GL Sciences

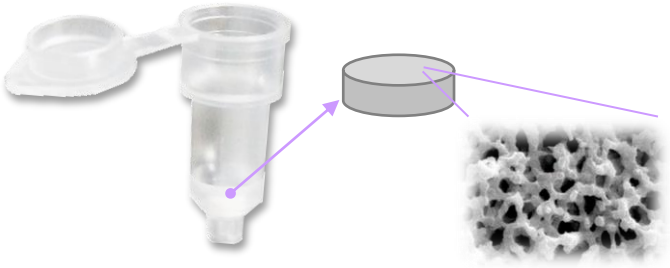
Published in Japan, 29 July 2022

MonoSpin

Solid Phase Extraction Spin Column

MonoSpin

MonoSpin is a solid-phase extraction spin column that uses silica monoliths with uniform continuum pores. It effectively and rapidly extracts, isolates, purifies, and concentrates samples by centrifugation.



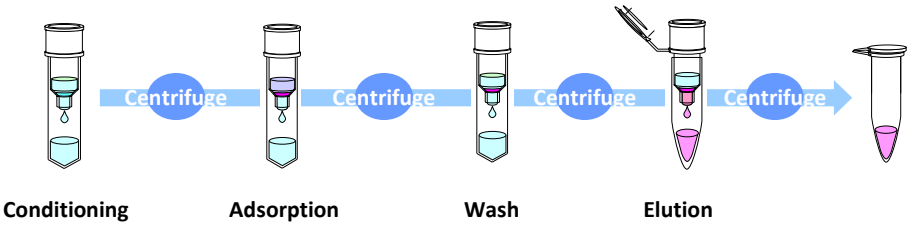
【Features】

- Easy operation by centrifuge
- Speedy sample treatment with a superb through the pore
- Excellent reproducibility (S-type) even at 100 µL or fewer elution volumes.

Operation method

Short time centrifugation is used to pass the liquid in solid-phase extraction.

The whole sample treatment process can be done within 10 min.



Centrifuge Operation

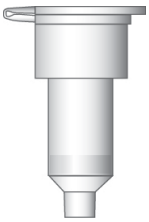
Shape

MonoSpin series cartridges of different types are available:

Type S: Excellent for pretreating the sample for 50–800 uL

Type L: Appropriate for sample 0.5–8 mL.

For the details of the varied functional group, please see the next page.



S Type

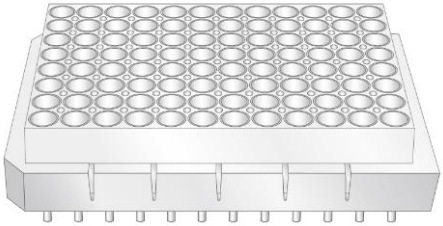
- Disk size：4.2 × 1.5 mm
- Sample volume：up to 800 µL
- Elution volume：50 to 800 µL
- Centrifugation speed：2,000 to 10,000 ×*g*

L Type

- Disk size：9 × 3 mm
- Sample volume：up to 8 mL
- Elution volume：0.5 to 8 mL
- Centrifugation speed：1,000 ×*g*

NOTE) MonoSpin ProA and MonoSpin ProG have different shapes. Please see page 16 for details.

96 Well plate type

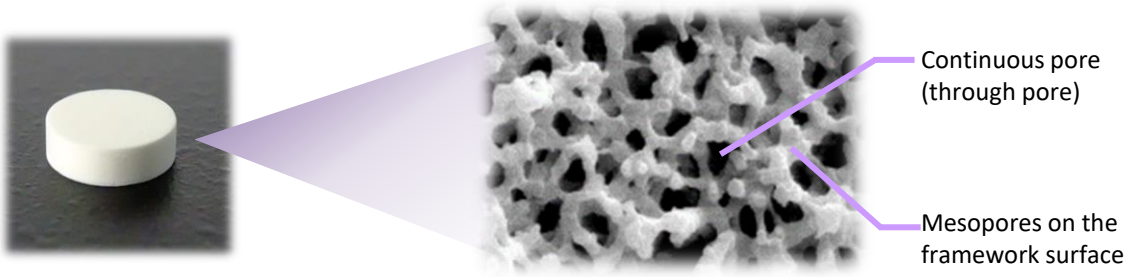


- Sample volume：up to 800 µL
- Elution volume：50 to 800 µL
- Centrifugation speed：1,000 to 5,000 ×g (can be used in vacuum aspiration)

NOTE) MonoSpin C18 FF, MonoSpin ProA and MonoSpin ProG have different specifications.
Please see page 14 and 15 for details.

Silica monolith ~ New separation media that are neither particulate nor membrane ~

Silica monoliths are integral silica gels with uniform continuous pores and produced from ethyl silicate. Unlike the particle media, the silica monolith is shaped like a disk. Silica monoliths have high liquid permeability and large surface area as they have through-pores and mesopores on their framework surface. Thus, this state-of-the-art medium is becoming popular worldwide for its properties: high recovery, high performance of adsorption, and desorption.

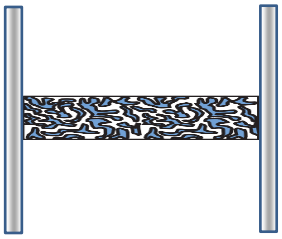


Silica monolith structure

Advantages of Monolithic SPE materials over particle packed SPE materials

- ❖ Disk-shaped silica monoliths do not use frits to hold particle media in traditional solid-phase extraction cartridges.
- ❖ Monolithic material has a massive surface area, making it possible to reduce the sample volume. Silica monoliths makes it possible to retain samples in the cartridge and completely elute small samples during processing.
- ❖ Despite its high liquid permeability, it is also suitable for fast elution without losing its high recovery as it achieves rapid sample diffusion and separation.

Silica monolith



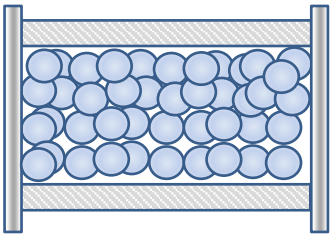
- No filter required
- Minimized separation media

Bed volume for separation media : small

Sample diffusion in the column : fast

Separation speed : fast

Particle-filled Form



- Need for filters

→ liquid may be remained in the filter

Bed volume for separation media : large

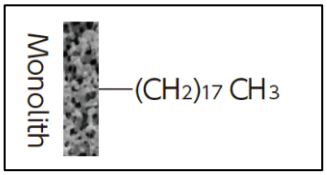
Sample diffusion in the column : slow

Separation speed : slow

MonoSpin series lineup

MonoSpin C18/C18 FF

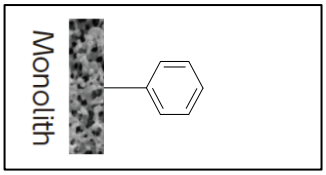
S L 96



Octadecyl functional group.
Optimal for drug extraction in biological samples and desalting and enrichment of peptide samples.
High-flow (FF) designs are also available.

MonoSpin Ph

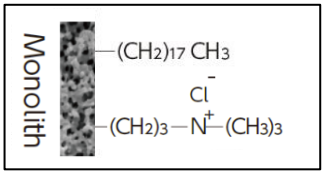
S



The phenyl group is chemically bonded, which makes it feasible to use weaker hydrophobicity than C18. Therefore, it is suitable for the recovery of hydrophobic drugs from biological samples under reversed phase mode.

MonoSpin C18-AX

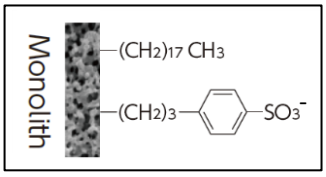
S 96



It is a mix mode type in which both octadecyl and quaternary ammonium groups are chemically bonded. It can reliably retain bio-samples at high salt concentrations and is particularly suitable for the recovery of acidic drugs.

MonoSpin C18-CX

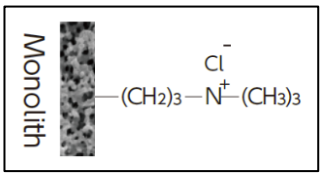
S 96



Its octadecyl and benzenesulfonic acid groups are bonded. Thus, purifying dissociated basic drugs in serum and urine is appropriate. Compared with MonoSpin C18 and SCX alone, SCX has higher cleanup efficacy as it works as hydrophobic and ion-exchange interactions.

MonoSpin SAX

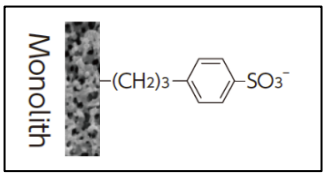
S L 96



Bond with Trimethyl aminopropyl, combining strong anion exchange and weak hydrophobic interaction. It is best for extracting acidic drugs.

MonoSpin SCX

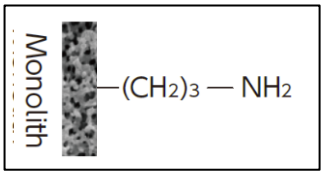
S L 96



It is bonded with propyl benzene sulfonic acid, combining strong cation exchange and hydrophobic interaction. Therefore, MonoSpin SCX is excellent for extracting basic drugs.

MonoSpin NH2

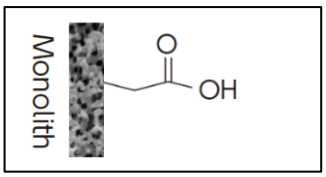
S L 96



It is bonded with aminopropyl and is beneficial for enriching the sugar chain or hydrophilic compounds by HILIC mode.

MonoSpin CBA

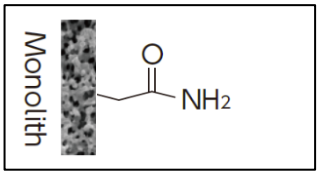
S L 96



It is bonded with propyl benzene sulfonic acid, combining strong cation exchange and hydrophobic interaction. It is excellent for extracting basic drugs.

MonoSpin Amide

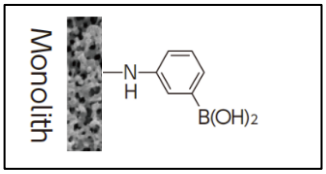
S 96



It is bonded with an amide group. MonoSpin amide is best for extracting sugar chains and various acidic and basic hydrophilic compounds by HILIC mode.

MonoSpin PBA

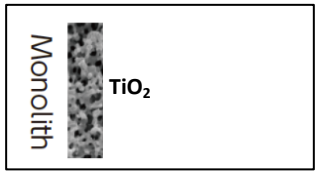
S 96



It is bonded with phenyl boric acid, which gives you higher selectivity. Hence, MonoSpin PBA is excellent for extracting cis diol compounds, such as catechol amines.

MonoSpin TiO

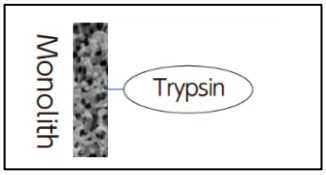
S



It is characterized by a monolith skeleton coated with dioxide titanium. It is excellent for enriching phosphopeptides.

MonoSpin Trypsin

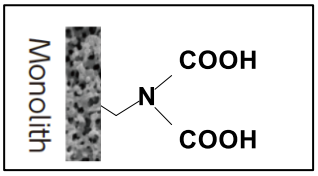
S



The columns are immobilized with trypsin, a digestive protein enzyme.
It enables the rapid digestion of proteins.

MonoSpin ME

S L

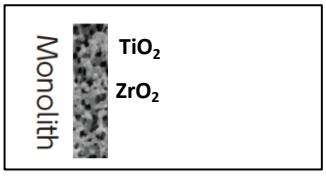


It is bonded with iminodiacetic acid groups. Therefore, it is optimal for the recovery of trace metals in samples.

MonoSpin Phospholipid

S L

・・・ see the page 13

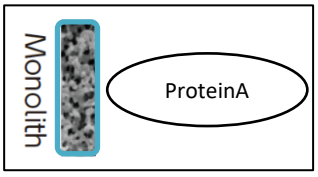


It has a phospholipid removal column coated with titanium dioxide and zirconium dioxide on a silica monolith. It adsorbed phospholipids in samples with an easy pretreatment.

MonoSpin ProA

S L 96

・・・ See page 16

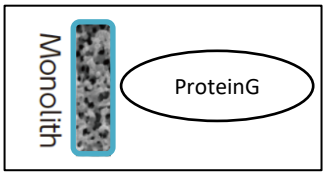


It contains protein A, which is immobilized on the monolith. Therefore, it enables the efficient purification of antibodies.

MonoSpin ProG

S L 96

・・・ see the page 16



The protein G is immobilized on the monolith. Therefore, it enables the efficient purification of antibodies.

S : S-type column products L : L-type column products 96 : 96-well plate-type product

Purification and Enrichment of Trace Analytes

Due to its high permeability, the MonoSpin series enables quicker and more efficient purification and enrichment with centrifugation.

It is also recommended to elution small volume samples, and trace analytes can be collected without dilution.

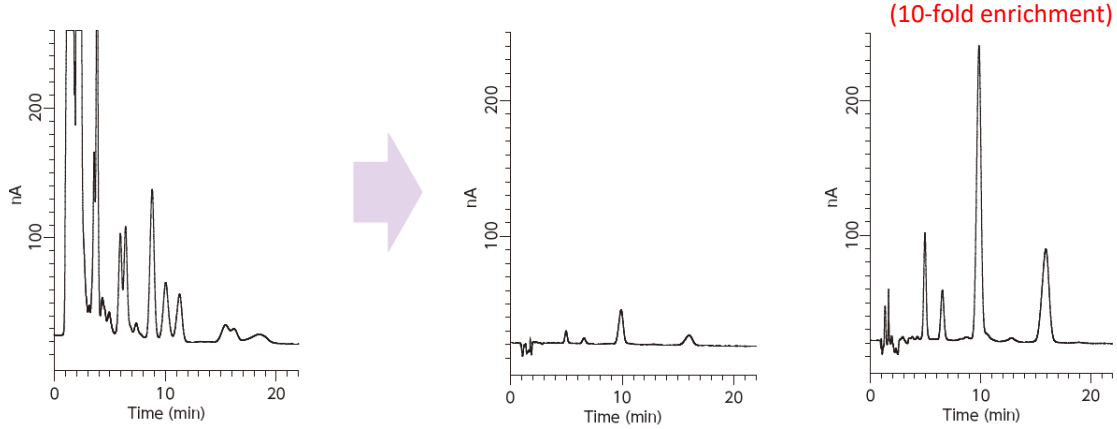
S type

Purification of Catecholamine by MonoSpin PBA
Sample volume : 500 µL

Before purification

Elution Volume : 500 µL

Elution Volume : 50 µL
(10-fold enrichment)



Conditions

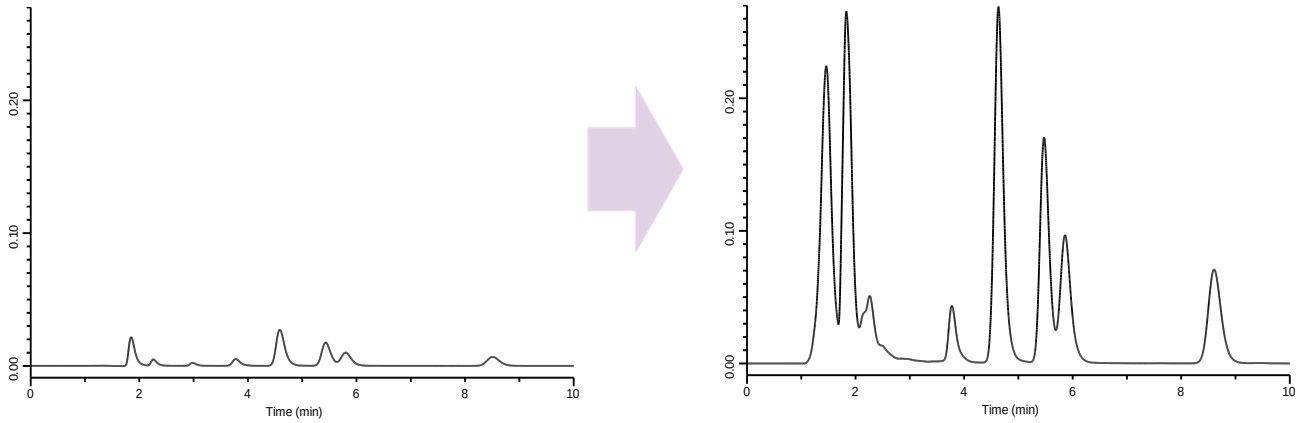
Column	: Inertsil ODS-3（5 µm, 150 × 2.1 mm I.D.）
Eluent	: 50 mM Phosphate buffer (pH 5.6) 50 mg/L EDTA, 600 mg/L IPCC-008, -10% Methanol
Flow Rate	: 0.3 mL/min
Col.Temp.	: 35 ℃
Injection Vol.	: 5 µL
Detection	: ECD Pulse Mode

Please see page 10 for preprocessing methods, etc.

L type

Purification of Serum samples by MonoSpin L C18
Sample volume : 5,000 µL
Elution volume : 500 µL
(10-fold concentration)

Before purification



Conditions

Column	: Inertsil ODS-3（5 µm, 150 × 4.6 mm I.D.）
Eluent	: CH_3CN/3 mM KH_2PO_4, 27 mM SDS= 48 / 52
Flow Rate	: 1.0 mL/min
Col.Temp.	: 40 ℃
Injection Vol.	: 1 µL
Detection	: 230 nm

Physical properties of MonoSpin series

Product name	Functional Group	S Type / 96 well		L Type		Surface Area (m^2/g)	Bed Capacity (For type S)	
		Through pore (μm)	Mesopore (nm)	Through pore (μm)	Mesopore (nm)			
MonoSpin C18	Octadecyl group	5	10	10	10	350	100 μg	Amitriptyline
MonoSpin C18 FF	Octadecyl group	20	15	10	10	300	50 μg	Amitriptyline
MonoSpin Ph	Phenyl group	5	10	-	-	350	100 μg	Amitriptyline
MonoSpin C18-AX	Octadecyl group, Quaternary ammonium	5	10	-	-	350	100 μg	Ibuprofen
MonoSpin C18-CX	Octadecyl group, Benzenesulfonic acid group	5	10	-	-	350	100 μg	Amitriptyline
MonoSpin SAX	Trimethylaminopropyl group	5	10	10	10	350	100 μg	Ibuprofen
MonoSpin SCX	Propylbenzenesulfonic acid group	5	10	10	10	350	100 μg	Amitriptyline
MonoSpin NH2	Aminopropyl-group	5	10	10	10	350	100 μg	Maltopentaose
MonoSpin CBA	Carboxyl group	5	10	10	10	350	100 μg	Amitriptyline
MonoSpin Amide	Amide group	5	10	-	-	350	100 μg	Angiotensin Ⅱ
MonoSpin PBA	Phenylboronic acids	5	10	-	-	350	100 μg	Dopamine
MonoSpin TiO	Titanium dioxide	20	15	-	-	200	40 μg	Adenosine monophosphate
MonoSpin Trypsin	Trypsin	5	10	-	-	100	-	-
MonoSpin ME	Iminodiacetic acid group	5	10	10	10	350	25 μg	Cu ions
MonoSpin Phospholipid	Titanium dioxide Zicronium dioxide	5	10	10	10	350	10 μL	Human serum
MonoSpin ProA	Protein A	2	60	2	60	-	400 μg	Human IgG
MonoSpin ProG	Protein G	2	60	2	60	-	300 μg	Human IgG

Specifications for Shape and Type

Type	MonoSpin S type *1	MonoSpin FF *2	MonoSpin L type	MonoSpin 96 well type
Disk size	4.2 × 1.5 mm	4.2 × 1.5 mm	9 × 3 mm	4.2 × 1.5 mm
Sample Volume	Up to 800 μL	Up to 800 μL	Up to 8 mL	Up to 800 μL
Elution Volume	50 to 800 μL	50 to 800 μL	0.5 to 8 mL	100 to 800 μL
Centrifugal force	2,000 to 10,000 × *g*	1,000 × *g*	1,000 × *g*	1,000 to 5,000 × *g*

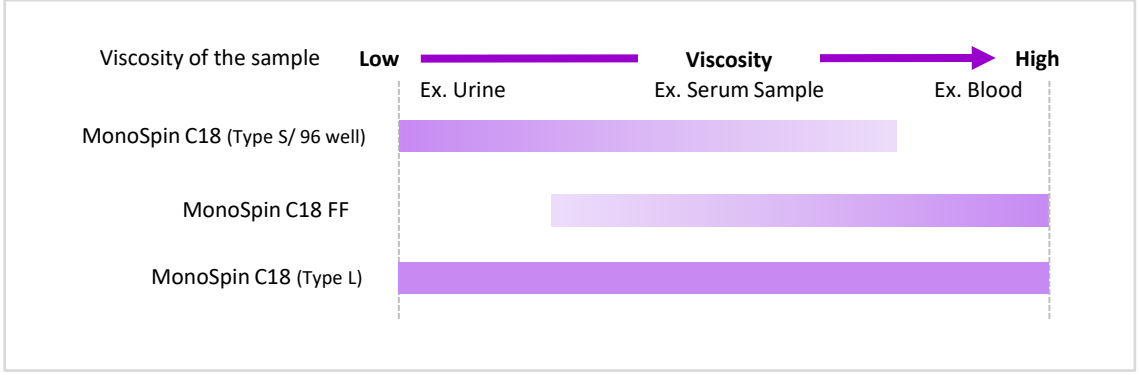
* 1:MoSpin ProA and MonoSpin ProG are different in specifications. Please refer to page 15 for the details.

* 2:FF type is available for MonoSpin C18 FF only.

The Viscosity of the Sample

The MonoSpin series is optimized as a spin column for pretreatment of biological samples. If you are working on very viscous samples such as blood, MonoSpin C18 FF is the best choice.

Please refer to the following chart for choosing the suitable MonoSpin.



Application

Purification of Amphetamines in urine using MonoSpin C18

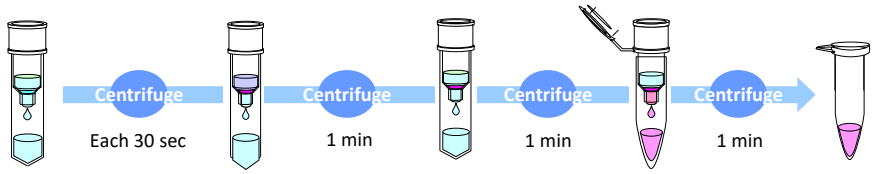
Sample Volume 800 µL

Urine : 400 µL

Buffer solution (pH 13) : 400 µL

*Sample was mixed for 1 min at 10,000 x g. Transferred and used the supernatant as sample.

Centrifuge : 5,000 × *g*



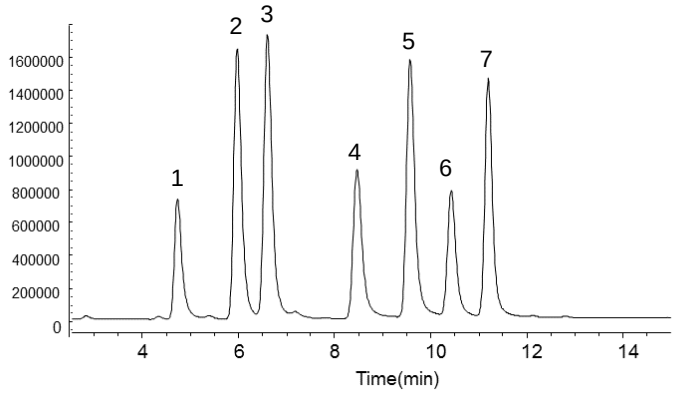
1. Conditioning
① Methanol 300 µL
② Buffer (pH 13) 300 µL
(①→Centrifuge→②)

2. Adsorption
Sample solution 800 µL

3. Wash
Buffer (pH 13) 300 µL

4. Elution
Methanol-0.1 % Formic acid (1:1, v/v) 100 µL

Purified sample



※ Data provided by Dr. Namera, Hiroshima University

Conditions

Column : InertSustainSwift C18 (3 µm, 150 × 2.1 mm I.D.)

Eluent : A)10 mM $HCOONH_4$(pH 3.3)
B) CH_3OH
A/B = 90/10 - 2 min - 90/10 - 13 min - 70/30, v/v

Flow Rate : 0.3 mL/min

Col. Temp. : 40 ℃

Detection : LC/MS

Sample :
1. Norephedrine
2. Ephedrine
3. Methylephedrine
4. Amphetamine
5. Methamphetamine
6. 3,4-methylenedioxyamphetamine
7. 3,4-methylenedioxymethamphetamine

Recovery of drugs in biological samples using MonoSpin C18

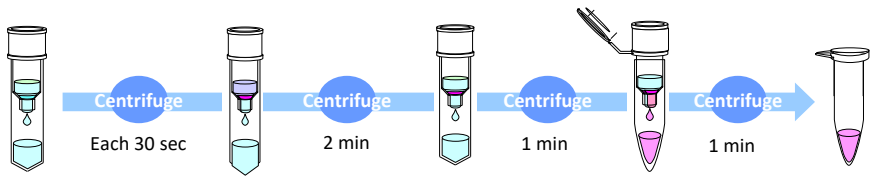
Sample Volume 600 µL

Serum : 200 µL

10 mM potassium phosphate : 400 µL (pH 7.0)

* Sample was mixed for 1 min at 10,000 × *g*. Transferred and used the supernatant as sample.

Centrifuge : 2,300 × *g*



1. Conditioning
① Methanol 300 µL
②10 mM Potassium phosphate (pH 7.0) 300 µL
(①→Centrifuge→②)

2. Adsorption
Sample solution 600 µL

3. Wash
Water 300 µL

4. Elution
Acetonitrile 200 µL

Purified sample

Day-to-day reproducibility of the drug in serum using MonoSpin C18 (3 days, n = 10).

Sample	Concentration (ng/mL)	Recovery rate (%)	RSD (%)
Desipramine	5	91.2	4.8
	10	86.1	3.3
	50	85.2	5.9
	250	88.4	6.5
Imipramine	5	96.3	9.5
	10	95.8	1.5
	50	94.5	0.9
	250	95.9	0.9
Fluvoxamine	5	96.8	11.6
	10	87.1	5.0
	50	86.8	8.1
	250	87.5	9.7

Sample	Concentration (ng/mL)	Recovery rate (%)	RSD (%)
Paroxetine	5	83.7	3.9
	10	84.1	7.8
	50	83.9	8.2
	250	86.7	7.5
Maprotiline	5	85.7	8.1
	10	84.7	3.2
	50	88.6	5.4
	250	87.5	7.7
Duloxetine	5	106.3	9.9
	10	104.8	6.7
	50	99.8	8.7
	250	99.8	6.0

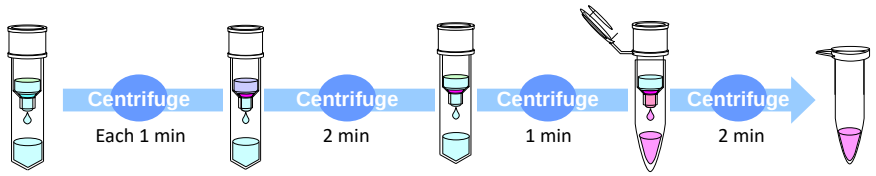
Sample	Concentration (ng/mL)	Recovery rate (%)	RSD (%)
Amitriptyline	5	83.7	7.0
	10	81.8	2.8
	50	83.8	3.0
	250	88.4	2.7
Sulpiride	5	97.9	9.0
	10	95.5	8.5
	50	90.8	2.6
	250	92.6	3.0

Desalination of protein digestion using MonoSpin C18

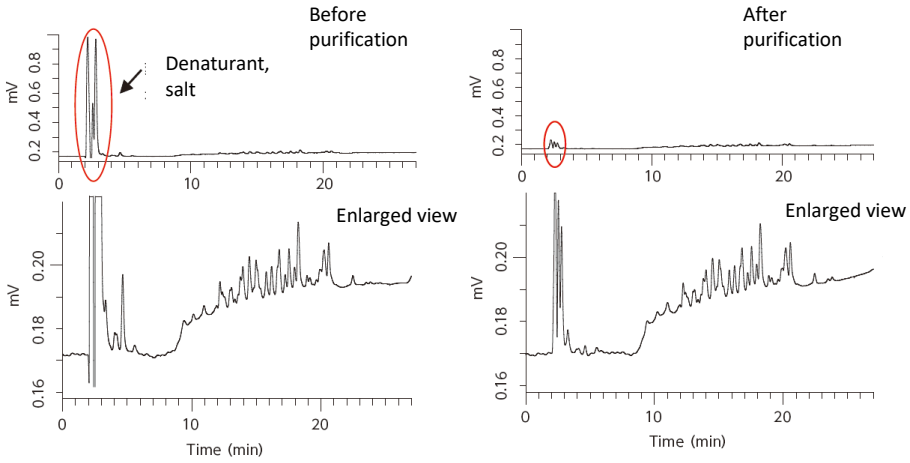
Maximum sample solution 800 µL

After Tryptic digestion, add TFA to adjust the concentration to o.1%.

Centrifuge : 2,300 ×*g*



1. Conditioning	2. Adsorption	3. Wash	4. Elution	Desalted samples
① Acetonitrile 200 µL ② 0.1% aqueous TFA 200 µL (①→Centrifuge→②)	Sample solution Maximum 800 µL	0.1 % aqueous TFA 200 µL	60 % acetonitrile 200 µL	



Conditions

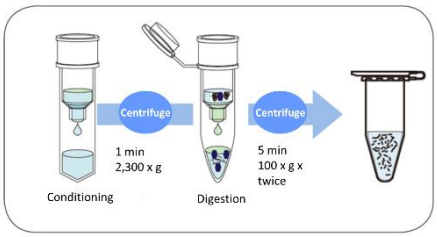
Column : Inertsil ODS-3 (3 µm, 150 × 2.1 mm I.D.)
Eluent : A)H_2O (0.1 % TFA)
B)CH_3CN (0.1 % TFA)
A/B = 90/10 - 20 min - 50/50
Flow Rate : 0.2 mL/min
Col. Temp. : 40 ℃
Detection : UV 210 nm
Sample : Digested BSA 2 µL

Highly concentrated denaturant and salt in digestive were successfully removed using MonoSpin C18.

Rapid Digestion of BSAs by MonoSpin's Trypsin HP

■ Ex. Reductive alkylation protocol

1 mg bovine serum-albumin
----- 500 mM Tris-HCL(pH 8. 0)-- 8M urea (Solution 1): 175µL
----- 40 mg/mL Dithiothreitol in Solution 1: 25µL
----- Incubation at 37 ℃ for 90 min
----- 40 mg/mL Iodoacetamide in Solution 1: 50µL
----- Incubation at 37 ℃ for 30 min (under shaded conditions)
Reductive alkylation of proteins: 250µL
----- Dilute with 50mM Ammonium bicarbonate to adjust the urea to 2M: 750µL



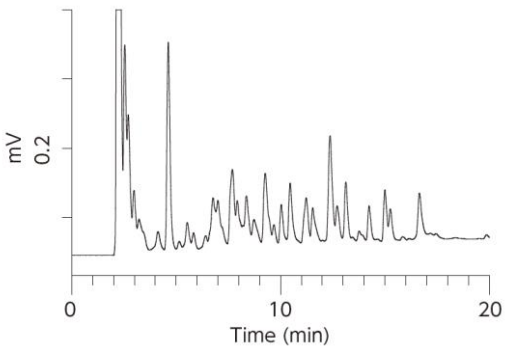
Conditions

Column : Inertsil ODS-3 (3 µm, 150 × 2.1 mm I.D.)
Eluent : A)H_2O (0.1 %HCOOH)
B)CH_3CN (0.1 %HCOOH)
A/B = 90/10 - 20 min - 50/50
Flow Rate : 0.2 mL/min
Col. Temp. : 40 ℃
Detection : UV 210 nm
Sample : Digested BSA 2 µL

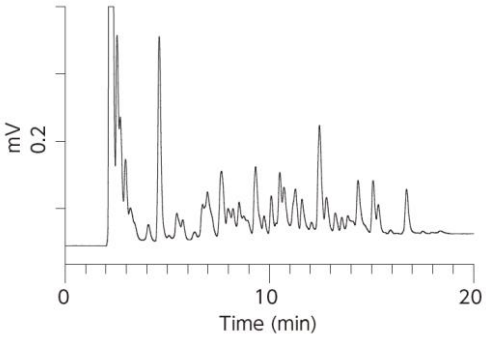
MonoSpin Trypsin HP

NOTE) The method of reductive alkylation should be optimized depending on the type of protein.

● In-Solution digestion (37℃ for 10 h)



● Digested with MonoSpin Trypsin HP(at 25℃ for 10 min)



Trypsin-immobilized spin column can complete the process just in 10 min.

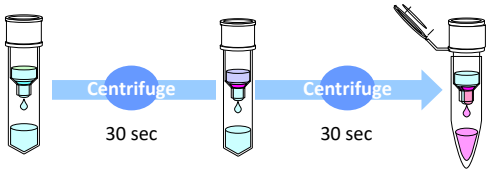
NOTE) For digestion, be sure to use protein after reductive alkylation.

Fractionation of Protein digests using MonoSpin SCX

The use of spin columns and elution salt concentration stepwise makes it feasible to fractionate peptides without using 2D-LC or other complex systems.

Sample Volume: 500 µL

Used Peptide sample dissolved in 0.1% Formic acid after desalting with MonoSpin C18.



1. Conditioning
0.1 % formic acid
300 µL

2. Adsorption
Peptide sample
500 µL

3. Elution

Centrifuge : 10,000 × *g*

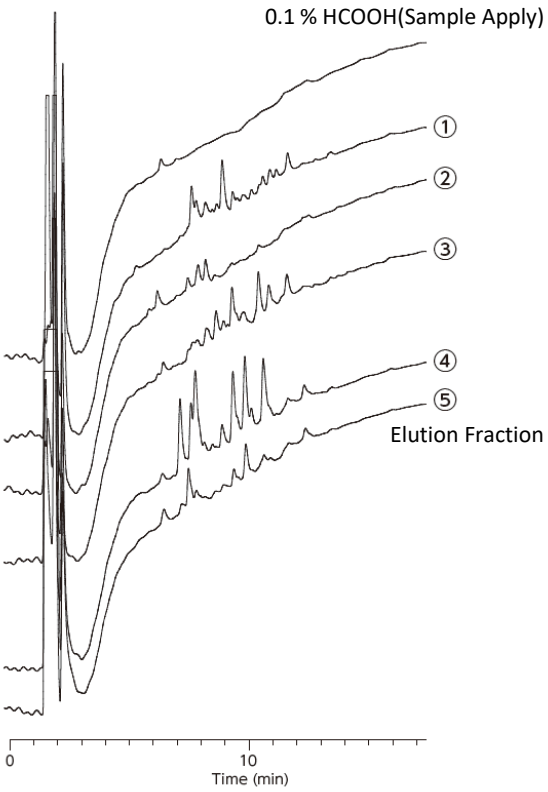
Apply the eluent, centrifuge, and then attach a new tube to apply the next eluent.

Each eluate composition

①25 mM $HCOONH_4$ 200 µL ④500 mM $HCOONH_4$ 200 µL

②50 mM $HCOONH_4$ 200 µL ⑤1 M $HCOONH_4$ 200 µL

③100 mM $HCOONH_4$ 200 µL Injection) Each solution contains 10% acetonitrile.



Conditions

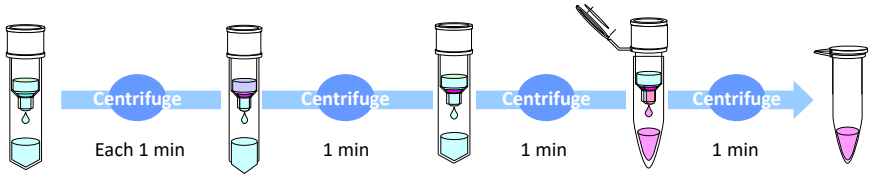
Column : Inertsil ODS-3 (3 µm, 2.1 × 150 mm)
Eluent : A)H_2O (0.1 % HCOOH)
B)CH_3CN (0.1 % HCOOH)
A/B = 90/10 - 20 min - 50/50
Detection : UV 210 nm
Flow Rate : 0.2 mL/min
Col. Temp. : 40 ℃
Injection Vol. : 2 µL

Purification of pyridylaminated glycans using MonoSpin's NH2

Sample volume: 800 µL

Dissolve the sample to adjust the concentration of ACN to 90~95%.

Centrifuge : 2,300 × *g*



1. Conditioning
① 50 % acetonitrile
(0.1 % formic acid) 500 µL
② 90 % acetonitrile
(0.1 % formic acid) 500 µL
(①→Centrifuge→②)

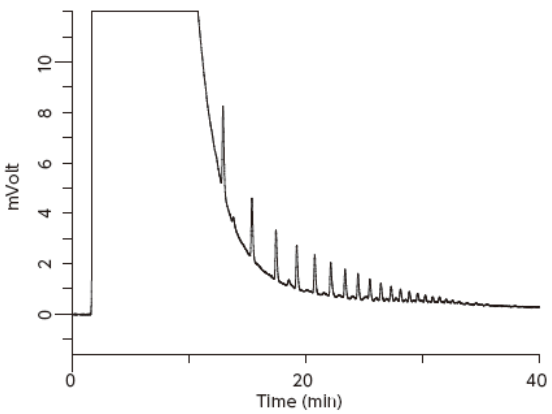
2. Adsorption
Sample solution
800 µL

3. Wash
90 % acetonitrile
(0.1 % formic acid)
500 µL

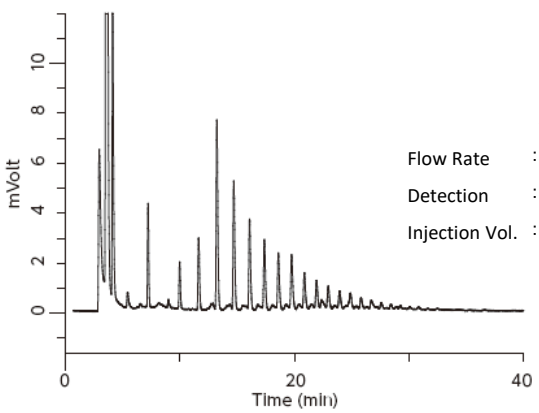
4. Elution
50 % acetonitrile
(0.1 % formic acid)
50 - 800 µL

Purified sample

Before purification



Purified with MonoSpin NH2



Conditions

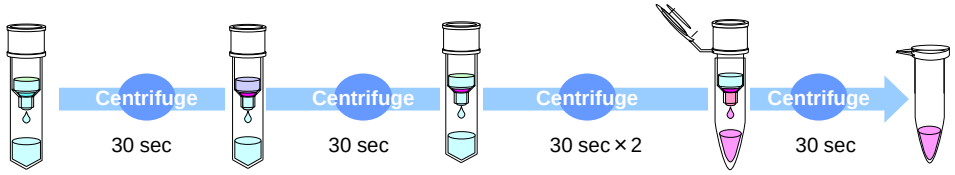
Column : NH_2 Column (5 µm, 250 × 4.6 mm I.D.)
Eluent : A)H_2O/CH_3CN
=5/95 0.1 % HCOOH
B) H_2O/CH_3CN
=95/5 0.1 % HCOOH
A/B = 90/10-10 min–90/10-40 min-60/40
Flow Rate : 1 mL/min
Detection : FL Em 320 nm, Ex 400 nm
Injection Vol. : 1.5 µL

Purification of Paraquat and Diquat using MonoSpin CBA

Sample volume 600 µL

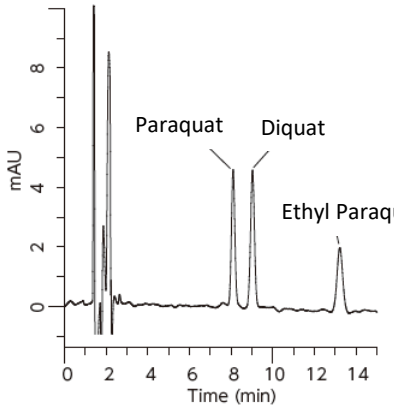
Urine: 200 µL
10 mM potassium phosphate
Buffer solution (pH 7.0): 400µL

Centrifuge : 10,000 ×*g*

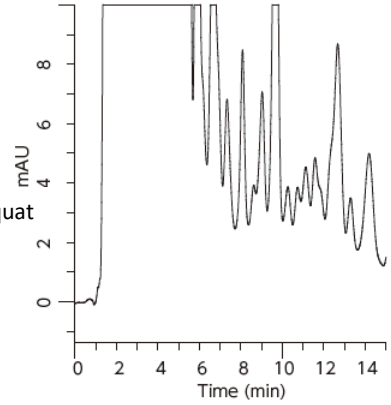


1. Conditioning	2. Adsorption	3. Wash	4. Elution	Purified sample
10 mM Potassium Phosphate Buffer (pH 7. 0) 200 µL	Sample solution 600 µL	10 mM potassium phosphate Buffer (pH 7. 0) 200 µL	1 % Hydrochloric acid 30% Methanol 69% Water 200 µL	

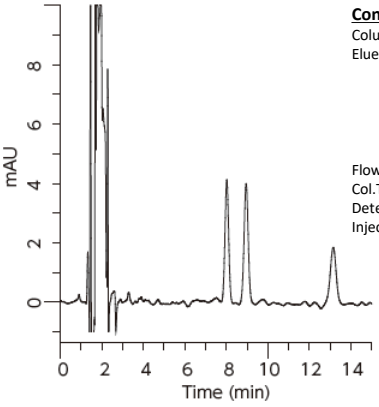
Standard Solution (1µg/mL)



Urine ＋ pesticide (1µg/mL each)



After purification with MonoSpin CBA



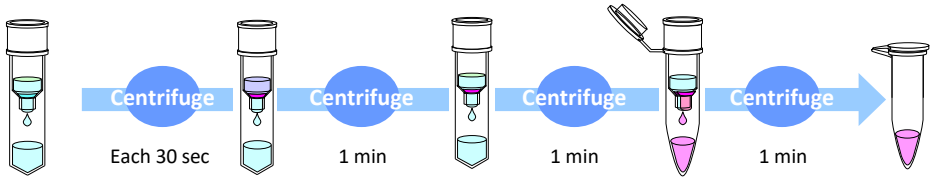
Conditions
Column :Inertsil ODS-3 (5 µm, 150 mm × 4.6 mm I.D.)
Eluent :0.2 M phosphoric acid, 0.1 M diethyl amine, 7.5 mM IPCC08(IPCC-0.8, Sodium 1-Octanesulfonate) /Acetonitrile=89/11
Flow Rate :1 mL/min
Col.Temp. :40 ℃
Detection :PDA 290 nm
Injection Vol. :50 µL

Recovery of hormones in serum using MonoSpin C18

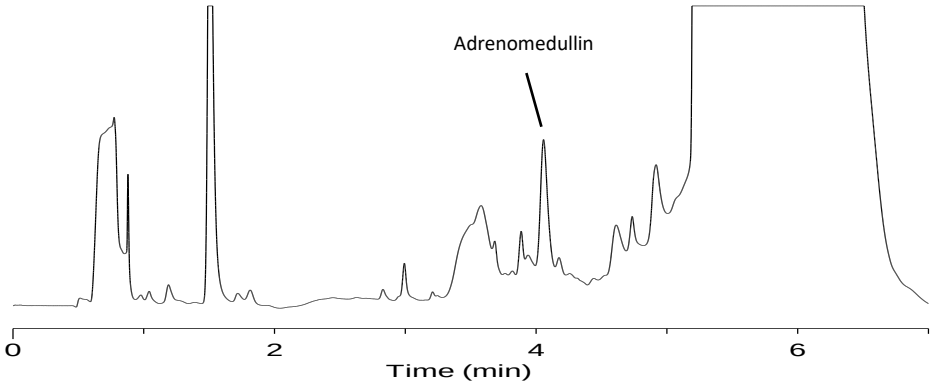
Sample preparation

Add 10 µL of 1 mg/mL adrenomedullin to serum: 190 µL.
Centrifuge the sample after addition of 0.1% TFA solution 200 µL.
Used the supernatant as sample.

Centrifuge : 2,300 ×*g*



1. Conditioning	2. Adsorption	3. Wash	4. Elution	Purified sample
① Acetonitrile 200 µL ② 0.1% aqueous TFA: 200µL (①→Centrifuge→②)	Samples were prepared 400 µL of supernatant	0.1% aqueous TFA 200 µL	Contain 0.1% TFA 60% acetonitrile solution 200 µL	



Conditions
Column :InertSustain C18 (2 µm, 50 × 2.1 mm I.D.)
Eluent :A)0.1 % TFA in Water
B) 0.1 % TFA in Acetonitrile
A/B = 85/15 – 5 min – 50/50 -2 min-50/50
Flow Rate :200 µL/min
Col. Temp. :40 ℃
Detection :UV 210 nm
Injection Vol. :10µL

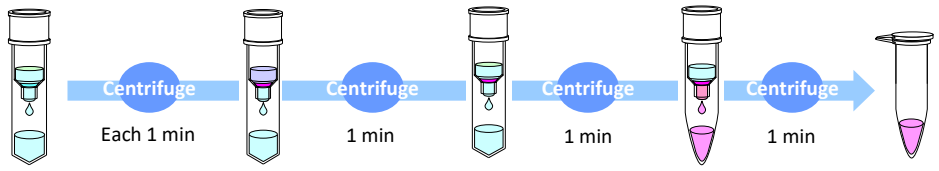
Application

Purification of Catecholamines using MonoSpin PBA

Sample solution 250 µL

Sample solution(urine or serum)
200 µL
1 M Dipotassium hydrogen phosphate
(adjusted to pH 8 with phosphoric acid)
50µL

Centrifuge : 10,000 × g



1. Conditioning
1% acetic acid solution: 200 µL
→ 100 mM Dipotassium hydrogen phosphate
Adjusted to pH 8: 50µL

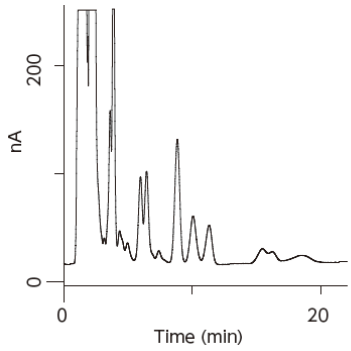
2. Adsorption
Sample solution 250 µL

3. Wash
100 mM hydrogen phosphate
Aqueous dipotassium solution
(adjusted to pH 8 with phosphate) 200 µL

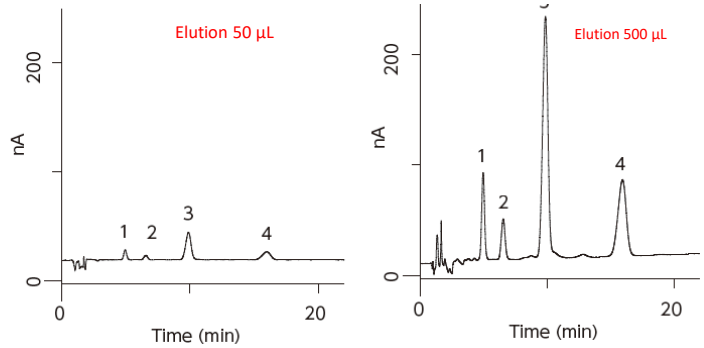
4. Elution
1% acetic acid solution 200 µL

Purified sample

Before Purification



Purification with MonoSpin PBA (sample amount:500 µL)



Conditions

Column	:Inertsil ODS-3 (5 µm, 150 mm × 2.1 mm I.D.)
Eluent	:50 mM Phosphate Buffer (pH 5.6) 50 mg/L EDTA 600 mg/L IPCC-008 -10 % Methanol
Flow Rate	:0.3 mL/min
Col.Temp.	:35 °C
Injection	:5 µL
Detection	:ECD Pulse Mode
Sample	:1. Noradrenaline 2. Adrenaline 3. DHBA 4. Dopamine

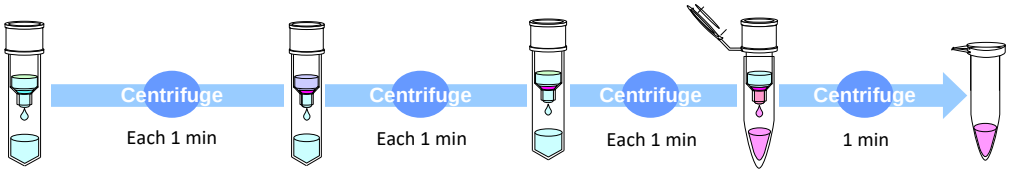
By using MonoSpin PBA, we can selectively recover and purify compounds with cis-type diols such as catecholamines.
See our website Technical Note LT093 for more information.

Purification of Organophosphorus pesticides in human serum using MonoSpin TiO

Sample Volume 50 µL

Sample 10 µL
Water 40 µL

Centrifuge : 5,200 × *g*



1. Conditioning
① 80% acetonitrile (0.1 % TFA) 50 µL
② 50% acetonitrile (0.1 % TFA) 50 µL
(①→Centrifuge→②)

2. Adsorption
Sample solution 50 µL
→ Collect the solution and repeat
Put on a column

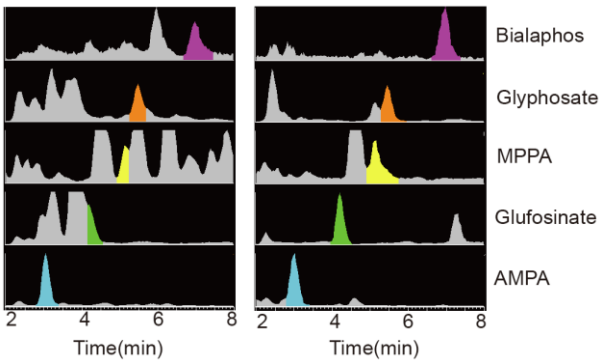
3. Wash
①80% acetonitrile (0.1 % TFA) 50 µL
②50% acetonitrile (0.1 % TFA) 50 µL
(①→Centrifuge→②)

4. Elution
2% ammonia solution 50 µL

Purified sample
N-acetyl-O-methyl Derivatives
To LC/MS

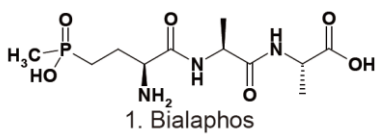
Before purification

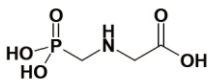
After purification using MonoSpin TiO

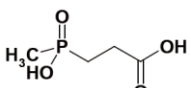


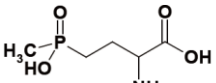
Conditions

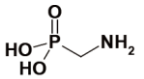
Column	: ODS Column (150 × 2.1 mm I.D.)
Eluent	: A)CH_3OH B)20 mM $HCOONH_4$ (pH 3.0) A/B = 15/85, v/v
Flow Rate	: 0.2 mL/min
Detection	: SIM
Injection Vol.	: 5 µL
Sample	: 1. Bialaphos 2. Glyphosate 3. MPPA 4. Glufosinate 5. AMPA


1. Bialaphos


2. Glyphosate


3. MPPA


4. Glufosinate


5. AMPA

MonoSpin TiO shows selectivity for phosphate sites in compounds.

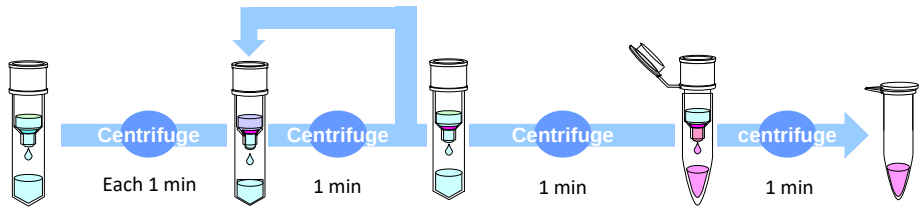
Application

With Insulin or BSAs

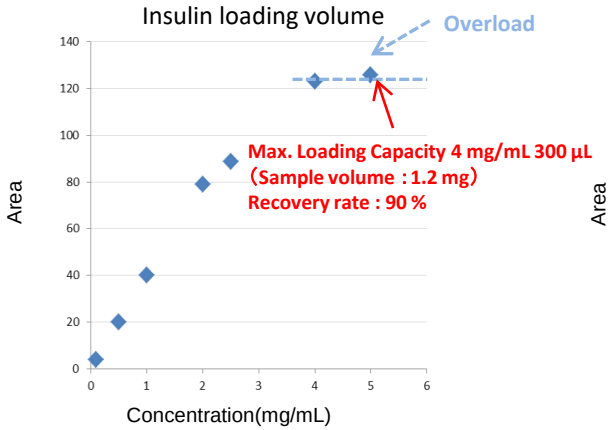
Sample Preparation

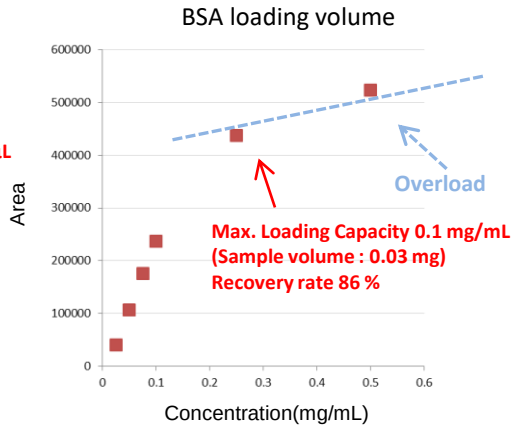
Adjust concentration of Insulin and BSA with 0.1% aqueous TFA.

Centrifuge : 2000 × g



1. Conditioning	2. Adsorption	3. Wash	4.Elution	Purified sample
① ACN: 300µL ② 0.2% TFA in H2O: 300µL (①→Centrifuge→②)	Sample solution 300 µL	0.2 % TFA in H_2O 300 µL	C_2H_5OH/H_2O/TFA =60:40:0.1 300 µL	





Please see Technical Note LT157 for more information .

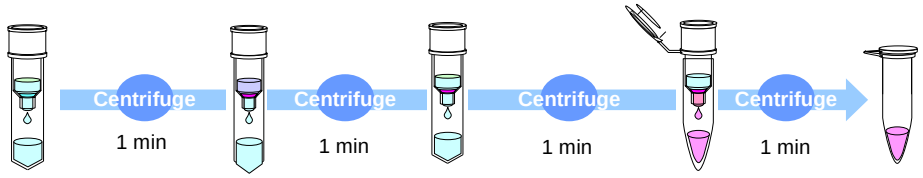
Analysis of blood samples using MonoSpin C18FF

Sample Preparation

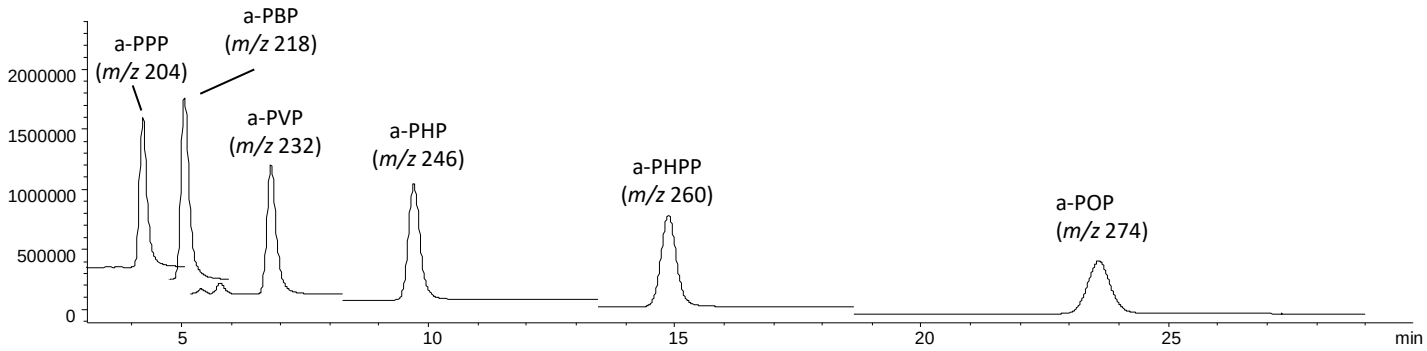
Mix blood sample(0.3mL) and 300mM phosphate buffer(pH 10.0).

Use supernatant as sample after centrifugation at 12,000 x g for 5 min.

Centrifuge : 1,000 x g



1. Conditioning	2.Adsorption	3. Wash	4. Elition	Purified sample
① MeOH: 300µL ② 300 mM phosphate buffer (pH 10): 300µL (①→Centrifuge→②)		300 mM phosphate buffer(pH 10): 300µL	MeOH 100 µL	



Conditions

Column : InertSustain Phenyl (3 µm, 150 × 2.1 mm I.D.)

Eluent : CH_3CN-$HCOONH_4$(10 mM, 0.1 % HCOOH) = 25:75 (v/v)

Flow Rate : 0.2 mL/min

Col. Temp. : 40 ℃

Detection : MS(ESI)

MonoSpin Phospholipid

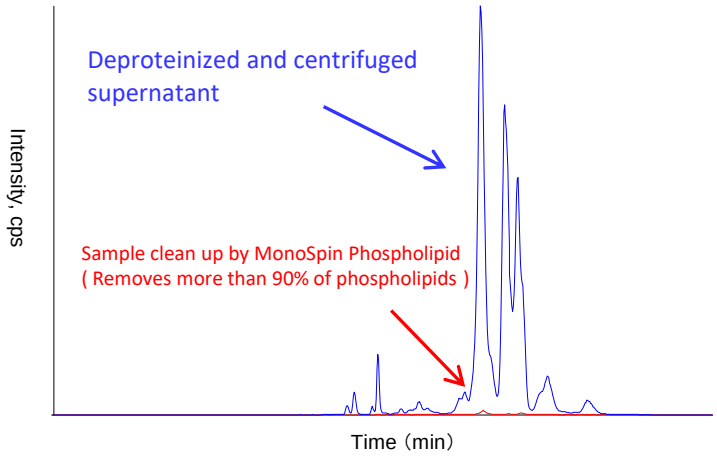
Phospholipid removal column coated with titanium dioxide and zirconium dioxide on silica monolith. It adsorbs phospholipids in samples such as blood and serum with easy pretreatment. More significantly, the adsorbed phospholipids can also be collected very well.

Cartridge shape: S-type, L type

Functional groups: titanium dioxide, zirconium dioxide

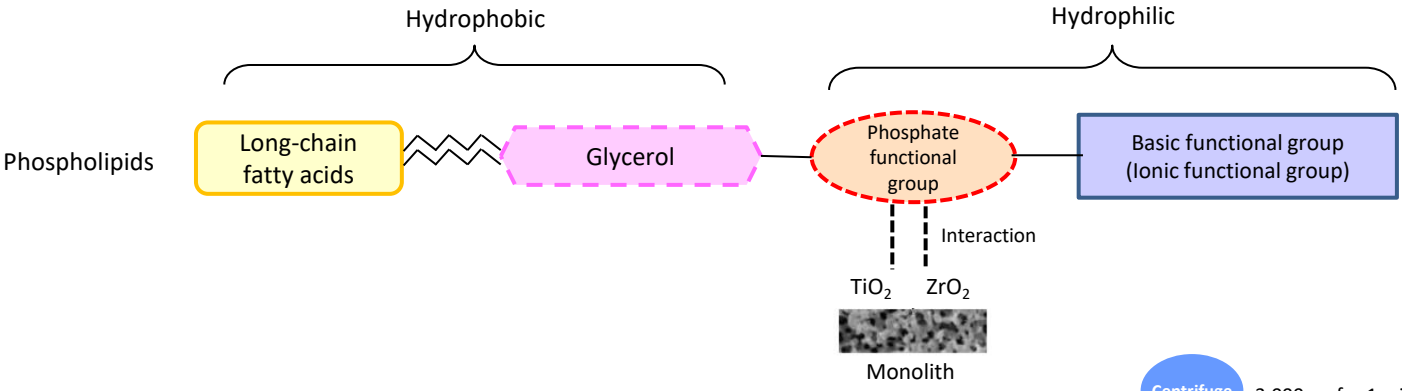
【Features】

- Phospholipids in the biological sample can be removed in few easy steps.
- The matrix effect is reduced considerably since it removes more than 90% of Phospholipids.
- Capable of processing small volume sample
- Adsorbed phospholipids are easily recovered.



Adsorption principle

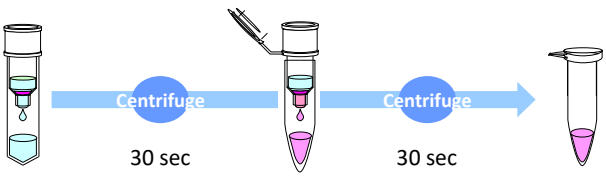
The specific interaction of the metal oxide and phosphate compound retains the phospholipids in the packing material.



Operation

Sample Preparation

Mix 0.1 % formic acid and serum sample 4:1 into 2mL micro tube.
↓
Use supernatant after centrifugation at 10,000 × g 30 sec



Centrifuge 3,000 x g for 1 min

1. Conditioning

0.1% formic acid in ACN: 200 µL

2. Apply

Sample volume: 50 µL

Phospholipid-free sample

Related Product

The FastRemover for Phospholipid 96-well plate delivers a fast and efficient removal of proteins and phospholipids in plasma and serum samples without sacrificing the recovery of your target analytes.

Functional group	Compounds	Reference
	[1-(5-fluoropentyl)-1H-indol-3-yl](4-methyl-1-naphthalenyl)methanone (MAM-2201)	Forensic Toxicol., 2013, 31(2), 333–337
	α-Pyrrolidinovalerophenone	Forensic Toxicol., 2014, 32(1), 68–74
	25-Hydroxyvitamin D3	Anal. Sci., 2018, 34(9), 1043-1047
	Aconitines and Colchicine	Chromatographia, 2015, 78(15), 1041–1048
	Amphetamines	J. Chromatogr. A, 2008, 1208(1-2), 71-75
	Amphetamines	Anal. Chim. Acta, 2010, 661(1), 42-46
	a-Pyrrolidinovalerophenone (a-PVP) and a-pyrrolidinobutiophenone (a-PBP)	Forensic Toxicol., 2014, 32, 68-74
	Desalting	Amino Acids., 2018, 50(1), 117–124
	Desalting	Org. Biomol. Chem., 2018, 17(1), 165-171
	Desalting	J. Proteomics, 2018, 181, 238-248
	Desalting	J. Pept. Sci., 2018, 24(12), e3133
	Desalting of LaIT1	Mass Spectrometry, 2017, 6(1), A0059
	Desalting of LaIT1	J. Pept. Sci., 2015, 21(8), 636-643
	Dibucaine、Naphazoline	J. Chromatogr. B, 2008, 872, (1-2), 186-190
	Diquat, Paraquat	Anal. Bioanal. Chem., 2011, 400(1), 25–31
	Diquat, Paraquat	Anal. Bioanal. Chem., 2011, 400(1), 25-31
	Drugs	J. Chromatogr. B, 2008, 867(1), 99-104
	Drugs	Chromatographia, 2009, 70(3), 519-526
	Eperisone, Tolperisone	J.Health Sci., 2010, 56(5), 598-605
	Eperisone, Tolperisone, and Tizanidine	J.AOAC Int. 2014, 97(6), 1546-1551
	Flavonoid	J. Chem. Ecol. 2016, 42(12), 1226-1236
	glucocorticoids	J. Chromatogr. B, 2017, 1057, 62-69
	Iodide	Am. J. Mod. Chromatogr., 2015, 2(1), 1-6
	iTRAQ labeled desalting	Int. J. Oncol., 2015, 47(1), 384-390
	Liraglutide	J. Chromatogr. B, 2018, 109, 29-35
	MAM-2201	Forensic Toxicology. 2013, 31(2), 333–337
	Medicinal toxicants	J. Clin. Pharm. Ther., 2017, 42(4), 454-460
	N-1-Naphthalenyl-1-pentyl-1H-indole-3-carboxamide	Forensic Toxicol., 2015, 33(1), 165–169
C18	Nanoparticles	J. Chromatogr. A, 2015, 1404, 141-145
	Naringin	J. Clin. Pharmacol., 2013, 53(7), 738-745
	Organophosphorus compounds	Anal. Sci., 2011, 27(10), 999-1005
	Oxidized phospholipids	J. Lipid. Res., 2017, 58(11), 2229-2237
	oxPUFAs	Sci. Rep., 2018, 8, 7954
	Peptides	Cancer Res., 2017, 77(4), 926-936
	Peptides	Bio protocol. 2015, 5(8), 2015
	Peptides	Clin. Exp. Nephrol., 2018, 22(4), 782–788
	Peptides	Biosci. Biotechnol. Biochem., 2017, 81(12), 2237-2243
	Peptides	Methods Mol. Biol. 2018, 1696, 91-105
	Peptides	Biosci. Biotechnol. Biochem., 2018, 82(8), 1309-1315
	Peptides	Data Brief., 2018, 31(17), 604-609
	Peptides	Data Brief., 2017, 12(11), 252-257
	Peptides	Bioresour. Technol., 2018, 254, 278-283
	Peptides	Biomass Bioenergy, 2016, 91, 83-90
	Peptides	Neurogenetics, 2019, 20(1), 9-25
	Peptides	J. Proteomics, 2015, 119, 183-195
	Peptides	Proc. Natl. Acad. Sci., 2018, 115(14), 3646-3651
	Peptides	Oncogene, 2017, 36(26), 3740-3748. doi: 10.1038/onc.2016.524
	Peptides	Sci. Rep., 2018, 22, 8(1), 1303
	Peptides	Sci. Rep., 2016, 6, 26723
	Peptides	Proteomics, 2013, 13(5), 751-755
	Peptides	J. Proteomics., 2013, 84(12), 40-51
	Phthalate esters	J. Pharm. Anal., 2011, 1(2), 92-99
	Phthalates	J. Pharm. Anal., 2011, 1(2), 92-99
	Plant samples	Sci. Rep., 2017, 7(1), 1243. doi: 10.1038/s41598-017-01390-3
	Purines	Nucleosides Nucleotides Nucleic Acids, 2018, 37(6), 348-352
	Pyrrolidinophenone type designer	J. Chromatogr. B, 2013, 30, 942-943
	Pyrrolidinophenone-type designer drugs	J. Chromatogr. B, 2013, 942-943, 15-20
	review	Bioanalysis., 2015, 7(17), 2171-2176

Publicly Available Reference

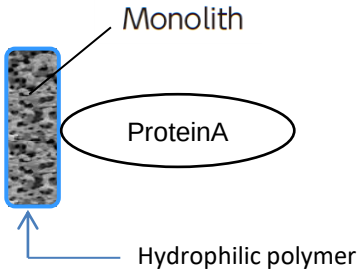
Functional group	Compounds	Reference
C18 FF	Drugs	J. Chromatogr. A, 2017, 1517, 9-17
C18, C18CX	Cardiovascular drug	Acta Chromatographica, https://doi.org/10.1556/1326.2018.00493
C18, SCX	Melamine	J. Anal. Sci. Meth. Instrum., 2012, 2, 68-73
	Peptides	Sci. Rep., 2017, 7(1), 11137
C18, TiO	Peptides	Int. J. Mol. Sci., 2018, 19(9), 2655
C18, SAX	Aamphetamines, Opiates, and THC	Forensic Toxicol., 2013, 31(2), 312–321
C18-AX	Oxidized Fatty Acids	Mod. Chem. Appl., 2015, 3, 3
C18-CX	Arsenite, Arsenate, and Methylarsenate	J. Sep. Sci., 2012, 35(18), 2506-2513
	Clean up	J. Occup. Health., 2018, 60(2), 140-147
	Drugs	J. Sep. Sci., 2011, 34(16-17), 2232-2239
	Halogenated compounds	Toxicology, 2013, 314(1), 22-9
Amide	PA-labelled glycans	Bicsci. Biotechnol. Biochem., 2012, 76(10), 1982-1983
CBA	clenbuterol	Talanta, 2018, 186, 521-526
CBA, Amide	Tetrodotoxin	Chromatographia, 2014, 77, (9-10), 687–693
NH2	nanoparticles	J. Sep. Sci., 2015, 38, 283–290
	Oligosaccharides	Sci Rep. 2017, 26(7) :46099. doi
	PA labeled N-glycans	Glycoconj. J., 2017, 34(4), 537-544
	PA-labelled glycans	Plant Biotechnol. J., 2016, 14(8), 1682-1694
	Pyridylaminated Oligosaccharides	Anal. Sci., 2016, 32(5), 487-490
PBA	Adenosine	Biosens. Bioelectron., 2013, 15(41), 379-385
	Allergenic ingredients	Food Control, 2018, 84, 89-96
	Catecholamines	J. Comp. Neurol., 2016, 524(18), 3849-3864
	Catecholamines	Food Chem., 2019, 276, 376-382
	Catecholamines	EBioMedicine., 2016, 8, 60-71
	Catecholamines	PLoS One, 2018, 13(7), e0201203
	Catecholamines	J. Chromatogr. B, 2015, 985, 142-148
	Catecholamines	Biol. Pharm. Bull., 2017, 40(2), 227-233
	Catecholamines	Biosci. Biotechnol. Biochem., 2018, 82(3), 497-506
	Cis-diol groups	Anal. Chim. Acta., 2015, 857(1), 64-70
	hippocampal monoamines	J. Pharmacol. Sci., 2016, 132(4), 249-254
	Pyridylamino monosaccharide	Bicsci. Biotechnol. Biochem., 2011, 75(7), 1405-1407
	Serotonine and Noradrenaline	Br. J. Pharmacol., 2015, 172(5), 1250-1262
Phospholipid	Farnesyl pyrophosphate	Anal. Bioanal. Chem., 2017, 409(14), 3551–3560
ProteinA, G	IgG	Biochimie., 2018, 145, 113-124
ProteinG	IgG	Virology, 2019, 15, 527, 132-140
	IgG	PLoS One, 2017, 12(7):e0181181
	IgG	Bioanalysis, 2018, 10(18), 1501-1510
SAX	Alendronate	Legal. Medicine, 2018, 30, 14-20
	Deoxyribonucleoside	Biotechnol., 2016, 228, 52-57.
	metabolite of 18 F-THK5351	Eur. J. Nucl. Med. Mol. Imaging, 2016, 43(12), 2211-2218
	Urinary excretion	Nucleosides Nucleotides Nucleic Acids. 2016, 35(10-12), 559-565.
SCX	Amino acid	Psychiatry Res., 2016, 238, 203-210
	Amino acid	J. Sep. Sci., 2014, 37(16), 2087-2094
	Amino acid	Sci. Rep., 2018, 8(1), 14587
	Amino acid	Orig. Life Evol. Biosph., 2013, 43(2), 99-108
	Angiogenic peptide	BioSci. Trends, 2016, 10(6), 500-506
	Fluoresence derivatization	Biomed. Chromatogr., 2012, 26(2), 147-151
	iTRAQ-labeled peptides	Biochim. Biophys. Acta, 2018, 1865(6), 874-888
	Methylated lysine	Anal. Bioanal. Chem., 2018, 410(17), 4189–4194
	Morphine, Codeine, Dihydrocodeine	J. AOAC Int., 2011, 94(3), 765-774.
TiO	Glyphosate	Acta Chromatographica, https://doi.org/10.1556/1326.2018.00513
Trypsin	Protein digestion	J. Am. Chem. Soc., 2018, 140(38), 11982-11991
	Protein digestion	Anal. Sci., 2018, 34(4), 397-406
	review	Forensic Toxicol., 2010, 28(2), 61–68
	review	Trac. Trends Anal. Chem., 2013, 45, 182-196
	review	Electrophoresis. 2017, 38(22-23), 2851-2869
	review	Chromatogr., 2015, 2(1), 79-95
	review	J. Pharm. Biomed. Anal., 2018, 161, 51-60

MonoSpin ProA, MonoSpin ProG

MonoSpin ProA and MonoSpin ProG are already immobilized onto a silica monolith offering rapid purification of antibodies. Additionally, a 96-well plate format is available to purify a multi-analyte. Each reagent for the purification of samples is attached.

【Features】

The silica is modified with a hydrophilic polymer and then immobilized with either Protein A or Protein G to prevent the adsorption of proteins, resulting in higher purification and recovery of antibodies.



Silica monolith surfaces immobilized with Protein A and Protein G have modified hydrophilic polymers, suppressing the non-specific adsorption of proteins and allowing the recovery of purer antibodies.

【Specification】

Through-pore size	: 2 µm
Meso-pore size	: 60 nm
Disk size	: 4.2 × 1.5 mm
Sample Volume	: 500 µL
Sample Volume	: 50 µL
Centrifugation speed	: 2,300 × *g* *
Recovery rates	: 400 µg（IgG）

*:96-well plate type can also be used with vacuum aspiration (e.g., −0.015 MPa).

Shapes

Spin Column Type

• Purification with compact tabletop centrifuge just in two minutes (e.g., 2,300 × g)

• Appropriate for purification of small volume sample (approximately 0.4 mg)

96 Well plate type

• Purification by both aspiration or centrifuge

• Available for a multi-analyte with the same spin column volume.

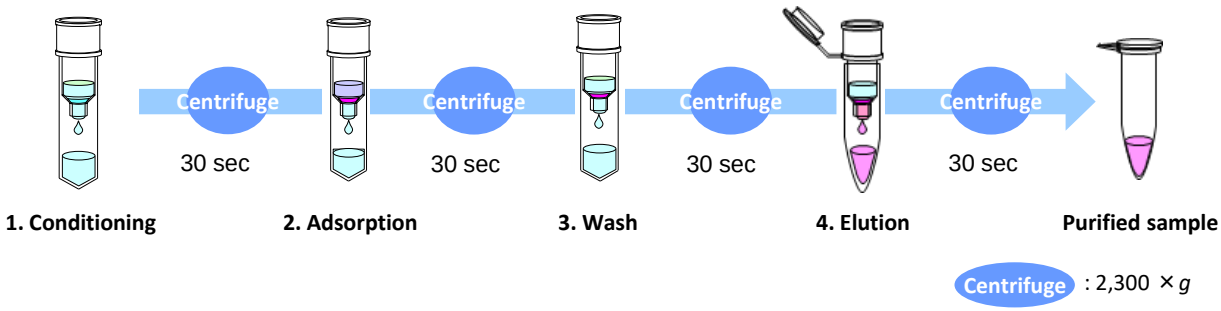
Large Spin Column

・Maximum 16 mg antibody can be recovered by centrifuge.

Ultra-high-speed processing ensures stable recovery

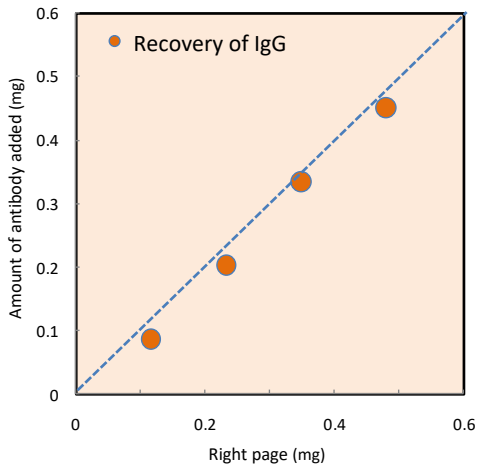
Antibodies can be easily purified by centrifugation in a short time in a tabletop centrifuge With silica monoliths.

When collecting antibodies, the neutralizing solution can be added to the collection tube in advance to immediately neutralize the antibodies collected by the acid immediately. This action greatly reduces the risk of antibody degeneration.

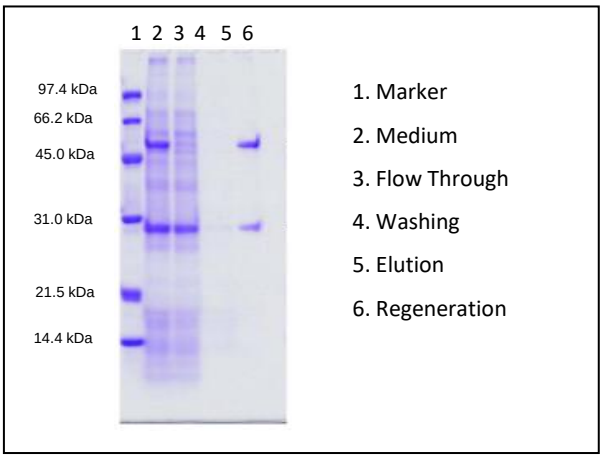


As shown below, the antibody concentrations were determined quantitatively from the medium of CHOcells. The purified antibodies show very few impurities by the results of electrophoresis.

Calibration curve of IgG concentration



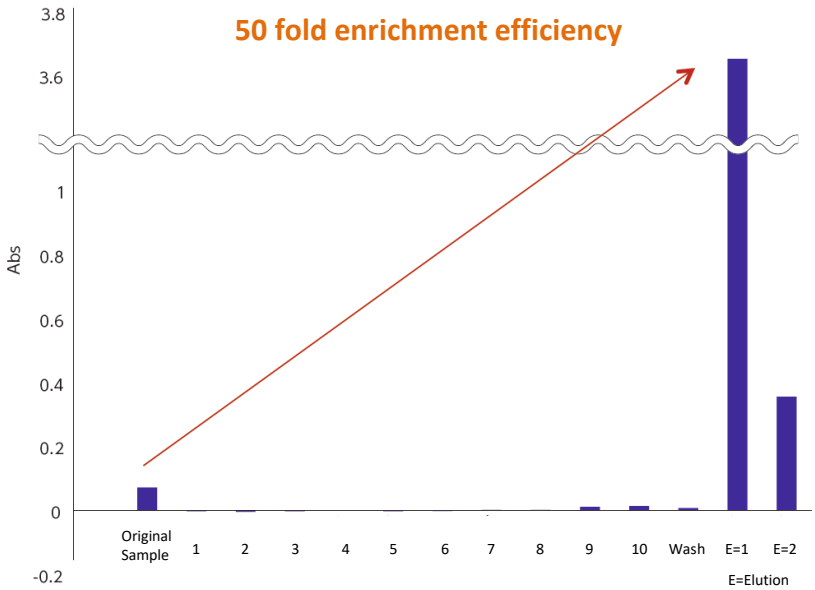
Results of recovery electrophorensis



Enrichment of Antibody Solution Using MonoSpin ProA

Human IgG solution (500 µL of 0.025 mg/mL) was applied to a MonoSpin ProG spin column 10 times (In = I1–I10).

Then, the elution of IgG concentration was determined twice with 100 µL elution buffer (En = E1 and E2). The first IgG elution (E1) was 50 fold concentration of the standard solution and indicates a 90% recovery of IgG without loss.



Elution Volume and Recovery Rate Comparing with Other Brands Products

MonoSpin ProA needs only 100 µL elution buffer to obtain a recovery rate of at least 90% IgG. However, other brands' products require 400 µL or more elution buffer with a recovery rate of 70% IgG.

MonoSpin ProA

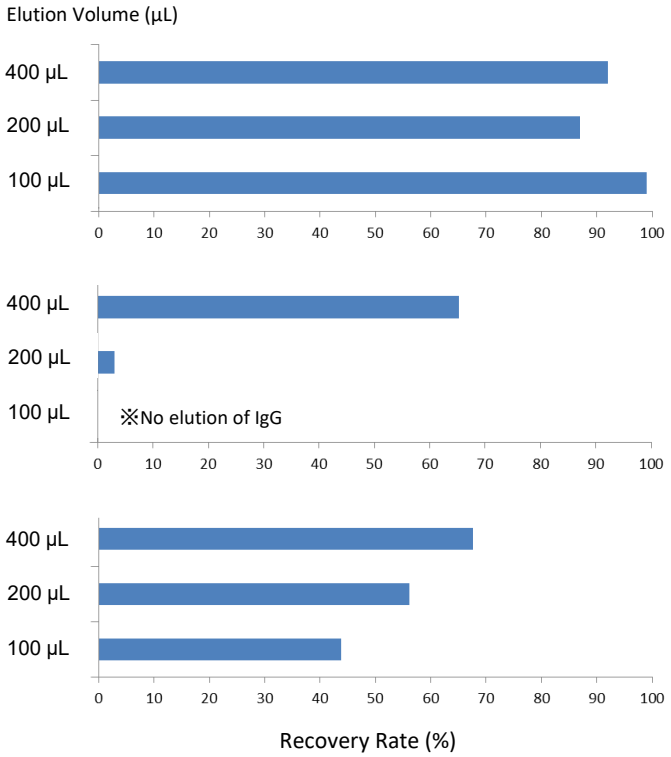
90 % recovery rate of IgG with 100 µL elution.

Brand T's Product

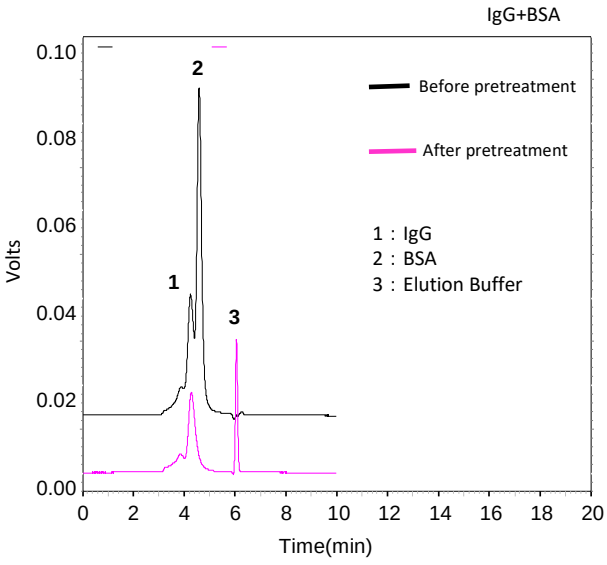
60 – 65 % recovery rate of IgG with 400 µL elution

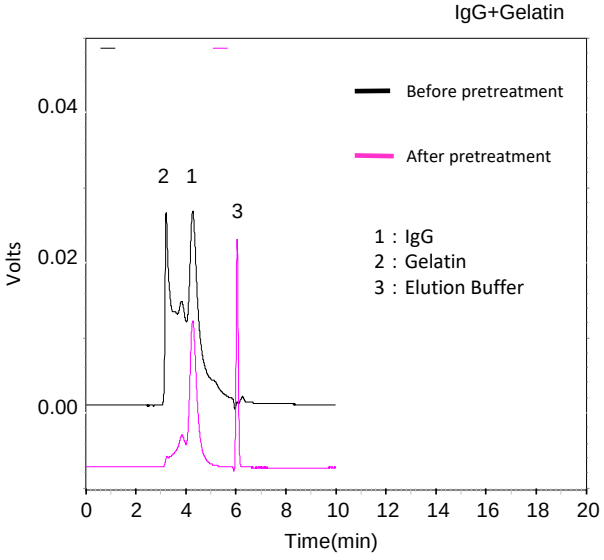
Brand G's Product

65 – 70 % recovery rate of IgG with 400 µL elution



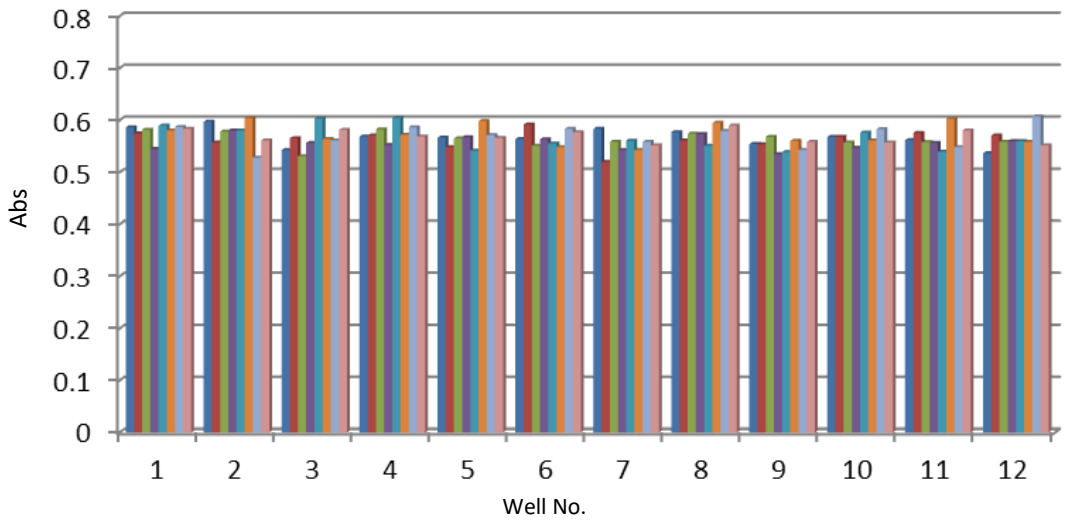
Removal of preservatives in antibody solutions





MonoSpin ProA/ProG enables you to remove proteins such as BSA and Gelatin in antibody solutions without dilution.

Recovery of antibodies from CHO cell culture medium (96-well plate)



Sample volume : 150 µL
Elution volume : 150 µL
Recovery rate : 90% (CV 3.1 %)
IgG concentration : 1.3 mg/mL

Purification of multiple antibodies using MonoSpin L and ProA

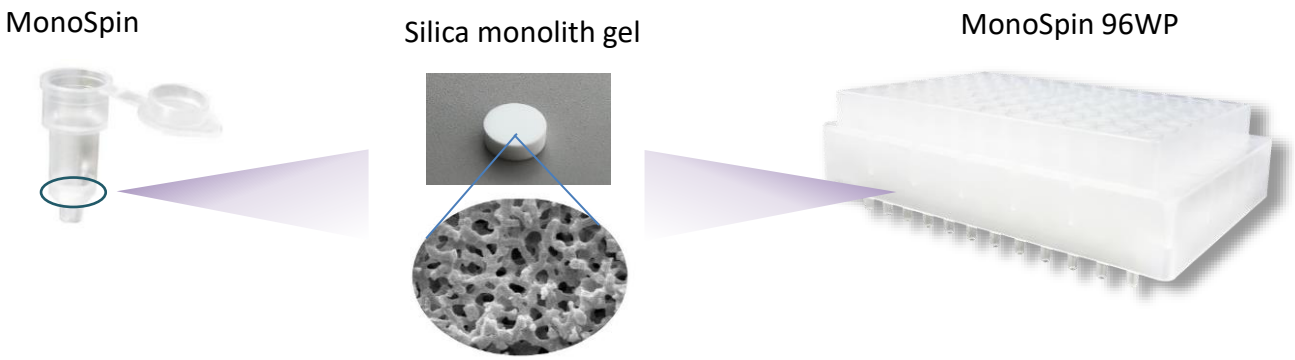
Procedure

1. Apply 5 mL of equilibration buffer.
2. Apply sample (Max. 8 mL) after filtration through 0.2 µL filtration.
3. Apply 5 mL of washing buffer.
4. Apply 5 mL of elution buffer.

Centrifugal force at each step : 1,500 x g, 2 min
* MonoSpin ProA/G buffer kit was used.

MonoSpin 96 Well Plate

MonoSpin 96WP is a multi-specimen pretreatment plate with immobilized silica monolith disks.
The same monolithic disks earlier used in MonoSpin have been fixed and designed to specifications that facilitate the same amount of load and results as when spin columns are used.



【Features】

- Fix the same gels as MonoSpin spin columns to a 96-well plate
- Can be used with centrifugal or suction (−0.05 MPa or higher recommended)
- Rapid pretreatment of biological samples is possible
- Capable of processing solution compositions similar to spin columns
- Extensive lineup

【Application】

- Desalting, purification, and fractionation of peptide samples
- Protein recovery and purification
- Purification after iTRAQ derivatization
- Purification of glycans
- Recovery of drugs from biological samples (urine, serum, plasma)
- Purification of catecholamines
- Recovery and purification of organic acids

Description	Qty.	Cat.No.
MonoSpin 96WP C18	1	5010-21900
MonoSpin 96WP NH2	1	5010-21901
MonoSpin 96WP PBA	1	5010-21902
MonoSpin 96WP SAX	1	5010-21903
MonoSpin 96WP SCX	1	5010-21904
MonoSpin 96WP Amide	1	5010-21905
MonoSpin 96WP CBA	1	5010-21906
MonoSpin 96WP C18-CX	1	5010-21907
MonoSpin 96WP C18-AX	1	5010-21908

96 Deep Well Plate / GL Sticker for 96 well plate

96 Deep Well Plate

【Features】

• Plate dimensions conform to SBS standards for the automatic operation of dispensing machines

• V-bottom well geometry reduces sample loss

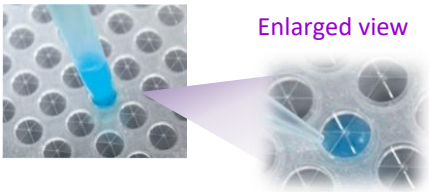
• Made of polypropylene with outstanding heat, cold, and solvent resistance

• Low adsorption (LB type) suppresses non-specific adsorption of proteins and peptides by super hydrophilic surface treatment

Description	Material	Qty.	Cat.No.
MS Plate	Polypropylene	50	6045-00201
MS Plate Low adsorption (LB type)	Polypropylene (hydrophobic polymer)	15	6045-00203

GL Sticker for 96 well plate

Evapo Less Slit



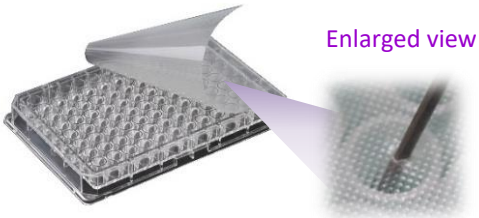
【Features】

• Sticker closes automatically after each application.

• Adhesive-free on top of the sticker to prevent contamination.

• Can be operated under −80℃–100℃

Sealing Sticker



【Features】

• High durability against organic solvent

• High air leakage efficiency

• Used to store samples down to −80℃

Description	Material	Qty.	Cat.No.
Evapo Less Slit	PET, Silicon	100	5010-21950
Sealing Sticker	Polyolefin	100	5010-21951

Order Information

MonoSpin type S

Description	Qty.	Cat.No.
MonoSpin C18	50	5010-21700
	100	5010-21701
MonoSpin C18 FF	50	5010-21670
	100	5010-21671
MonoSpin Ph	50	5010-21733
	100	5010-21734
MonoSpin C18-AX	50	5010-21735
	100	5010-21736
MonoSpin C18-CX	50	5010-21731
	100	5010-21732
MonoSpin SAX	50	5010-21720
	100	5010-21721
MonoSpin SCX	50	5010-21725
	100	5010-21726
MonoSpin NH2	50	5010-21710
	100	5010-21711
MonoSpin CBA	50	5010-21729
	100	5010-21730
MonoSpin Amide	50	5010-21727
	100	5010-21728
MonoSpin PBA	50	5010-21715
	100	5010-21716
MonoSpin TiO	50	5010-21705
	100	5010-21706
MonoSpin Trypsin HP [KEEP COOL]	30	7510-11302
MonoSpin ME	50	5010-21737
	100	5010-21738
MonoSpin Phospholipid	50	5010-21698
	100	5010-21699

MonoSpin Type S

Recovery tube
(1.7 mL)

Liquid waste tube
(2 mL)

MonoSpin type S Trial kit

Trial and custom kits are shipped with various columns packaged for initial method development.

Description	Content	Cat.No.
MonoSpin Trial Kit 1	C18, TiO, SCX, SAX 10 each	5010-21740
MonoSpin Trial Kit 2	C18, Amide, CBA, NH2 10 each	5010-21741
MonoSpin Trial Kit 3	SCX, SAX, CBA, NH2 10 each	5010-21742

MonoSpin type L

Description	Qty.	Cat.No.
MonoSpin L C18	30	7510-11320
MonoSpin L SAX	30	7510-11321
MonoSpin L SCX	30	7510-11322
MonoSpin L NH2	30	7510-11323
MonoSpin L CBA	30	7510-11324
MonoSpin L ME	30	7510-11325
MonoSpin L Phospholipid	30	7510-11326

MonoSpin type L

MonoSpin 96 well plate

Description	Qty.	Cat.No.
MonoSpin 96WP C18	1	5010-21900
MonoSpin 96WP NH2	1	5010-21901
MonoSpin 96WP PBA	1	5010-21902
MonoSpin 96WP SAX	1	5010-21903
MonoSpin 96WP SCX	1	5010-21904
MonoSpin 96WP Amide	1	5010-21905
MonoSpin 96WP CBA	1	5010-21906
MonoSpin 96WP C18-CX	1	5010-21907
MonoSpin 96WP C18-AX	1	5010-21908

MonoSpin ProA, MonoSpin ProG

Description		Qty.	Cat.No.
MonoSpin ProA column	[KEEP COOL]	10	7510-11310
MonoSpin ProG column	[KEEP COOL]	10	7510-11311
MonoSpin ProA 96 well plate	[KEEP COOL]	1	7510-11312
MonoSpin ProG 96 well plate	[KEEP COOL]	1	7510-11313
MonoSpin L ProA	[KEEP COOL]	4	7510-11314
MonoSpin L ProG	[KEEP COOL]	4	7510-11315
MonoSpin ProA/G buffer kit	[KEEP COOL]	–	7510-11316

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Published in Japan, July 29, 2022(PDF)
EN1074-20220729PDF