MonoTrap™

Monolithic Material Sorptive Extraction

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

Based on monolithic technology, 
Merck KGaA, Darmstadt, Germany
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.

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™**

### Head Space Gas Sampling

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

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

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

### Stirring Sampling

- **Use an agitation bath for heating and stirring.**
- **For screening without heating, use the handleless shaker (Cat.No.8500-50000) and special holder (Cat.No.8500-50001).**
- *We recommend EYELA NTS-4000B 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**

### Passive Sampling

- ***Please contact our local dealer for the Tedlar bags***

### 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**

### Thermal Desorption

- **Inserts for Autosampler**
- **200 µL Glass Insert**
- **Pour pure water into the vials**

*Gerstel, T-Dex and Linex glass tubes are available*
● 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.

**Recovery rate comparison between MonoTrap DCC18 and other PDMS product A**

<table>
<thead>
<tr>
<th>Component</th>
<th>logP</th>
<th>MonoTrap DCC18 (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>

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 (OPTIC Linex)
- **Column**: IntCap Pure-WAX 0.32 mm I.D. × 60 m df = 0.50 µm
- **Col. Temp.**: 40 °C (3 min hold) - 6 °C/min - 250 °C (30 min hold)
- **Carrier Gas**: He 1 mL/min (constant flow)
- **Desorb Temp.**: 250 °C
- **Time**: 5 min
- **Flow**: 7 mL/min
- **Split**: Splitless
- **Cryo Trapping**: -150 °C
- **Injection Temp.**: 250 °C
- **Detection**: MS Scan (28.5 - 600 m/z)
# MonoTrap™ Series Line-up

## 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></td>
<td></td>
<td>50 ea</td>
<td>1050.72101</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></td>
<td></td>
<td>50 ea</td>
<td>1050.72201</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></td>
<td></td>
<td></td>
<td>50 ea</td>
<td>1050.71101</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></td>
<td></td>
<td></td>
<td>50 ea</td>
<td>1050.71201</td>
<td></td>
</tr>
<tr>
<td>MonoTrap RGPS TD*</td>
<td>250 °C</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 10 mm</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
<td>30 ea</td>
<td>1050.74202</td>
<td></td>
</tr>
<tr>
<td>MonoTrap RSC18 TD*</td>
<td>200 °C</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 10 mm</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
<td>30 ea</td>
<td>1050.73201</td>
<td></td>
</tr>
<tr>
<td>MonoTrap RGC18 TD*</td>
<td>200 °C</td>
<td>Rod</td>
<td>Diameter: 2.9 mm Length: 10 mm</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
<td>30 ea</td>
<td>1050.74201</td>
<td></td>
</tr>
</tbody>
</table>

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

## MonoTrap’s Nomenclature & Character

Ex) MonoTrap  R G C18 TD

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>Solvent Extraction</td>
<td>MMSE Start Up KIT for SE</td>
<td>①<del>④ x 20 pcs, ⑧</del>⑩, ⑪ x 5 pcs, ⑫ x 40 pcs</td>
<td>1050-79001</td>
</tr>
<tr>
<td>Thermal Desorption</td>
<td>MMSE Start Up KIT for TD (OPTIC/LINEX)</td>
<td>①<del>④ x 10 pcs, ⑧</del>⑩, ⑪ x 5 pcs, ⑫ x 3 pcs</td>
<td>1050-78001</td>
</tr>
<tr>
<td></td>
<td>MMSE Start Up KIT for TD (T-Dex/ATD/TD-20)</td>
<td>①<del>④ x 10 pcs, ⑧</del>⑩, ⑪ x 5 pcs, ⑫ x 3 pcs</td>
<td>1050-78002</td>
</tr>
<tr>
<td></td>
<td>MMSE Start Up KIT for TD (Gerstel-TDS)</td>
<td>①<del>④ x 10 pcs, ⑧</del>⑩, ⑪ x 5 pcs, ⑫ x 3 pcs</td>
<td>1050-78003</td>
</tr>
<tr>
<td></td>
<td>MMSE Start Up KIT for TD (Gerstel-TDU)</td>
<td>①<del>④ x 10 pcs, ⑧</del>⑩, ⑪ x 5 pcs, ⑫ 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>⑬ MonoTrap TD Liner for OPTIC/LINEX</td>
<td>1 pcs</td>
<td>1003-75001</td>
</tr>
<tr>
<td>⑭ MonoTrap TD Liner for T-Dex/ATD/TD-20</td>
<td>1 pcs</td>
<td>1003-75002</td>
</tr>
<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. (°C)</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>
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<td>60</td>
<td>0.25</td>
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<td>1010-68162</td>
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<td>0.32</td>
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<td>0.25</td>
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<td>0.53</td>
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<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 1 ea
60 °C, 10 min

TD-GC/MS

System: GC/MS-Thermal Desorption (OPTIC-4)
Column: InertCap Pure-WAX
Col.Temp.: 60 °C, 10 min
Carrier Gas: He 1 mL/min (constant flow)
Desorb Temp.: 250 °C
Time: 10 min
Flow: 1 mL/min
Split: Split 1:20 (split flow 20 mL/min)
Cryo Trapping: -150 °C
Injection Temp.: 250 °C
Detection: MS Scan (28.8 - 600 m/z)

1. Pyridine 13. Trimethylpyrazine
3. Methylpyrazine 15. Furfurylacetate
4. 3-Hydroxy-2-butanone 16. 2-Formyl-5-methylfuran
5. 1-Hydroxy-2-propanone 17. 2-Formyl-1-methylpyrrole
6. Dimethylpyrazine 18. 2-Furanmethanol
7. Dimethylpyrazine 19. 1-Acetyl-1,4-dihydropyridine
8. Ethylpyrazine 20. 1-Furfurylpyrrole
10. 1-Hydroxy-2-butanone 22. Methyl
11. Ethylmethylpyrazine 23. 1H-Pyrrole-2-carboxaldehyde
12. Ethylmethylpyrazine 24. 2-Methoxy-4-vinylphenol

● Fragrance of Peach Juice

Peach juice 30 mL

Sampling (agitate) MonoTrap RGPS TD 1 ea
36 °C, 10 min, 160 rpm

Rinse

TD-GC/MS

System: GC/MS-Thermal Desorption (OPTIC-4)
Column: InertCap Pure-WAX
Col.Temp.: 60 °C, 10 min
Carrier Gas: He 1 mL/min (constant flow)
Desorb Temp.: 250 °C
Time: 10 min
Flow: 1 mL/min
Split: Split 1:20 (split flow 20 mL/min)
Detection: MS Scan (28.8 - 600 m/z)

1. Isoamyl acetate 12. p-Menthan-2-one
2. Isopentanol 13. Linalool
3. Ethylhexanoate 14. Terpineol
4. Hexyl acetate 15. Geranyl acetate
5. Hexenyl acetate 16. Damascenone
6. Hexenyl acetate 17. y-Decalactone
8. 3-Hexenol 19. 6-Pentyl-2,6-dihydro-2H-pyran-2-one
9. 2-Hexenol 20. 8-Undecalactone
10. Furfural 21. y-Dodecalactone
11. Benzaldehyde 22. 8-Dodecalactone
### Flower Hyacinth Aroma

**Sample**

**Sampling (passive)**

MonoTrap DCC18 1 ea

Leave at room temperature for 3 h

**Solvent Extraction/Centration**

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

**TD-GC/MS**

1. β-cis-Ocimene
2. β-Linalool
3. Caryophyllene
4. Benzoic acid, methyl ester
5. α-Farnesene
6. Benzyl Alcohol
7. Indole
8. Benzyl Benzoate

### Red Wine Aroma

**Sample**

20 mL

**Sampling (HS)**

MonoTrap DCC18 1 ea

60 °C, 30 min

**Solvent Extraction**

Dichloromethane 300 μL
Ultrasoundication for 5 min

**TD-GC/MS**

1. 2,2,6-Trimethyl-6-vinyltetrahydropyran
2. Isoamyl acetate
3. Limonene
4. 1-Pentanol
5. Ethyl hexanoate
6. Maleic anhydride
7. 3-Methylpentanol
8. 1,1-Dimethoxy-2-propanol
9. Ethyl 2-hexenoate
10. 1-Hexanol
11. cis-3-Hexen-1-ol
12. Nonanal
13. cis-2-Hexen-1-ol
14. Ethyl 2-hydroxy-3-methybutanoate
15. Ethyl octanoate
16. Purfural
17. 2-Ethyl-1-hexanol
18. Benzaldehyde
19. 3-Ethyl-4-methylpentanol
20. 2-Borneone
21. α-Propyl propionate
22. Ethyl dl-2-hydroxycaproate
23. β-Cyclocitrinal
24. Ethyl decanoate
25. α-D-Galactopyranoside methyl glycoside
26. Diethyl succinate
27. 3-(Methylthio)-1-propanol
28. 1,5,8-Trimethyl-1,2-dihydroxynaphthalene
29. Hexanoic acid
30. Benzyl Alcohol
31. Phenethyl Alcohol
32. Diethyl dl-malate
33. Octanoic Acid
### Mushroom Fragrance

**Sample**

- 2 kinds of Mushrooms produced in different areas

**Sampling (Still Standing)**

- MonoTrap DCC18 5 ea

**Solvent Extraction**

- Diethyl ether 1000 μL
- Ultrasonication for 5 min
- Enrich by N₂ purge to a few μL

**System**

- GC/MS

**Column**

- InertCap Pure-WAX 0.25 mm I.D. × 30 m df = 0.25 μm

**Col. Temp.**

- 40 °C (5 min hold) - 4 °C/min - 250 °C (5 min hold)

**Carrier Gas**

- He 95 kPa

**Injection**

- Split 1:10

**Detection**

- MS Scan (25-450 m/z)

**Sample size**

- 1.0 μL

### Comparison of Fragrances by Area %

<table>
<thead>
<tr>
<th></th>
<th>Mushroom A</th>
<th>Mushroom B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 3-Octanone</td>
<td>1.8 %</td>
<td>35.8 %</td>
</tr>
<tr>
<td>2. Dimethyl trisulfide</td>
<td>1.7 %</td>
<td>4.5 %</td>
</tr>
<tr>
<td>3. 3-Octanol</td>
<td>1.7 %</td>
<td>33.1 %</td>
</tr>
<tr>
<td>4. 1-Octen-3-ol</td>
<td>2.3 %</td>
<td>4.5 %</td>
</tr>
</tbody>
</table>

### Pu-erh Tea

**Sample**

- Brew 5 g tea leaves with 15 mL hot water

**Sampling**

- MonoTrap DCC18 1 ea

**Solvent Extraction**

- Dichloromethane 1000 μL
- Ultrasonication for 5 min

**Enrichment**

- Enrich by N₂ purge to 100 μL

**System**

- GC/MS

**Column**

- InertCap Pure-WAX 0.25 mm I.D. × 30 m df = 0.25 μm

**Col. Temp.**

- 40 °C (5 min hold) - 4 °C/min - 250 °C

**Carrier Gas**

- He 1 mL/min

**Injection**

- Splitless

**Detection**

- MS Scan (40-600 m/z)

**Sample Size**

- 1.0 μL

1. Methylpyrazine
2. Dimethylpyrazine
3. Dimethylpyrazine
4. Ethylpyrazine
5. 6-Methyl-3-hepten-2-one
6. 2-Ethyl-6-methylpyrazine
7. Trimethylpyrazine
8. Furfural
9. Acetol acetate
10. 2,4-Heptadien-1-al
11. 2-Acetyl furan
12. Benaldehyde
13. 2-Formyl-5-methylfuran
14. Methyl 2-furanoate
15. 2-Furanmethanol
16. Dimethoxybenzene
17. Trimethoxybenzene
18. Pyrrole-2-carboxaldehyde
19. Coumaran
20. Caffeine
Monolithic Material Sorptive Extraction

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**Cinnamon**

**Sample**

**Sampling (HS)**
MonoTrap RCC18 2 ea

**Solvent Extraction**
Ethanol 200 μL
Ultrasonication 5 min

**GC/MS**

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**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

**Rinse**
Take the MonoTrap out after sampling. Rinse lightly with pure water to remove soil and dirt from the surface.

**Solvent Extraction**
Acetone 200 μL
Ultrasonication 5 min

**GC/MS**

---

**System**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC/MS</td>
<td></td>
</tr>
<tr>
<td>Column</td>
<td>InertCap Pure-WAX</td>
</tr>
<tr>
<td>Column I.D.</td>
<td>0.25 mm I.D. x 30 m</td>
</tr>
<tr>
<td>Col. Temp.</td>
<td>40 °C (5 min hold) - 5 °C/min - 250 °C</td>
</tr>
<tr>
<td>Carrier Gas</td>
<td>He 1 mL/min</td>
</tr>
<tr>
<td>Injection</td>
<td>Split 1:20</td>
</tr>
<tr>
<td>Temperature</td>
<td>250 °C</td>
</tr>
<tr>
<td>Detection</td>
<td>MS Scan (35-600 m/z)</td>
</tr>
<tr>
<td>Sample Size</td>
<td>1.0 μL</td>
</tr>
</tbody>
</table>

---

**Sample**

1. Cyclosativene
2. α-Cubebene
3. Sativen
4. δ-Elemene
5. α-Muurolene
6. β-Chamigrene
7. Eudesma-4(14)11-diene
8. β-Chamigrene
9. Sativen
10. δ-Cadinene
11. Calamenene
12. α-Calacorene
13. Cinnamaldehyde
14. 3-Methyl-7,8-dihiydroquinolin-5(6H)-one
15. Cedr-8-ene
16. Murolan-3,9(11)-dione-10-peroxy
17. α-Cadinol
18. Cadalene
19. Coumarin

---

**Sample**

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. Trimethylpentane
12. Trimethylpentane
13. 2-Methylheptane
14. Toluene
15. 2-Methylheptane
16. Ethylbenzene
17. m-p-Xylene
18. o-Xylene
19. Propyl benzene
20. Ethyl methyl benzene
21. Trimethyl benzene
22. Ethyl methyl benzene
23. Trimethyl benzene
24. Propyl toluene
25. Cymene
26. Indane
27. Cymene
28. 1-Ethyl-3,5-dimethylbenzene
29. Naphthalene
30. 1-Methylnaphthalene
VOC from Putrid Cabbage

**Sample**
- 1. Chopped paper before color print 10 g
- 2. Chopped paper after color print 10 g

**Putrefacient cabbage**
- 60 °C, 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. × 60 m df = 0.25 μm
- Col. Temp.: 40 °C (5 min hold) - 6 °C/min - 220 °C
- 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**
- Cut into strips, put 25 g into 100 mL vial

**Putrefacient cabbage**
- 60 °C, 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/MS**
- System: GC/MS
- Column: InertCap Pure-WAX
- 0.25 mm I.D. × 30 m df = 0.25 μm
- Col. Temp.: 40 °C (5 min hold) - 4 °C/min - 250 °C
- Carrier Gas: He 1 mL/min
- Injection: Splitless
- Detection: MS Scan (35-500 m/z)
- Sample Size: 1.0 μL

**Applications**
### VOC from Scalp

#### Sampling (Passive)
**MonoTrap RGPS TD 1 ea**

- Room temperature: 3 h

#### Sampling (Still Standing)
**MonoTrap RGC 18 TD 1 ea**

**TD-GC/MS**

#### System
- GC/MS-Thermal Desorption (OPTIC / Linex)

#### Column
- InertCap Pure-WAX
- 0.25 mm I.D. × 60 m, df = 0.25 µm

#### Col.Temp.
- 35 °C (5 min hold) - 4 °C/min - 250 °C

#### Carrier Gas
- He 1 mL/min (constant flow)

#### Desorb Temp.
- 250 °C

#### Time
- 5 min

#### Flow
- 5 mL/min

#### Split
- Splitless

#### Cryo Trapping
- -150 °C

#### Injection Temp.
- 250 °C

#### Detection
- MS Scan (28.8 - 600 m/z)

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

### Tabacco

#### Sampling (Passive)
**MonoTrap RGPS TD 1 ea**

- 60 °C, 90 min

#### Sampling (Still Standing)
**MonoTrap RGC 18 TD 1 ea**

**TD-GC/MS**

#### System
- GC/MS-Thermal Desorption (OPTIC / Linex)

#### Column
- InertCap Pure-WAX
- 0.25 mm I.D. × 30 m, df = 0.25 µm

#### Col.Temp.
- 40 °C (5 min hold) - 4 °C/min - 250 °C

#### Carrier Gas
- He 1 mL/min (constant flow)

#### Desorb Temp.
- 200 °C

#### Time
- 5 min

#### Flow
- 5 mL/min

#### Split
- Splitless

#### Cryo Trapping
- -150 °C

#### Injection Temp.
- 250 °C

#### Detection
- MS Scan (40 - 600 m/z)

1. 6-Methyl-5-hepten-2-one
2. trans-Geranylacetone
3. Megastigmatrienone
4. Megastigmatrienone
### Parmesan Cheese

- **Sample**: 10 g
- **Sampling (HS)**: MonoTrap RGC 18 TD 1 ea
  - 60 °C, 30 min
- **TD-GC/MS**

### Maple Sugar

- **Sample**
- **Sampling (HS)**: MonoTrap RGC 18 TD 1 ea
  - 60 °C, 1 h
- **TD-GC/MS-O**

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>
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<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>18.16</td>
<td>weak</td>
<td>sweet</td>
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<td>18.30</td>
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<td>weak</td>
<td>mushroom</td>
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<td>4</td>
<td>19.10</td>
<td>19.21</td>
<td>weak</td>
<td>nuts pyrazine</td>
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<tr>
<td>5</td>
<td>19.64</td>
<td>19.68</td>
<td>weak</td>
<td>pyrazine</td>
</tr>
</tbody>
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