GL Sciences

MonoTrap™

Monolithic Material Sorptive Extraction

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

Based on monolithic technology,
Merck KGaA,Darmstadt,Germany

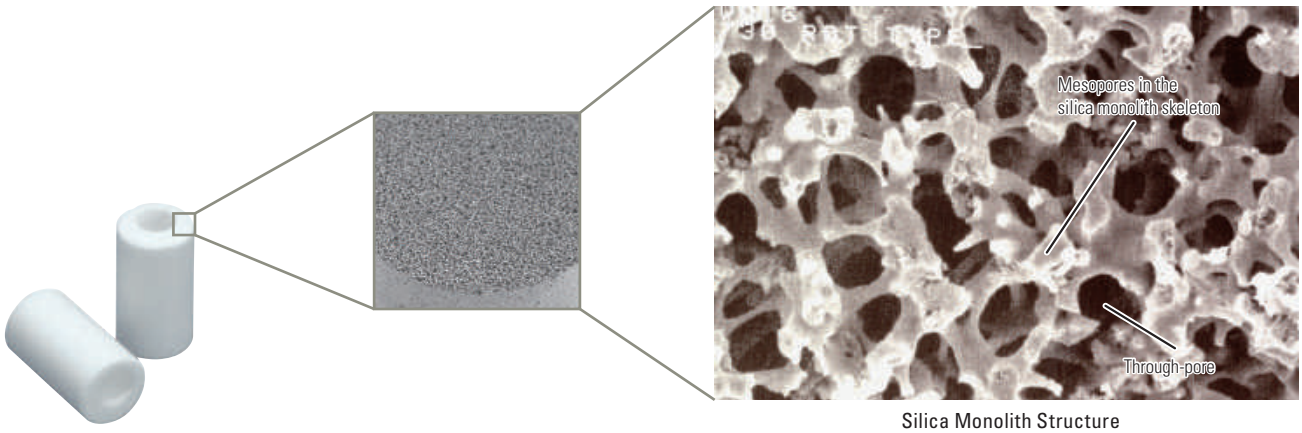
GL Sciences Inc.

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.



Silica Monolith Structure

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 150m^2/g surface area, therefore small hybrid adsorbent
MonoTrap perform high adsorption and desorption.

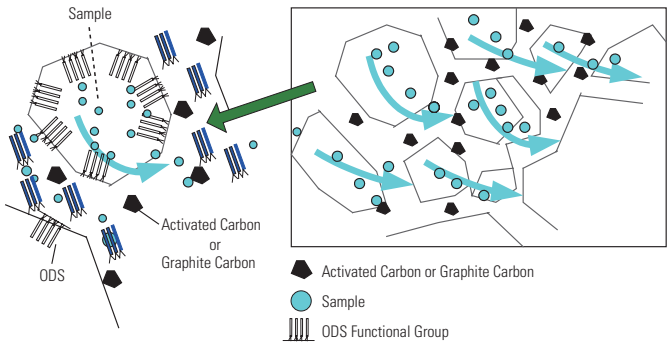


Illustration of adsorption by MonoTrap™

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

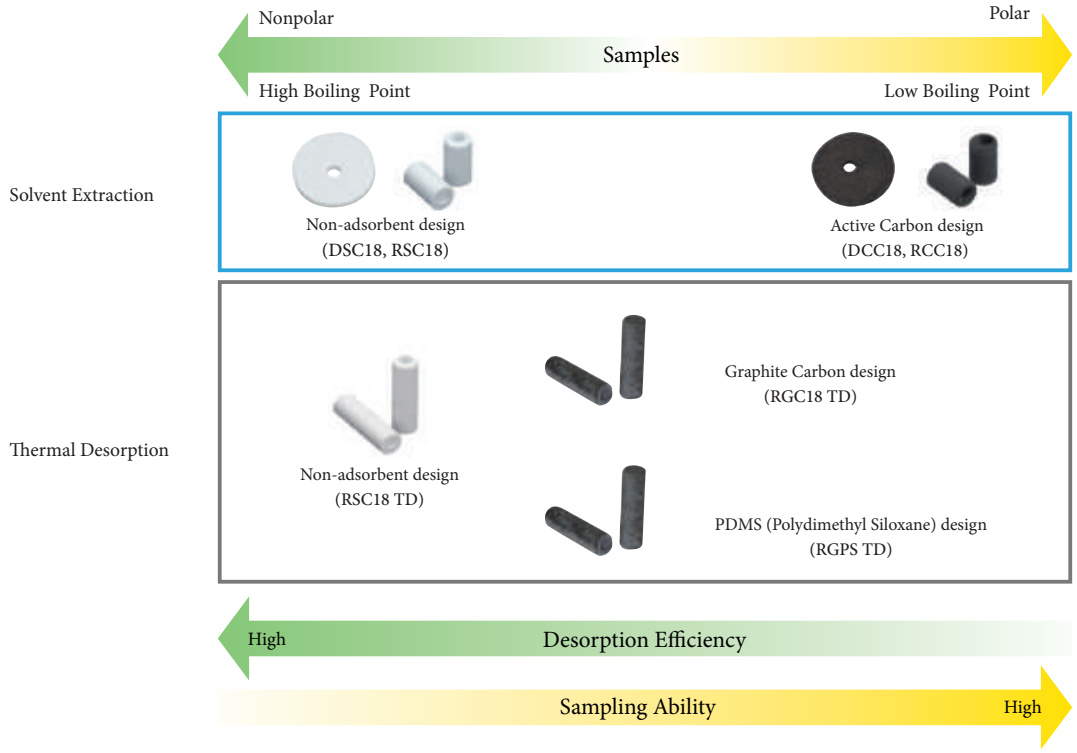
It only takes a small amount of solvent, 200 µL, to completely saturate the monolithic network and achieve desorption, though more solvent can be used to control the final concentration of your samples.

▪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.

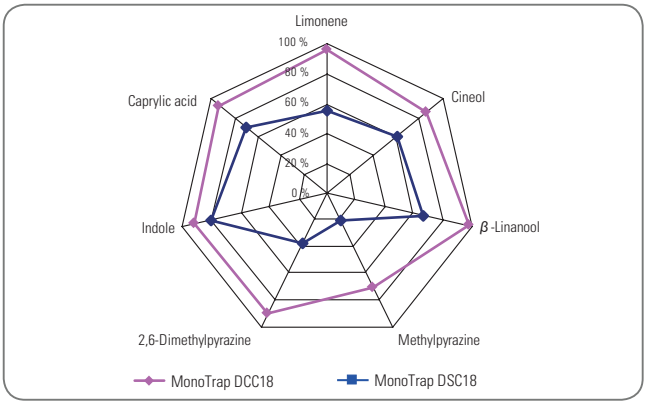


Superior Enrichment Capabilities using Activated Carbon/ Graphite Carbon in addition to ODS

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.



Solvent Extraction

Thermal Desorption

Sample Adsorption

Head Space Gas Sampling

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.

Stirring 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-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

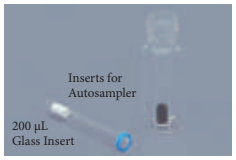
Extraction from the Disk Type

Fill the MT Extract Cup with the extraction solvent

Put the MonoTrap and tighten the septum

Pour pure water into the vials

Extraction from the Rod Type



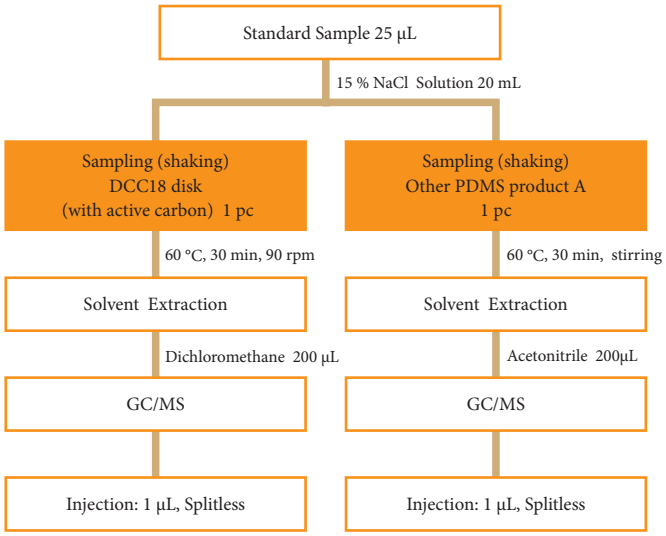
Thermal Desorption

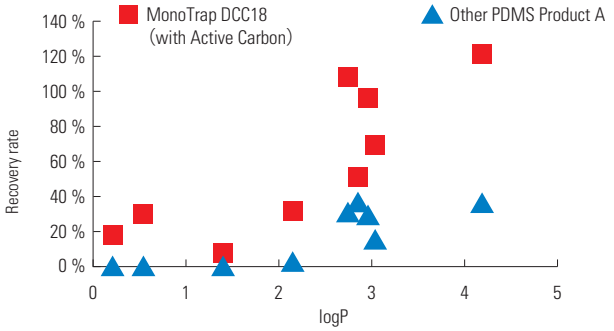
Gerstel, T-Dex and Linex glass tubes are available

● 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.

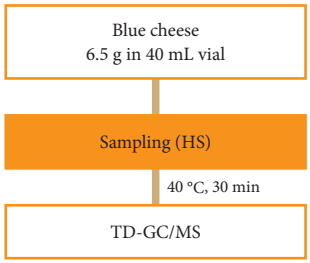




Recovery rate comparison between
MonoTrap DCC18 and other PDMS product A

Component	logP	MonoTrap DCC18 (with Active Carbon)	Other PDMS Product A
Methylpyrazine	0.21	18.8 %	0.6 %
2,6-Dimethylpyrazine	0.54	30.7 %	1.8 %
Indole	2.14	32.0 %	3.5 %
Cineol	2.74	107.0 %	30.5 %
Linalool	2.97	97.0 %	29.8 %

● MonoTrap performs high recovery

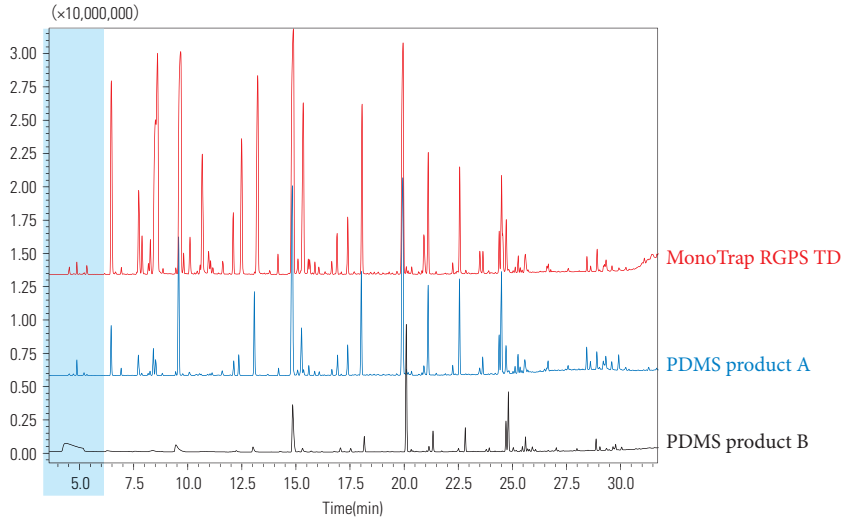


Here is an example of blue cheese, after sampling fragrance of blue cheese with MonoTrap RGPS TD, analysis was performed with Thermal Desorption system.

System : GC/MS-Thermal Desorption (OPTIC Linex)
Column : InertCap 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)

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



Sampling blue cheese with MonoTrap RGPS TD

Line-up

	Description	Recommended Operating Temperature	Appearance	Shape	Size	Active Carbon	Graphite Carbon	ODS Function	PDMS	Qty.	Cat.No.
Solvent Extraction	MonoTrap DCC18	-		Disk	Diameter: 10 mm Thickness: 1 mm	•		•		50 ea	1050-72101
	MonoTrap RCC18	-		Rod	Diameter: 2.9 mm Length: 5 mm	•		•		50 ea	1050-72201
	MonoTrap DSC18	-		Disk	Diameter: 10 mm Thickness: 1 mm			•		50 ea	1050-71101
	MonoTrap RSC18	-		Rod	Diameter: 2.9 mm Length: 5 mm			•		50 ea	1050-71201
Thermal Desorption	MonoTrap RGPS TD*	250 °C		Rod	Diameter: 2.9 mm Length: 10 mm		•		•	30 ea	1050-74202
	MonoTrap RSC18 TD*	200 °C		Rod	Diameter: 2.9 mm Length: 10 mm			•		30 ea	1050-73201
	MonoTrap RGC18 TD*	200 °C		Rod	Diameter: 2.9 mm Length: 10 mm		•	•		30 ea	1050-74201

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

MonoTrap's Nomenclature & Character

Ex) MonoTrap

(1)	(2)	(3)	(4)
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 withPDMS (Polydimethyl Siloxane), end-capped

(4) Desorption --- TD: for thermal desorption

Start-up kit

Type	Description	Contens	Cat.No.
Solvent Extraction	MMSE Start Up KIT for SE	①~④ x 20 pcs, ⑧~⑩, ⑪ x 5 pcs, ⑫x 40 pcs	1050-79001
Thermal Desorption	MMSE Start Up KIT for TD (OPTIC/LINEX)	⑤~⑦ x 10 pcs, ⑧~⑨, ⑪ x 5 pcs, ⑬x 3 pcs	1050-78001
	MMSE Start Up KIT for TD (T-Dex/ATD/TD-20)	⑤~⑦ x 10 pcs, ⑧~⑨, ⑪ x 5 pcs, ⑭x 3 pcs	1050-78002
	MMSE Start Up KIT for TD (Gerstel-TDS)	⑤~⑦ x 10 pcs, ⑧~⑨, ⑪ x 5 pcs, ⑮x 3 pcs	1050-78003
	MMSE Start Up KIT for TD (Gerstel-TDU)	⑤~⑦ x 10 pcs, ⑧~⑨, ⑪ x 5 pcs, ⑯x 3 pcs	1050-78005

Solvent Extraction

①DCC18 ②RCC18 ③DSC18 ④RSC18

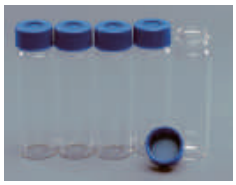
Thermal Desorption

⑤RSC18 TD ⑥RGC18 TD ⑦RGPS TD

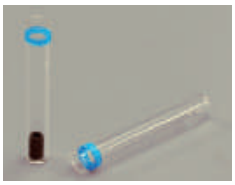
⑧ MT Holder 5 pcs

⑨ MT Stand 1 pcs

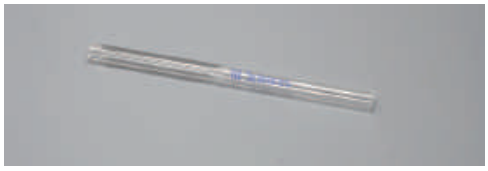
⑩ MT Extract Cup with Vial (20 mL) 5 pcs



⑪ Clean Pin Hole Septum with Vial (40 mL)



⑫ 200 µL glass insert



⑬MonoTrap TD Liner for OPTIC/LINEX

⑭MonoTrap TD Liner for T-Dex/ATD/TD-20

Accessories

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

Glass tube for Thermal Desorption

Description	Qty.	Cat. No.
⑬ MonoTrap TD Liner for OPTIC/LINEX	1 pcs	1003-75001
⑭ MonoTrap TD Liner for T-Dex/ATD/TD-20	1 pcs	1003-75002
⑮ Gerstel-MT Tube	1 pcs	1003-75003
⑯ Gerstel-MT-U Tube	1 pcs	1003-75004

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.

I.D.(mm)	Length(m)	Thickness(µm)	Max. operating Temp. (°C)	Cat.No.
0.25	30	0.25	iso.260-prog.260	1010-68142
	60	0.25	iso.260-prog.260	1010-68162
0.32	30	0.25	iso.260-prog.260	1010-68242
	60	0.25	iso.260-prog.260	1010-68262
0.53	15	1.00	iso.240-prog.240	1010-68425
	30	1.00	iso.240-prog.240	1010-68445

For more information, please contact.

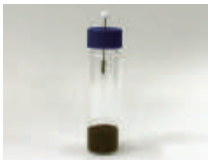
● Easy Enrichment of Coffee Fragrance

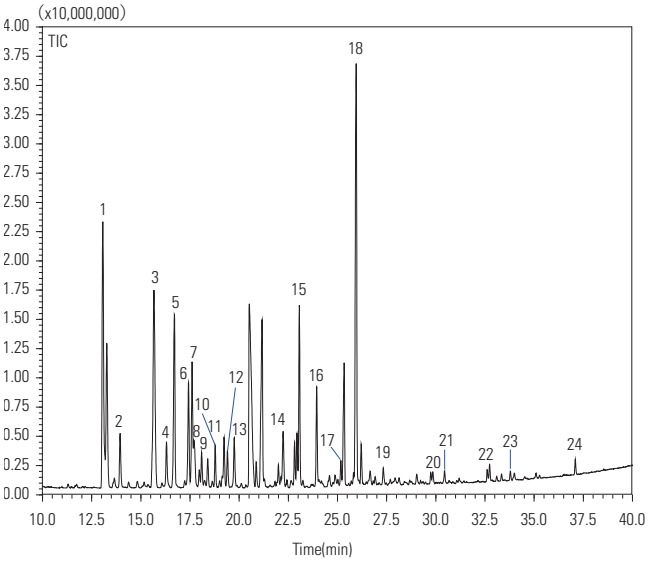
Sample (coffee) 3.0 g

Sampling (HS)
MonoTrap RGPS TD 1ea

60 °C, 10 min

TD-GC/MS





System		: GC/MS-Thermal Desorption (OPTIC-4)
Column		: InertCap Pure-WAX 0.25 mm I.D. × 60 m df = 0.25 µm
Col.Temp.		: 40 °C, (3 min hold) - 5 °C /min - 250 °C
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
2. Pyrazine
3. Methylpyrazine
4. 3-Hydroxy-2-butanone
5. 1-Hydroxy-2-propanone
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-methylpyrrole
18. 2-Furanmethanol
19. 1-Acetyl-1,4-dihydropyridine
20. 1-Furfurylpyrrole
21. Guaiacol
22. Maltol
23. 1H-Pyrrole-2-carboxaldehyde
24. 2-Methoxy-4-vinylphenol

● Fragrance of Peach Juice

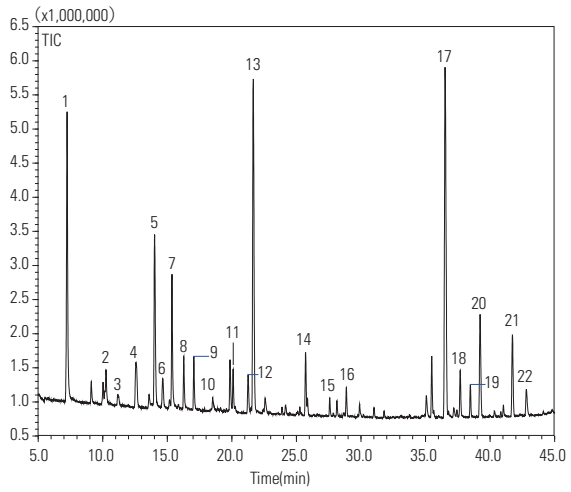
Peach juice 30 mL

Sampling (agitate)
MonoTrap RGPS TD 1ea

36 °C, 10 min, 160 rpm

Rinse

TD-GC/MS



System		: GC/MS-Thermal Desorption (OPTIC-4)
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.	: 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
2. Isopentanol
3. Ethyl hexanoate
4. Hexyl acetate
5. Hexenyl acetate
6. Hexenyl acetate
7. Hexanol
8. 3-Hexenol
9. 2-Hexenol
10. Furfural
11. Benzaldehyde
12. p-Menthan-2-one
13. Linalool
14. Terpineol
15. Geranyl acetate
16. Damascenone
17. γ-Decalactone
18. δ-Decalactone
19. 6-Pentyl-5,6-dihydro-2H-pyran-2-one
20. δ-Undecalactone
21. γ -Dodecalactone
22. δ-Dodecalactone

● Flower Hyacinth Aroma

Sample

Sampling (passive)
MonoTrap DCC18 1 ea

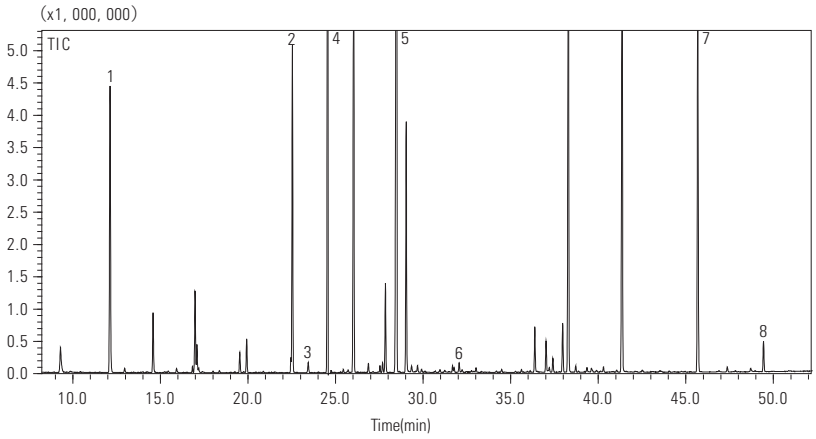
Leave at room temperature
for 3 h

Solvent Extraction
/ Concentration

Dichloromethane 1000 µL
Ultrasonication for 5 min
Enrich by N_2 purge to 100 µL

TD-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 (5 min hold)
Carrier Gas : He 120 kPa
Injection : Splitless 0.5 min
250 °C
Detection : MS Scan (40-350 m/z)
Sample Size : 1.0 µL



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

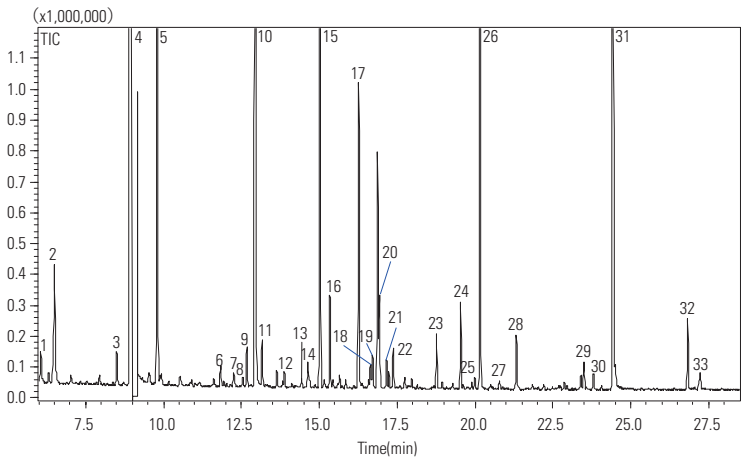
Solvent Extraction

Dichloromethane 300 µL
Ultrasonication for 5 min

TD-GC/MS

image

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) - 6 °C /min -250 °C (5 min hold)
Carrier Gas : He 95 kPa
Injection : Splitless
250 V
Detection : MS Scan (55-400 m/z)
Sample Size : 1.0 µL



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-methylbutanoate
15. Ethyl octanoate
16. Furfural
17. 2-Ethyl-1-hexanol
18. Benzaldehyde
19. 3-Ethyl-4-methylpentanol
20. 2-Bornene
21. n-Propyl propionate
22. Ethyl dl-2-hydroxycaproate
23. β-Cyclocitral
24. Ethyl decanoate
25. α-D-Galactopyranose methyl glycoside
26. Diethyl succinate
27. 3-(Methylthio)-1-propanol
28. 1,5,8-Trimethyl-1,2-dihydronaphthalene
29. Hexanoic acid
30. Benzyl Alcohol
31. Phenylethyl Alcohol
32. Diethyl dl-malate
33. Octanoic Acid

● Mushroom Fragrance

Sample

2 kinds of Mushrooms produced in different areas 38 g/each

Sampling (Still Standing)
MonoTrap DCC18 5 ea

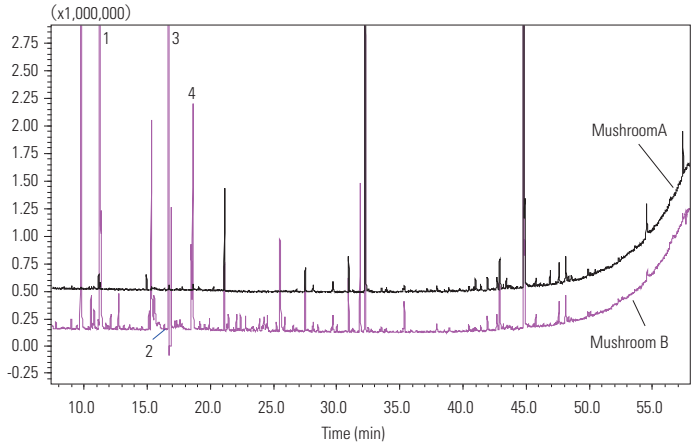
Room temperature, 12 h

Solvent Extraction / Concentration

Diethylether 1000 µL
Ultrasonication for 5 min
Enrich by N_2 purge to a few µL

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 (5 min hold)
Carrier Gas : He 95 kPa
Injection : Split 1:10
: 250 °C
Detection : MS Scan (25-450 m/z)
Sample size : 1.0 µL



< Comparison of Fragrances by Area % >

	Mushroom A	Mushroom B
1. 3-Octanone	1.8 %	35.8 %
2. Dimethyl trisulfide	1.7 %	4.5 %
3. 3-Octanol	1.7 %	33.1 %
4. 1-Octen-3-ol	2.3 %	4.5 %

● Pu-erh Tea

Sample

Brew 5 g tea leaves with 15 mL hot water

Sampling
MonoTrap DCC18 1 ea

60 °C, 30 min

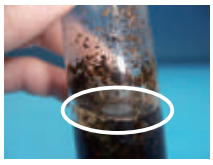
Solvent Extraction

Dichloromethane 1000 µL
Ultrasonication for 5 min

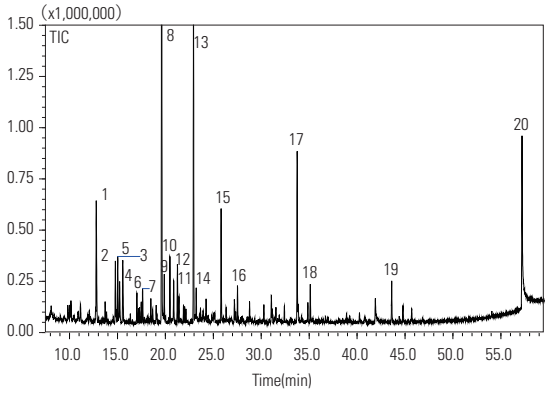
Enrichment

Enrich by N_2 purge to 100 µL

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
250 °C
Detection : MS Scan (40-600 m/z)
Sample Size : 1.0 µL



1. Methylpyrazine
2. Dimethylpyrazine
3. Dimethylpyrazine
4. Ethylpyrazine
5. 6-Methyl-5-hepten-2-one
6. 2-Ethyl-6-methylpyrazine
7. Trimethylpyrazine
8. Furfural
9. Acetol acetate
10. 2,4-Heptadien-1-al
11. 2-Acetylfuran
12. Benzaldehyde
13. 2-Formyl-5-methylfuran
14. Methyl 2-furoate
15. 2-Furanmethanol
16. Dimethoxybenzene
17. Trimethoxybenzene
18. Pyrrole-2-aldehyde
19. Coumaran
20. Caffeine

● Cinnamon

Sample

Sampling (HS)
MonoTrap RCC18 2 ea

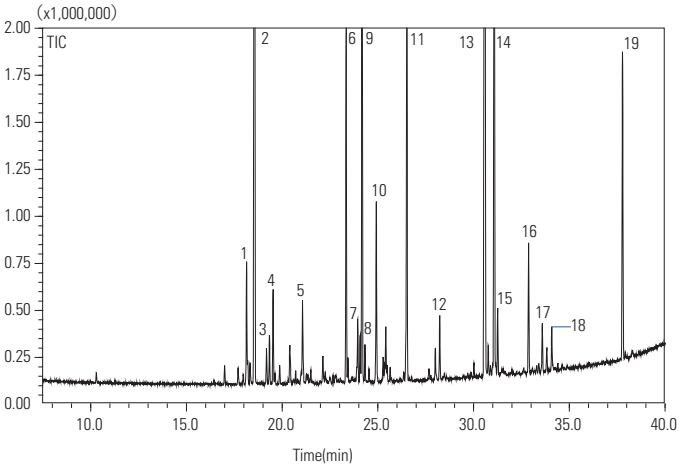
Solvent Extraction

Ethanol 200 µL
Ultrasonication 5 min

GC/MS

Image

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) - 5 °C /min - 250 °C
Carrier Gas : He 1 mL/min
Injection : Split 1 : 20
250 °C
Detection : MS Scan (35-600 m/z)
Sample Size : 1.0 µL



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

● 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

Leave for 1 hour at room temperature.

Rinse

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

Solvent Extraction

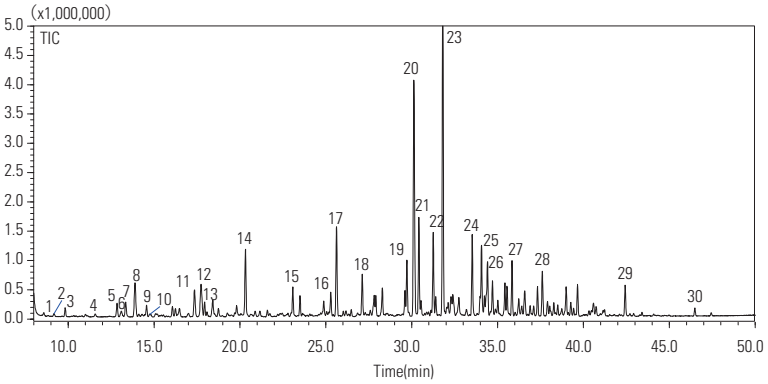
Acetone 200 µL
Ultrasonication 5 min

GC/M


Burning


Recovered clod part

System : GC/MS
Column : InertCap AQUATIC
0.25 mm I.D. × 60 m df = 1.00 µm
Col.Temp. : 40 °C (5 min hold) - 4 °C /min - 220 °C
Carrier Gas : He 1 mL/min
Injection : Split 1:50
220 °C
Detection : MS Scan (30 - 600 m/z)
Sample Size : 1.0 µL



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-Methyloctane
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
18. 1-Ethyl-3,5-dimethylbenzene
29. Naphthalene
30. 1-Methylnaphthalene

● 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 °C

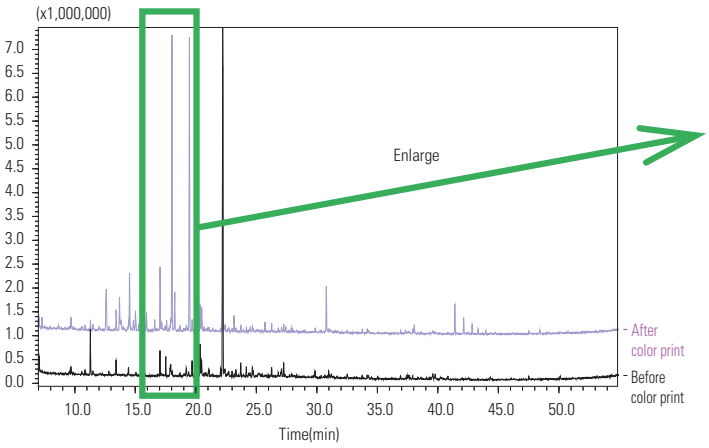
Solvent Extraction

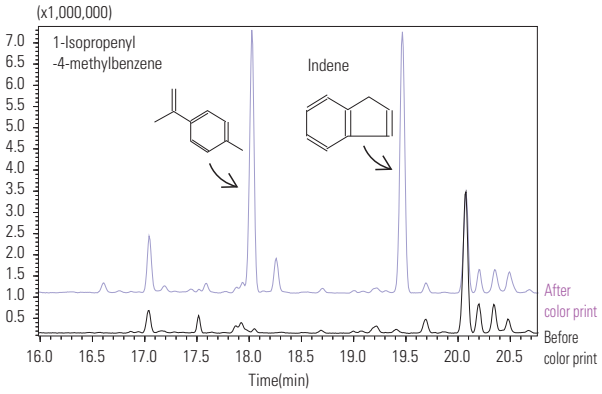
Dichloromethane 500 µL
Ultrasonication for 5 min

GC/MS

Left : Before color print
Right : After Before color print

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
250 °C
Detection : MS Scan (35-500 m/z)
Sample Size : 1.0 µL





● VOC from Putrid Cabbage

Sample

Cut into strips, put 25 g into 100 mL vial

Putrefacient cabbage

60 °C, a certain preiod

Sampling (Passive)
MonoTrap RCC18 3 ea

Room temperature, 3 h

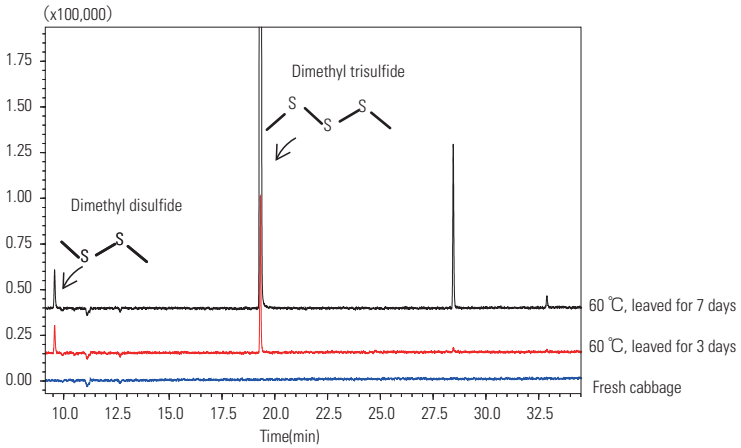
Solvent Extraction

Diethyl ether/ n-pentane = 1:1
Mixed sample 500 µL
Ultrasonication for 5 min

GC/FPD

Left : fresh Cabbage
Right : 60 °C, putrefacient cabbage leaved for 3 days

System : GC/FPD
Column : InertCap AQUATIC
0.25 mm I.D. × 60 m df = 1.00 µm
Col. Temp. : 40 °C (5 min hold) - 6 °C /min - 220 °C (10 min hold)
Carrier Gas : He 1 mL/min
Injection : Split 1:50
220 °C
Detection : FPD (S)
Sample Size : 1.0 µL



● VOC from Scalp

Sample

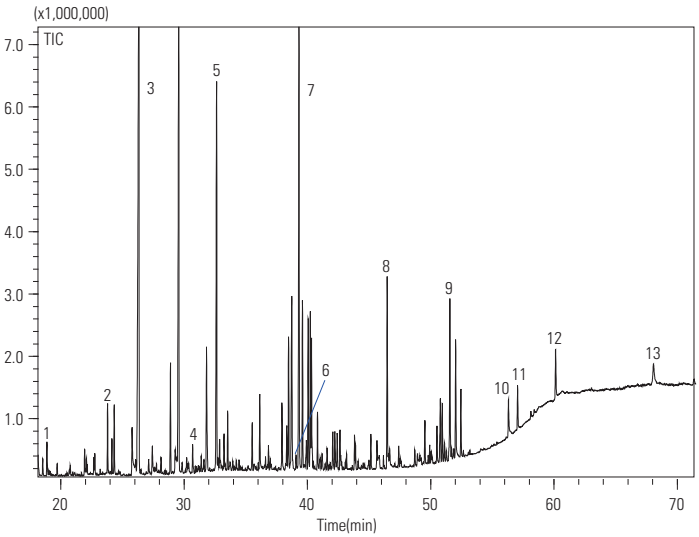
Sampling (Passive)
MonoTrap RGPS TD 1 ea

Room temperature 3 h

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. Phenoxyethyl alcohol
9. Octanal, 2- (phenylmethylene) -
10. 1-Octadecanol
11. Benzyl Benzoate
12. Tetradecanoic acid
13. Squalane

● Tabacco

Sample

Samapling (Still Standing)
MonoTrap RGC 18 TD 1 ea

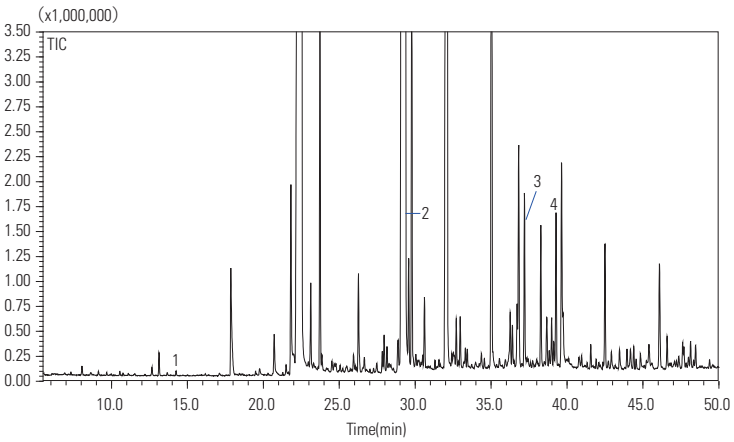
60°C, 90 min

TD-GC/MS

Image

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 : 2 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

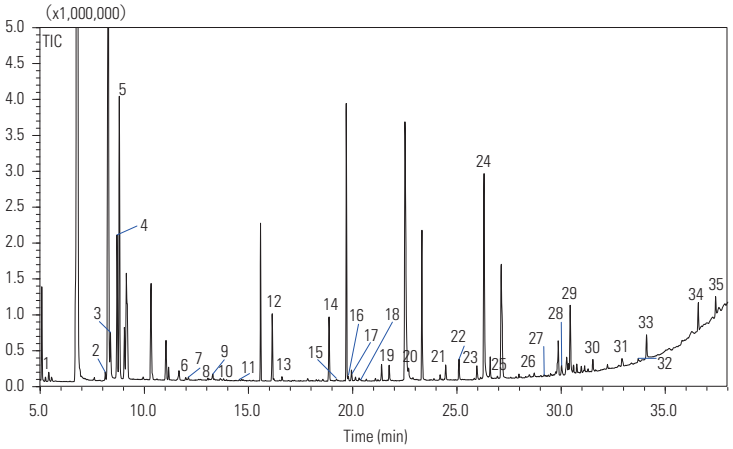
Sampling (HS)
MonoTrap RGC 18 TD 1 ea

60 °C, 30 min

TD-GC/MS

System : GC/MS-Thermal Desorption (OPTIC / Linex)
Column : InertCap Pure-WAX
0.25 mm I.D. × 60 m df = 0.25μm
Col.Temp. : 40 °C (5 min hold) - 6 °C /min - 250 °C
Carrier Gas : He 1 mL/min (constant flow)

Desorb Temp. : 200 °C
Time : 5 min
Flow : 1 mL/min
Split : Splitless
Cryo Trapping : -150 °C
Injection Temp. : 250 °C
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-Furanmethanol
26. Acetamide
27. 2-Tetradecanol
28. 2-Tridecanone
29. Hexanoic acid
30. Dimethyl sulfone
31. δ-Octalactone
32. 2-Pentadecanone
33. Octanoic acid
34. δ-Decalactone
35. Decanoic acid

● Maple Sugar

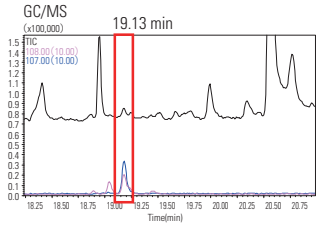
Sample

Sampling (HS)
MonoTrap RGC 18 TD 1 ea

60 °C, 1 h

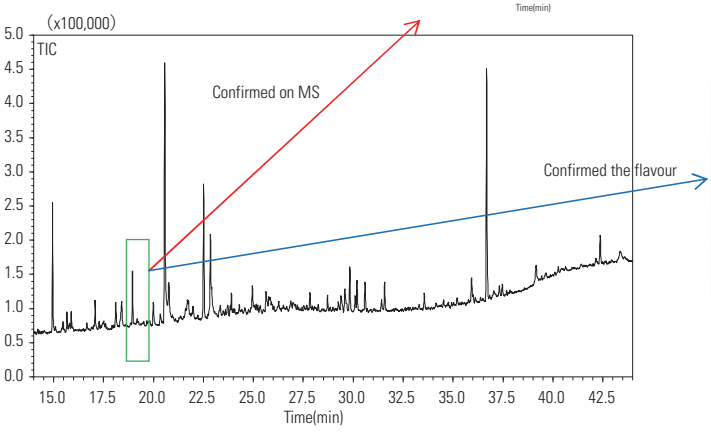
TD-GC/MS-O

Ethylpyrazine

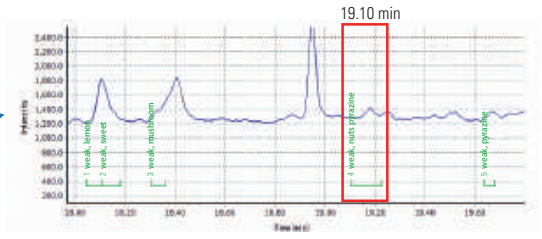


System : GC/MS-Thermal Desorption (OPTIC / Linex)
Column : InertCap Pure-WAX
0.25 mm I.D. × 60 m df = 0.25 μm
Col.Temp. : 40 °C (5 min hold) - 6 °C /min - 250 °C
Carrier Gas : He 1 mL/min (constant flow)

Desorb Temp. : 200 °C
Time : 5 min
Flow : 1 mL/min
Split : Split 1:2 (Desorb 10 mL/min, Split 20 mL/min)
Cryo Trapping : -150 °C
Injection Temp. : 250 °C
Detection : MS Scan (28.8 - 600 m/z)



Screen of Olfactory Voicegram Software



No.	Start (min)	End (min)	Intensity	Smell
1	18.05	18.11	weak	lemon
2	18.11	18.18	weak	sweet
3	18.30	18.36	weak	mushroom
4	19.10	19.23	weak	nuts pyrazine
5	19.64	19.68	weak	pyrazine

＊We reserve the right to change specifications to make improvements without notice.

GL Sciences

Dillenburgstraat 7C
5652AM Eindhoven, The Netherlands
info@glsciences.eu
www.glsciences.eu

GLSBV20140218KH2T