MonoTrap™
Monolithic Material Sorptive Extraction

A State-of-Art media for the Extraction & Enrichment

Based on monolithic technology, Merck KGaA, Darmstadt, Germany

GL Sciences Inc.
The Ultimate Technology for Sample Concentration

MonoTrap is a newly-developed, state-of-the-art sorptive media, based on the high surface area of silica monolith technology. It's designed for simple and rapid enrichment of flavors, aromas, and fragrances, and can be easily used for the analysis of volatile and semi-volatile compounds for quality control, environmental, and forensic applications.

Silica Monolith Structure

The large surface area provided by the three dimensional silica monolith’s network of through pores and mesopores offers unmatched adsorption and desorption efficiency.

Outline of adsorption

Samples are adsorbed on the surface of silica monolith structure either comically modified or embedded with active carbon or graphite carbon.

Through Pores and Meso Pores provide over 150m²/g surface area, therefore small hybrid adsorbent MonoTrap perform high adsorption and desorption.
Monolithic Material Sorptive Extraction

Features

- **Easy-to-use**
  MonoTrap performs a very low blank, it can be used directly without any conditioning.

- **Highly Efficient Adsorption**
  MonoTrap’s large surface area offers larger sample loading capacity, ensuring a higher concentration of adsorbed compounds.

- **Complete Desorption with low Solvent Volume**
  It only takes a small amount of solvent, 200 µL, to completely saturate the monolithic network and achieve desorption, though more solvent can be used to control the final concentration of your samples.

- **Hydrophobic Surface**
  MonoTrap’s monolithic network is functionalized using hydrophobic ODS groups, therefore, MonoTrap will not adsorb water from aqueous samples. No need to worry about injecting water onto your GC or GC/MS when using MonoTrap as with liquid-liquid extraction or other sorptive media. This also allows for the addition of ionic salts to improve sample adsorption with MonoTrap.

- **Multiple Injections & Analyses**
  Because compounds adsorbed to MonoTrap can be extracted using 200 µL (or more) of organic solvent, it is no problem to perform multiple injections of your sample. With MonoTrap, it is even possible to make injections on different GC systems utilizing different column phases! Solvent extraction can even be accomplished within a GC autosampler vial using the rod shaped MonoTrap.

Superior Enrichment Capabilities using Activated Carbon/Graphite Carbon in addition to ODS

The graph on the right shows a comparison between the recovery rate of DCC18 (containing activated carbon) and DSC18 (containing only ODS groups). For a relatively non-polar compound such as Indole, both the MonoTrap DCC18 and DSC18 have approximately the same enrichment capabilities.

With more polar compounds, such as Methylpyrazine, the activated carbon groups on the MonoTrap DCC18 do a much better job of enrichment than the MonoTrap DSC18, which contains only hydrophobic ODS groups.

Recoveries were calculated using dichloromethane as the extraction solvent.
How to use MonoTrap™

MT Holder & MT Stand
Grasp the MonoTrap with tweezers and insert the holder into the hole on the MonoTrap.

Hold MT Holder with pliers whose ends have been cleaned and pass it through the septum. Put a cap on top of the holder.

Clean Pin Hole Septum with Vial (40 mL)
Tighten the septum on the vial.

MT Holder & MT Stand
Grasp the MonoTrap with tweezers and insert the holder into the hole on the MonoTrap.

Hold MT Holder with pliers whose ends have been cleaned and pass it through the septum. Put a cap on top of the holder.

Clean Pin Hole Septum with Vial (40 mL)
Tighten the septum on the vial.

Head Space Gas Sampling
Use an agitation bath for heating and stirring. For screening without heating, use the handless shaker (Cat.No. 8500 - 50000) and special holder (Cat.No. 8500 - 50001)
※ We recommend EYELA NTS-4000 B series for agitation bath. Please contact our local dealer for more details of the agitation bath and vial rack.

Put the sample into the vial and float MonoTrap Handsfree shaker and the holder
※ Please contact our local dealer for the Tedlar bags

Gerstel, T-Dex and Linex glass tubes are available

Solvent Extraction

Extraction from the Disk Type
Fill the MT Extract Cup with the extraction solvent
Put the MonoTrap and tighten the septum

Extraction from the Rod Type
Pour pure water into the vials

Thermal Desorption

Inserts for Autosampler
200 µL Glass Insert

Sample Adsorption
● MonoTrap performs high recovery

MonoTrap DCC18 shows high recovery rates for low to high logP compounds and hydrophilic to hydrophobic compounds. Unlike other products for which usable extraction solvents are limited to methanol and acetonitrile, dichloromethane with higher solvent extraction power can be used for MonoTrap. To obtain a high recovery MonoTrap is an easy-to-use media to select the types of extraction solvents.

Standard samples: Limonene, Cineol, β-Linalool, Methylpyrazine, 2,6-dimethylpyrazine, Indole, Camphor, Octanoic acid, Coumarin, 2'-acetonaphthone. 200 µg/mL of each in Methanol.

- Sampling (shaking)
  - DCC18 disk (with active carbon) 1 pc
  - 60 ℃, 30 min, 90 rpm
- Solvent Extraction
  - Dichloromethane 200 µL
- GC/MS
  - Injection: 1 µL, Splitless

- Sampling (shaking)
  - Other PDMS product A 1 pc
  - 60 ℃, 30 min, stirring
- Solvent Extraction
  - Acetonitrile 200 µL
- GC/MS
  - Injection: 1 µL, Splitless

Comparison of different sampling tools on the flavor of blue cheese analysis.

Here is an example of blue cheese, after sampling fragrance of blue cheese with MonoTrap RGPS TD, analysis was performed with Thermal Desorption system.

- System: GC/MS-Thermal Desorption (T-Dex II)
- Column: InteCap Pure-WAX
- Col.Temp.: 40 ℃ (3 min hold) - 6 ℃/min - 250 ℃ (30 min hold)
- Carrier Gas: He 1 mL/min (constant flow)
- Desorb Temp.: 250 ℃
- Time: 5 min
- Flow: 7 mL/min
- Split: Splitless
- Cryo Trapping: 150 ℃
- Injection Temp.: 250 ℃
- Detection: MS Scan (28.5 - 600 m/z)

Recovery rate comparison between MonoTrap DCC18 and other PDMS product A

<table>
<thead>
<tr>
<th>Component</th>
<th>logP</th>
<th>MonoTrap DCC 18 (with active carbon)</th>
<th>Other PDMS Product A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylpyrazine</td>
<td>0.21</td>
<td>18.8%</td>
<td>0.6%</td>
</tr>
<tr>
<td>2,6-Dimethylpyrazine</td>
<td>0.54</td>
<td>30.7%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Indole</td>
<td>2.14</td>
<td>32.0%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Cineol</td>
<td>2.74</td>
<td>107.0%</td>
<td>30.5%</td>
</tr>
<tr>
<td>Linalool</td>
<td>2.97</td>
<td>97.0%</td>
<td>29.8%</td>
</tr>
</tbody>
</table>

MonoTrap DCC18 (with Active Carbon)
### MonoTrap™ Series Line-up

<table>
<thead>
<tr>
<th>Description</th>
<th>Recommended Operating Temperature</th>
<th>Appearance</th>
<th>Shape</th>
<th>Size</th>
<th>Active Carbon</th>
<th>Graphite Carbon</th>
<th>ODS Function</th>
<th>PDMS</th>
<th>Qty.</th>
<th>Cat.No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MonoTrap DCC18</td>
<td>—</td>
<td>Disk</td>
<td>Diameter: 10 mm Thickness: 1 mm</td>
<td>●</td>
<td>●</td>
<td>50 ea</td>
<td>1050-72101</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MonoTrap RCC18</td>
<td>—</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 5 mm</td>
<td>●</td>
<td>●</td>
<td>50 ea</td>
<td>1050-72201</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MonoTrap DSC18</td>
<td>—</td>
<td>Disk</td>
<td>Diameter: 10 mm Thickness: 1 mm</td>
<td>●</td>
<td>50 ea</td>
<td>1050-71101</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MonoTrap RSC18</td>
<td>—</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 5 mm</td>
<td>●</td>
<td>50 ea</td>
<td>1050-71201</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MonoTrap RGPS TD*</td>
<td>250 ℃</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 10 mm</td>
<td>●</td>
<td>●</td>
<td>30 ea</td>
<td>1050-74202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MonoTrap RSC18 TD*</td>
<td>200 ℃</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 10 mm</td>
<td>●</td>
<td>30 ea</td>
<td>1050-73201</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MonoTrap RGC18 TD*</td>
<td>200 ℃</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 10 mm</td>
<td>●</td>
<td>30 ea</td>
<td>1050-74201</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* : MonoTrap for Thermal Desorption is packed individually in an ampoule

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### MonoTrap’s Nomenclature & Character

Ex) **MonoTrap**  

1. **Shape** — D: disk type, R: rod type  
2. **Adsorbent** — C: Chemical bonded with active carbon, G: Chemical bonded with graphite carbon, S: without adsorbent  
3. **Function group/stationary phase** — C18: octadecyl C18, end-capped  
   - PS: coded with PDMS (Polydimethyl Siloxane), end-capped  
4. **Desorption** — TD: for thermal desorption
### Start-up kit

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Contents</th>
<th>Cat.No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solvent Extraction</strong></td>
<td>MMSE Start Up KIT for SE</td>
<td>①〜④ x 20 pcs, ⑧〜⑩, ⑪ x 5 pcs, ⑬ x 40 pcs</td>
<td>1050-79001</td>
</tr>
<tr>
<td><strong>Thermal Desorption</strong></td>
<td><strong>MMSE Start Up KIT for TD (OPTIC/LINEX)</strong></td>
<td>⑤〜⑦ x 10 pcs, ⑧〜⑩, ⑪ x 5 pcs, ⑩ x 3 pcs</td>
<td>1050-78001</td>
</tr>
<tr>
<td></td>
<td><strong>MMSE Start Up KIT for TD (T-Dex/ATD/TD-20)</strong></td>
<td>⑤〜⑦ x 10 pcs, ⑧〜⑩, ⑪ x 5 pcs, ⑩ x 3 pcs</td>
<td>1050-78002</td>
</tr>
<tr>
<td></td>
<td><strong>MMSE Start Up KIT for TD (Gerstel-TDS)</strong></td>
<td>⑤〜⑦ x 10 pcs, ⑧〜⑩, ⑪ x 5 pcs, ⑩ x 3 pcs</td>
<td>1050-78003</td>
</tr>
<tr>
<td></td>
<td><strong>MMSE Start Up KIT for TD (Gerstel-TDU)</strong></td>
<td>⑤〜⑦ x 10 pcs, ⑧〜⑩, ⑪ x 5 pcs, ⑩ x 3 pcs</td>
<td>1050-78005</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty.</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑧ MT Holder</td>
<td>5 pcs</td>
<td>1050-79003</td>
</tr>
<tr>
<td>⑨ MT Stand</td>
<td>1 pcs</td>
<td>1050-79004</td>
</tr>
<tr>
<td>⑩ MT Extract Cup with Vial (20 mL)</td>
<td>5 pcs</td>
<td>1050-79005</td>
</tr>
<tr>
<td>⑪ Clean Pin Hole Septum with Vial (40 mL)</td>
<td>72 pcs</td>
<td>1050-79006</td>
</tr>
<tr>
<td>⑫ 200 μL glass insert</td>
<td>500 pcs</td>
<td>1030-17211</td>
</tr>
</tbody>
</table>

### Glass tube for Thermal Desorption

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty.</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑮ Gerstel-MT Tube</td>
<td>1 pcs</td>
<td>1003-75003</td>
</tr>
<tr>
<td>⑯ Gerstel-MT-U Tube</td>
<td>1 pcs</td>
<td>1003-75004</td>
</tr>
</tbody>
</table>

### GC, GC/MS Capillary column

**InertCap™ Pure-WAX**

New inner treatment technology, InertCap Pure-WAX performs the highest inertness, an optimal column for aromatic and flavor compounds.

<table>
<thead>
<tr>
<th>I.D.(mm)</th>
<th>Length(m)</th>
<th>Thickness(µm)</th>
<th>Max. operating Temp. (℃)</th>
<th>Cat.No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>30</td>
<td>0.25</td>
<td>iso.260-prog.260</td>
<td>1010-68142</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>0.25</td>
<td>iso.260-prog.260</td>
<td>1010-68162</td>
</tr>
<tr>
<td>0.32</td>
<td>30</td>
<td>0.25</td>
<td>iso.260-prog.260</td>
<td>1010-68242</td>
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<tr>
<td></td>
<td>60</td>
<td>0.25</td>
<td>iso.260-prog.260</td>
<td>1010-68262</td>
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<tr>
<td>0.53</td>
<td>15</td>
<td>1.00</td>
<td>iso.240-prog.240</td>
<td>1010-68425</td>
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<tr>
<td></td>
<td>30</td>
<td>1.00</td>
<td>iso.240-prog.240</td>
<td>1010-68445</td>
</tr>
</tbody>
</table>

For more information, please contact.
### Easy Enrichment of Coffee Fragrance

**Sample (coffee) 3.0 g**

**Sampling (HS) MonoTrap RGPS TD 1ea**

60 ℃, 10 min

**TD-GC/MS**

**System**: GC/MS-Thermal Desorption (OPTIC-4)

**Column**: InertCap Pure-WAX

0.25 mm ID × 60 m df = 0.25 µm

**Col.Temp.**: 40 ℃ (3 min hold) - 5 ℃/min - 250 ℃

**Carrier Gas**: He 1 mL/min (constant flow)

**Desorb Temp.**: 250 ℃

**Time**: 10 min

**Flow**: 1 mL/min

**Split**: Split 1:20 (split flow 20 mL/min)

**Cryo Trapping**: -150 ℃

**Injection Temp.**: 250 ℃

**Detection**: MS Scan (28.8 - 600 m/z)

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>10.0</th>
<th>12.5</th>
<th>15.0</th>
<th>17.5</th>
<th>20.0</th>
<th>22.5</th>
<th>25.0</th>
<th>27.5</th>
<th>30.0</th>
<th>32.5</th>
<th>35.0</th>
<th>37.5</th>
<th>40.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIC</td>
<td>0.00</td>
<td>0.25</td>
<td>0.50</td>
<td>0.75</td>
<td>1.00</td>
<td>1.25</td>
<td>1.50</td>
<td>1.75</td>
<td>2.00</td>
<td>2.25</td>
<td>2.50</td>
<td>2.75</td>
<td>3.00</td>
</tr>
</tbody>
</table>

**Applications**

1. Pyridine
2. Pyrazine
3. Methylpyrazine
4. 3-Hydroxy-2-butanone
5. 1-Hydroxy-2-butanone
6. Dimethylpyrazine
7. Dimethylpyrazine
8. Ethylpyrazine
9. Dimethylpyrazine
10. 1-Hydroxy-2-butanone
11. Ethylmethylpyrazine
12. Ethylmethylpyrazine
13. Trimethylpyrazine
14. Acetylfuran
15. Furfuryl acetate
16. 2-Formyl-5-methylfuran
17. 2-Formyl-1,4-dihydropyridine
18. 1-Acetyl-1,4-dihydropyridine
19. 1-Acetylpyrrole
20. 1-Furfurylpyprole
21. Guaiacol
22. Maltol
23. 1H-Pyrrole-2-carboxaldehyde
24. 2-Methoxy-4-vinylphenol

### Fragrance of Peach Juice

**Peach juice 30 mL**

**Sampling (agitate) MonoTrap RGPS TD 1ea**

36 ℃, 10 min, 160 rpm

**Rinse**

**TD-GC/MS**

**System**: GC/MS-Thermal Desorption (OPTIC-4)

**Column**: InertCap Pure-WAX

0.25 mm ID × 30 m df = 0.25 µm

**Col.Temp.**: 40 ℃ (5 min hold) - 4 ℃/min - 250 ℃

**Carrier Gas**: He 1 mL/min (constant flow)

**Desorb Temp.**: 250 ℃

**Time**: 10 min

**Flow**: 1 mL/min

**Split**: Split 1:20 (split flow 20 mL/min)

**Detection**: MS Scan (28.8 - 600 m/z)

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>5.0</th>
<th>10.0</th>
<th>15.0</th>
<th>20.0</th>
<th>25.0</th>
<th>30.0</th>
<th>35.0</th>
<th>40.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIC</td>
<td>5.00</td>
<td>6.00</td>
<td>6.50</td>
<td>7.00</td>
<td>7.50</td>
<td>8.00</td>
<td>8.50</td>
<td>9.00</td>
</tr>
</tbody>
</table>

**Applications**

1. Isoamyl acetate
2. Isopentanol
3. Ethyl hexanoate
4. Hexyl acetate
5. Hexene
6. Hexene
7. Hexane
8. Benzaldehyde
9. Hexenone
10. p-Menth-2-one
11. Linalool
12. Terpineol
13. Geranyl acetate
14. Damascenone
15. γ-Decalactone
16. δ-Decalactone
17. 6-Pentyl-5,6-dihydro-2H-pyran-2-one
18. δ-Dodecalactone
19. γ-Dodecalactone
20. δ-Dodecalactone
### Flower Hyacinth Aroma

**Sample**

**Sampling (passive)**

MonoTrap DCC18 1 ea

- Leave at room temperature for 3 h
- Solvent Extraction
- Concentration

- Dichloromethane 1000 μL
- Ultrasonication for 5 min
- Enrich by N₂ purge to 100 μL

**TD-GC/MS**

**Flower Hyacinth Aroma**

- β-cis-Ocimene
- β-Linalool
- Caryophyllene
- Benzoic acid, methyl ester
- α-Farnesene
- Benzyl Alcohol
- Indole
- Benzyl Benzoate

---

### Red Wine Aroma

**Sample**

20 mL

**Sampling (HS)**

MonoTrap DCC18 1 ea

- 60 ℃, 30 min

**Solvent Extraction**

- Dichloromethane 300 μL
- Ultrasonication for 5 min

**TD-GC/MS**

**Red Wine Aroma**

- 2,2,6-Trimethyl-6-vinyltetrahydropyran
- Isoamyl acetate
- Limonene
- 1-Pentanol
- Ethyl hexanoate
- Maleic anhydride
- 3-Methylpentanol
- Ethyl 2-hexenoate
- 1-Hexanol
- cis-3-Hexen-1-ol
- Nonanal
- cis-2-Hexen-1-ol
- Ethyl 2-hydroxy-3-methylbutanoate
- Ethyl octanoate
- Furfural
- Benzaldehyde
- 3-Ethyl-4-methylpentanol
- 2-Bornene
- n-Propyl propionate
- Ethyl dl-2-hydroxycaproate
- β-Cyclocitral
- Ethyl decanoate
- α-D-Galactopyranose methyl glycoside
- Diethyl succinate
- 3- (Methylthio) -1-propanol
- 1,5,8-Trimethyl-1,2-dihydronaphthalene
- Hexanoic acid
- Benzyl Alcohol
- Phenylethyl Alcohol
- Diethyl dl-malate
- Octanoic Acid
Mushroom Fragrance

Sampling (Still Standing)
MonoTrap DCC 18 5 ea
Room temperature, 12 h

Solvent Extraction
Concentration
Diethylether 1000 μL
Ultrasonication for 5 min
Enrich by N₂ purge to a few μL

GC/MS

Comparison of Fragrances by Area %

<table>
<thead>
<tr>
<th></th>
<th>Mushroom A</th>
<th>Mushroom B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3-Octanone</td>
<td>1.8 %</td>
</tr>
<tr>
<td>2</td>
<td>Dimethyl trisulfide</td>
<td>1.7 %</td>
</tr>
<tr>
<td>3</td>
<td>3-Octanol</td>
<td>1.7 %</td>
</tr>
<tr>
<td>4</td>
<td>1-Octen-3-ol</td>
<td>2.3 %</td>
</tr>
</tbody>
</table>

Pu-erh Tea

Sample
Brew 5 g tea leaves with 15 mL hot water

Sampling
MonoTrap DCC 18 1 ea
60 ℃, 30 min

Solvent Extraction
Dichloromethane 1000 μL
Ultrasonication for 5 min

Enrichment
Enrich by N₂ purge to 100 μL

GC/MS

Comparison of Fragrances by Area %

<table>
<thead>
<tr>
<th></th>
<th>Mushroom A</th>
<th>Mushroom B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Methylpyrazine</td>
<td>1.6 %</td>
</tr>
<tr>
<td>2</td>
<td>Dimethylpyrazine</td>
<td>11.2 %</td>
</tr>
<tr>
<td>3</td>
<td>Dimethylpyrazine</td>
<td>21.4 %</td>
</tr>
<tr>
<td>4</td>
<td>Ethylpyrazine</td>
<td>10.2 %</td>
</tr>
<tr>
<td>5</td>
<td>6-Methyl-5-hepten-2-one</td>
<td>14.7 %</td>
</tr>
<tr>
<td>6</td>
<td>2-Ethyl-6-methylpyrazine</td>
<td>18.9 %</td>
</tr>
<tr>
<td>7</td>
<td>Trimethylpyrazine</td>
<td>12.3 %</td>
</tr>
<tr>
<td>8</td>
<td>Furfural</td>
<td>1.3 %</td>
</tr>
<tr>
<td>9</td>
<td>Acetol acetate</td>
<td>1.2 %</td>
</tr>
<tr>
<td>10</td>
<td>2,4-Heptadien-1-al</td>
<td>1.2 %</td>
</tr>
</tbody>
</table>

Applications
### Cinnamon

**Sample**

- Put the wood (12.75 g) on soil, pour gasoline over the wood and burn.

**Sampling (HS)**

- MonoTrap RCC18 2 ea

**Solvent Extraction**

- Ethanol 200 μL
- Ultrasonication 5 min

**GC/MS**

- System: GC/MS
- Column: InertCap Pure-WAX
- Col. Temp.: 40 ℃ (5 min hold) - 4 ℃/min - 250 ℃
- Carrier Gas: He 1 mL/min
- Injection: Split 1:50
- Detection: MS Scan (35-600 m/z)
- Sample Size: 1.0 μL

**Compounds**

1. Cycloisosativene
2. α-Cubebene
3. Sativen
4. β-Elemene
5. α-Muurolene
6. β-Chamigrene
7. α-Muurolene
8. β-Calacorene
9. Calamenene
10. α-Calacorene
11. Cinnamaldehyde
12. 1-Ethyl-3,5-dimethylbenzene
13. Naphthalene
14. 1-Methylnaphthalene

### VOC from Burnt Materials

**Sample**

- Put the wood (12.75 g) on soil, pour gasoline over the wood and burn.

**Sampling (Passive)**

- MonoTrap RCC18 2 ea

**Solvent Extraction**

- Acetone 200 μL
- Ultrasonication 5 min

**GC/MS**

- System: GC/MS
- Column: InertCap AQUATIC
- Col. Temp.: 40 ℃ (5 min hold) - 4 ℃/min - 220 ℃
- Carrier Gas: He 1 mL/min
- Injection: Split 1:50
- Detection: MS Scan (30-600 m/z)
- Sample Size: 1.0 μL

**Compounds**

1. 2-Methylpentane
2. 3-Methylpentane
3. Hexane
4. Methylcyclopentane
5. 2-Methylhexane
6. 2,3-Dimethylpentane
7. 3-Methylhexane
8. Trimethylpentane
9. Heptane
10. Benzene
11. Toluene
12. Ethylbenzene
13. Ethylbenzene
14. m,p-Xylene
15. α-Xylene
16. β-Xylene
17. 1,2-Dichloroethane
18. 1,1-Dichloroethane
19. 1,2-Dibromoethane
20. 1,2-Dichloroethane
21. Trimethylbenzene
22. Ethylbenzene
23. Trimethylbenzene
24. Toluene
25. n-Butylbenzene
26. Indane
27. Cymene
28. 1-Ethyl-3,5-dimethylbenzene
29. Naphthalene
30. 1-Methylnaphthalene
**VOC from Putrid Cabbage**

**Sample**

Cut into strips, put 25 g into 100 mL vial

**Putrefacient cabbage**

60 ℃, a certain period

**Sampling (Passive)**

MonoTrap RCC18 3 ea

**Room temperature, 3 h**

**Solvent Extraction**

Diethyl ether/ n-pentane = 1:1

Mixed sample 500 μL

Ultrasonication for 5 min

**GC/FPD**

**System**

: GC/FPD

**Column**

: InertCap AQUATIC

0.25 mm I.D. × 30 m  df = 1.00 μm

**Col. Temp.**

: 40 ℃ (5 min hold) - 6 ℃ /min - 220 ℃ (10 min hold)

**Carrier Gas**

: He 1 mL/min

**Injection**

: Split 1:50

**Detection**

: FPD (S)

**Sample Size**

: 1.0 μL

---

**VOC from Papers Before & After Printing**

**Sample**

1. Chopped paper before color print 10 g
2. Chopped paper after color print 10 g

**Sampling**

MonoTrap RCC18 5 ea

Put MonoTrap into the vial and leave for 3 days at 60 ℃

**Solvent Extraction**

Dichloromethane 500 μL

Ultrasonication for 5 min

**GC/MS**

**System**

: GC/MS

**Column**

: InertCap Pure-WAX

0.25 mm I.D. × 30 m  df = 0.25 μm

**Col. Temp.**

: 40 ℃ (5 min hold) - 4 ℃ /min - 250 ℃

**Carrier Gas**

: He 1 mL/min

**Injection**

: Splitless

**Detection**

: MS Scan (35-500 m/z)

**Sample Size**

: 1.0 μL
### VOC from Scalp

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sampling (Passive)</th>
<th>MonoTrap RGPSTD 1 ea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room temperature 3 h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TD-GC/MS**

<table>
<thead>
<tr>
<th>System</th>
<th>GC/MS-Thermal Desorption (T-Dex II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column</td>
<td>InertCap Pure-WAX</td>
</tr>
<tr>
<td>Col.Temp.</td>
<td>35 °C (5 min hold) - 4 °C/min - 250 °C</td>
</tr>
<tr>
<td>Carrier Gas</td>
<td>He 1 mL/min (constant flow)</td>
</tr>
<tr>
<td>Desorp Temp.</td>
<td>250 °C</td>
</tr>
<tr>
<td>Time</td>
<td>5 min</td>
</tr>
<tr>
<td>Flow</td>
<td>5 mL/min</td>
</tr>
<tr>
<td>Split</td>
<td>Splitless</td>
</tr>
<tr>
<td>Cryo Trapping</td>
<td>-150 °C</td>
</tr>
<tr>
<td>Injection Temp.</td>
<td>250 °C</td>
</tr>
<tr>
<td>Detection</td>
<td>MS Scan (28.8 - 600 m/z)</td>
</tr>
</tbody>
</table>

1. D-Limonene
2. 6-Methyl-5-hepten-2-one
3. Nonanal
4. Linalool
5. Octadecane
6. Hexanoic acid
7. Dinonyl phthalate
8. Phenoxethyl alcohol
9. Octanal, 2- (phenylmethylene) -
10. 1-Octadecanol
11. Benzyl Benzoate
12. Tetradecanoic acid
13. Squalane

### Tabacco

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sampling (Still Standing)</th>
<th>MonoTrap RGC 18 TD 1 ea</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 °C, 90 min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TD-GC/MS**

<table>
<thead>
<tr>
<th>System</th>
<th>GC/MS-Thermal Desorption (T-Dex II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column</td>
<td>InertCap Pure-WAX</td>
</tr>
<tr>
<td>Col.Temp.</td>
<td>40 °C (5 min hold) - 4 °C/min - 250 °C</td>
</tr>
<tr>
<td>Carrier Gas</td>
<td>He 1 mL/min (constant flow)</td>
</tr>
<tr>
<td>Desorp Temp.</td>
<td>200 °C</td>
</tr>
<tr>
<td>Time</td>
<td>5 min</td>
</tr>
<tr>
<td>Flow</td>
<td>5 mL/min</td>
</tr>
<tr>
<td>Split</td>
<td>Splitless</td>
</tr>
<tr>
<td>Cryo Trapping</td>
<td>-160 °C</td>
</tr>
<tr>
<td>Injection Temp.</td>
<td>250 °C</td>
</tr>
<tr>
<td>Detection</td>
<td>MS Scan (40 - 600 m/z)</td>
</tr>
</tbody>
</table>

1. 6-Methyl-5-hepten-2-one
2. trans-Geranyl acetone
3. Megastigmatrienone
4. Megastigmatrienone
### Applications

#### Parmesan Cheese

**Sample 10 g**

<table>
<thead>
<tr>
<th>Sampling (HS)</th>
<th>MonoTrap RGC 18 TD</th>
<th>1 ea</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 ℃, 30 min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TD-GC/MS**

- **System**: GC/MS-Thermal Desorption (T-Dex II)
- **Column**: InertCap Pure-WAX
- **Col.Temp.**: 40 ℃ (5 min hold) - 6 ℃/min - 250 ℃
- **Carrier Gas**: He 1 mL/min (constant flow)
- **Desorb Temp.**: 200 ℃
- **Time**: 5 min
- **Flow**: 1 mL/min
- **Split**: Splitless
- **Cryo Trapping**: -150 ℃
- **Injection Temp.**: 250 ℃
- **Detection**: MS Scan (28.5 - 600 m/z)

1. Methanethiol
2. Ethyl Acetate
3. 2-Butanone
4. 2-methylbutanal
5. 3-methylbutanal
6. 1-Propanol
7. Toluene
8. Dimethyl disulfide
9. Hexanal
10. 2-Pentenal
11. 3-Penten-2-one
12. 2-Heptanone
13. D-Limonene
14. Acetoin
15. Acetol
16. Dimethylpyrazine
17. Dimethylpyrazine
18. Dimethylpyrazine
19. 2-Nonanone
20. 2,5-Dimethyl-3-ethylpyrazine
21. Benzaldehyde
22. Isobutyric acid
23. 2-Undecanone
24. Butanoic acid
25. 2-Furancarboxaldehyde
26. Acetamide
27. 2-Tetradecanone
28. 2-Tridecanone
29. Hexanoic acid
30. 2-Methyl-3-buten-2-one
31. 3-Hexanone
32. 2-Pentadecanone
33. Octanoic acid
34. 2-Decanone
35. Decanoic acid

#### Maple Sugar

**Sample 10 g**

<table>
<thead>
<tr>
<th>Sampling (HS)</th>
<th>MonoTrap RGC 18 TD</th>
<th>1 ea</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 ℃, 1 h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TD-GC/MS-O**

- **System**: GC/MS-Thermal Desorption (T-Dex II)
- **Column**: InertCap Pure-WAX
- **Col.Temp.**: 40 ℃ (5 min hold) - 6 ℃/min - 250 ℃
- **Carrier Gas**: He 1 mL/min (constant flow)
- **Desorb Temp.**: 200 ℃
- **Time**: 5 min
- **Flow**: 1 mL/min
- **Split**: Splitless
- **Cryo Trapping**: -150 ℃
- **Injection Temp.**: 250 ℃
- **Detection**: MS Scan (28.8 - 600 m/z)

**Screen of Olfactory Voicegram Software**

<table>
<thead>
<tr>
<th>No</th>
<th>Start (min)</th>
<th>End (min)</th>
<th>Intensity</th>
<th>Smell</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18.05</td>
<td>18.11</td>
<td>weak</td>
<td>lemon</td>
</tr>
<tr>
<td>2</td>
<td>18.11</td>
<td>18.18</td>
<td>weak</td>
<td>sweet</td>
</tr>
<tr>
<td>3</td>
<td>18.30</td>
<td>18.36</td>
<td>weak</td>
<td>mushroom</td>
</tr>
<tr>
<td>4</td>
<td>19.10</td>
<td>19.23</td>
<td>weak</td>
<td>nuts pyrazine</td>
</tr>
<tr>
<td>5</td>
<td>19.64</td>
<td>19.68</td>
<td>weak</td>
<td>pyrazine</td>
</tr>
</tbody>
</table>
http://www.glsciences.com/

Sample preparation products
InertSep Series
MonoSpin Series

What's New
Jan 6, 2014: InertSustain applications are updated on InertSearch
Dec 26, 2013: Exhibit at Analytica 2014 / April 1-4, 2014
Dec 24, 2013: InertSearch Application is Updated

Technical Support

InertSearch
- "InertSearch" is GL Sciences’ onsite search engine for chromatographic data. A large number of chromatographic results of various analyses are available.
- You can find the chromatogram you need simply by entering the keywords (e.g. names of sample compounds) and choose from the search result.

Technical Note
- "Technical Note" is a database of chromatographic results and useful information of various analyses.
- These files provide detailed explanation of each analysis which will help you greatly (e.g. method and instruction, chromatogram with analytic condition, chemical structure of compounds).
- Now please visit our "Technical Note" and find the right application. You can start the analysis right away.

InertSearch  LC Technical Note  GC Technical Note

http://www.glsciences.com/tech/