



Patent Pending Silica Monolith Adsorbents

*MonoTrap*TM

A New Generation Tool for Adsorption & Extraction

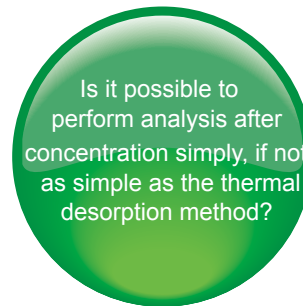


MonoTrapTM
Easy-to-use Concentration and Extraction Chip



A State-of-the-Art for Adsorption and Extraction

MonoTrap™ is a state-of-the-art silica monolithic and hybrid adsorbent having a large surface area and properties based on silica, activated carbon and Octadecyl functional group. MonoTrap™ can be used for the simple enrichment analyses and screening of aroma components, foods and environment.



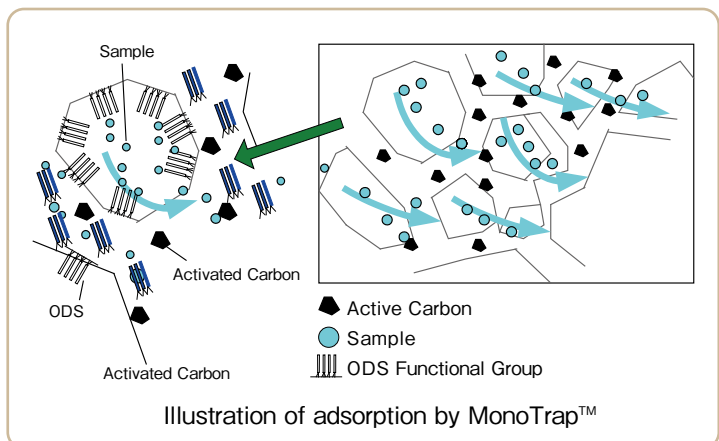
MonoTrap™ has been developed in response to these requirements and offers an easy-to-use extraction procedure for an analysis after concentration.

Adsorption and Extraction by MonoTrap™

Structure of the MonoTrap™ is highly porous monolithic rods of pure silica with a large surface area due to through-pores in the rods and mesopores on the surface of monolithic skeleton.

When sample passes through the through-pores in a monolithic structure, the sample is trapped by ODS groups chemically bonded to the surface of the silica structure or by activated carbon present inside and outside the structure. Such trapping is performed all over the large surface area of at least 150m²/g, which allows a high level of efficiency. On the top of that, the surface of the silica monolith is chemically modified and subjected to end cap treatment.

MonoTrap™ is available in two types, one that has the same characteristics as general silica gel and one whose silica skeleton contains an adsorption medium (activated carbon).



Silica Monolith Structure

Use of the high-purity silica gel modified to the evenly balanced three-dimensional network (Monolithic structure) as the base material enables MonoTrap to offer high aeration property and high liquid through.

(This product is made by GL Sciences Inc. Japan based on monolithic technology, Merck KGaA, Darmstadt, Germany)



Silica Monolith Structure

Features

Effective Adsorption

A large surface area enables a large amount of sample loading.

Fast Adsorption and Extraction

One of the advantages of a monolithic structure is that the through-pores significantly reduce the resistance of the flow path. Samples can be easily spread and adsorbed by ODS groups and activated carbon.

Complete Desorption with a Small Solvent Volume

When extracting with the solvent, the full amount of the solvent enters the through-pores and remains in contact with the entire surface to create speedy desorption of the sample. Only a small amount of solvent allows almost complete desorption.

Note) Desorption differs depending on the sample

Inexpensive

Inexpensive trapping materials realize easy enrichment and fast multiple sample analyses also inexpensively.

Easy Remeasurement

Unlike thermal desorption that loads total volume of the sample at once, extracts from MonoTrap with a solvent can subject to another analysis under reconsidered conditions.

Highly Water-Shedding

With a high water-shedding of the MonoTrap surface, water can be hardly sinked in and dehydration process becomes extremely easy.

Note) Degree of the water-shed differs depending on the sample

Ready-To-Use

No conditioning needed before use.

Concentration for increase of sensitivity is needed.

Make an analysis of blank.

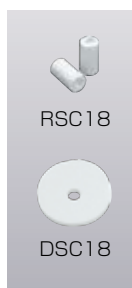
Note) MonoTrap has a high trapping ability. Make sur to seal the bag when not used.

MonoTrap™

MonoTrap DSC18, RSC18(ODS)

Disk type with a diameter of approximately 10 mm and a thickness of 1 mm, is ODS groups bobbed and notcontaining activated carbon (50 pieces in a set)

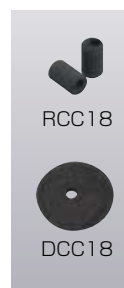
Rod type with a diameter of approximately 2.9 mm and a height of 5 mm and with a through hole of 1 mm, containing ODS groups and not containing activated carbon (50 pieces in a set)



MonoTrap DCC18, RCC18(Activated Carbon)

Disk type with a diameter of approximately 10 mm and a thickness of 1 mm, containing ODS groups and activated carbon. (50 pieces contained in a set).

Rod type with a diameter of approximately 2.9 mm and a height of 5 mm and with a through hole of 1 mm, containing ODS groups and activated carbon; (50 pieces in a set).



Selection and Application of MonoTrap™

Descriptopn	Shape	Activated Carbon	Example of Application
MonoTrap DSC18	Disk	No	Hydrophobic Compounds (medium to high boiling point)
MonoTrap RSC18	Rod	No	Hydrophobic Compounds (medium to high boiling point)
MonoTrap DCC18	Disk	Contained	Polar, hydrophic compounds, low to medium boiling point
MonoTrap RCC18	Rod	Contained	Polar, hydrophic compounds, low to medium boiling point

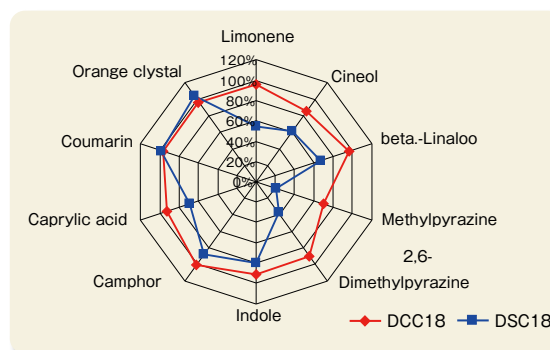
※MonoTrap has several absorption fuctions, thus the absorption character is not guaranteed.

Superior Trap Ability with Activated Carbon Monolithic Silica C18

The graph at right provides a comparison between the recovery rate of DCC18 (containing activated carbon) and DSC18 (not containing activated carbon) The Recovery rate is calculated when the standard samples mentioned are added to a 44-mL vial to which a MonoTrap is located. Dichloromethane was used as extraction solvent.

As shown in the graph above, coumarin and orange crystal that are both highly hydrophobic can be collected to a similar degree either by DSC18 (not containing activated carbon) or DCC18 (containing activated carbon). However, polar compounds are more effectively collected by DCC18 (containing activated carbon).

This fact shows that the activated carbon helps a great deal in the collection of polar compounds and nitrogen-containing compounds.



How to Adsorb and Extract with MonoTrap™

Sample Adsorption

Head Space Gas Sampling



MT Holder & MT Stand
Grabs 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 (40mL)
Tighten the septum on the vial.

Stirring Sampling

The hydrophobicity of MonoTrap™ allows it to trap samples while floating on the surface of the liquid.

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 GL Sciences Inc. for the agitation bath and vial rack for more details.



Put the sample into the vial and flow MonoTrap



Handless shaker and the holder

Passive Sampling

This method is useful for sampling the fragrance of flowers in their natural state.



※Please contact GL Sciences Inc for the Tedlar bags

Extraction of Targets

Extraction from the Disk Type

Take the MonoTrap out of the vial after trapping the sample.
Put the MonoTrap™ in MT Extract Cup to and fill the cup with solvent.
Hermetically seal the cup and expose it to ultrasound (for five minutes maximum).



Fill the MT Extract Cup with the extraction solvent



Put the MonoTrap and tighten the septum



Pour pure water into the vials weight



Give it ultrasonic agitation for 5 mins

Extraction from the Rod Type

Put the rod type MonoTrap™ in Insert Vial and set the Insert vial in autosampler vial (Cat No. 1030-41403)
Give it ultrasonic agitation for 5 minutes.



Autosampler...AOC20i+S
Vial...Cat.No.1030-17105
Insert...Cat.No.1030-17211

Application

Auto Sampler Analysis of Candy Flavours

Direct analysis is available by placing the MonoTrap and solvents in the vials for auto sampler.

※ Make sure that the auto sampler syringe needle does not touch the bottom of the vial and have 10mm of space between the needle point and vial bottom.



Sample

← Candy 3pcs

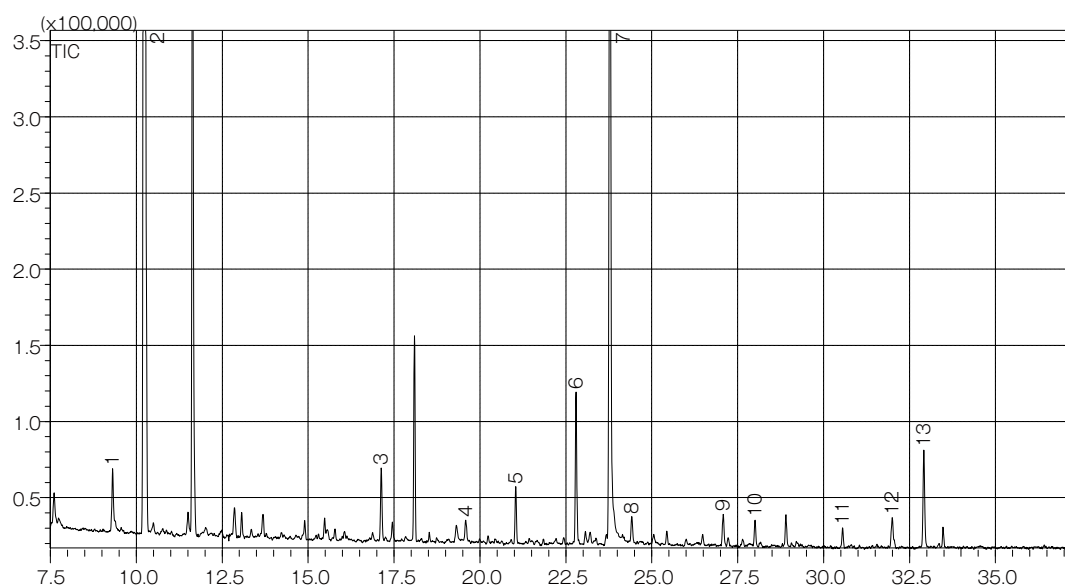
Adsorption (Headspace)

← MonoTrap™ ; RCC18 1
60°C, 1hour

Extraction

← Dichloromethane 200 μ L
Ultrasonic agitation for
5minutes

GC/MS



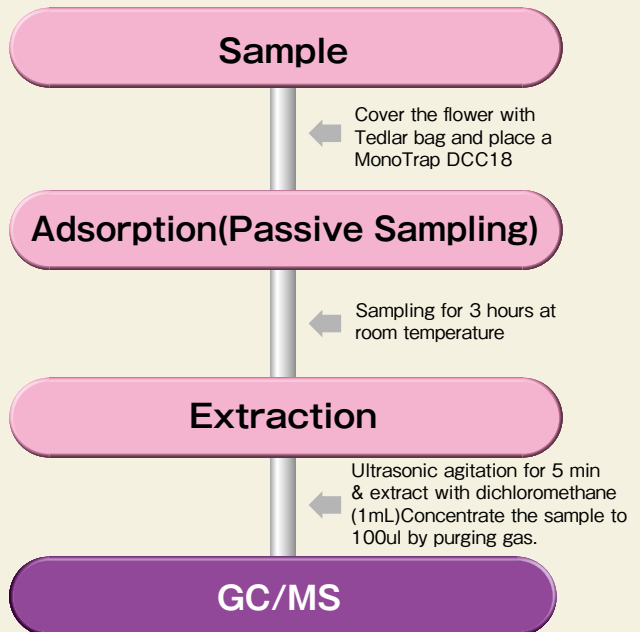
Column : InertCap Pure-WAX
0.25mm I.D. \times 30m $df=0.25 \mu$ m
Column Temp : 40°C (5min) \rightarrow 6°C/min \rightarrow 250°C (5min)
Carrier Gas : He 95kPa
Injection : Splitless (0.5min) , 1 μ L
250°C
Detector : MS Scan (m/z:55-400)

1. β -Myrcene	8. Ethyl laevulinate
2. Limonene	9. α -Terpineol
3. cis-3-Hexenol	10. Citral
4. Furfural	11. β -Damascenone
5. Decanal	12. Benzyl Alcohol
6. β -Linalool	13. Phenylethyl Alcohol
7. Propylene Glycol	

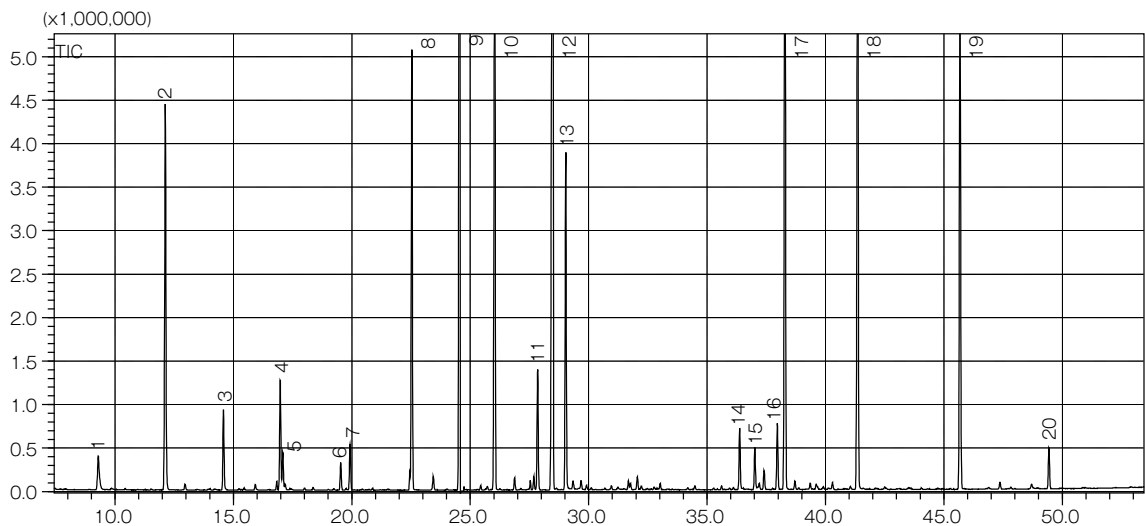
Application

Analysis of Aroma Components of Flowers

This method is useful for sampling fragrance of flowers in their natural state. Cut off one side of a Tedlar Bag to create a bag and put the flower in it. Put a MonoTrap in the bag and leave for three hours or more. When the enough sensitivity of the fragrance can not be obtained, increase number of pieces of MonoTrap to use and prolong the sampling time properly.



(Approx. about 24 hours is required for low-concentration compounds)



Column : InertCap Pure-WAX
0.25mmI.D. x 30m df=0.25 μm
Column Temp : 40°C (5min) → 4°C/min → 250°C (5min)
Carrier Gas : He 120kPa
Injection : Split Less (0.5min) , 1 μL
250°C
Detector : MS Scan (m/z:40-350)

- | | |
|------------------------------|--------------------------------------|
| 1. Pyridine | 11. Benzyl acetate |
| 2. β-cis-Ocimene | 12. α-Farnesene |
| 3. cis-3-Hexenyl acetate | 13. Methyl salicylate |
| 4. cis-3-Hexen-1-ol | 14. trans-Nerolidol |
| 5. cis-3-Hexenyl isobutyrate | 15. Hexyl benzoate |
| 6. cis-3-Hexenyl butyrate | 16. Phenylmethyl 2-methyl-2-butenate |
| 7. cis-3-Hexenyl valerate | 17. cis-3-Hexenyl benzoate |
| 8. Linalool | 18. δ-Nonalactone |
| 9. Clorius | 19. Indole |
| 10. Isopropylcyclohexane | 20. Benzyl benzoate |

InertCap Pure-WAX is an optimum for aroma components analysis.

Application

Analysis of Potate-Based Distilled Liquor

Because of its water-repellency (due to ODS functional groups and end-capping), the equilibration time can be shortened by stirring a MonoTrap disk (or rod) directly in the sample in a vial compared to the HS method.

Using HS-MT-Sampling Kit, Head-Space sampling is easily achieved with high efficiency.



Sampling

← Pour 10mL of distilled liquor and MonoTrap DCC18 into a 40mL vial

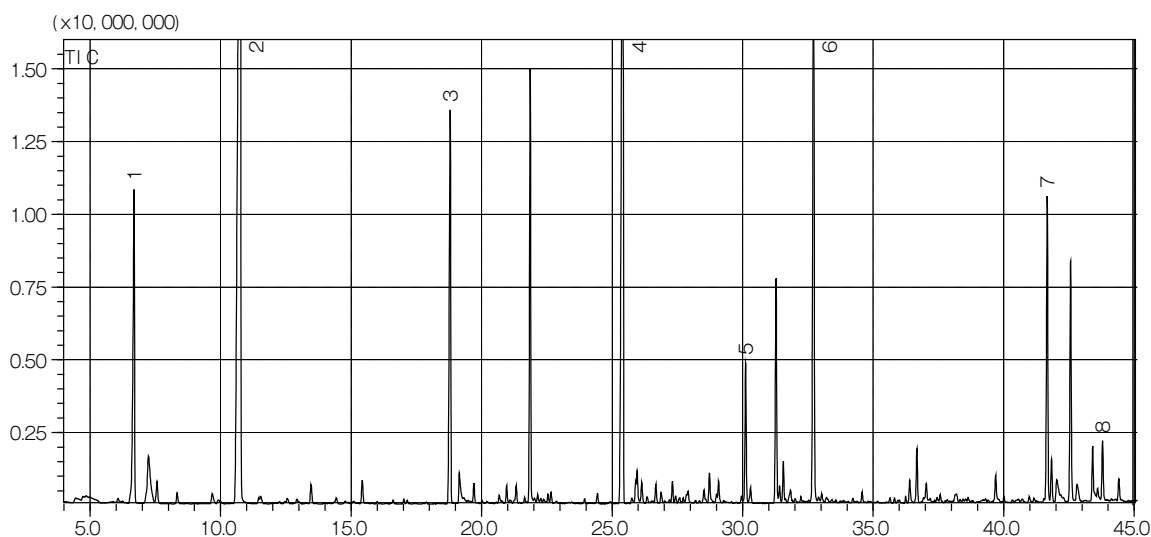
Adsorption (Stirring)

← Stir at 60C for 3 hours(90rpm)

Extraction

← Extract with Diethyl ether/pentane (1:1) 1mL by giving ultrasonic agitation for 5 min. Concentrate the sample to 100 μ by purging gas.

GC/MS



Column : InertCap Pure-WAX
0.25mm I.D. x 30m df=0.25 μm
Column Temp : 40°C (5min) → 4°C/min → 250°C (5min)
Carrier Gas : He 120kPa
Injection : Splitless (0.5min) , 1 μL
250°C
Detector : MS Scan (m/z:55-400)

1. 2-Methyl-1-propanol
2. 3-Methyl-1-butanol
3. Ethyl octanoate
4. Ethyl decanoate
5. Phenethyl Acetate
6. 2-Phenylethyl Alcohol
7. Ethyl palmitate
8. Farnesol

InertCap Pure-WAX is an optimum for aroma components analysis.

MonoTrap™ Product Lineup

Type	Description	Qty	Cat.No.
Disk Type (Diameter 10mm, Thickness 1mm)	MonoTrap DSC18 (ODS, End-Capped)	50ea	1050-71101
	MonoTrap DCC18 (Activated Carbon, ODS, End-Capped)	50ea	1050-72101
Rod Type (Diameter 2.9mm, Height 5mm, Hole 1mm)	MonoTrap RSC18 (ODS, End-Capped)	50ea	1050-71201
	MonoTrap RCC18 (Activated Carbon, ODS, End-Capped)	50ea	1050-72201

MonoTrap™ Start UP-KIT

A convenient kit to conduct a simple enrichment of target compounds by MonoTrap™



① MT Holder 5 pcs



② MT Stand



③ MT Extract Cup with Vial (20mL) 5 pcs



④ Clean Pin Hole Septums with vials (40mL) 5 pcs



⑤ 200 μL Glass Inserts (Flat Bottom) 40 pcs



⑥ MonoTrap 20 pcs (DSC18, RSC18, DCC18, RCC18)

Cat.No. 1050-79001

HS-MT-Sampling KIT

The HS sampling and extraction can be done with very little contamination.

Description	Qty
① MT Holder	5pcs
② MT Stand	1pcs
③ MT Extract Cup with Vial (20mL)	5pcs

Cat.No. 1050-79002

Accessories

Description	Qty	Cat.No.
① MT Holder	5pcs	1050-79003
② MT Stand	1pcs	1050-79004
③ MT Extract Cup with Vial (20mL)	5pcs	1050-79005
④ Clean Pin Hole Septum with vial (40mL)	72pcs	1050-79006
⑤ 200 μL Glass Insert (Flat Bottom)	500pcs	1030-17211

GC · GC/MS Capillary Column InertCap® Pure-WAX

ID(mm)	Length(M)	Thickness(μm)	Highest Temperature(°C)	Cat.No.
0.25	30	0.25	Iso.260-prog.260	1010-68142
0.25	60	0.25	Iso.260-prog.260	1010-68162
0.32	30	0.25	Iso.260-prog.260	1010-68242
0.32	60	0.25	Iso.260-prog.260	1010-68262
0.53	15	1.0	Iso.240-prog.240	1010-68425
0.53	30	1.0	Iso.240-prog.240	1010-68445



GL Sciences Inc.

22-1 Nishishinjuku 6-chome, Shinjuku-ku, Tokyo 163-1130, Japan
International Department TEL: +81-3-5323-6620 Fax: +81-3-5323-6621