TD systems and offers the same peerless analytical flexibility and performance, including a universal application range, cryogen-free operation, stringent leak testing, and quantitative re-collection.

### Key additional features of TD100-xr include:

- 100-tube capacity means unattended operation all weekend
- Automated sample re-collection for repeat analysis ("50:50" capability)
- Onboard tag read/write capability for enhanced sample and tube traceability
- Stringent tube sealing via Difflok caps before and after desorption prevents loss of analytes and ingress of contaminants
- Mechanically simple automation—no uncapping/recapping required



TD100-xr 10 trays, each accommodating up to 10 capped tubes and incorporating "50:50" capability for automatic sample re-collection



### Thermal desorption supplies for performing reliable air quality tests

Markes International TD platforms let you analyze single tubes, real-time air samples, and canisters with options for automated analysis.

You can count on Agilent for a selection of unique sampling tools for measuring volatile and semivolatile organics in challenging matrices.

Find out more at:

[www.agilent.com/chem/thermaldesorption](http://www.agilent.com/chem/thermaldesorption)

# Thermal Desorption Brings Versatility and Labor-Saving Benefits to a Wide Range of Applications



## Air monitoring

Thermal desorption is the optimum solution for a wide range of air monitoring applications. By offering superior sensitivity, TD technology has supplanted solvent extraction and charcoal/CS<sub>2</sub> as the method of choice.

This trend is driven by recent advances in instrumentation, such as the ability to quantitatively re-collect split flow for repeat analysis. Applications of Markes' TD technologies include:

- Atmospheric research
- Ambient/urban air monitoring (TO-15/TO-17)
- Industrial (stack) emissions
- Odor assessment
- Indoor air quality
- Personal exposure monitoring
- Biological exposure assessment (breath testing)
- Soil gas and vapor intrusion assessment
- Counter-terrorism and chemical defense
- Photochemical Assessment Monitoring Stations (PAMS)
- SVOCs



## Material emissions

Regulatory initiatives have led to increased focus on measuring chemical releases from everyday products and materials. Thermal desorption complements GC/MS in the evaluation of VOC releases from materials, offering both simple direct desorption of chemical content and method-compliant assessment of emitted vapors.

Markes' thermal desorbers are compatible with the widest possible ranges of target analytes at both trace and high levels.

Applications include:

- Paint, pigments, coatings, and adhesives
- Construction materials
- Furniture, furnishings, and vehicle trim components
- Carpet and other flooring products
- Toys and electronics
- Electronics for semiconductor industry



### Multi-Tube Conditioner and Dry-Purge Unit (TC-20)

Markes' TC-20 is a compact, standalone device for the simultaneous conditioning of up to 20 industry-standard thermal desorption sorbent tubes. It lets you condition tubes in a fraction of the time and can reduce costs.

- Uses nitrogen rather than expensive helium
- Eliminates potential for analytical instrument contamination
- Purges excess water trapped during sampling to stop water from interfering with the sample analysis
- Improves productivity since you'll be able to avoid using valuable instrument time for conditioning sorbent tubes





## Food, flavor, and fragrance

Flavor and fragrance profiling by GC/MS can be challenging, as profiles typically comprise hundreds of VOCs, with trace-level analytes often having the greatest effect on perceived aroma.

Thermal desorption offers a more reliable solution than conventional sample preparation methods, because it allows for a wide range of sampling methods; samples can also be re-collected for repeat analysis and validation.

Applications include:

- Aroma profiling of toiletries, consumer products, and plant extracts
- Off-odor and taint analysis
- Detecting key olfactory components
- Flavor and aroma profiling of coffee and beverages



### Micro-Chamber/Thermal Extractor ( $\mu$ -CTE)

Markes'  $\mu$ -CTE is a versatile tool for testing VOC emissions from small samples. A controlled flow of air or inert gas is passed through all chambers, and sorbent tubes are attached to begin the vapor sampling process. These can then be analyzed by TD-GC/MS in the usual way.

- Four samples can be tested simultaneously, up to 250 °C
- Complies with standard methods for emissions screening
- Direct correlation with tests from environmental chambers
- Bulk and surface emissions can be sampled
- Perfect for quality control, product comparison, and testing of raw materials
- Suitable for a wide range of materials, including construction products, furnishings, and food



## Environmental monitoring

Thermal desorption is now recognized as the technique of choice for environmental and workplace air monitoring. Relevant standard methods include: EN ISO 16017, EN 14662 (parts 1 and 4), prEN 13649, EPA 325, ASTM D6196, US EPA TO-17, and NIOSH 2549. Applications include:

- Atmospheric research
- Ambient/urban air monitoring
- Industrial (stack) emissions testing
- Odor monitoring
- Indoor air quality
- Soil gas and vapor intrusion assessment
- Trace volatiles and odors in water
- Workplace air monitoring/industrial hygiene
- Personal exposure monitoring (inhalation)
- Biological exposure assessment (breath testing)

### The combined benefits of two industry pioneers

Agilent Technologies has a long history of innovation in GC and GC/MS, coupled with a reputation for building rugged instrumentation. In developing strategic business alliances, we seek companies that are similarly forward-thinking.

Markes International resoundingly meets our criteria. Markes is the world leader in thermal desorption technology, manufacturing products renowned for reliability and performance. Given Agilent's position as the leading global supplier of GC/MS instrumentation, the two companies share obvious synergy. This partnership ensures that customers will get the very best in quality products and support from a single source.





## Defense and forensics

Thermal desorption is used extensively for forensic science and chemical defense. Key forensic applications include:

- Detection and forensic analysis of drugs of abuse
- Arson residue analysis for accelerants
- Detection of trace explosive vapors
- Shotgun propellant
- Forensic analysis of inks, paper, and paint

The wide range of TD applications in chemical defense include monitoring agent destruction, battlefield protection, and civil defense (counter-terrorism).

### **An ever-expanding portfolio of solutions from the leader in GC/MS technology**

Agilent's partnership with Markes International is another example of our ongoing goal of offering innovative new solutions for maximizing productivity. As the industry benchmark for quality, Agilent's instrumentation helps engineers, scientists, manufacturers, researchers, and government agencies achieve more accurate measurement and analysis.

Count on Agilent for:

- Workflow solutions that let you maintain stringent practices, from sample preparation to analysis.
- GC/MS software for managing large quantities of data, while preserving the integrity and security of your results.  
So you can make the most of every run, and every workday.
- Agilent-engineered supplies that expand your hours of continuous uptime.
- World-class global service and support that can reduce lab time, optimize instrument use, and increase productivity.

## Agilent CrossLab: Real insight, real outcomes

CrossLab is an Agilent capability that integrates services, consumables, and lab-wide resource management. So your lab can improve efficiency, optimize operations, increase instrument uptime, develop user skill, and more.



Learn more:

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