Supporting Information for

"Enantiorecognition Ability of Peptoids with α-chiral, Aromatic Side Chains"

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1. General Experimental Methods

Supplies and Equipment.

Chloroacetyl chloride, sodium carbonate, potassium carbonate, acetone, n-propanol, n-butanol, and toluene were purchased from Shanghai Lingfeng Chemicals Co., Ltd. (China). Anhydrous ethanol, methanol and dichloromethane were purchased from Shanghai Heqi Chemicals Co., Ltd. (China). (S)-(-)-α-phenylethylamine was purchased from Shanghai Hanhong Chemicals Co., Ltd. (China). Triethoxy(3-isocyanatopropyl) silane was purchased from Aladin Chemistry Co., Inc. (China). HPLC-grade spherical silica gel (5 μm particle size; 10 nm pore size; 300 m^2/g surface area) was purchased from Fuji Silysia Chemical Ltd. (Japan). HPLC grade n-Hexane, ethanol, methanol, 2-propanol, dichloromethane, ethyl acetate, tert-butyl methyl ether were purchased from Tedia (USA). Trifluoroacetic acid (TFA) was purchased from Acros (USA). All the solvents and chemicals were used as received.

All chromatographic separations were performed on an Agilent 1200 HPLC system, comprised of a G1310A iso pump, G1316B thermostatic column compartment and a G1314B variable wavelength detector (VWD). Peptoid CSP columns were used (5 μm, 150 mm×4.6 mm, laboratory-made). ^{1}H NMR experiments were carried out on a Bruker AVANCE 400 (Germany) at a temperature of 25 °C. All ^{1}H chemicals shifts were reported relative to tetramethylsilane. In researching interactions between chiral selectors and the (*S*)- or (*R*)-binaphthol enantiomers, ^{1}H NMR samples were prepared by dissolving binaphthol and $(Nspe)_n$ (n = 3-7) at a 1 : 1 molar ratio in deuteriochloroform ($CDCl_3$), respectively. Elemental analysis was measured on an Elementar Vario EL III (Germany). UPLC-ESI-LC/MS analysis was performed on a Waters ACQUITY UPLC^{TM} system with a Quattro Micro MS operating in ESI$^+$ mode (Waters, Inc.,USA). Separation was carried out on an ACQUITY UPLC BEH C8 column (1.7 μm, 50 mm × 2.1 mm) (Waters, Inc., Ireland).

Column packing. CSP-1 ~ CSP-5 (2.5 g each) were slurried in methanol (20 mL) and packed into a 150 mm × 4.6 mm HPLC column with methanol (100 mL) as propulsion solvent under a pressure of 50 MPa, respectively.

2. Synthesis and Characterization of Compounds

Preparation of 2-chloro-*N*-(S)-1-phenylethyl)acetamide

Chloroacetyl chloride (9.04 g, 80 mmol) was dissolved in 20 mL acetone and added dropwise to a mixture of (*S*)-1-phenylethylamine (9.68 g, 80 mmol) and sodium carbonate (4.24 g, 40 mmol) in 100 mL water-acetone (v/v = 1/1) at 0 ^{o}C. The mixture was stirred at 0 ^{o}C for 1 h, and the solvent was removed under reduced pressure. The residue was acidified with 6 M HCl and extracted with ethyl acetate. The solvent was evaporated *in vacuo*, and the product obtained was a white solid (14.0 g, 89% yield).

^{1}H NMR ($CDCl_3$): δ1.54 (d, 3H), 4.06-4.09 (m, 2H), 5.14 (m, 1H), 6.81 (s, 1H), 7.31-7.36 (m, 5H).

Preparation of 2-((*S*)-1-phenylethylamino)-*N*-(S)-1-phenylethyl)acetamide ($(Nspe)_2$)

Potassium carbonate (4.86 g, 35.2 mmol) was added to a solution of 2-chloro-*N*-(*S*)-1-phenylethyl)acetamide (13.9 g, 70.4 mmol) and (*S*)-1-phenylethylamine (8.5 g, 70.4 mmol) in absolute ethanol (100 mL). The solution was heated to reflux for 8 h. The solvent was removed *in vacuo*, and 100 mL water was added. The mixture was extracted with ethyl acetate. The solvent was removed, the residue was purified by silica gel chromatography, and $(Nspe)_2$ was obtained as colorless oil (15.9 g, 80% yield).

^{1}HNMR ($CDCl_3$): δ1.36 (d, 3H), 1.43 (d, 3H), 1.52 (m, 1H), 3.18 (m, 2H), 3.72 (q, 1H), 5.10 (m, 1H), 7.27-7.35 (m, 10H), 7.42 (d, 1H).

Preparation of $(Nspe)_3$ to $(Nspe)_7$. $(Nspe)_3$ to $(Nspe)_7$ were synthesized by repeating the above acylation step and nucleophilic displacement step.

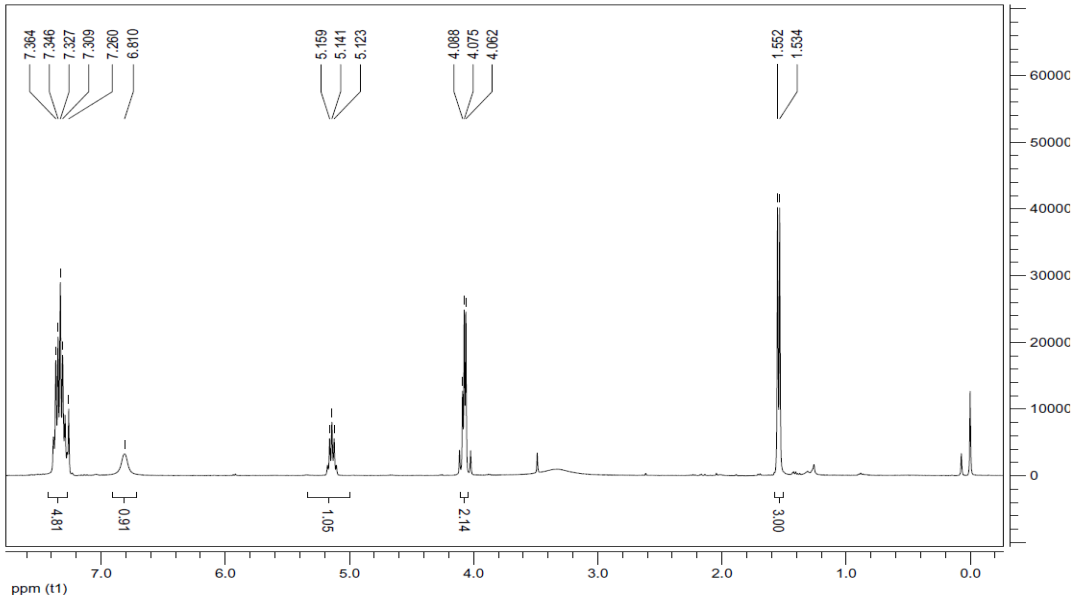
Preparation of $(Nspe)_n$-$CONH(CH_2)_3Si(OEt)_3$ (n = 3, 4, 5, 6, and 7). Triethoxy-(3-isocyanatopropyl)silane (4.4 g, 18.0 mmol) was added to the solution of $(Nspe)_3$ (4.0 g, 9.0 mmol) in 50 mL anhydrous dichloromethane. After stirring at room temperature overnight, the solvent was removed under reduced pressure, and the residue was purified by silica gel chromatography (dichloromethane /methanol, 50/1), yielding $(Nspe)_3$-$CONH(CH_2)_3Si(OEt)_3$ as a white solid (5.3 g, 85%).

$(Nspe)_n$-$CONH(CH_2)_3Si(OEt)_3$ (n = 4, 5, 6, and 7) were synthesized by reacting the corresponding $(Nspe)_n$ (n = 4, 5, 6, and 7) with triethoxy- (3-isocyanatopropyl)silane following the same procedure.

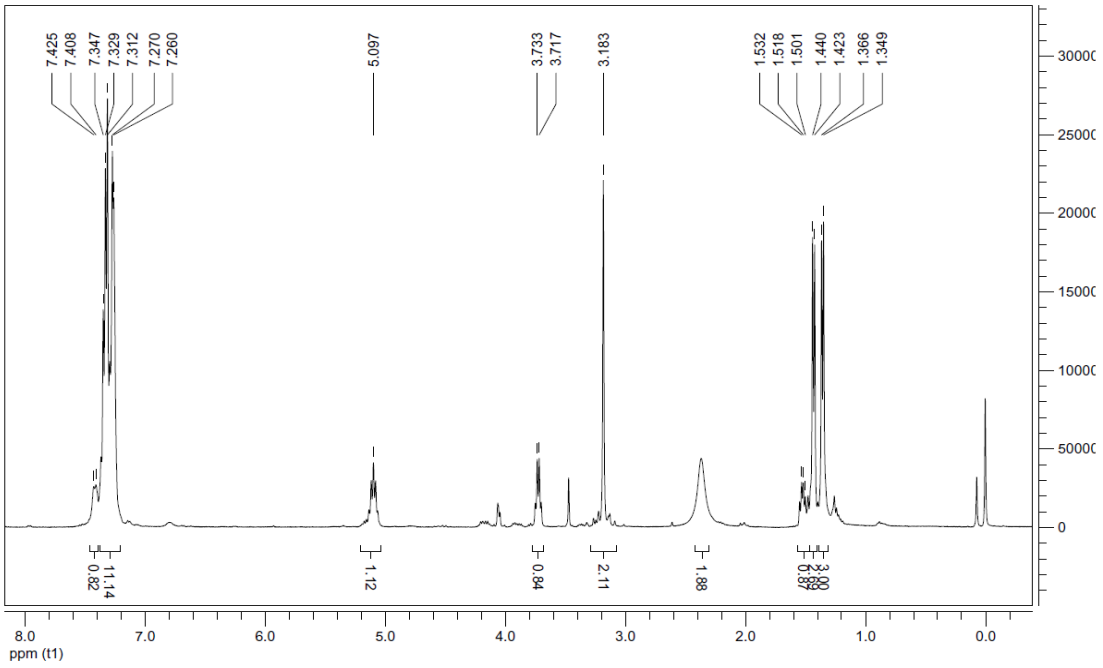
Preparation of CSP-1~ CSP-5. Nucleosil 100-5 (4.0 g) and $(Nspe)_3$-$CONH(CH_2)_3Si(OEt)_3$ (2.76 g, 4.0 mmol) were heated to reflux in dry toluene (40 mL) for 48 h. The silica gel was collected by filtration, washed with toluene (50 mL), methanol (50 ml) and acetone (50 ml) in turn, and then dried at 50 °C under vacuum. CSP-1 (4.6 g) was obtained.

CSP-2~CSP-5 were prepared by the same procedure.

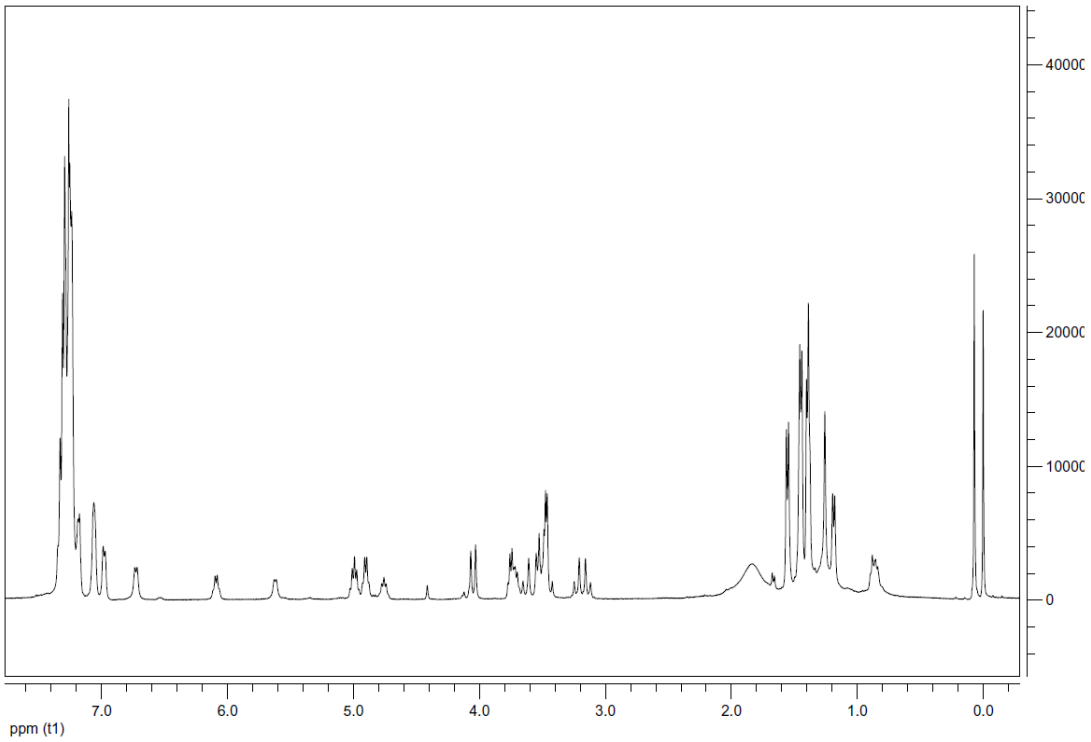
1H NMR:



2-chloro-*N*-(S)-1-phenylethyl)acetamide



2-((*S*)-1-phenylethylamino)-*N*-(S)-1-phenylethyl)acetamide ($(Nspe)_2$)



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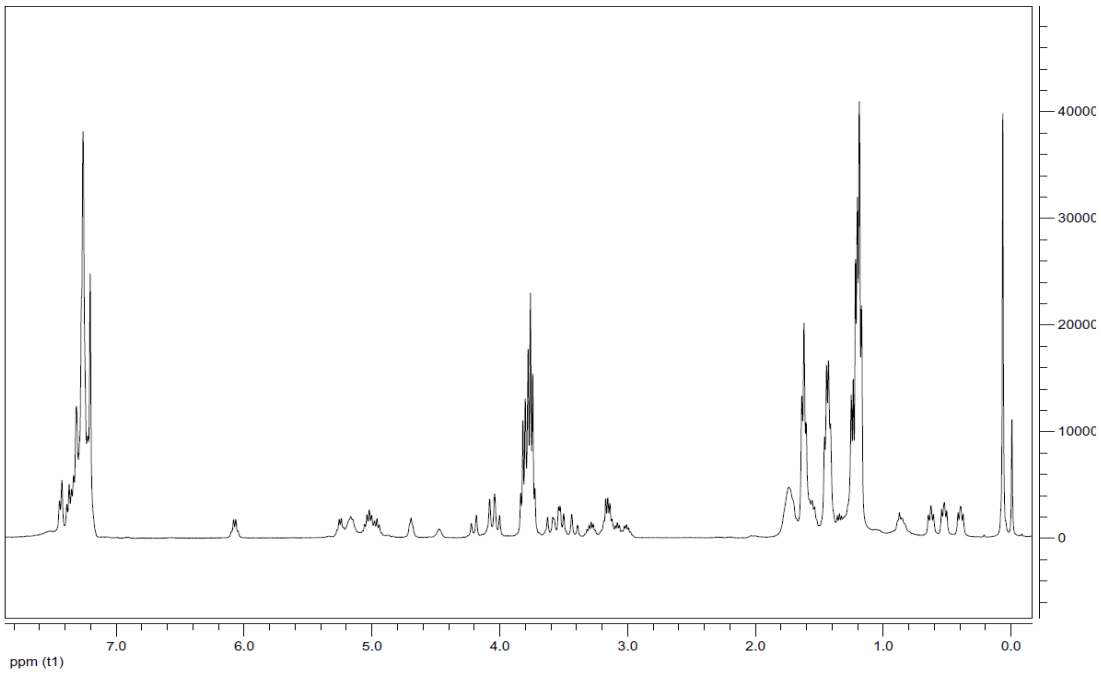
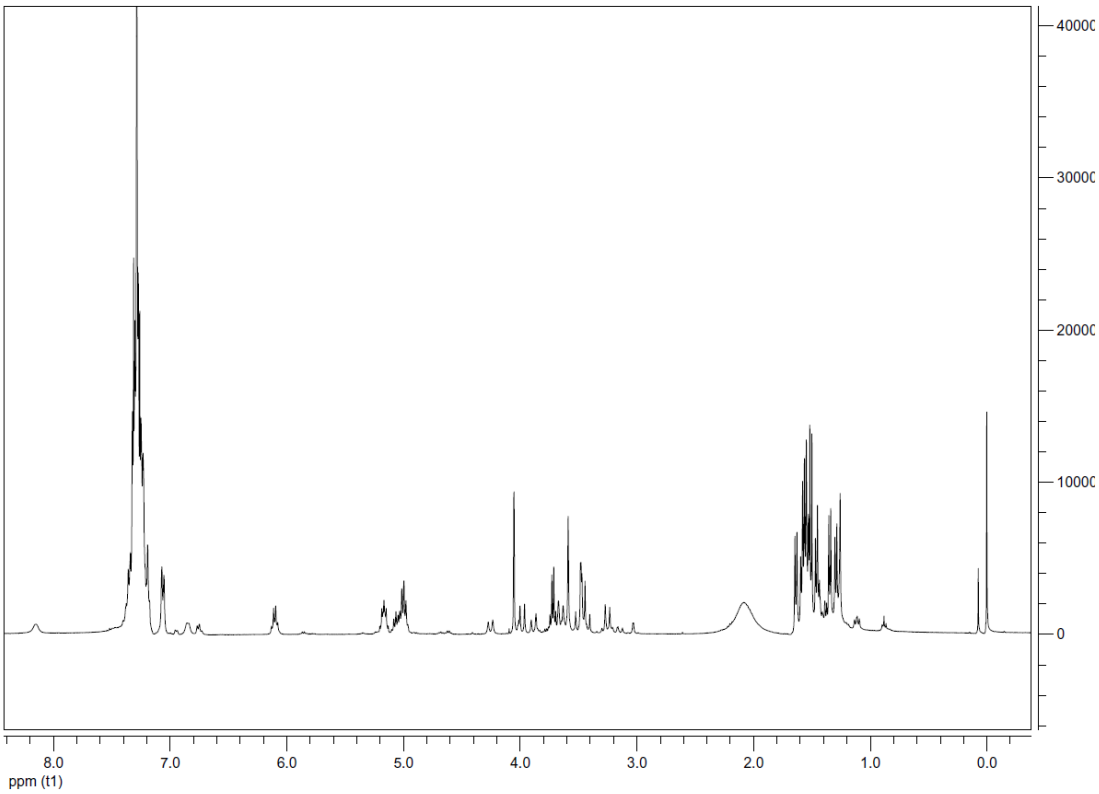


$(Nspe)_3$-$CONH(CH_2)_3Si(OEt)_3$



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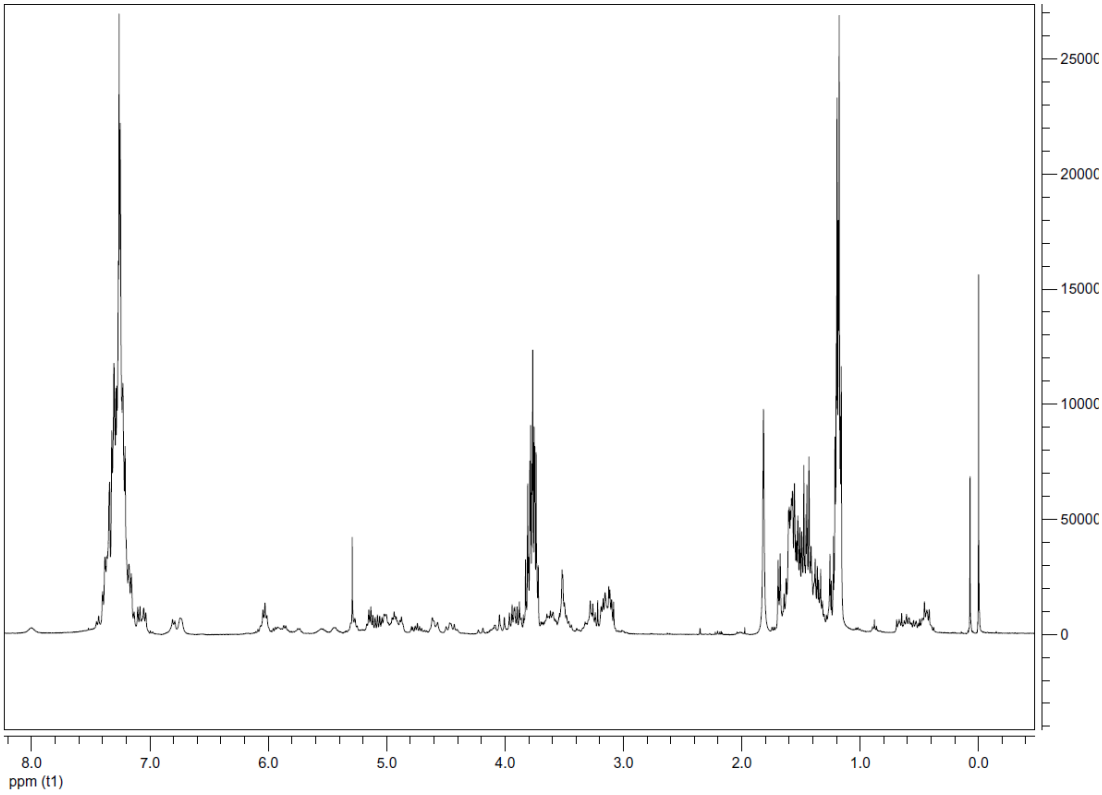

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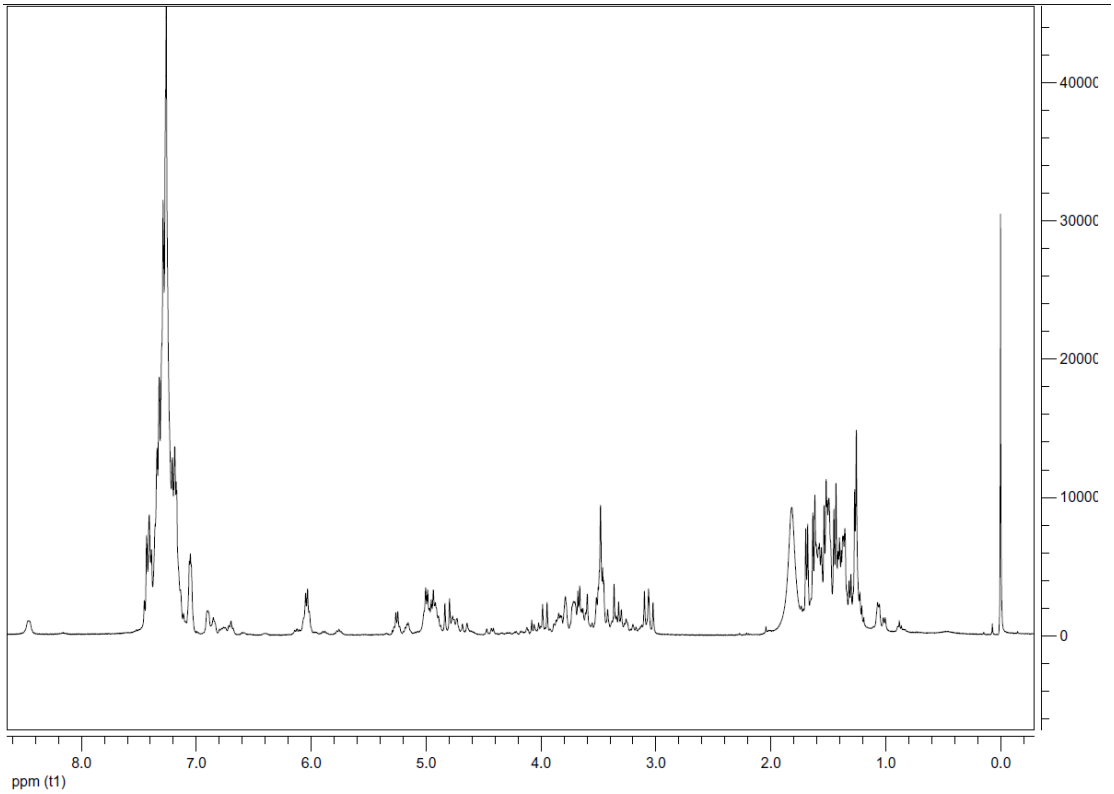

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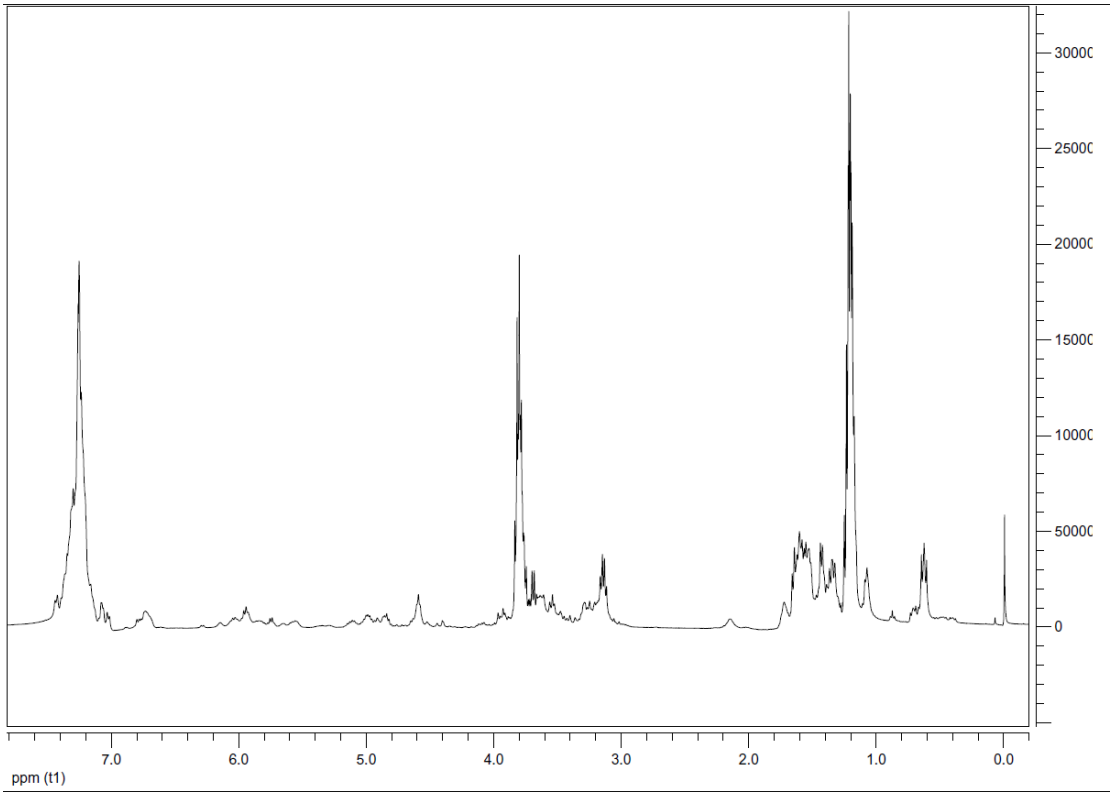
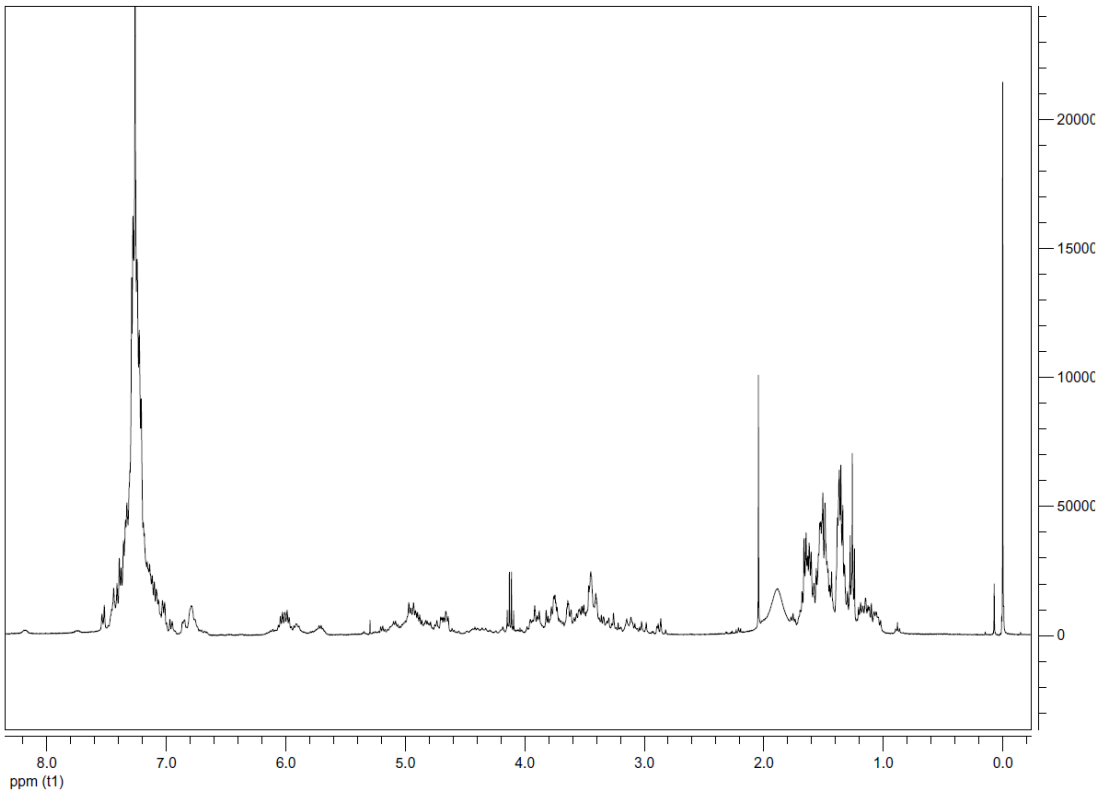
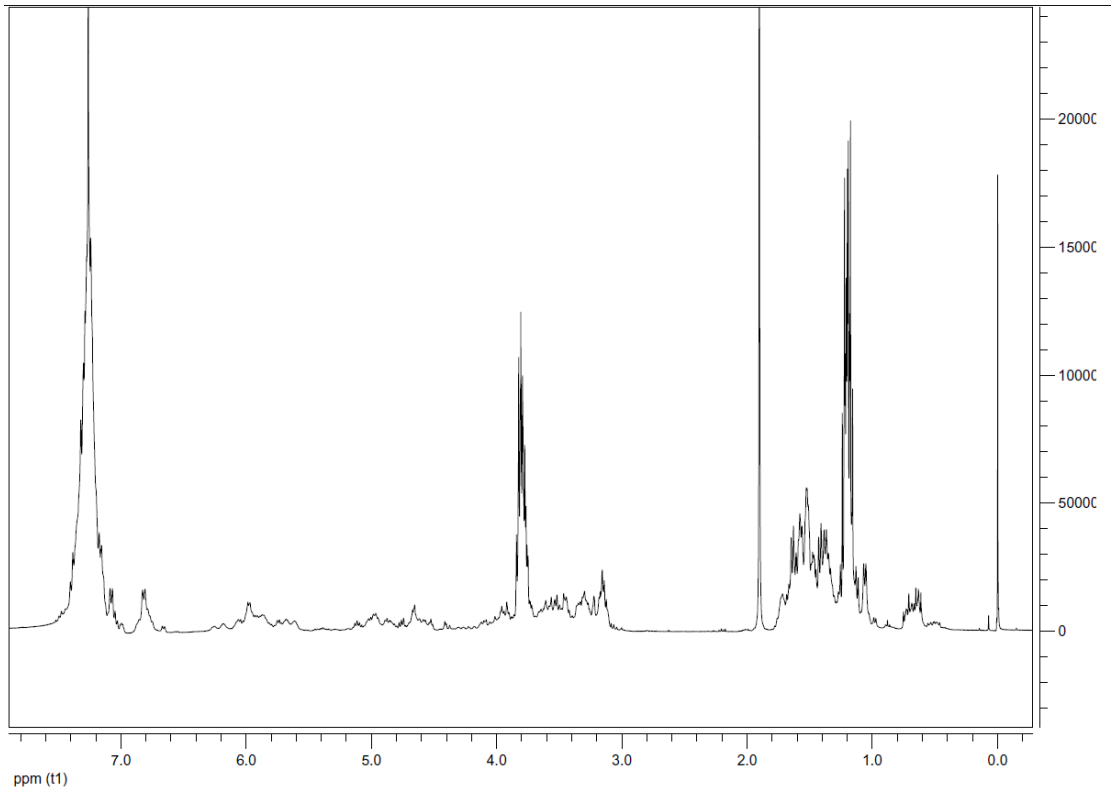


$(Nspe)_5$-$CONH(CH_2)_3Si(OEt)_3$



$(Nspe)_6$



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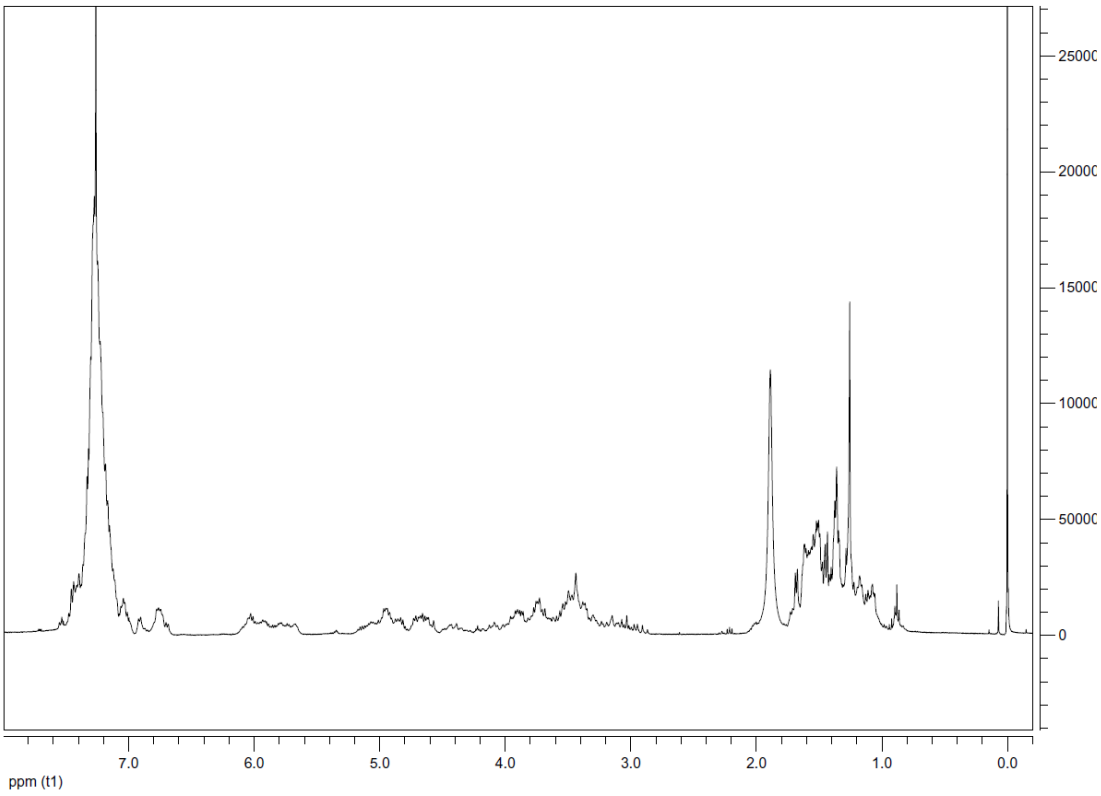
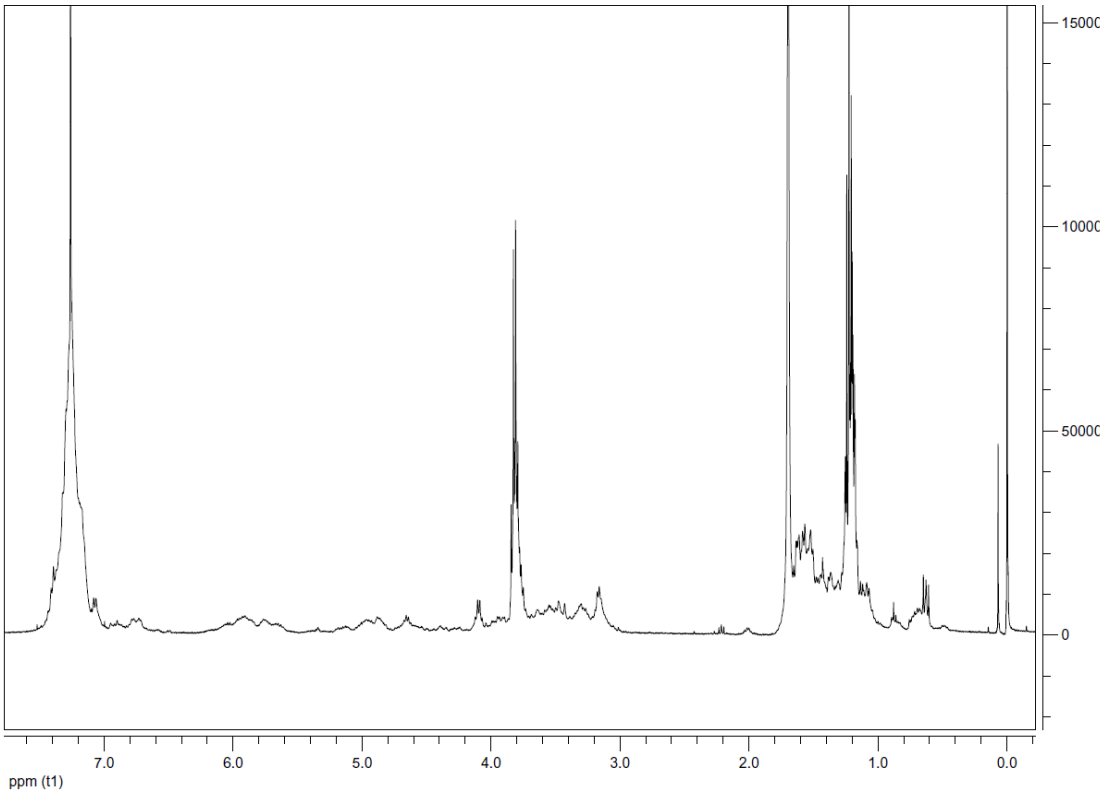


$(Nspe)_7$

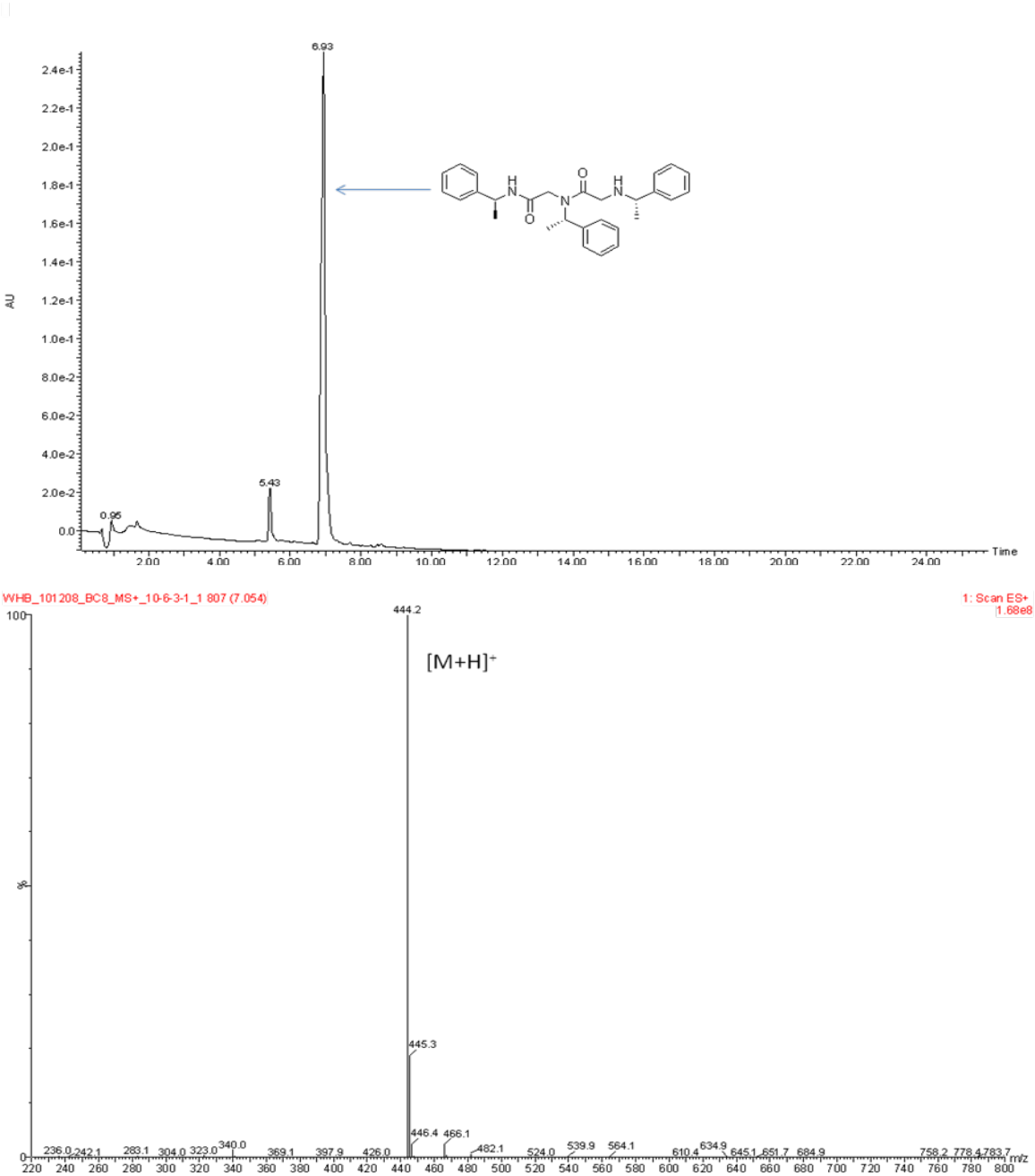


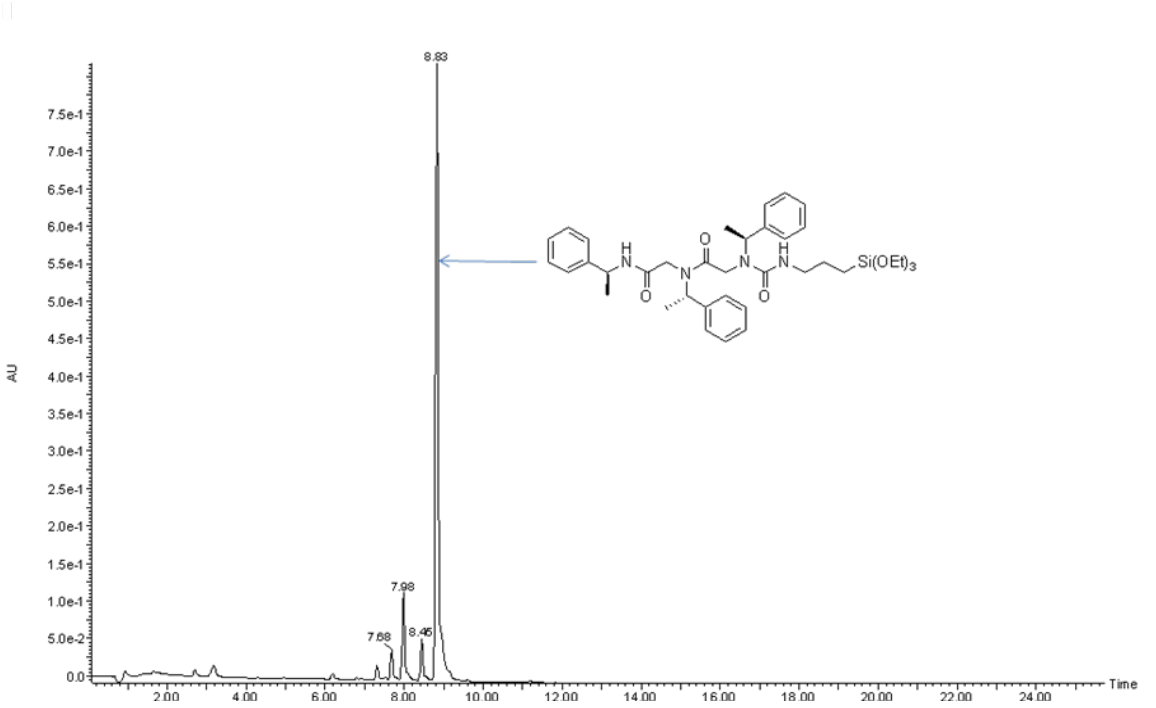
$(Nspe)_7$-$CONH(CH_2)_3Si(OEt)_3$

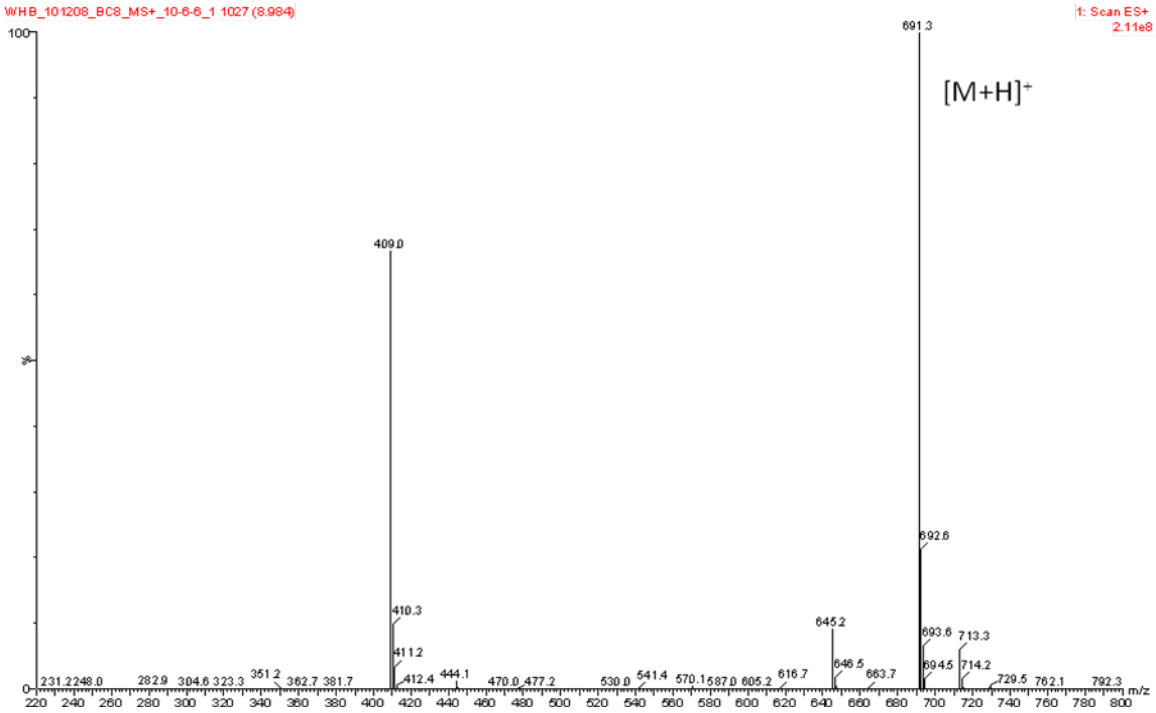
Table S1 $(Nspe)_n$ and $(Nspe)_n$-$CONH(CH_2)_3Si(OEt)_3$, mass confirmation and purity.

n	$(Nspe)_n$		$(Nspe)_n$-$CONH(CH_2)_3Si(OEt)_3$	
	molar mass Found(calcd)	Purity %	molar mass Found(calcd)	Purity %
3	443.2 (443.3)	94	690.3 (690.4)	87
4	604.2 (604.3)	92	851.4 (851.5)	85
5	765.3 (765.4)	93	1012.4 (1012.5)	92
6	926.3 (926.5)	91	1173.6 (1173.6)	90
7	1087.5 (1087.6)	98	1334.7 (1334.7)	85

LC-MS analysis results




8.83
7.98
7.68
8.45
AU
Time
Si(OEt)3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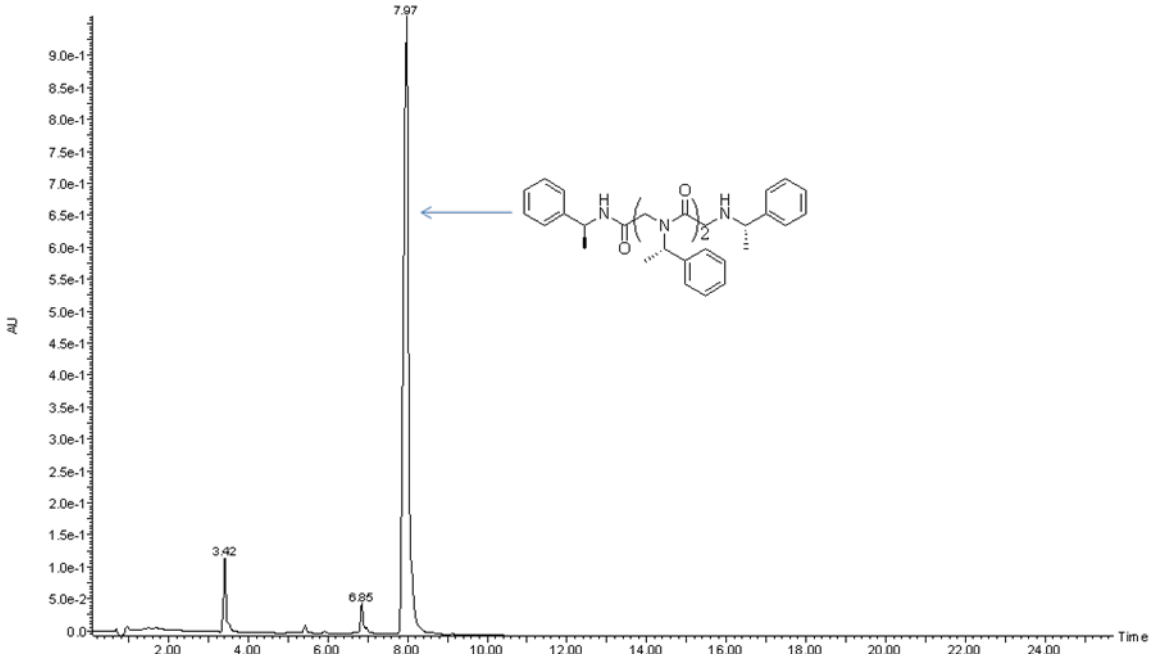
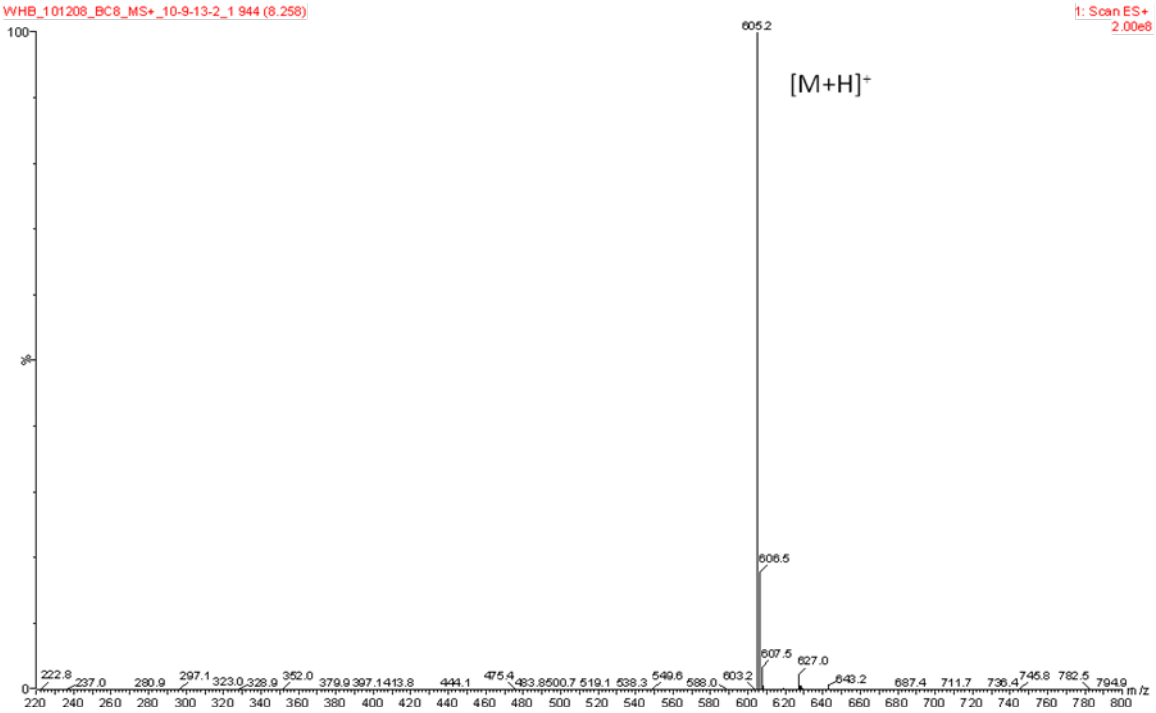
2.11e8
[M+H]+
691.3
409.0
692.6
410.3
645.2
693.6
713.3
411.2
646.5
694.5
714.2
663.7
%
m/z


7.97
3.42
6.85
AU
Time


WHB_101208_BC8_MS+_10-9-13-2_1 944 (8.258)
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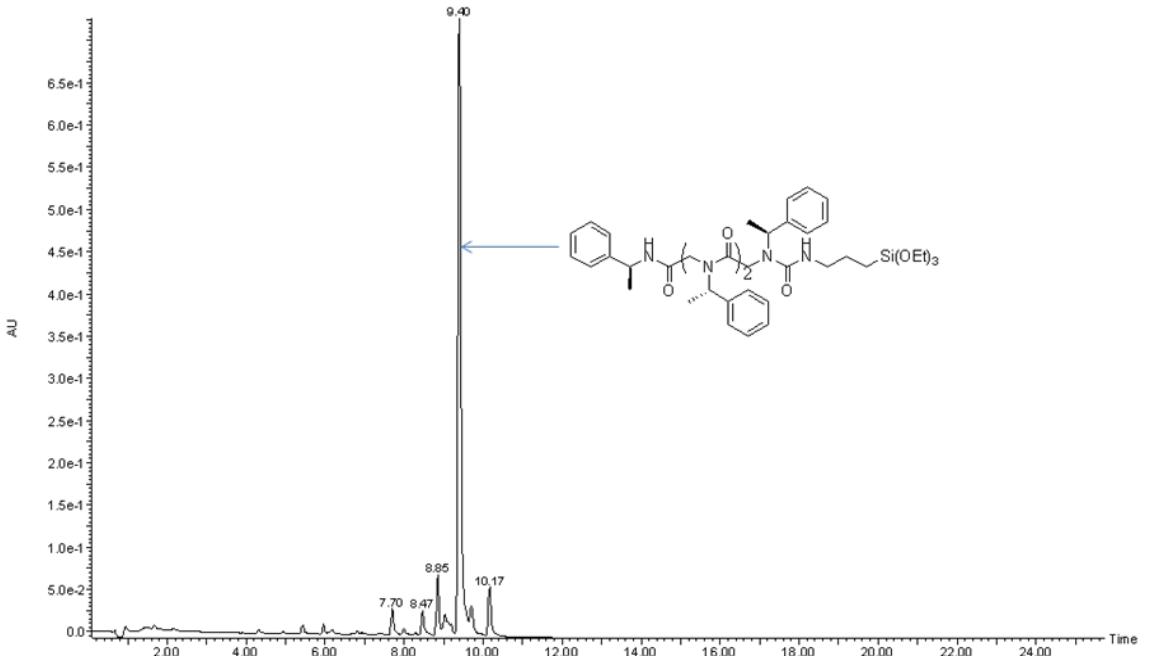
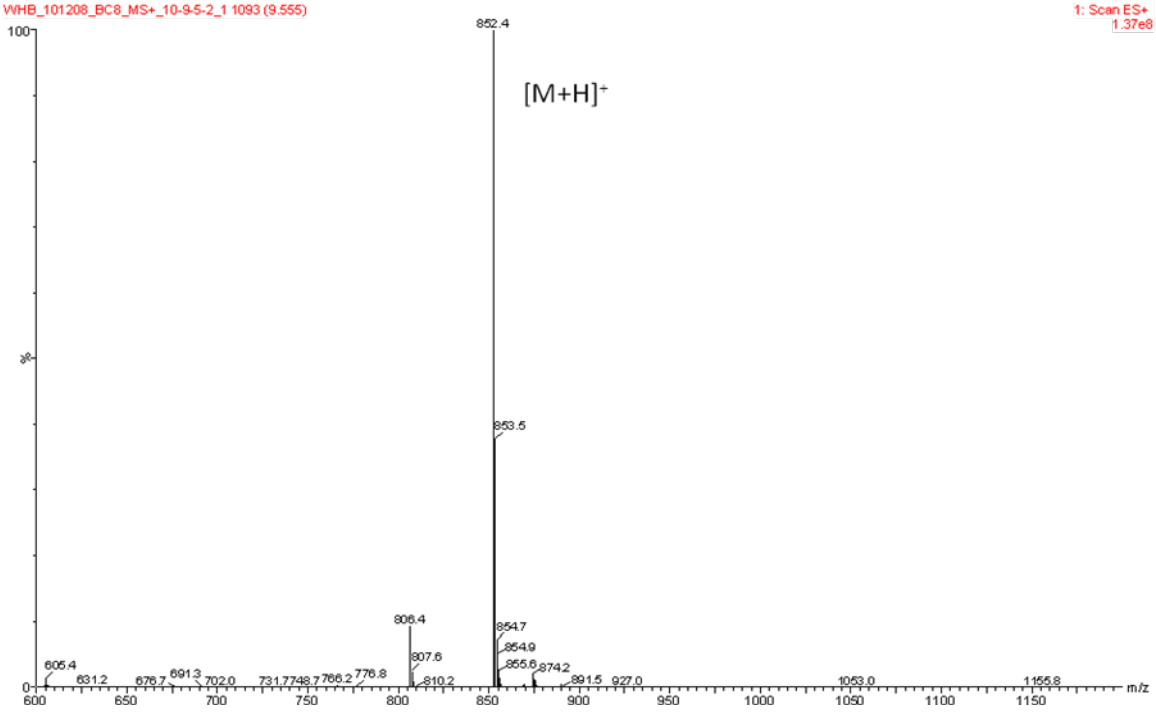
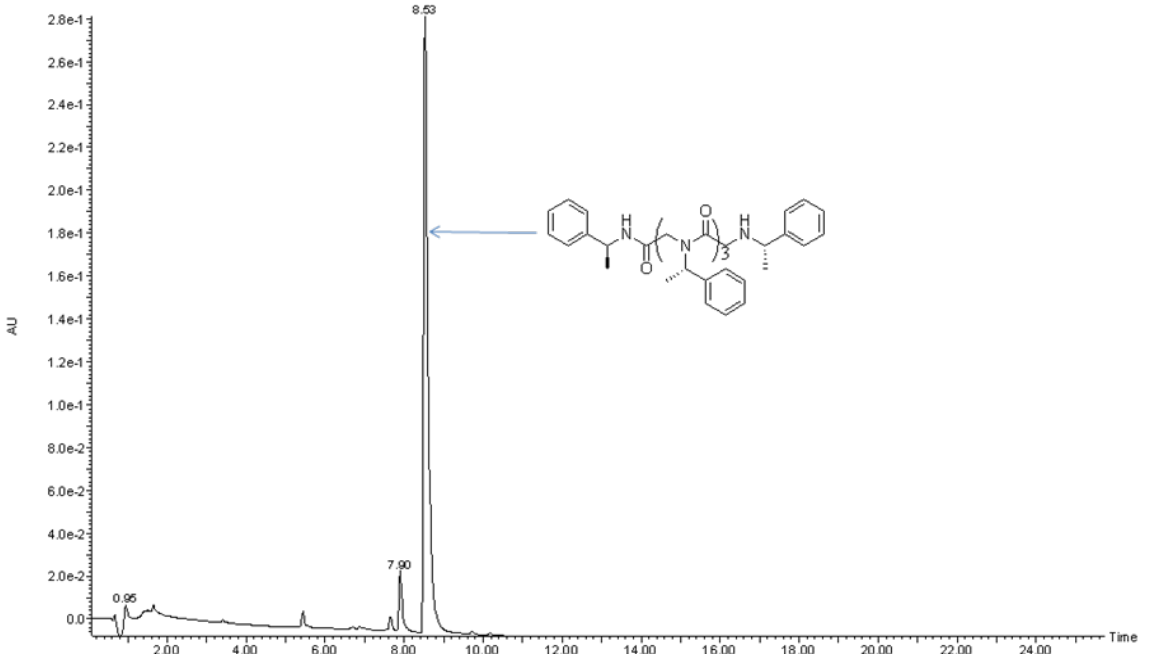
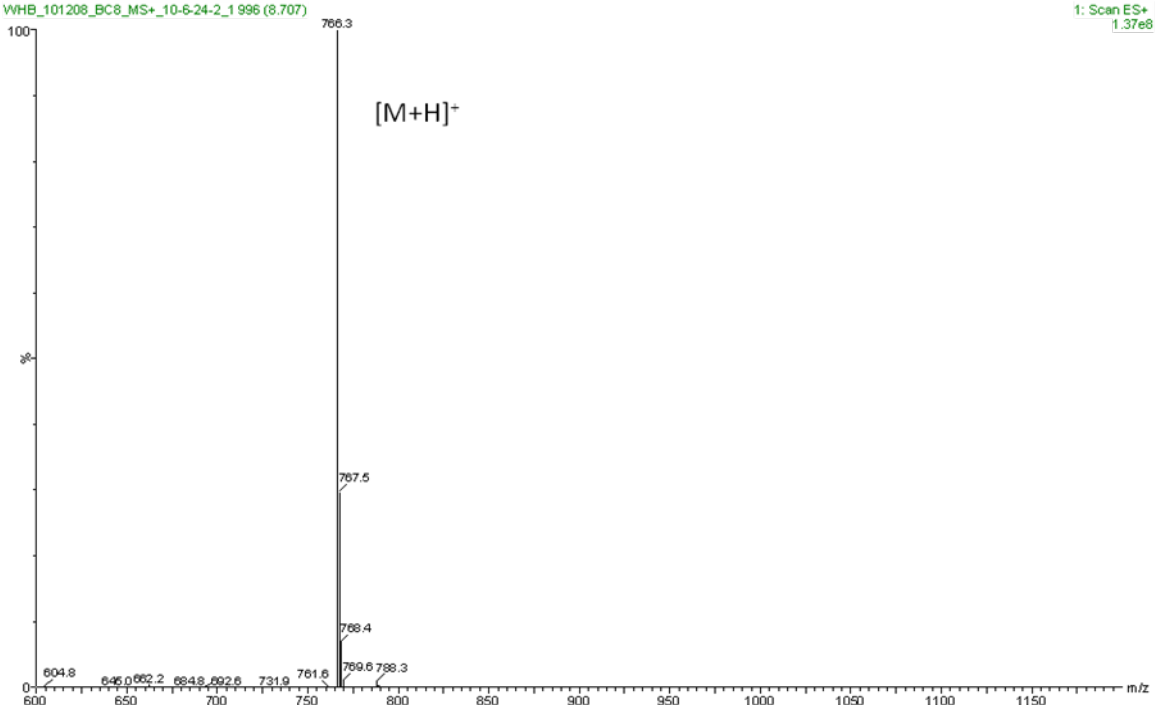
[M+H]+
606.5
607.5
627.0
%
m/z






8.53
7.90
0.95
AU
Time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[M+H]+
767.5
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761.6
731.9
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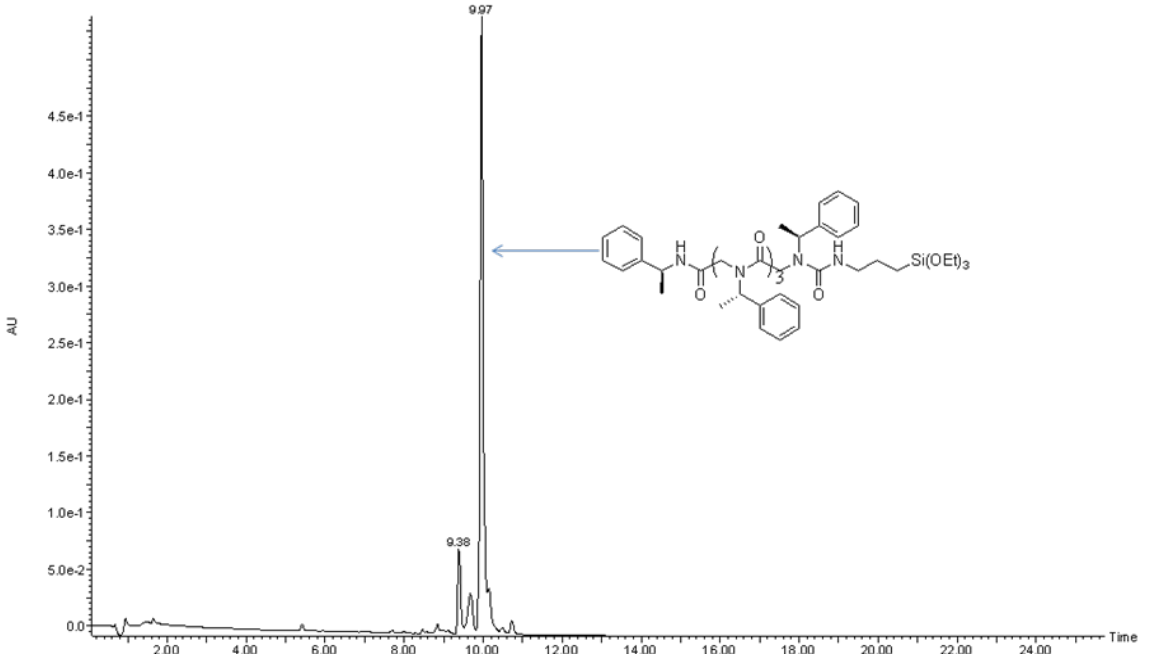
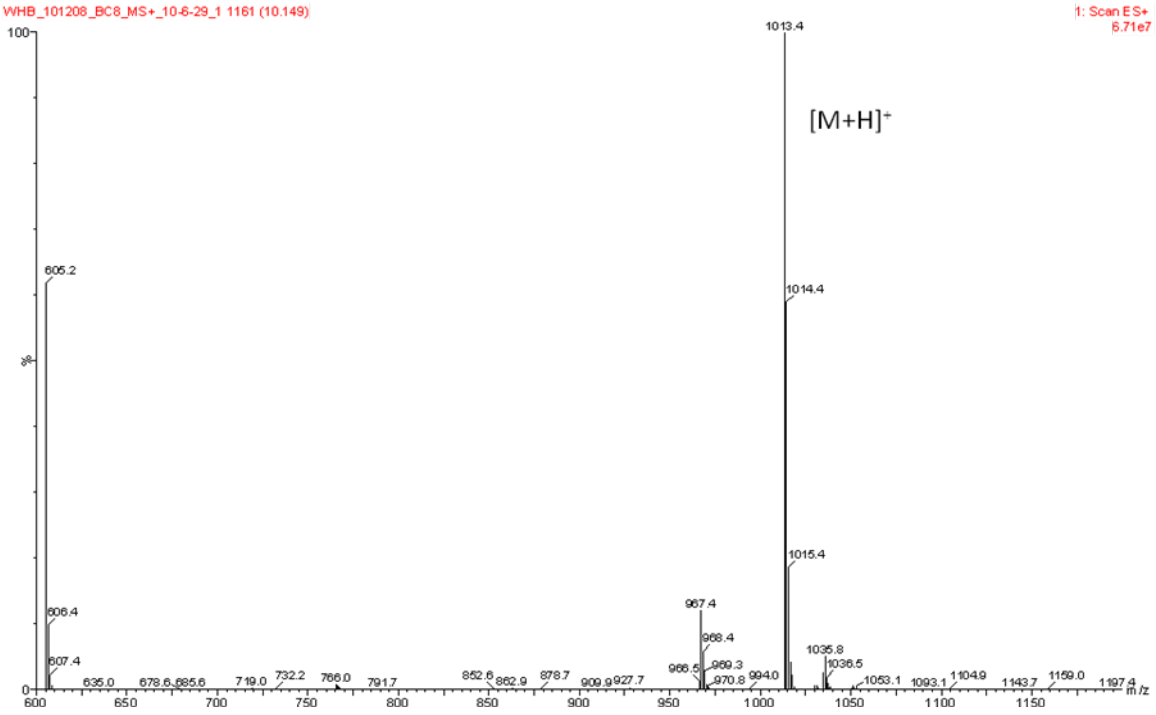
684.8
662.2
646.0
604.8
%
m/z


9.97
9.38
AU
Time
Si(OEt)3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606.4
607.4
967.4
968.4
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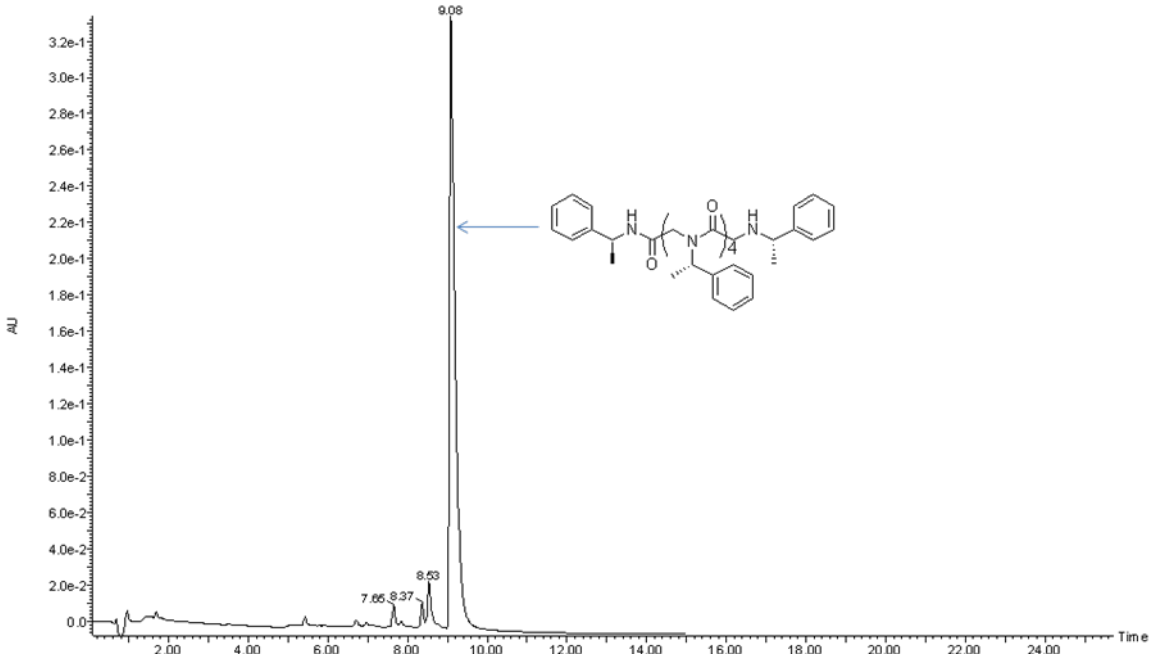
1036.5
%
m/z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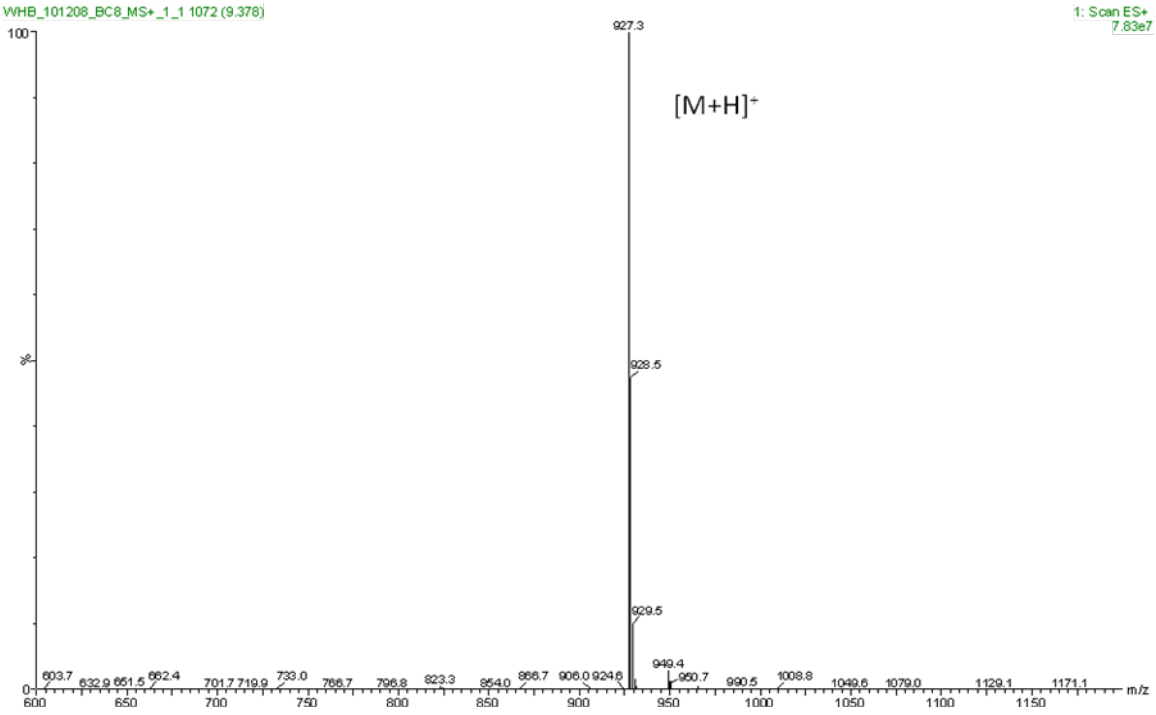
8.53
8.37
7.65
AU
Time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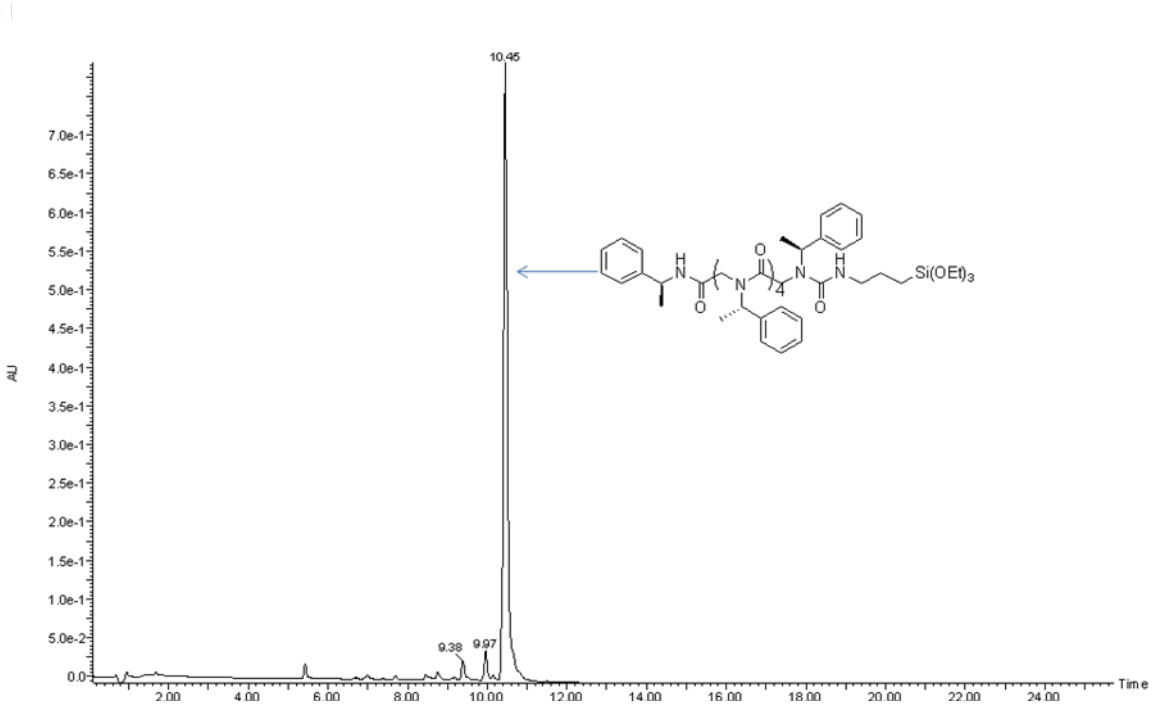
949.4
%
m/z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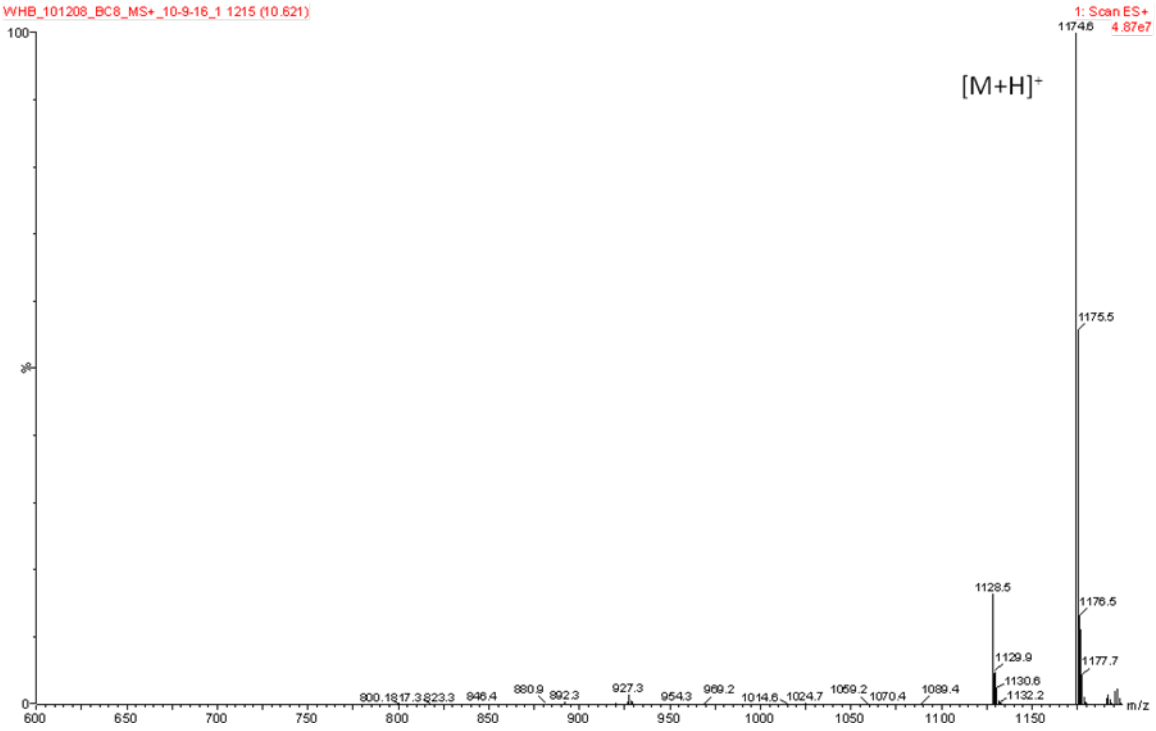
9.97
AU
Time
Si(OEt)3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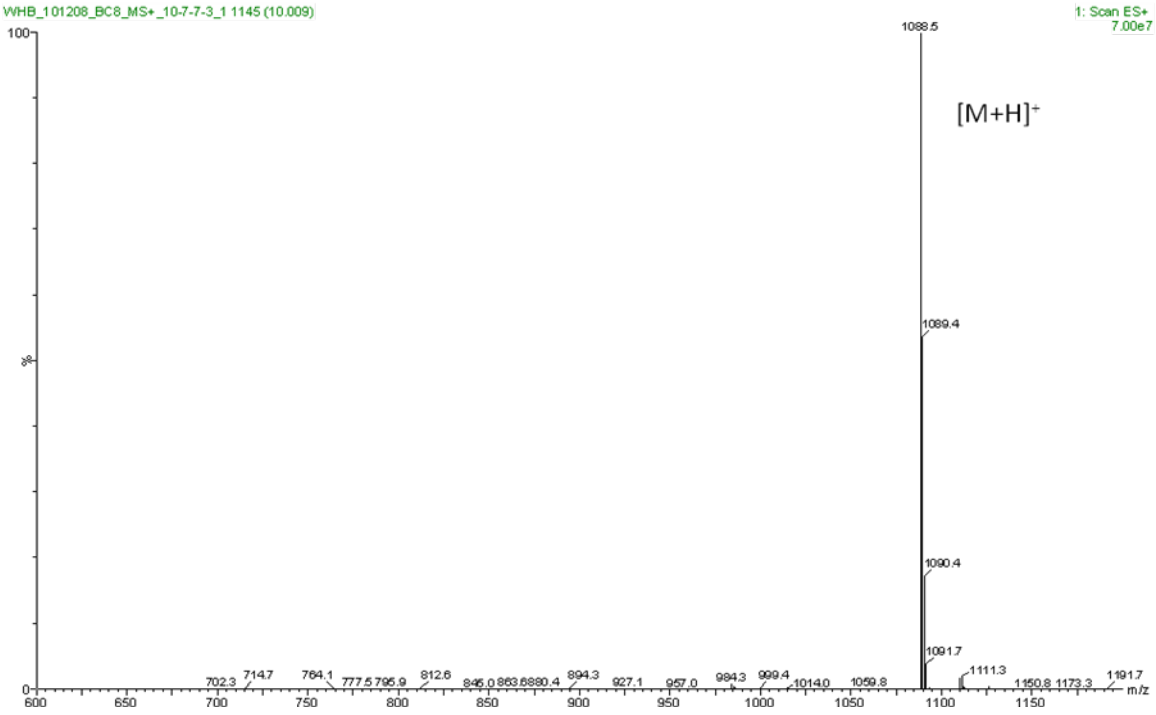
[M+H]+
1175.5
1128.5
1176.5
1129.9
1177.7
1130.6
1132.2
%
m/z


9.82
9.33
AU
Time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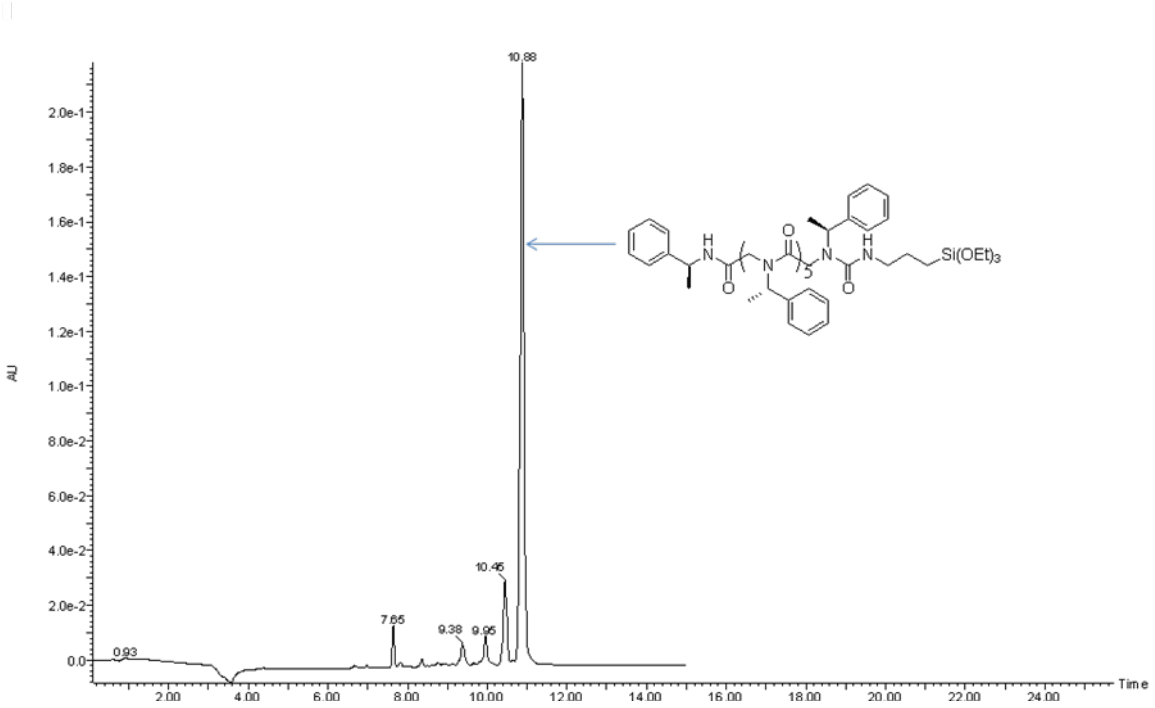
1091.7
m/z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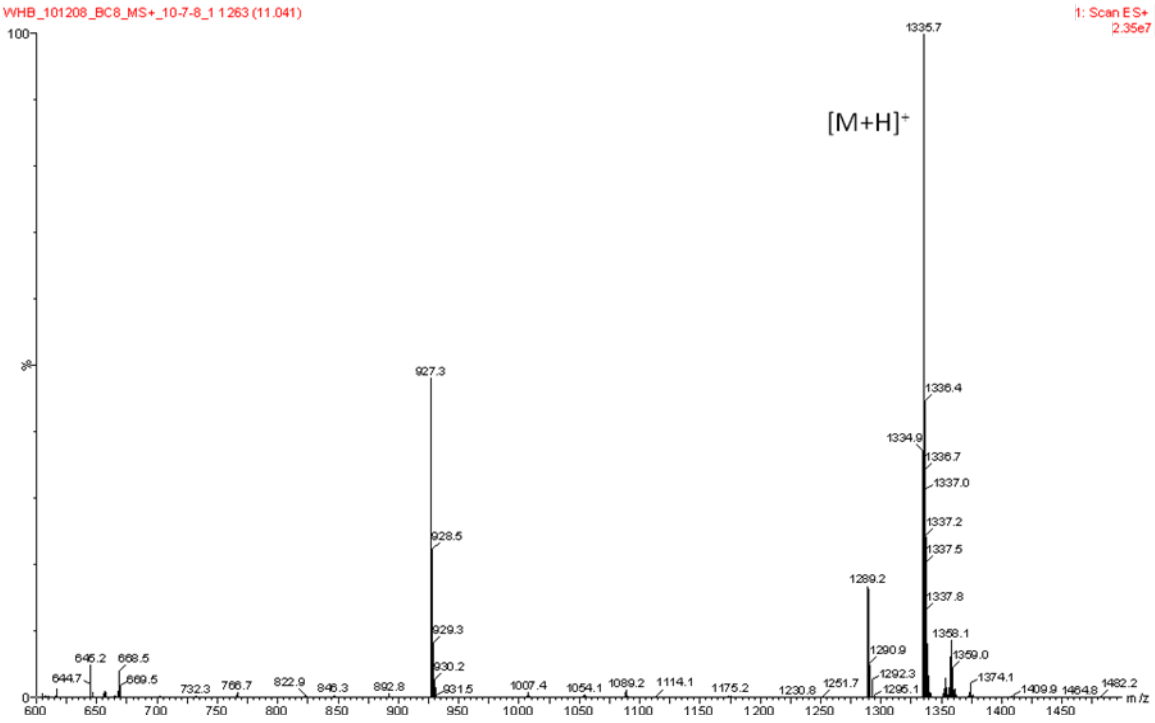
9.38
9.95
0.93
AU
Time
Si(OEt)3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927.3
928.5
1336.4
1334.9
1336.7
1337.0
1337.2
1337.5
1289.2
1337.8
1358.1
1359.0
1290.9
1292.3
1374.1
929.3
930.2
645.2
668.5
644.7
669.5
%
m/z

Table S2 Elemental analysis data and chiral selector loadings for CSPs。

	CSP-1	CSP-2	CSP-3	CSP-4	CSP-5
C%	9.82	11.32	13.35	13.33	11.32
H%	2.16	1.96	2.52	2.0	2.21
N%	1.59	1.64	1.82	1.77	1.41
Selector Loading, mmol/g	0.28	0.23	0.21	0.18	0.13

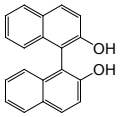
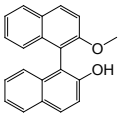
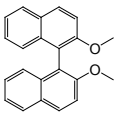
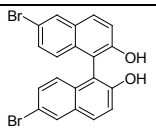
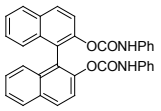
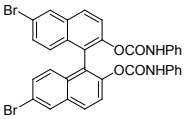
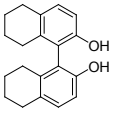
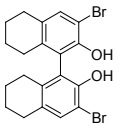
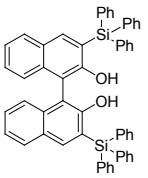
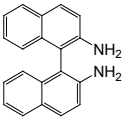
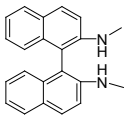
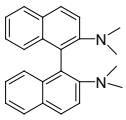
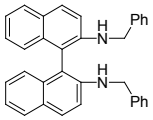
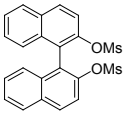
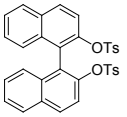
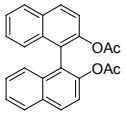
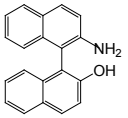
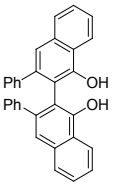
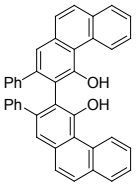
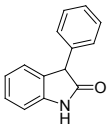
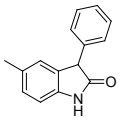
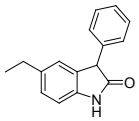
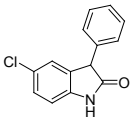
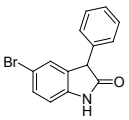
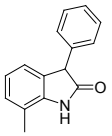
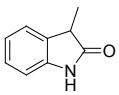
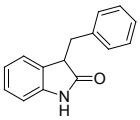
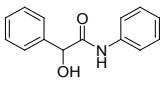
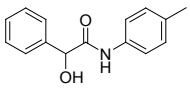
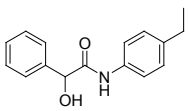
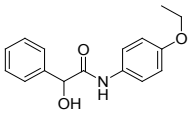
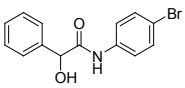
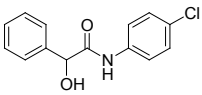
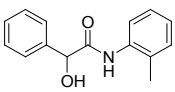
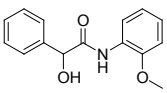
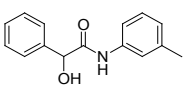
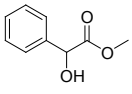
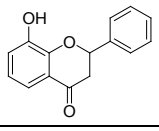
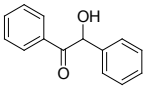
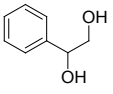
3. Enantioseparation of chiral compounds.

The racemic analytes used for chiral separation evaluation were dissolved in HPLC grade ethanol at a concentration of about 1 mg/mL. The structures of the analytes are shown in Table 1.

For chromatographic evaluations, the column temperature was held constant at 20 °C, and the flow rate was 0.8 mL/min unless otherwise specified. The injection volume was 1 μL. The UV detection wavelengths were set at 220 nm.

The retention factor (k) is equal to $(t_r - t_0)/t_0$, in which t_r is the retention time and t_0 is the dead time. Specifically, k values of the enantiomers eluting first and second were defined as k_A and k_B, respectively. The separation factor (α) equals k_B/k_A. Resolution factor (R_s) is equal to $1.18\times[(t_{rB} - t_{rA})/(W_{1/2A} + W_{1/2B})]$, where t_{rA} and t_{rB} are the retention times of the enantiomers eluting first and second, respectively, and $W_{1/2}$ is the peak width at half height.

Table S3 Structures of analytes studied.

1		2		3		4	
5		6		7		8	
9		10		11		12	
13		14		15		16	
17		18		19		20	
21		22		23		24	
25		26		27		28	
29		30		31		32	
33		34		35		36	
37		38		39		40	
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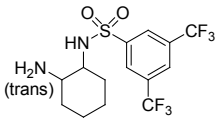
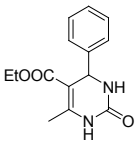
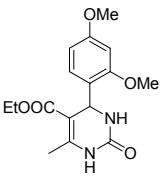
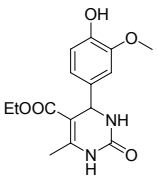
49		**50**		**51**		**52**	

Table S3 Enantioseparation of analytes on CSP-3 and CSP-4.

Analytes	Mobile phase composition	CSP **3**			CSP **4**		
		k_A	α	R_s	k_A	α	R_s
1	A	3.51	1.96	5.34	3.59	2.03	5.28
1	B				2.70	1.78	7.12
1	C				3.13	1.94	6.13
1	D				2.93	2.02	6.92
1	E				2.64	1.74	4.14
1	F				1.91	1.91	5.12
1	G				1.27	2.69	7.43
1	H				2.02	1.99	2.90
1	I				3.98	1.24	2.14
2	A	1.99	1.28	2.31	2.18	1.35	2.99
3	A	0.91	1.00	-	1.04	1.00	-
4	A	4.28	2.02	5.32	4.81	2.12	5.64
5	A	3.55	1.97	5.47	3.83	2.07	5.79
6	A	4.27	2.01	5.57	4.83	2.13	6.07
7	A	1.13	1.43	2.29	1.15	1.49	2.80
8	A	1.05	1.00	-	1.08	1.08	0.69
9	A	0.75	1.00	-	0.93	1.00	-
10	A	3.34	1.00	-	4.16	1.00	-
11	A	0.77	1.00	-	0.93	1.00	-
12	A	0.39	1.00	-	0.60	1.00	-
13	A	0.87	1.00	-	1.13	1.00	-
14	A	5.22	1.00	-	6.62	1.00	-
15	A	4.41	1.00	-	5.79	1.00	-
16	A	0.94	1.00	-	1.09	1.00	-
17	A	3.38	1.70	4.36	3.72	2.15	4.99
18	A	1.68	1.15	1.08	2.10	1.16	1.10
19	A	1.74	1.31	1.76	1.99	1.21	1.30
20	J	6.78	1.07	0.84	5.54	1.05	0.58
21	J	5.19	1.08	0.92	4.70	1.06	0.76
22	J	5.12	1.08	0.96	4.52	1.07	0.84
23	J	7.54	1.09	0.95	6.84	1.00	-
24	J	7.94	1.09	0.90	7.34	1.00	-
25	J	4.25	1.08	0.87	3.72	1.06	0.59
26	K	1.57	1.00	-	1.98	1.00	-
27	J	3.44	1.00	-	4.85	1.05	0.67

28	K	5.97	1.04	0.57	5.14	1.08	1.07
29	K	5.05	1.04	0.54	4.32	1.08	1.08
30	K	4.47	1.04	0.52	3.82	1.08	1.08
31	K	7.24	1.04	0.53	6.29	1.09	1.06
32	K	6.41	1.04	0.52	6.14	1.07	1.00
33	K	6.11	1.04	0.53	5.79	1.07	1.01
34	K	4.61	1.06	0.73	3.96	1.09	1.15
35	K	6.50	1.04	0.53	6.03	1.09	1.06
36	K	5.00	1.05	0.59	4.43	1.08	1.03
37	K	2.94	1.00	-	2.81	1.00	-
38	K	4.35	1.00	-	5.27	1.00	-
39	K	1.95	1.00	-	2.69	1.00	-
40	K	5.21	1.00	-	4.57	1.00	-
41	K	0.99	1.00	-	1.24	1.00	-
42	K	2.55	1.07	0.91	2.48	1.08	1.23
43	K	13.25	1.00	-	19.13	1.00	-
44	K	10.37	1.06	0.80	10.02	1.04	0.67
45	K	3.62	1.05	0.72	3.62	1.04	0.67
46	A	5.42	1.00	-	6.46	1.00	-
47	L	1.24	2.17	2.64	2.71	2.39	2.52
48	L	2.17	1.29	1.30	4.84	1.31	1.31
49	L	0.77	1.00	-	1.61	1.00	-
50	A	1.12	1.00	-	1.15	1.00	-
51	A	1.72	1.00	-	1.95	1.00	-
52	A	3.96	1.00	-	4.06	1.00	-

Chromatographic conditions: column temperature, 20 °C; Mobile phase composition (v/v), (A) n-hexane/2-propanol = 70/30; (B) n-hexane/ethanol = 70/30; (C) n-hexane/1-propanol = 70/30; (D) n-hexane/1-butanol = 70/30; (E) n-hexane/ethyl acetate = 50/50; (F) dichloromethane; (G) chloroform; (H) methyl tertiary butyl ether; (I) methanol/water = 70/30; (J) n-hexane/2-propanol = 20/1; (K) n-hexane/2-propanol = 90/10; (L) n-hexane/ethanol/trifluoroacetic acid = 50/50/0.1; UV detection: 220 nm; flow rate: 0.8 mL/min.