GL Sciences

MonoSpin

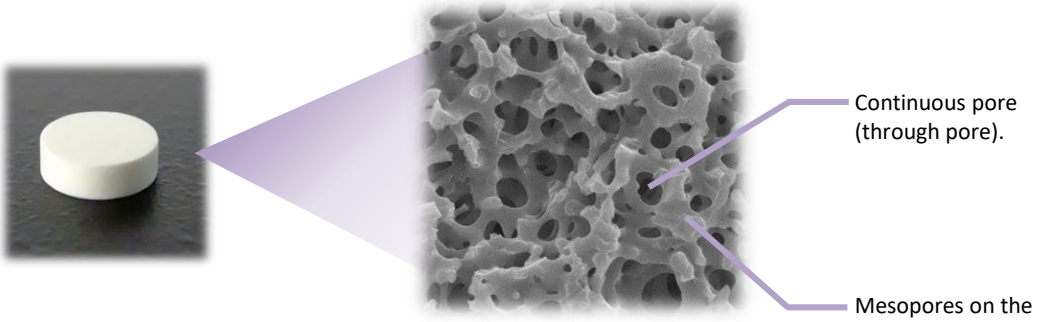
Solid Phase Extraction Spin Column

Contents

GL Sciences Inc.

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

Silica monoliths are integral silica gels with uniform continuous pores synthesized from ethyl silicate. Unlike the particle media, Silica monolith is shaped like a disk. Silica monoliths have high liquid permeability and large surface area as it has structure having through-pores and mesopores on the framework surface. Therefore, this state-of-the-art media is becoming popular globally for its characteristics: high recovery, high performance of adsorption and desorption.



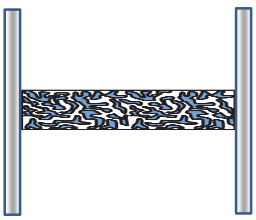
Silica monolith structure

Different points from the particle packing type pretreatment columns

Disk-shaped silica monoliths isn't required to use frits to hold particle media like conventional SPE cartridges. It also has a very large surface area, which makes it possible to reduce the volume of sample. From this point, Silica monolith makes it possible to prevent from remaining samples in the cartridge as well as complete elution for small amount of sample.

Despite the fact that it has high liquid permeability, It is also suitable for rapid elution without losing its high recovery as it enables fast sample diffusion and quick separation.

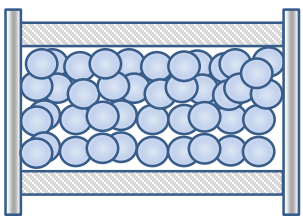
Silica monolith



・No filter required
・Minimized separation media

Bed volume for separation media	: small
Sample diffusion in the column	: fast
Separation Speed	: fast

Particle-filled Form

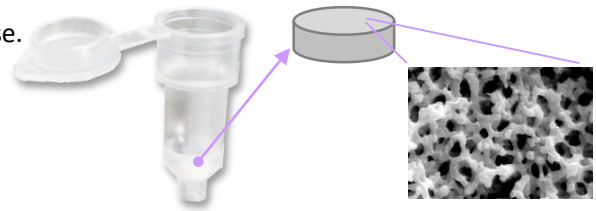


・Need for filters
→ liquid may be remained in the filter

Bed volume for separation media	: large
Sample diffusion in the column	: slow
Separation Speed	: slow

MonoSpin

MonoSpin is a SPE spin-column using silica monoliths with uniform continuum pores. It effectively and quickly extracts, isolates, purifies and concentrates samples by centrifugation with an ease.

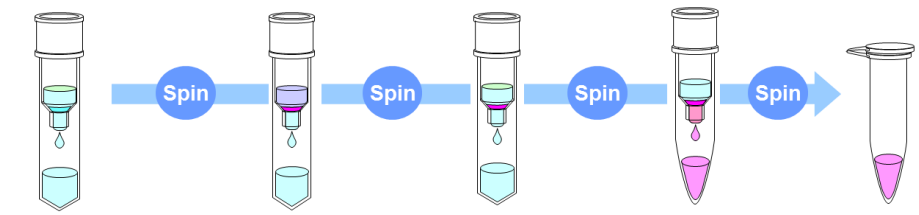


Feature

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

Operation method

Whole process for sample treatment can be done within 10 minutes.



Conditioning **Adsorption** **Wash** **Elution**

Centrifuge Operation

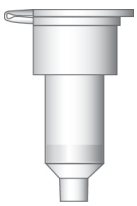
Shape

MonoSpin series cartridge with different types are available:

Type S: Excellent for the pretreatment of the sample for 50-800uL

Type L: Suitable for sample 0.5-8mL.

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



S Type

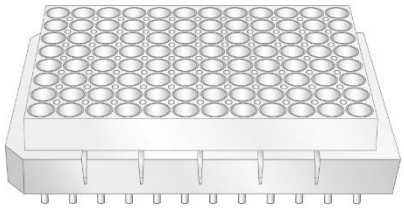
- Disk size: ϕ4.2 × 1.5 mm
- Sample volume up to 800 µL
- Elution volume: 50 to 800 µL
- Centrifugation speed: 2,000 to 10,000 x g

L Type

- Disk size: ϕ9 × 3 mm
- Sample volume to 8 mL:
- Elution volume : 0.5-8 mL
- Centrifugation speed : 1,000 x g

NOTE) The MonoSpin ProA,MonoSpin ProG has different shapes. Please see page 16 for details.

96 Well plate type

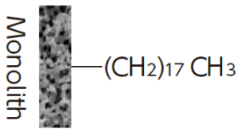


- Sample volume up to 800 µL
- Elution volume :50 ~ 800 µL
- Centrifugation speed : 1,000 to 5,000 × g (can be used in vacuum aspiration)

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

MonoSpin Series Lineup

MonoSpin C18/C18 FF

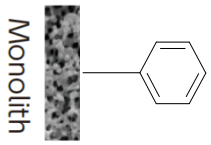


* Only S-type for MonoSpin C18 FF .

S L 96

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

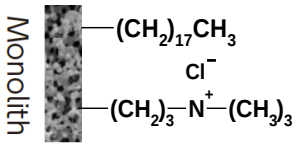
MonoSpin Ph



S

Phenyl group is chemically bonded which makes it possible to utilize weaker hydrophobicity than C18. It is suitable for the recovery of hydrophobic drugs from biological samples under reversed phase mode.

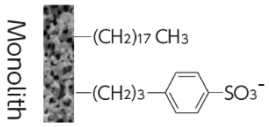
MonoSpin C18-AX



S 96

Is a mix mode type in which both octadecyl and quaternary ammonium groups are chemically bonded. It can reliably retain bio samples in high salt concentration. It is especially suitable for recovery of acidic drugs.

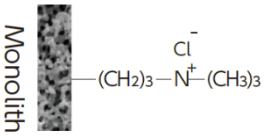
MonoSpin C18-CX



S 96

Octadecyl and Benzenesulfonic acid groups are bonded. It is suitable for the purification of dissociated basic drugs in serum and urine. Compared with MonoSpin C18 and SCX alone, SCX has higher cleanup efficacy as it works as Hydrophobic and ion-exchange interactions.

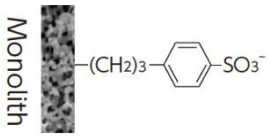
MonoSpin SAX



S L 96

Bonded with Trimethyl aminopropyl combining both strong anion exchange & weak hydrophobic interaction.
Optimal for the extraction of acidic drugs.

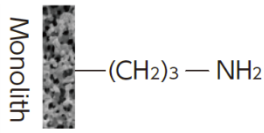
MonoSpin SCX



S L 96

Bonded with propyl benzene sulfonic acid combining both strong cation exchange & hydrophobic interaction.
Optimal for the extraction of basic drugs.

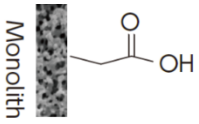
MonoSpin NH2



S L 96

Bonded with aminopropyl.
Optimal for the enrichment of sugar chain and/or hydrophilic compounds by HILIC mode.

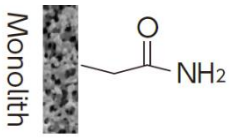
MonoSpin CBA



S L 96

Bonded with propyl benzene sulfonic acid combining both strong cation exchange & hydrophobic interaction.
Optimal for the extraction of basic drugs.

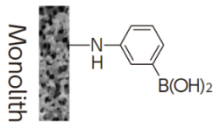
MonoSpin Amide



S 96

Bonded with amide group.
Optimal for the extraction of sugar chains and various acidic and basic hydrophilic compounds by HILIC mode.

MonoSpin PBA



S 96

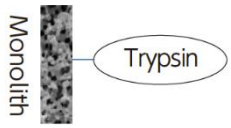
Bonded with phenyl boric acid which gives you higher selectivity. Excellent for the extraction of cis diol compounds, such as catechol amines.

MonoSpin TiO

S

Monolith skeleton coated with dioxide titanium. Excellent for the enrichment of phosphopeptides

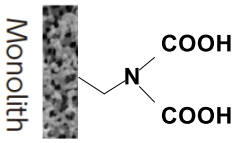
MonoSpin Trypsin



S

Columns immobilized with trypsin, a protein digestive enzyme.
It enables rapid digestion of proteins.

MonoSpin ME

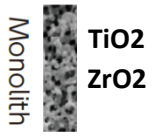


S L *Please refer to P12

Bonded with iminodiacetic acid groups. It is optimal for the recovery of trace metals in samples.

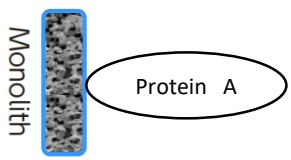
MonoSpin Phospholipid

S L *Please refer to P13



Phospholipid Removal Column coated with titanium dioxide and zirconium dioxide on Silica monolith.
It adsorbd phospholipids in samples with an easy pretreatment.

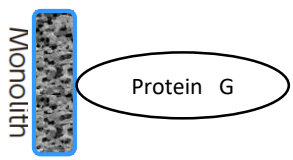
MonoSpin ProA



S 96 *Please refer to P15

Protein A is immobilized on the Monolith. It enables you efficient purification of Antibodies.

MonoSpin ProG



S 96 *Please refer to P15

Protein G is immobilized on the Monolith. It enables you 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, MonoSpin series enable you more faster and efficient purification and enrichment with centrifugation.

It's also recommended for the elution of small volume samples, and trace analytes can be collected without dilution.

S Type

Before purification

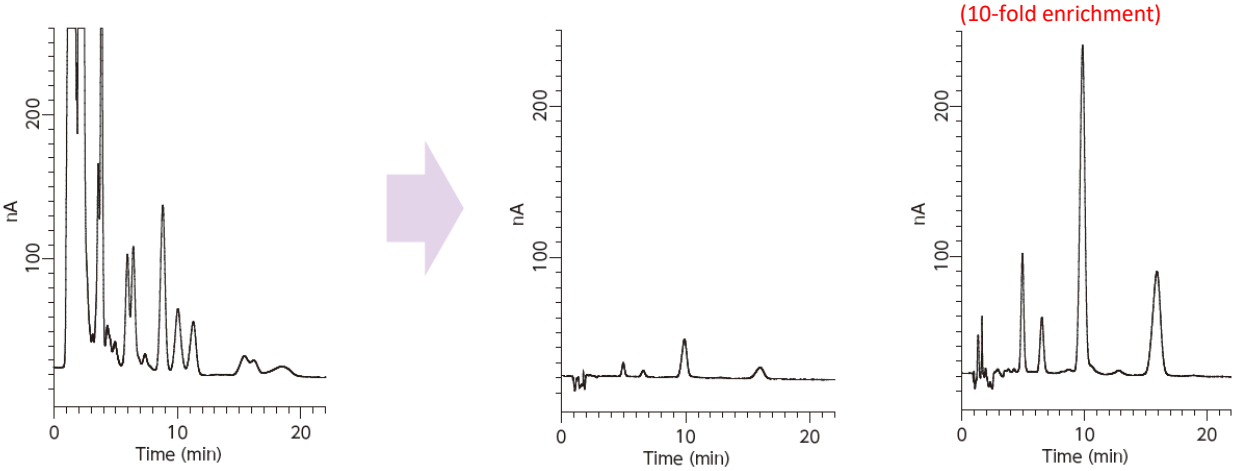
Purification of Catecholamine by MonoSpin PBA

Sample volume: 500 µL

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/LEDTA, 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

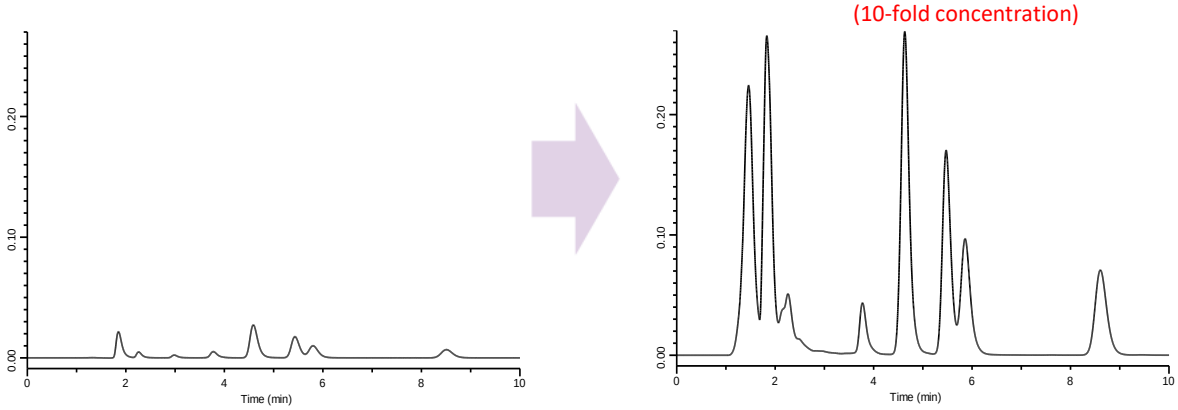
Before purification

Purification of Serum samples by MonoSpin C18

Sample Volume: 5000 µL

Elution Volume: 500 µL

(10-fold concentration)



Conditions

Column :Inertsil ODS-3 (5 µm, 150 × 4.6 mm I.D.)
Eluent :CH3CN/3 mM KH2PO4, 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/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	-	-	350	40 μg (adenosine monophosphate)
MonoSpin Trypsin	Trypsin	5	10	-	-	350	-
MonoSpin ME	Iminodiacetic acid group	5	10	10	10	350	25 μg (Cu ions)
MonoSpin Phospholipid	Titanium dioxide Zirconium dioxide	5	10	10	10	350	10 μL (human serum)
MonoSpin ProA	Protein A	2	60	-	-	-	400 μg (human IgG)
MonoSpin ProG	Protein G	2	60	-	-	-	400 μg (human IgG)

Specifications for Shape and Type

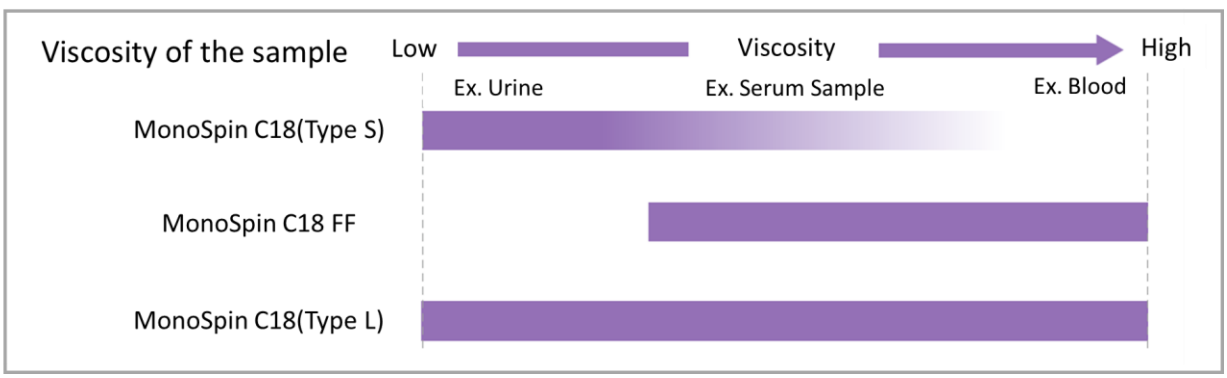
Type	MonoSpin S type *1	MonoSpin FF*2	MonoSpin L type	MonoSpin 96 well type
Disk size	Φ4.2 × 1.5 mm	Φ4.2 × 1.5 mm	Φ9 × 3 mm	Φ4.2 × 1.5 mm
Sample Volume	Up to 800 μL	Up to 800 μL	Up to 8 mL	Up to 800 μL
Elution Volume	50~800 μL	50~800 μL	0.5 ~ 8 mL	100~800 μL
Centrifugal force	2,000~10,000 × g	1,000 × g	1,000 × g	1,000~5,000 × 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.

Which MonoSpin is suitable for your analyte?

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

Please refer to the following chart for choosing appropriate MonoSpin.



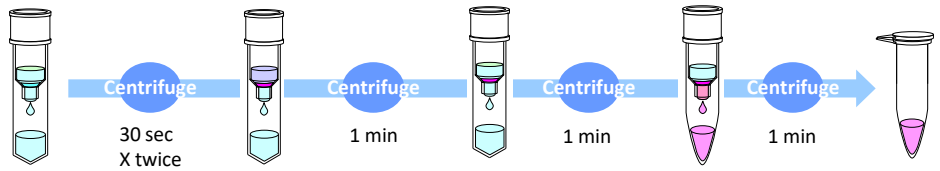
Application

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



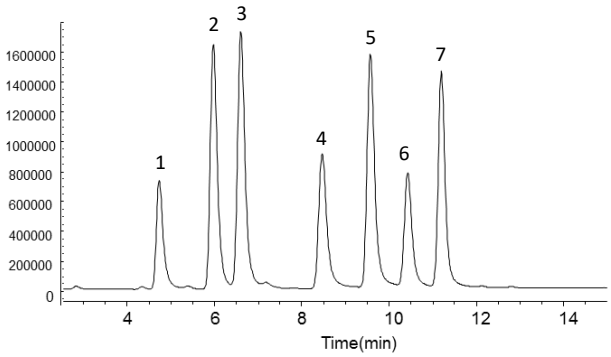
1. Conditioning
①Methanol 300 µL
② Buffer (pH 13).300 µL

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

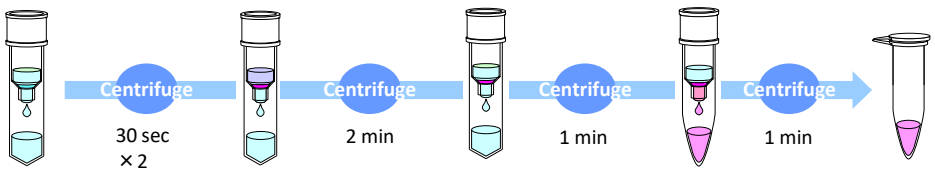
Column :InertSustainSwift C18 (3 µm, 150 × 2.1 mm I.D.)
Eluent A) 10 mM ammonium acetate-formic acid (pH 3. 3).
B) CH_3OH
A/B = 90/10 - 2 min - 90/10 - 13 min - 70/30,v/v
Flow Rate :0.3 mL/min
Col. Temp. :40 ℃
Detection :LC/MS
Sample : 1. Norephedrine
2. Ephedrine
3. Methylephedrine
4. Amphetamine
5. 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: 400µL (pH 7. 0).
*Sample was mixed for 1 min at 10,000 x g. Transferred and used the supernatant as sample.

Centrifuge : 2,300 × g



1. Conditioning
①Methanol 300 µL
②10 mM potassium phosphate, 300µL (pH 7. 0).

2. Adsorption
Sample solution 600 µL

3. Wash
Water 300 µL

4. Elution
Acetonitrile 200 µL

Purified sample

Day-to-day reproducibility of 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

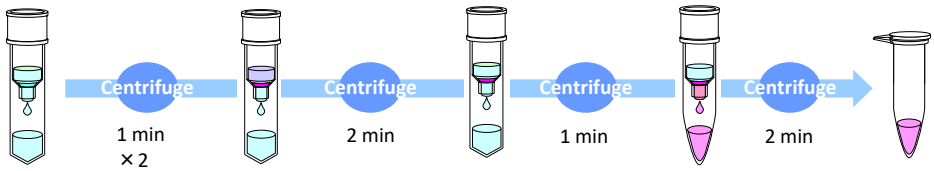
Sample	Concentration (ng/mL)	Recovery rate (%)	RSD (%)
Paroxetine	5	83.7	3.9
	10	84.1	7.8
	50	83.9	8.2
	250	86.7	7.5
Maprotiline	5	85.7	8.1
	10	84.7	3.2
	50	88.6	5.4
	250	87.5	7.7
Duloxetine	5	106.3	9.9
	10	104.8	6.7
	50	99.8	8.7
	250	99.8	6.0

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

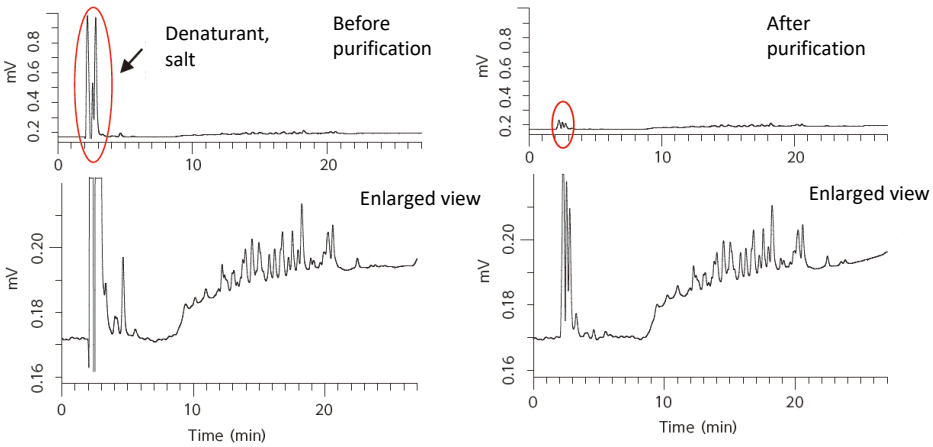
1. Conditioning
Acetonitrile 200 µL
→ 0.1% aqueous TFA 200 µL

2. Adsorption
Sample solution
Maximum800 µL

3. Wash
0.1% aqueous TFA 200 µL

4. Elution
60% acetonitrile 200 µL

Desalted samples



Conditions

Column	:Inertsil ODS-3 (3 µm, 150× 2.1 mm I.D.)
Eluent	:A)H2O (0.1 % TFA) B) Acetonitrile (0.1 % TFA) A/B = 90/10 - 20 min - 50/50
Flow Rate	:UV 210 nm
Col. Temp.	:0.2 mL/min
Detection	:40 ℃
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

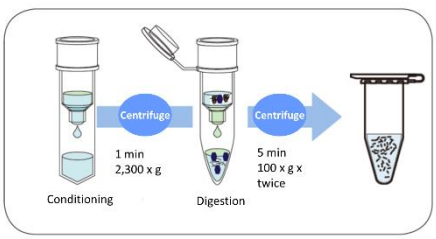
---- 500 mM Tris-HCL(pH 8. 0)-- 8M urea (Solution 1): 175µL
---- 40 mg/mL Dithiothreitol in Solution 1: 25µL
---- Incubation at 37 ℃ for 90 min

---- 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

MonoSpin Trypsin HP

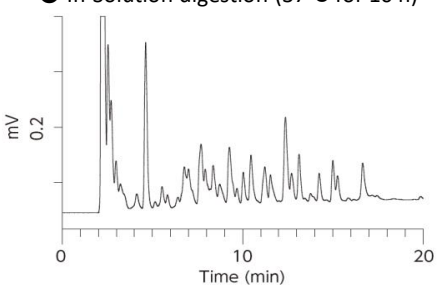


Conditions

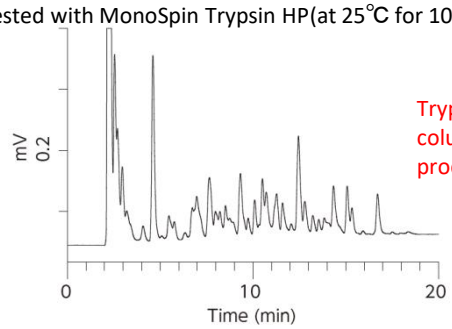
Column	:Inertsil ODS-3 (3 µm, 150× 2.1 mm I.D.)
Eluent	:A)H2O (0.1 % HCOOH) B) Acetonitrile (0.1 % HCOOH) A/B = 90/10 - 20 min - 50/50
Flow Rate	:UV 210 nm
Col. Temp.	:0.2 mL/min
Detection	:40 ℃
Sample	:Digested BSA 2 µL

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.

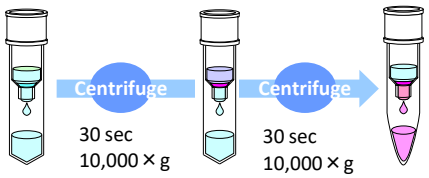
NOTE) For digestion, be sure to use protein after reductive alkylation.

Fractionation of Protein digests using MonoSpin SCX.

The use of spin columns and elution salt concentration in stepwise makes it possible to fractionate peptides without using 2D-LC systems 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

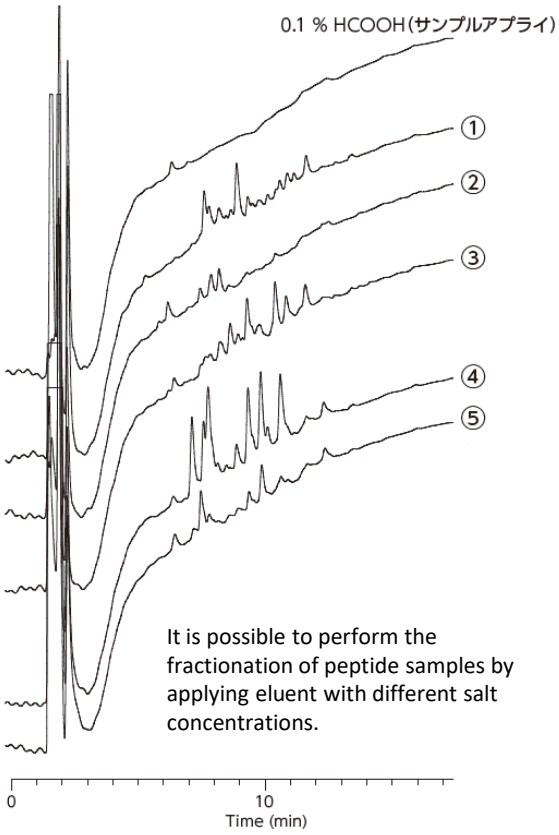
Apply the eluent, centrifuge, and then attach a new tube to apply the next eluent.

Each eluate composition
① 25 mM HCOONH4 200 µL ④500 mM HCOONH4 200 µL
② 50 mM HCOONH4 200 µL ⑤1 M HCOONH4 200 µL
③ 100 mM HCOONH 4200 µL Injection) Each solution contains 10% acetonitrile.

Conditions

Column :Inertsil ODS-3 (3 µm, 2.1 × 150 mm)
Eluent :A)H2O (0.1 % HCOOH)
B) Acetonitrile (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



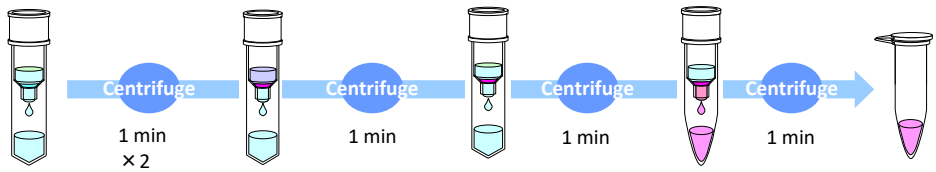
It is possible to perform the fractionation of peptide samples by applying eluent with different salt concentrations.

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
50% acetonitrile
(0.1% * formic acid) 500µL
→ 90% acetonitrile
(0.1% * formic acid) 500µL

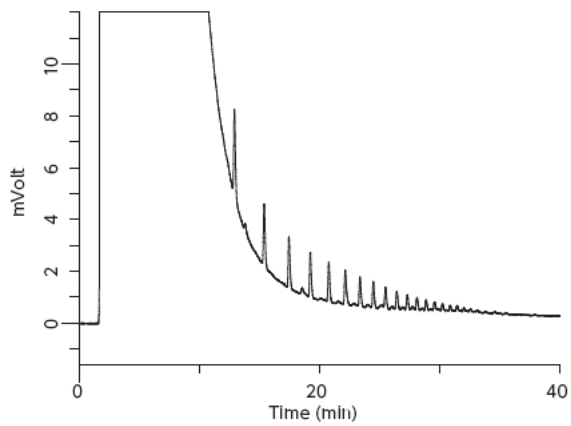
2. Adsorption
Sample solution
800 µL

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

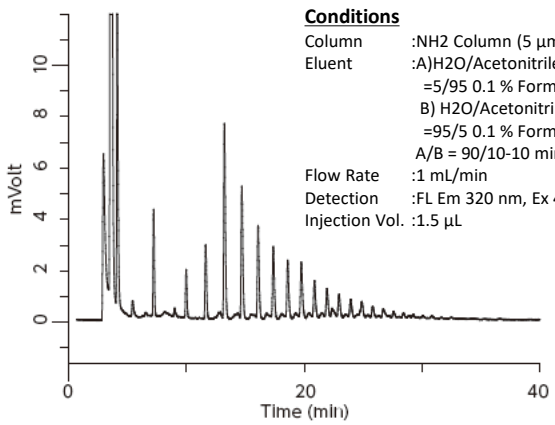
4. Elution
50% acetonitrile
(0.1% * formic acid)
50~800 µL

Purified sample

Before purification



Purified with MonoSpin NH2



Conditions

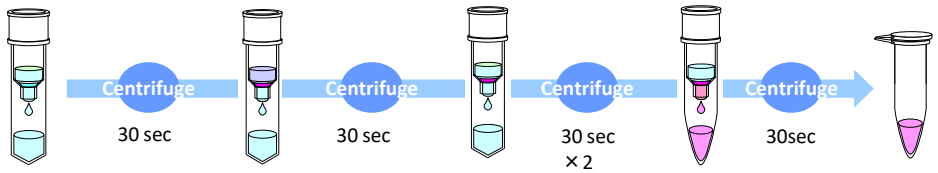
Column :NH2 Column (5 µm, 250 × 4.6 mm I.D.)
Eluent :A)H2O/Acetonitrile
=5/95 0.1 % Formic acid
B) H2O/Acetonitrile
=95/5 0.1 % Formic acid
A/B = 90/10-10 min–90/10-40 min-60/40
Flow Rate :1 mL/min
Detection :FL Em 320 nm, Ex 400 nm
Injection Vol. :1.5 µL

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
10 mM Potassium Phosphate Buffer (pH 7. 0).
200 µL

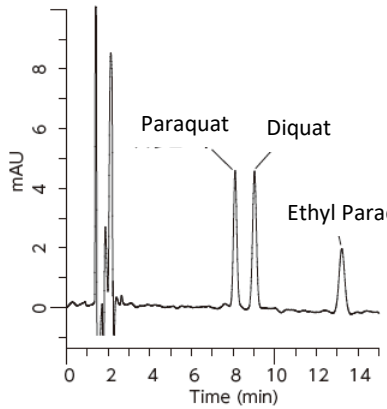
2. Adsorption
Sample solution
600 µL

3. Cleaning
10 mM potassium phosphate Buffer (pH 7. 0).
200 µL

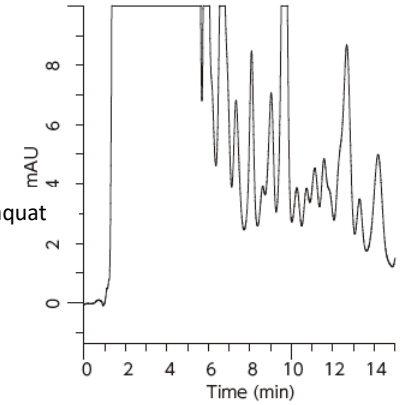
4. Elution
1 % Hydrochloric acid
30% Methanol
69% Water
200 µL

Purified sample

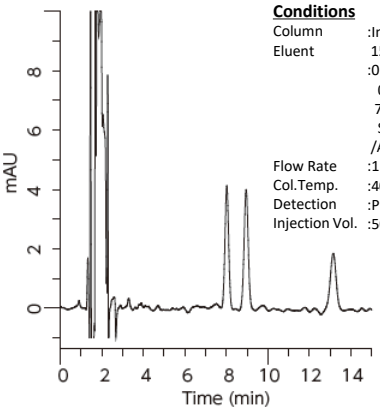
Standard Solution (1µg/mL)



Urine ＋ pesticide (1µg/mL each)



After purification with MonoSpin CBA



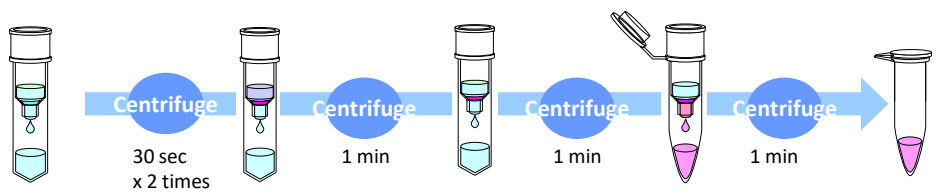
Conditions
Column :Inertsil ODS-3 (5 µm, 150 mm × 4.6 mm I.D.)
Eluent :0.2 M phosphoric acid, 0.1 M diethyl amine, 7.5 mM IPCC08(IPCC-0.8, Sodium 1-Octanesulfonate) /Acetonitrile=89/11
Flow Rate :1 mL/min
Col.Temp. :40 ℃
Detection :PDA 290 nm
Injection Vol. :50 µL

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



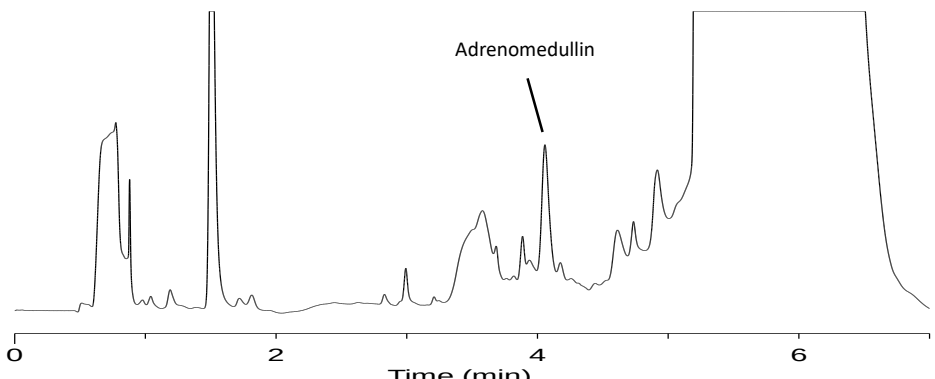
1. Conditioning
Acetonitrile 200 µL
→ 0.1% aqueous TFA: 200µL

2. Adsorption
Samples were prepared 400 µL of supernatant

3. Wash
0.1% aqueous TFA
200 µL

4. Elution
Contain 0.1% TFA
60% acetonitrile solution
200 µL

Purified sample



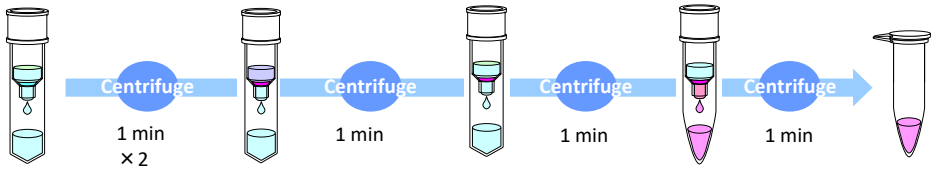
Conditions
Column :InertSustain C18 (2 µm, 50 × 2.1 mm I.D.)
Eluent :A)0.1 % TFA in Water
B) 0.1 % TFA in Acetonitrile
A/B = 85/15 – 5 min – 50/50 -2 min-50/50
Flow Rate :200 µL/min
Col. Temp. :40 ℃
Detection :UV 210 nm
Injection Vol. :10µL

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

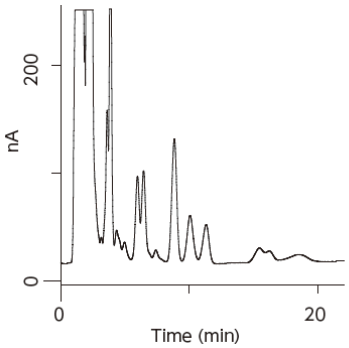
2. Adsorption
Sample solution 250 µL

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

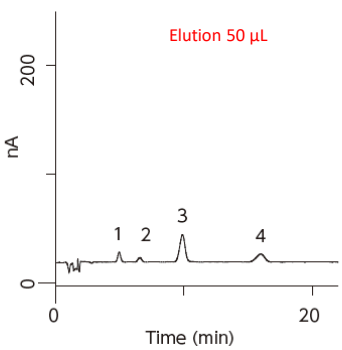
4. Elution
1% acetic acid solution 200 µL

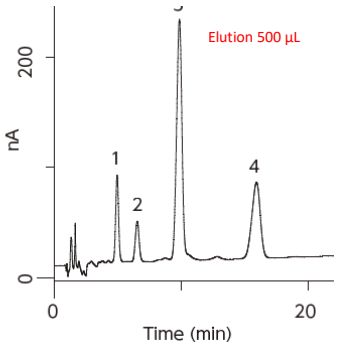
Purified sample

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 ℃
Injection	:5 µL
Detection	:ECD Pulse Mode
Sample	:1. Noradrenaline 2. Adrenaline 3. DHBA 4. Dopamine

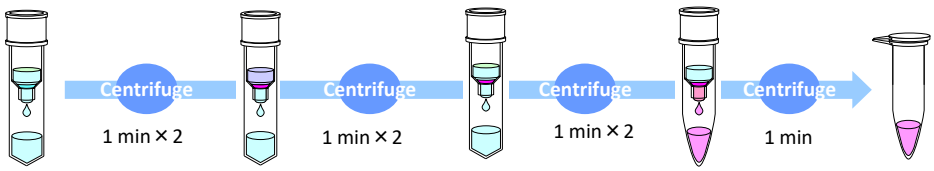
By using MonoSpin PBA, we can selectively recover and purify compounds with cis-type diols such as catecholamines.
See our website Technical Note LT093 for more information.

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
①80% acetonitrile
(0.1 % TFA) 50 µL
②50% acetonitrile
(0.1 % TFA) 50 µL
*Operated as an order :①→②

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

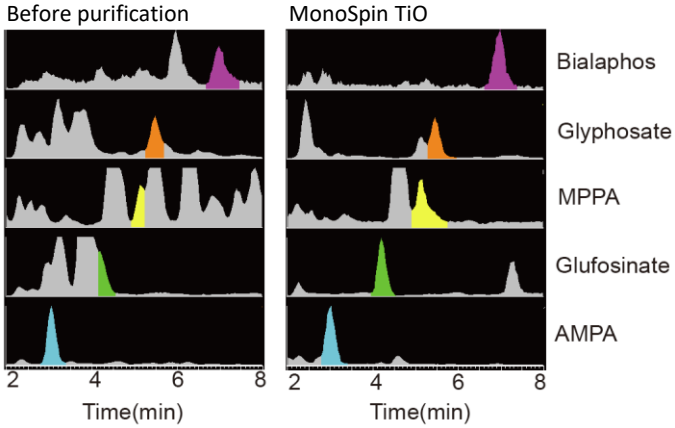
3. Wash
①80% acetonitrile
(0.1 % TFA) 50 µL
②50% acetonitrile
(0.1 % TFA) 50 µL
*Operated as an order : ①→②

4. Elution
2% ammonia solution 50 µL

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

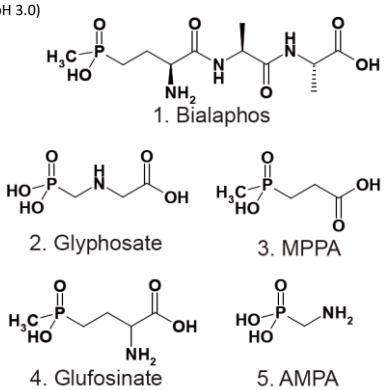
Before purification

After purification using MonoSpin TiO



Conditions

Column	:ODS Column (150 × 2.1 mm I.D.)
Eluent	:A)CH3OH B) 20 mM HCO2NH4 (pH 3.0) A/B = 15/85, v/v
Flow Rate	:200 µL/min
Detection	:SIM
Injection Vol.	:5 µL
Sample	:1. Bialaphos 2. Glyphosate 3. MPPA 4. Glufosinate 5. AMPA

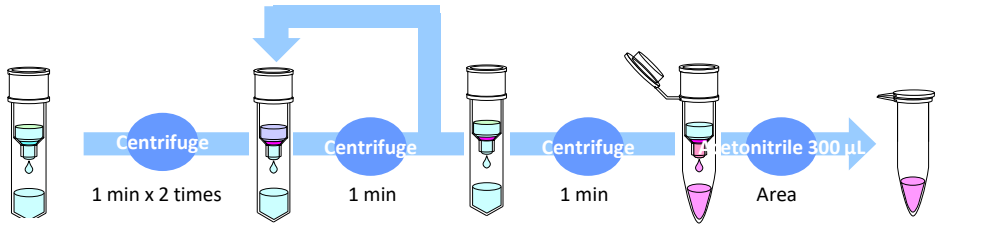


MonoSpin TiO shows selectivity for phosphate sites in compounds.

With Insulin or BSAs

Sample Preparation

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



1. Conditioning
①ACN: 300µL
②0.2% TFA in H2O: 300µL
Operated as an order:①→②

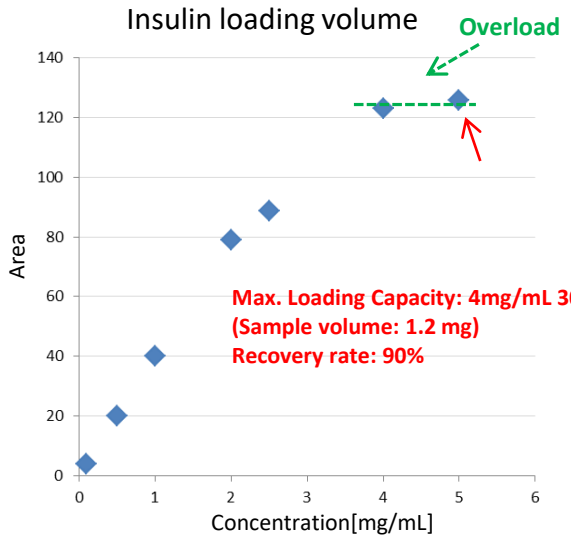
2. Adsorption
Sample solution:300 µL

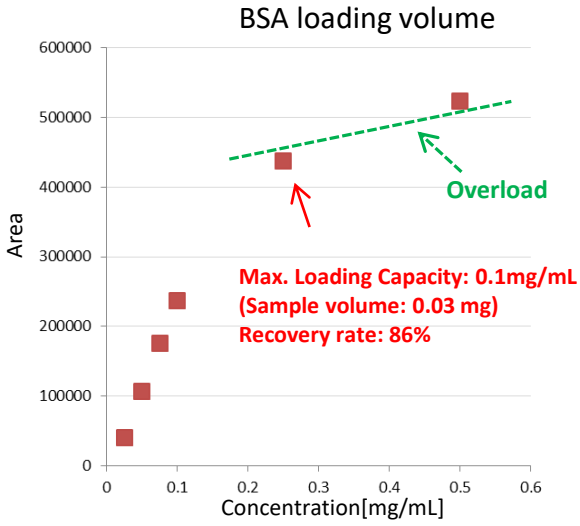
3. Wash
0.2% TFA in H2O: 300 µL

4. Elution
$C_2H_5OH/H_2O/TFA$ =60:40:0.1 300 µL

Purified sample

Centrifuge 2000 x g for 1 min





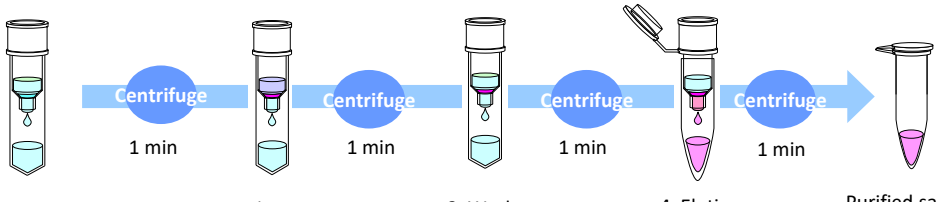
Please see Technical Note LT157 for more information .

Analysis of blood sample 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

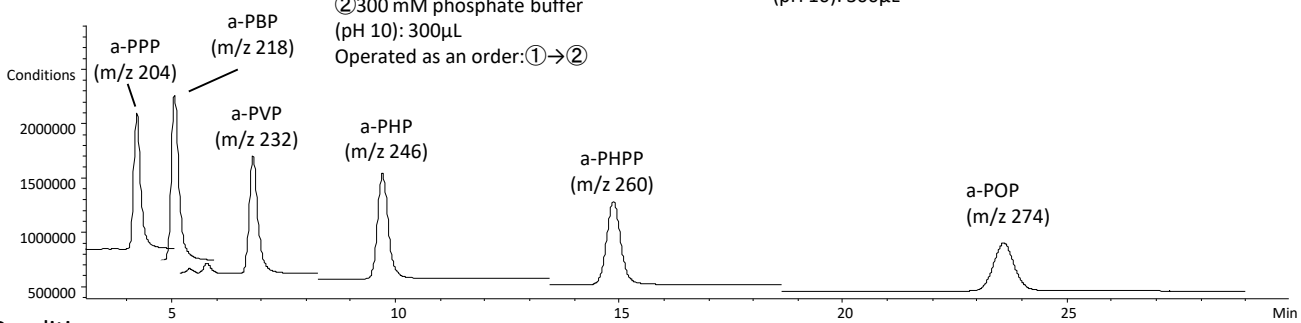
1. Conditioning
①MeOH: 300µL
②300 mM phosphate buffer (pH 10): 300µL
Operated as an order:①→②

2. Adsorption

3. Wash
300 mM phosphate buffer (pH 10): 300µL

4. Elution
MeOH: 100µL

Purified sample



Conditions

Column: InertSustain Phenyl (3 µm, 150 ×2.1 mm I.D.)
Eluent: acetonitrile-HCOONH4(10 mM, 0.1 % HCOOH) = 25:75 (v/v)
Flow Rate: 0.2 mL/min
Col. Temp. : 40 °C
Detection: MS(ESI)

MonoSpin Phospholopid

ZrO2

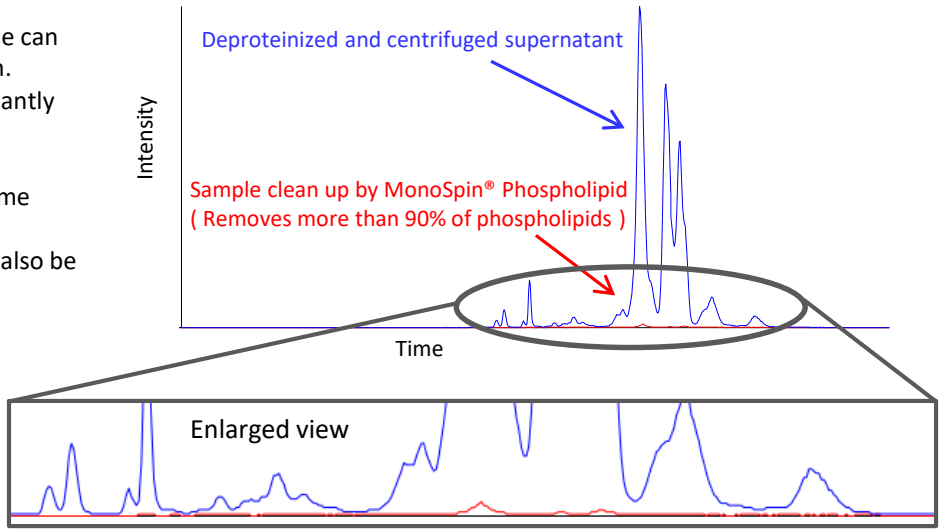
Phospholipid Removal Column coated with titanium dioxide and zirconium dioxide on Silica monolith. It adsorbs phospholipids in samples such as blood and serum with an easy pretreatment. More importantly, the adsorbed phospholipids can also be recovered very well.

Cartridge shape: S-type, L-type

Functional groups: titanium dioxide, zirconium dioxide

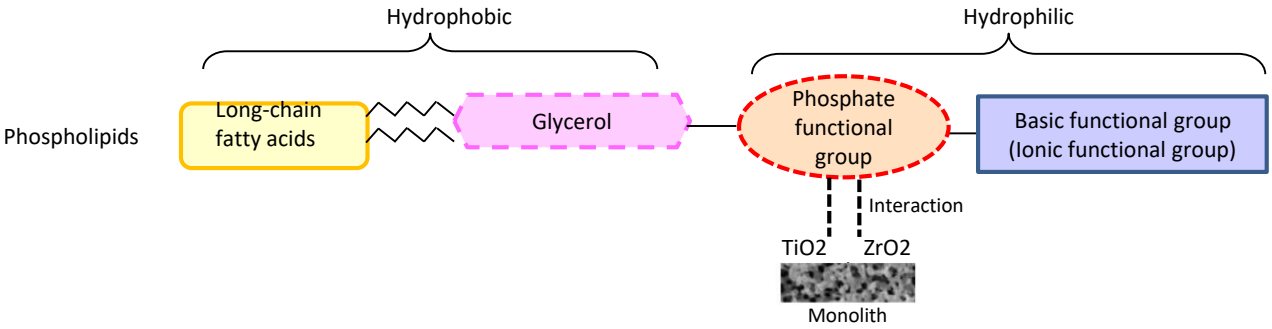
Features

- Phospholipids in biological sample can be removed with an easy operation.
- It decreases matrix effect significantly since it removes more than 90% of Phospholipids.
- Perform well even for small volume sample
- The adsorbed phospholipids can also be recovered.



How it's adsorbed?

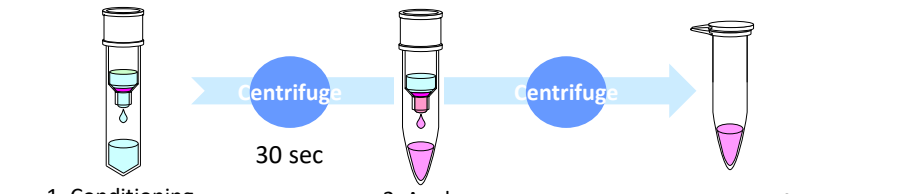
- Monolith skeletal structure coated with TiO2 and ZrO2 Selectively interacts with metal oxides and phosphorylated compounds, resulting in removing more than 90 % of phospholipids!



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



0.1% formic acid in ACN: 200 µL

Sample volume: 50 µL

Centrifuge 3,000 x g for 1 min

Related Product: FastRemover® for Phospholipid

The FastRemover ® for Phospholipid 96-well plate deliver a rapid and effective removal of proteins and phospholipids in plasma and serum samples without sacrificing the recovery of your target analytes.

Publicly Available Reference

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

Publicly Available Reference

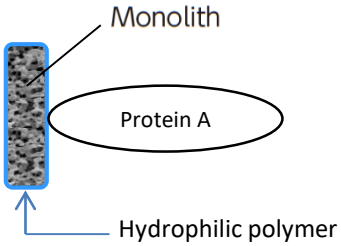
Functional Group	Compounds	Reference
C18 FF	Drugs	J. Chromatogr. A, 2017, 1517, 9-17
C18, C18CX	Cardiovascular drug	Acta Chromatographica, https://doi.org/10.1556/1326.2018.00493
C18, SCX	Melamine	J. Anal. Sci. Meth. Instrum., 2012, 2, 68-73
C18 , SCX	Peptides	Sci. Rep., 2017, 7(1), 11137
C18, TiO	Peptides	Int. J. Mol. Sci., 2018, 19(9), 2655
C18,SAX	Aamphetamines, Opiates, and THC	Forensic Toxicol., 2013, 31(2), 312–321
C18AX	Oxidized Fatty Acids	Mod. Chem. Appl., 2015, 3, 3
C18-CX	Clean up	J. Occup. Health., 2018, 60(2), 140-147
	Arsenite, Arsenate, and Methylarsenate	J. Sep. Sci., 2012, 35(18), 2506-2513
	Drugs	J. Sep. Sci., 2011, 34(16-17), 2232-2239
	Halogenated compounds	Toxicology, 2013, 314(1), 22-9
CBA	clenbuterol	Talanta, 2018, 186, 521-526
CBA, Amide	Tetrodotoxin	Chromatographia, 2014, 77, (9-10), 687–693
Amide	PA-labelled glycans	Bicsci. Biotechnol. Biochem., 2012, 76(10), 1982-1983
NH2	PA labeled N-glycans	Glycoconj. J., 2017, 34(4), 537-544
	PA-labelled glycans	Plant Biotechnol. J., 2016, 14(8), 1682-1694
	Oligosaccharides	Sci Rep. 2017, 26(7) :46099. doi
	Pyridylaminated Oligosaccharides	Anal. Sci., 2016, 32(5), 487-490
	nanoparticles	J. Sep. Sci., 2015, 38, 283–290
PBA	Pyridylamino monosaccharide	Bicsci. Biotechnol. Biochem., 2011, 75(7), 1405-1407
	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
	hippocampal monoamines	J. Pharmacol. Sci., 2016, 132(4), 249-254
	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
	Serotonine and Noradrenaline	Br. J. Pharmacol., 2015, 172(5), 1250-1262
	Cis-diol groups	Anal. Chim. Acta., 2015, 857(1), 64-70
	Allergenic ingredients	Food Control, 2018, 84, 89-96
	Adenosine	Biosens. Bioelectron., 2013, 15(41), 379-385
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	Deoxyribonucleoside	Biotechnol., 2016, 228, 52-57.
	Alendronate	Legal. Medicine, 2018, 30, 14-20
	Urinary excretion	Nucleosides Nucleotides Nucleic Acids. 2016, 35(10-12), 559-565.
	metabolite of 18 F-THK5351	Eur. J. Nucl. Med. Mol. Imaging, 2016, 43(12), 2211-2218
SCX	Methylated lysine	Anal. Bioanal. Chem., 2018, 410(17), 4189–4194
	Amino acid	Psychiatry Res., 2016, 238, 203-210
	Amino acid	J. Sep. Sci., 2014, 37(16), 2087-2094
	Angiogenic peptide	BioSci. Trends, 2016, 10(6), 500-506
	iTRAQ-labeled peptides	Biochim. Biophys. Acta, 2018, 1865(6), 874-888
	Amino acid	Sci. Rep., 2018, 8(1), 14587
	Morphine, Codeine, Dihydrocodeine	J. AOAC Int., 2011, 94(3), 765-774.
	Fluoresence derivatization	Biomed. Chromatogr., 2012, 26(2), 147-151
	Amino acid	Orig. Life Evol. Biosph., 2013, 43(2), 99-108
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

Rapid Purification of Antibodies(1)- MonoSpin ProA, MonoSpin ProG

MonoSpin ® ProA and MonoSpin ® ProG are available already immobilized onto a silica monolith offering rapid purification of antibodies. A 96-well plate format is available to purify a multi-analyte. Each reagent for 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,Protein G have modified hydrophilic polymers, which suppress the nonspecific adsorption of proteins and allow the recovery of more pure antibodies.

Specification	
Bonded phase	Protein A or Protein G
Through-pore size	2 µm
Meso-pore size	60 nm
Column size	Φ 4.2 ×1.5 mm
Sample Volume	50-500 µL
Centrifugation speed	2,300 ×g *
Recovery rates	MonoSpin ProA IgG 90%(With 400µg IgG)
	MonoSpin ProG IgG 90%(With 300µg IgG)

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

Silica Monolith is available for different shapes

Spin Column Type

・Purification with compact tabletop centrifuge just in two minutes(e.g. 2,300 x g)
・Suitable for purification of small volume sample(up to 0.4mg)

96 Well plate type

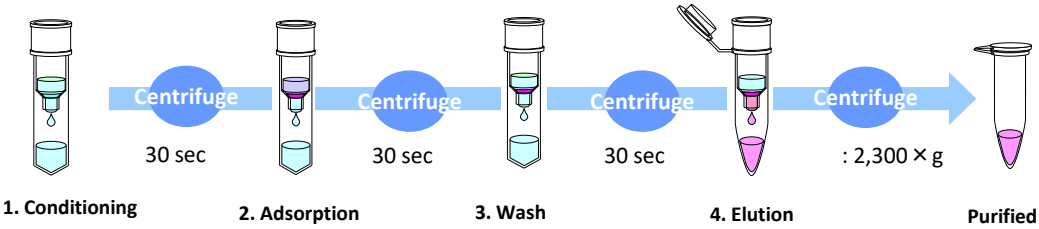
・Purification by both aspiration or centrifuge
・Available for a multi-analyte with same spin column volume..

Large Spin Column

・Max. 16mg antibody can be recovered by centrifuge.

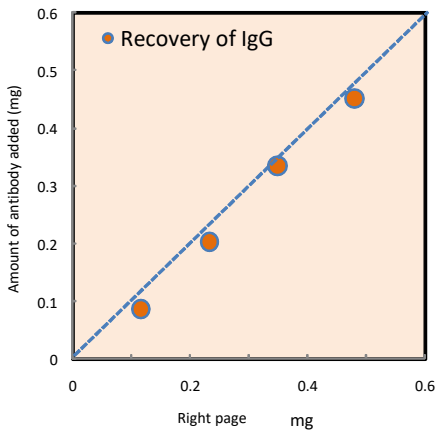
Purification of IgG Using MonoSpin ® ProA and MonoSpin ® ProG in Only 5 min.

Sample can be neutralized and maintained in stable condition by putting neutral solution in tube when recovering anti body.

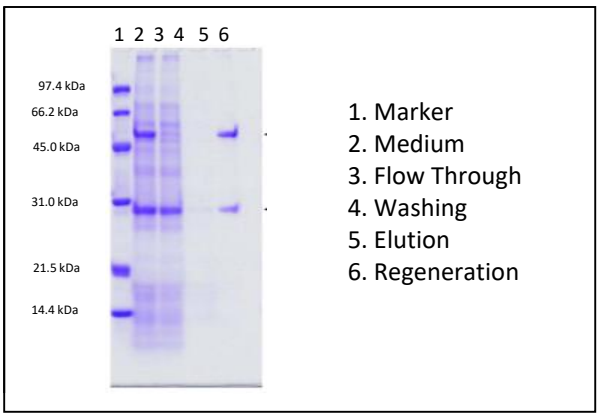


As shown below, the antibody concentrations were determined quantitatively from medium of CHO cells. The purified antibodies show very less impurities by the results from electrophoresis.

Calibration curve of IgG concentration

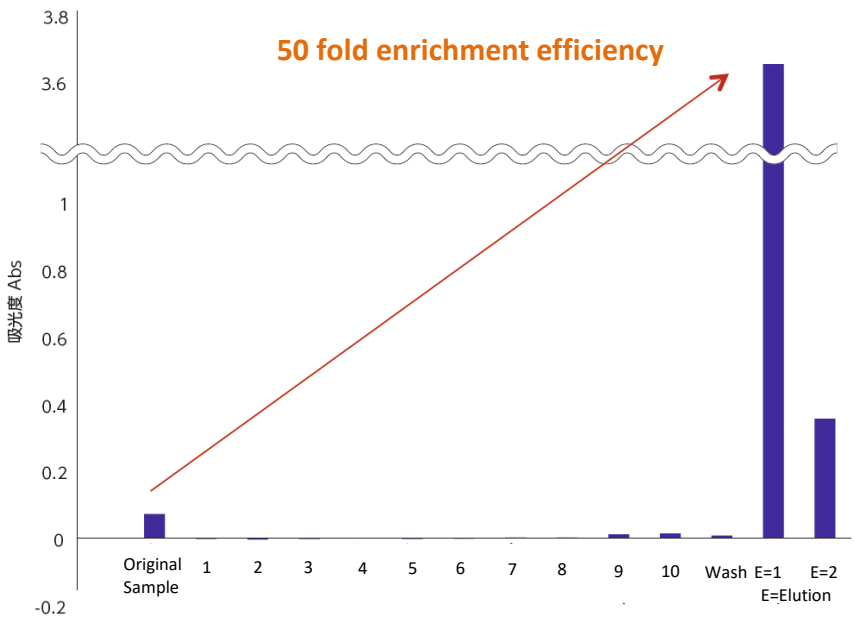


Results of recovery electrophorensis



Enrichment of Antibody Solution Using MonoSpin® ProA

500 µL volume of 0.025 mg / mL of human IgG solution is applied to MonoSpin ® ProG spin column for 10times (In = I1 – I10). And then the elution of IgG concentration is measured with 100 µL elution buffer twice (En = E1 and E2). The first IgG elution (E1) is 50 fold concentration of standard solution and indicates 90 % recovery of IgG without the loss of IgG.



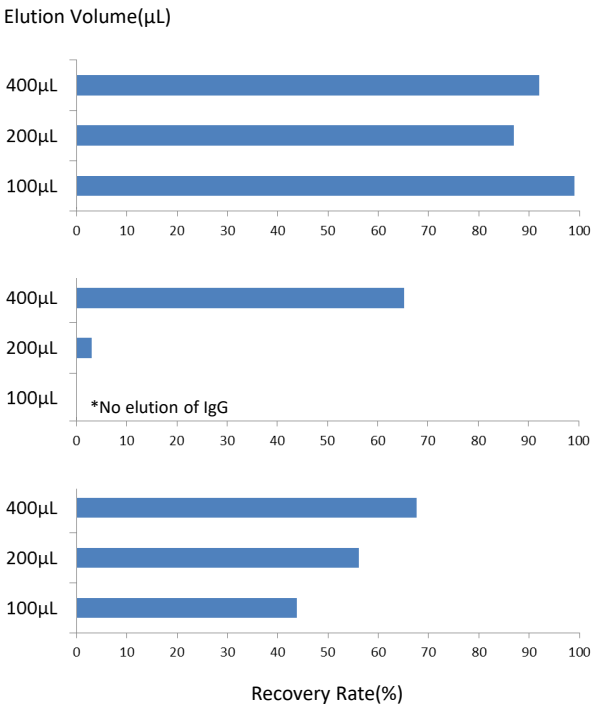
Elution Volume and Recovery Rate Comparing with Other Brands Products.

MonoSpin ® ProA requires only 100 µL elution buffer to obtain a recovery rate of at least 90% IgG. On the other hand, other brands products requires 400 µL or more elution buffer with a recovery rate of 70% IgG.

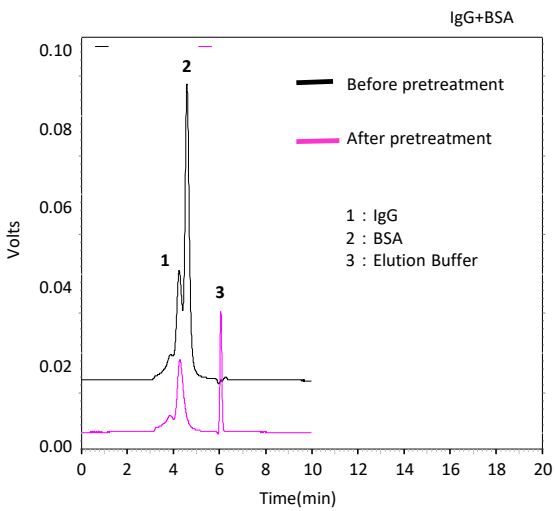
MonoSpin ProA
90 % recovery rate of IgG with 100 µL elution.

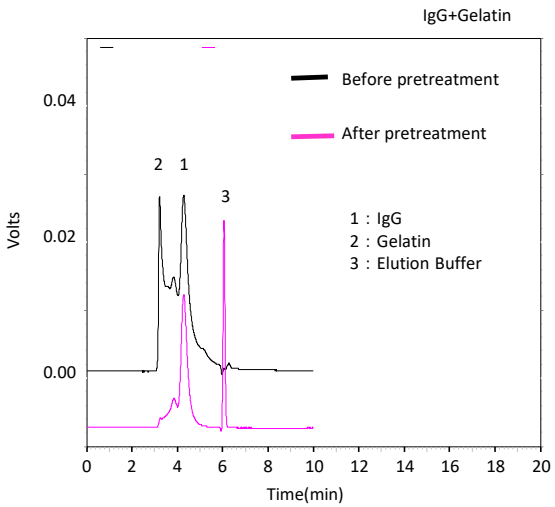
Brand T's Product
60-65 % recovery rate of IgG with 400 µL elution

Brand G's Product
65-70 % recovery rate of IgG with 400 µL elution.



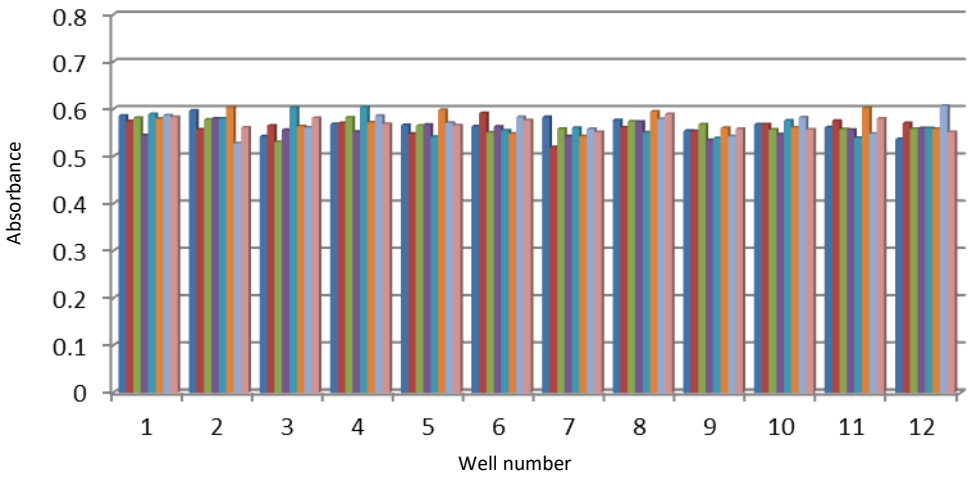
Removal of Preservatives in anti-body solutions





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

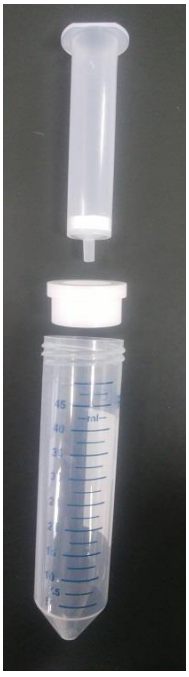
Recovery Rate and Reproducibility of IgG from medium cultured CHO cells with MonoSpin® ProA 96 Well Plate



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

16 mg of antibody samples can be purified under vacuum or centrifugation complying with the following procedure.



Procedure

1. Apply 5 mL of equilibration buffer.

⇩

2. Apply sample(Max. 8 mL) after filtration through 0.2. µL filtration.

⇩

3. Apply 5mL of washing buffer.

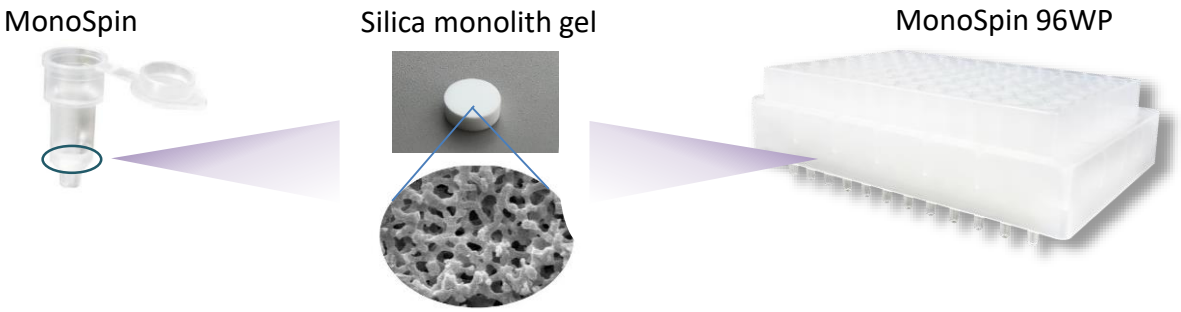
⇩

4. Apply 5mL 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 chosen for purification of multi-analytes. Immobilized silica monolith gel provides similar performance as MonoSpin series.



Features

- Silica monolith gel are used for MonoSpin 96WP
- Performs perfectly for both Vaccum and centrifugation
- Rapid pretreatment of biological sample

Application

- Purification and fractionation of peptides
- Recovery and purification of proteins
- Purification of sugar chains
- Purification of organic acid
- Recovery of drugs from biological samples (urine, serum, plasma)
- Purification of catecholamines

Description	Quantity	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 96 well plate

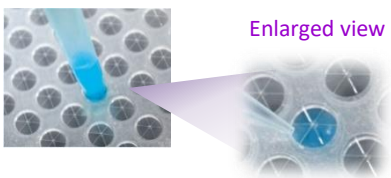
96 Deep Well Plate

・It is made of polypropylene and has excellent heat and cold tolerance as well as solvent tolerance.
・Superhydrophilic surface treatment can suppress nonspecific adsorption of proteins and peptides
・Low adsorption(LB type) can prevent from adsorption of peptides and proteins.

Description	Material	Cat. No.	Qty	Cat.No.
MS Plate	polypropylene	SMST-0201	50	6045-00201
MS Plate Low adsorption <LB type>	polypropylene (hydrophobic polymer)	SMST-0801-LB	15	6045-00203

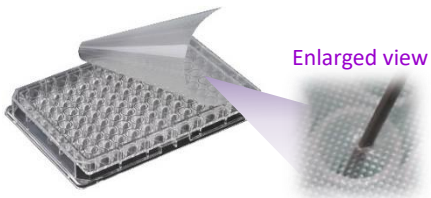
GL Sticker for 96 well plate

Evapo Less Slit



・Sticker closes automatically after each apply.
・Adhesive-free on top of the sticker to prevent from contamination.
・Can be operated under -80℃～100℃

Sealing Sticker



・ High durability against organic solvent
・High air leakage efficiency
・It can be used for storage of samples as it can bear up to -80℃.

Description	Material	Cat. No.	Qty	Cat.No.
MS Plate	polypropylene	SMST-0201	50	6045-00201
MS Plate Low adsorption <LB type>	polypropylene (hydrophobic polymer)	SMST-0801-LB	15	6045-00203

Ordering 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 (1.7mL)

Liquid waste tube

MonoSpin type S Trial kit

Trial kits and custom kits are shipped with various types of 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 L type Product name

MonoSpin L type

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

*Various reagents required for purification is already attached

*GL-SPE miniature suction manifolds are recommended for vacuum aspiration of 96-well plates

*Centrifugal adaptor is attached to L type

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