

SALES BOOKLETS

The task in this case was to prepare a set of seven sales-focused booklets highlighting the range of ways in which customers used the company's analytical equipment.

MARKES
international

Thermal Desorption Applications Guide: Biological profiling

A comprehensive guide to using thermal desorption to study human health, atmospheric chemistry and chemical ecology



A landscape A5 format made the content ideal for printing as a conference giveaway, while remaining easy to browse on-screen as a PDF download.



A clearly-defined, consistent style ensures that the six booklets are seen (within and outside the company) as a set.



Through all the booklets I selected stock photos carefully to emphasise the applications, and provide some colour.

Introduction

Human health

The study of volatile chemicals from humans has recently attracted increasing attention, particularly regarding the potential of breath volatiles to rapidly and non-invasively diagnose diseases such as cancer.



Ecosystems and the atmosphere

Biogenic volatile organic compounds (BVOCs) contribute substantially to atmospheric concentrations globally, and understanding the factors involved in their release is vital for accurate atmospheric modelling.



Chemical ecology

Many species use volatile chemicals to influence other organisms. This can simply involve the release of volatiles from plants to attract pollinators, or far more complex interactions involving multiple species.



Because the audience for these booklets could include novices as well as experts, I included brief introductions to the topics to set the scene.

In accordance with the company's guidelines, I used a matter-of-fact, authoritative language style to instill confidence in the reader.

In this Applications Guide, we describe how thermal desorption (TD) is being applied to advanced research into each of the above areas – covering everything from the effect of stress on breath VOC profiles to the ecological role of herbivore-induced plant volatiles.

For more information on any of the applications described, or to discuss how TD could benefit you, please contact our helpful and knowledgeable applications specialists at enquiries@markes.com, or by telephoning any of our regional offices (see back cover for details).



Throughout this Guide, this icon is used to indicate where you will find more details of the applications discussed (please note you will need to register with us to download our Application Notes, and may need to pay to download scientific journal papers).

A couple of lines define the purpose of the booklet and invite the reader to contact the company if they have any questions.

Analysing plant terpenoids

Inert systems for analysis of reactive monoterpenes

Monoterpenes dominate amongst the VOCs emitted from many plants, and are consequently important in atmospheric chemistry, but some of these compounds are highly reactive and prone to rearrangement within TD analytical systems.

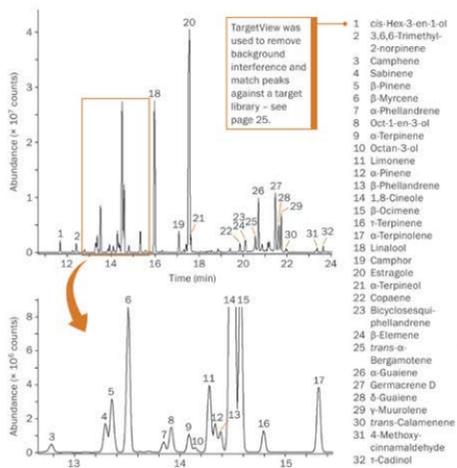
The inertness and adjustable flow-path temperature of Markes' TD systems ensures reliable analysis of monoterpenes (in addition to single-run analysis of compounds from C₂ to C₁₄). Use of porous-polymer sorbents such as Tenax® TA avoids on-tube decomposition of certain analytes, while inert-coated stainless steel tubes are used for the most reactive compounds, such as sulfur species. Validating recovery of these reactive species is made possible by the splitting and re-collection capability of Markes' TD systems.

Typical analytical conditions:

Sample: 5 g fresh Basil leaves (*Ocimum basilicum*).
Dynamic headspace (Micro-Chamber/Thermal Extractor): Flow rate: 50 mL/min for 20 min.
Chamber temperature: 40°C.

TD (UNITY or TD100): Tube (Tenax TA):
Desorbed at 280°C (10 min). Trap (Tenax TA): Analytes trapped at 20°C, desorbed at 290°C (3 min).
Split ratio: Inlet 2:1, Outlet: 16:1.

Analysis: GC-MS.



The fully passivated flow path of Markes' TD instruments, and the use of inert sorbents, enables detection of a large number of terpenoids in this analysis of leaf headspace.

Each page of technical content followed a common format:

- > Title and subtitle
- > Paragraph describing the background and the challenges faced
- > Paragraph describing how the company's equipment addresses those challenges

For the target audience, original datasets (such as these GC-MS chromatograms) are valued as evidence of system performance. Here, I used in-house data to create a graphic that neatly filled the space.

A listing of experimental conditions, written in consultation with the company's specialists, highlights the equipment used.



Inter-species interactions

Studying the role of VOCs in multitrophic relationships

Research into the role of plant volatiles within entire species communities promises to shed light on how evolutionary pressures have shaped the ability of plants to release VOCs. Interactions between species forming part of a food chain ("trophic levels") are a key aspect of this fascinating area. For example, the volatile profiles of many plants change substantially upon being eaten by herbivores such as caterpillars, and in some cases these modified profiles can attract predators of the herbivores.



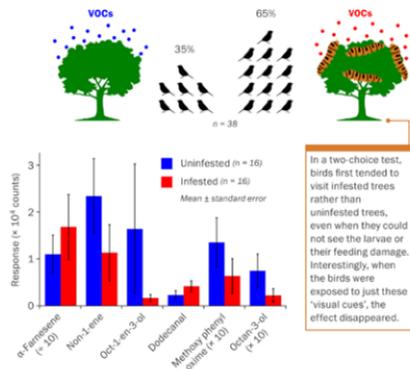
Researchers at the Netherlands Institute of Ecology and Wageningen University have pioneered work in this complex field, using TD-GC-MS techniques to investigate the shifts in VOC blends emitted by plants in response to herbivory. As in other studies of this kind, volatile profiles are typically captured from the plants *in situ*, using pumped sampling onto tubes packed with hydrophobic sorbents.

Typical analytical conditions:

Sample: 20 cm of a branch of Crab Apple (*Malus sylvestris*) in a polythene bag.
Pumped sampling: 200 mL/min for 120 min (total volume 24 L).
TD (UNITY or TD100): Tube (Hydrophobic): Desorbed at 200°C (12 min). Trap (Tenax® TA): Analytes trapped at -10°C, desorbed at 270°C (3 min). Split ratio: Outlet 4:1.
Analysis: GC-MS.

<http://dx.doi.org/10.1111/ele.12177>

L. Amo, J.J. Jansen, N.M. van Dam, M. Dicke and M.E. Visser. Birds exploit herbivore-induced plant volatiles to locate herbivorous prey, *Ecology Letters*, 2013, 16: 1348–1355.



In a rare example of a tritrophic interaction involving birds,

apple trees infested by larvae of the Winter Moth (*Operopthera brumata*) were more attractive to Great Tits (*Parus major*) than uninfested trees. The researchers inferred that differing emissions of herbivore-induced plant volatiles (HIPVs), studied here with TD-GC-MS, may underlie this preference.

Image generated from tabulated data in *Ecology Letters* with the permission of the authors.

For certain application areas, I surveyed the scientific literature and identified articles describing the company's equipment that were suitable for promotion. I then contacted the original authors and worked with them to generate a summary such as that shown here.

I wrote figure labels and created imagery to convey aspects of the work that would have been difficult to get across in the body text.

My experience of scientific publishing meant that I was aware of potential copyright issues and could act accordingly.

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Thermal Desorption Applications Guide:

Biological profiling

A comprehensive guide to using thermal desorption to study human health, atmospheric chemistry and chemi



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Thermal Desorption Applications Guide:

Consumer environ

A comprehensive guide to thermal desorption to assess chemi construction materials and



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Thermal Desorption Applications Guide:

Food and drink

A comprehensive guide to the use of thermal desorption for quality and content testing in the food and beverage industries



The complete set of seven booklets was very well-received, and proved to be valuable content for marketing campaigns, as well as a tool for direct sales.