

Thermal Desorption Solutions

**A COMPLETE PREPARATION
AND ANALYSIS PACKAGE
FROM ONE RELIABLE SOURCE**

The Measure of Confidence



Agilent Technologies

Introducing the ultimate sample introduction technology for gas chromatography

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

With the TD-100™, UNITY™, ULTRA™, Air Server™, and CIA Advantage™ products, Markes International has advanced TD instrumentation to an unprecedented level. These systems allow efficient direct desorption of materials and accurate analysis of air samples collected using sorbent tubes or canisters (or monitored in real-time). They are fully compliant with international standards.



TD technology offers significant advantages over solvent extraction:

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

A complete preparation and analysis package... all from one source. Agilent Technologies has partnered with Markes International to add thermal desorption technology to its expanding portfolio of solutions. Think of Agilent as your single source for sales, service and support of TD-GC/MS systems.

UNITY Series 2

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

Key features of UNITY Series 2 include:

- **Quantitative sample re-collection** (SecureTD-Q™) facilitates repeat analysis and overcomes the one-shot limitation of conventional TD systems
- **Electrically-cooled sorbent trapping** to -30 °C offers quantitative retention of ultra-volatile components and reduces running costs
- **Patented inert valving** allows compatibility with every TD application from semi-volatiles to reactive compounds
- **Fully compatible with TubeTAG™ RFID devices**, which 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 ChemStation



Series 2
ULTRA-UNITY-Air Server

UNITY Series 2

TD-100

Markes' TD-100 is dedicated and 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 SecureTD-Q.

Key additional features of TD-100 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

Automation options for UNITY

Series 2 ULTRA

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

- **Unattended thermal desorption** of up to 100 capped tubes

Series 2 Air Server and CIA Advantage

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

- **Adaptability** – connect to any Series 2 UNITY thermal desorption system
- **Deliver controlled flow** of whole-air or gas directly into the electrically cooled focusing trap of UNITY
- **Operate cryogen-free** to reduce costs and maintenance, while offering optimum analytical performance/sensitivity
- **Compact design**, especially useful for installation in mobile labs
- **High-throughput operation** – the CIA Advantage has capacity for up to 27 canisters, as well as in-built internal standard addition. The Agilent bundle has capacity for 14 canisters



TD-100: 10 trays, each accommodating up to 10 capped tubes and incorporating "50:50" capability for automatic sample re-collection (SecureTD-Q)

Thermal Desorption

brings versatility and labor-saving benefits to a wide range of applications



Air monitoring by tubes and canisters

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/CS₂ 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 defence

CIA Advantage:
Fully compliant with
US EPA Methods
TO-15 and TO-17





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



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:

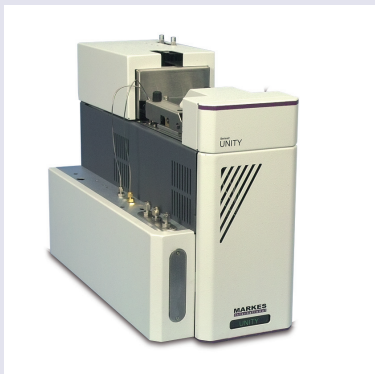
- Aroma profiling of toiletries, consumer products, and plant extracts
- Off-odor and taint analysis
- Detecting key olfactory components



Micro-Chamber/Thermal Extractor (μ-CTE™)

Markes' μ-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 following equilibration, 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, coatings and food



Mobile and remote monitoring

The Markes UNITY thermal desorber, in combination with the Agilent 5975T GC/MS, is the ideal system for field-based situations. Its small footprint, cryogen-free operation, and rugged nature have made the UNITY the established choice for mobile laboratories.

- Tube-based or whole-air online sampling using a single system to maximize productivity
- High- and low-concentrations of VOCs can be monitored for maximum sensitivity
- Sample re-collection enables re-analysis or sample archiving
- Electrical cooling, low gas consumption and stringent leak testing make the system ideal for mobile laboratories

The UNITY is also suited to a wide range of application types.

Environmental

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, 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 & vapor intrusion assessment
- Trace volatiles and odors in water
- Workplace air monitoring/industrial hygiene
- Personal exposure monitoring (inhalation)
- Biological exposure assessment (breath testing)



Defense and forensic

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 defence (counter-terrorism).

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 International 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.



Agilent Technologies

MARKES
international

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 analysis and measurement. 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

Our catalog of new applications is ever growing. To learn about the latest, contact your local Agilent representative or visit us at:

www.agilent.com/chem/ThermalDesorption



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