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THE QUEEN'S AWARDS FOR ENTERPRISE: INTERNATIONAL TRADE 2015

Micro-Chamber/Thermal Extractor

Fast and flexible sampling of chemicals and odours released from materials and foods





Micro-Chamber/Thermal Extractor™

The Micro-Chamber/Thermal Extractor (µ-CTE™) is a compact, stand-alone unit for the rapid, method-compliant sampling of chemical vapours released from a wide variety of products, foods and materials.

With its simple operation and ability to simultaneously collect volatile and semi-volatile organic compounds (VOCs and SVOCs) from up to six samples, the µ-CTE is a powerful tool for increasing laboratory productivity.

It is also versatile – accommodating many types of solid and liquid sample, and allowing vapour collection using sorbent tubes, DNPH cartridges and on-line systems.

The µ-CTE is widely used by industry and test laboratories for determining representative emission or odour profiles, identifying emission sources, and simulating ageing or formulation processes.

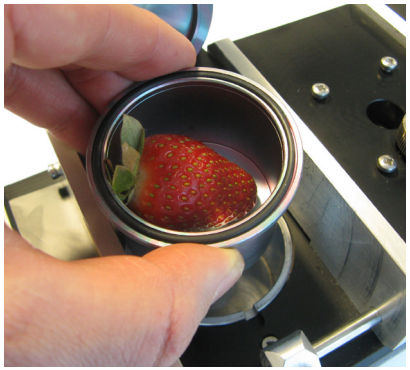
> **“The Micro-Chamber/Thermal Extractor is easy to use, with fast results”**

Murielle Etienne
Bostik, France

Convenient sampling of chemical vapours

The µ-CTE streamlines the whole process of sampling organic vapours from everyday materials, thanks to the minimised need for sample preparation and simple operation.

1 Load the material



The sample is placed inside one of the chambers. Up to four or six samples can be accommodated, depending on the model of µ-CTE chosen.

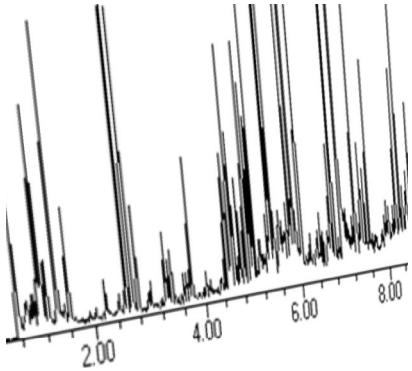
2 Set the conditions

Each chamber lid is closed, a flow of gas (air or nitrogen) is applied, and the temperature selected – from ambient up to 120 °C or 250 °C depending on the model of µ-CTE chosen.

3 Collect the volatiles

A sampling tube is attached to the outlet of each chamber, and vapours from the sample are swept onto it. The sorbent packing can be optimised for the analytes of interest.

4 Analyse the sample



Analysis of sorbent tubes for VOCs and SVOCs uses thermal desorption (TD) with GC or GC–MS. Analysis of DNPH cartridges for formaldehyde is carried out by HPLC.

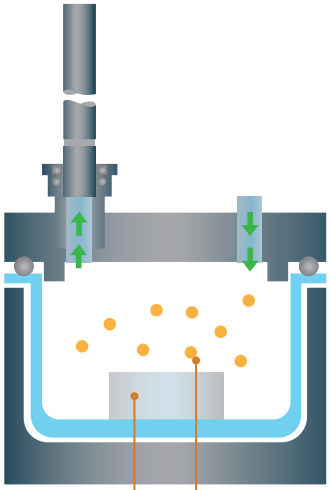
The µ-CTE can be used for:

- Quality-control of chemical emissions from products and materials.
- Screening of products before long-term certification tests.
- Checking raw materials.
- Comparing products to those of competitors.
- Monitoring odour and emission profiles.
- Product troubleshooting and R&D.
- Kinetic studies such as shelf-life tests, or monitoring fragrance profiles as they change over time.
- Permeation tests.

Perfect for a range of sample types

With three modes of operation, the µ-CTE can be used for a variety of investigations.

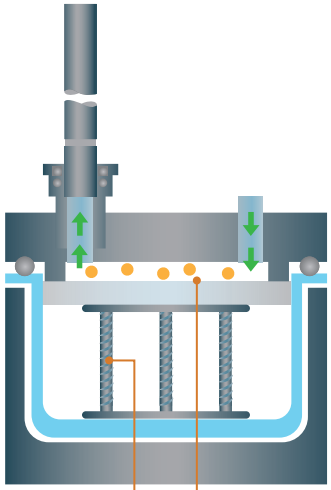
Bulk emissions testing is valuable for profiling odours and emissions, and for testing of raw materials and foods.



Samples are placed straight into the chambers.

Vapours swept from the entire sample are collected.

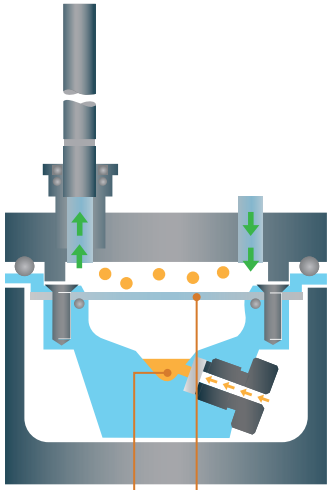
Surface emissions testing: This approach is suitable for determining area-specific emission rates from flat samples.



Sprung spacers raise planar samples to the top of the chamber.

A seal forms when the lid is closed, so only vapours released from the sample's surface are collected.

Permeation testing: A permeation accessory allows measurement of volatiles permeating through a thin layer of material.



Liquid samples are injected through a septum into the well under a sealed sample of test material.

Vapours diffuse through the test material into the chamber.

Other options include:

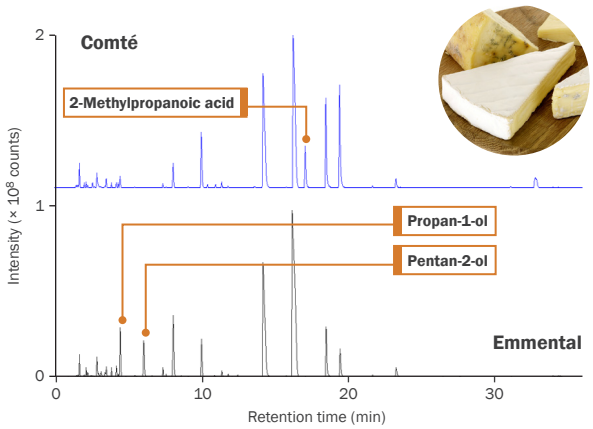
- **A Humidifier Accessory** supplies the µ-CTE with 50% humidified air. This allows closer simulation of conditions used in reference emission tests, and can enhance the recovery of some less-volatile polar compounds.
- **Toggle valves** allow the gas flow to unused chambers to be turned off, reducing gas consumption.

Comprehensive odour profiling...

...of foods and consumer products

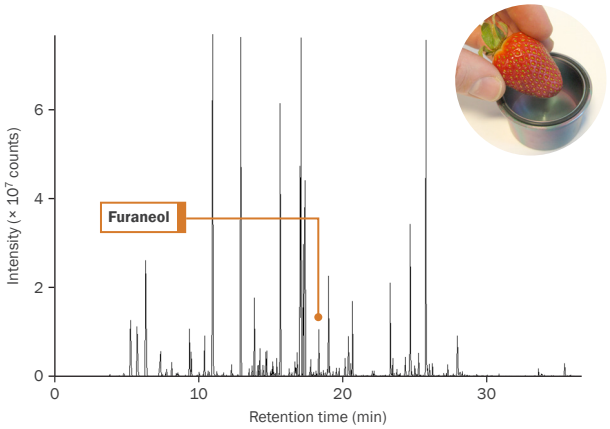
Sampling of headspace volatiles is well-established in the food and fragrance industries, and the μ-CTE uses this principle to odour-profile a wide range of sample types.

Aroma-profiling cheese



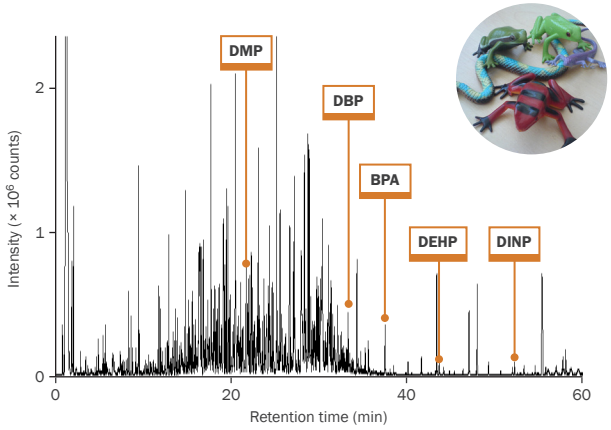
Key differences between the aroma profiles of food products are rapidly identified using the μ-CTE, as illustrated here by this comparison of vapours released from different **cheeses**.

Identifying key aroma compounds



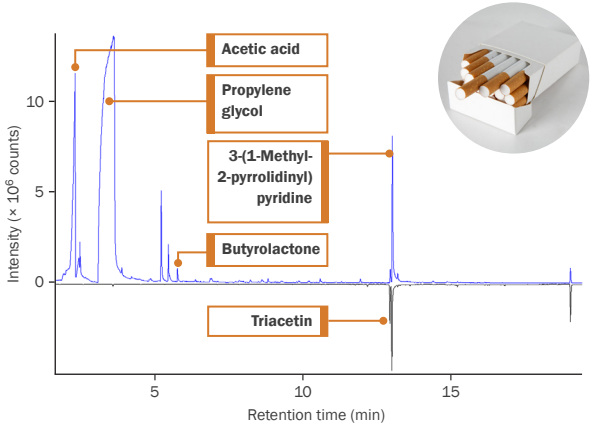
The μ-CTE is perfect for identifying target species in complex aroma profiles such as **strawberry** headspace. Furaneol was of interest in this case, with its desirable 'burnt sugar' aroma and sub-ppb odour threshold.

Assessing VOCs from consumer products



The μ-CTE is ideal for quickly assessing emission profiles from products – such as the **plastic toy** examined here. Chemicals identified included endocrine disruptors such as phthalates and bisphenol A.

Comparing the odour profiles of related products



Key differences between 'rolling' **tobacco** (top) and manufactured cigarette tobacco (bottom) are easily seen in this side-by-side comparison carried out using the μ-CTE.

Rapid emissions screening...

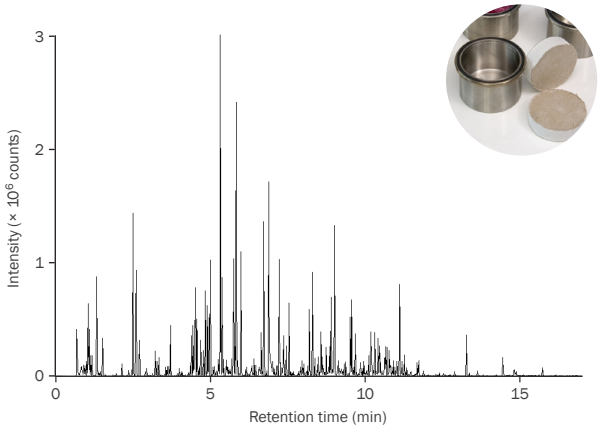
...of materials that affect indoor and in-vehicle air quality

The µ-CTE is ideally suited to the quick screening of emissions from materials used indoors or in vehicles – aiding compliance with regulatory requirements and facilitating product development.

Predict results of reference tests

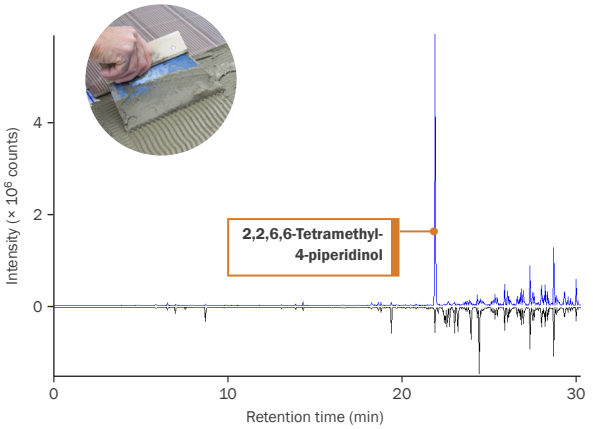
Results from the µ-CTE can be correlated with long-term (*e.g.* 28-day) reference tests – allowing you to predict whether your product will pass or fail.

Screening construction materials



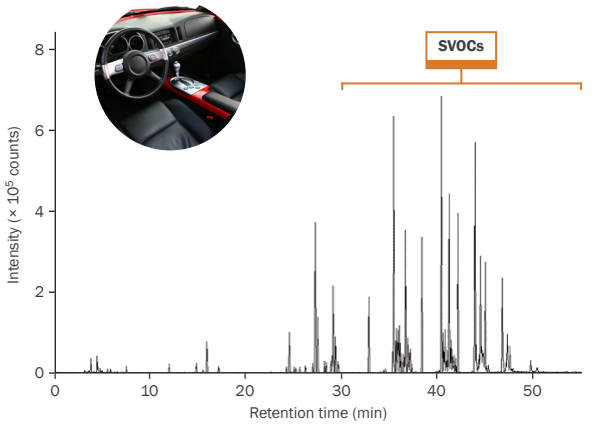
The µ-CTE is ideal for screening emissions from products such as flooring and **plasterboard**, for routine factory production control under the Construction Products Regulation (see prEN 16516).

Comparing products across a range



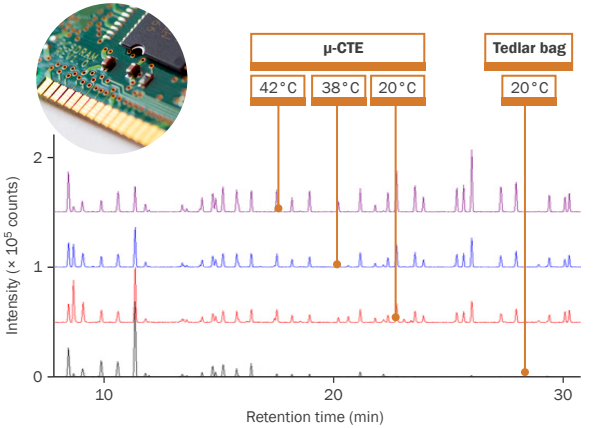
Emission profiles of similar products like these two brands of **grab-adhesive** are readily compared using the µ-CTE – aiding product development and compliance with standard methodology such as ASTM D7706-11.

Complying with standard methods



New regulations and voluntary controls limit the chemicals released from **car trim**, and the µ-CTE is an ideal tool for assessing vapour profiles from these materials – see ISO 12219-3.

Assessing different test methodologies



Quick investigations of how emission profiles vary under different conditions are easily conducted using the µ-CTE. This example shows the detection of residual solvents in **printed circuit boards**.

Compliant with key standard methods

Due to its outstanding productivity and exceptional repeatability and reproducibility, use of the µ-CTE is now described in a number of key international standard methods.

It is required for compliance with:

- **ISO 12219-3:** Interior air of road vehicles – Part 3: Screening method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials – Micro-scale chamber method.
- **ASTM D7706-11:** Standard practice for rapid screening of VOC emissions from products using micro-scale chambers.
- **VDI 2083-17:** Reinraumtechnik – Reinraum- und reinheitstauglichkeit von werkstoffen [*Cleanrooms – Cleanroom cleanliness and suitability of materials*].
- **GUT Test:** Test system for VOC emissions from carpets (Gemeinschaft umweltfreundlicher Teppichboden).
- **ASTM D7859:** 13e1 – Standard practice for spraying, sampling, packaging, and test specimen preparation of spray polyurethane foam (SPF) insulation for testing of emissions using environmental chambers.
- **ASTM WK40293:** New standard estimating chemical emissions from spray polyurethane foam (SPF) insulation using micro-scale environmental test chambers.
- **General Motors GMW17082:** Determination of volatile and semi-volatile organic compounds from vehicle automotive materials using a micro-scale chamber.
- **IKEA Test Instruction IOS-TI-0219:** Micro chamber sampling for screening of volatile organic compounds emitted from materials and products.
- **ISO 16000-25:** Determination of the emission of semi-volatile organic compounds by building products – Microchamber method. (Models M-CTE250, M-CTE250I and M-CTE250TI only).

It is also cited as a secondary screening method in:

- **prEN 16402:** Paint and varnishes – Assessment of emissions of substances from coatings into indoor air – Sampling, conditioning and testing.
- **prEN 16516:** Construction products – Assessment of release of dangerous substances.

Specifications

Micro-Chamber/Thermal Extractor – 120 series

Temperature range:	From ambient to 120 °C
Number of chambers:	6
Volume of each chamber:	44 mL
Flow ranges (air or gas):	50–500 mL/min (high) 10–70 mL/min (low)

Micro-Chamber/Thermal Extractor – 250 series

Maximum temperature:	From ambient to 250 °C
Number of chambers:	4
Volume of each chamber:	114 mL
Flow ranges (air or gas):	50–500 mL/min (high) 10–70 mL/min (low)

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