Supporting Information

Catalytic Asymmetric C-7 Friedel-Crafts Reaction of 4-Aminoindoles: Construction of N-Substituted Quaternary Carbon Atoms

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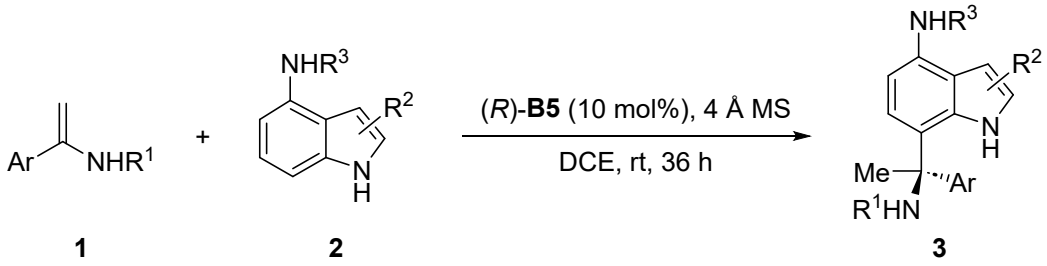
1. General Considerations

All reactions were carried out in flame-dried or oven-dried screw-cap test tubes and were allowed to proceed under a dry argon atmosphere with magnetic stirring. Anhydrous dichloroethane was purchased from Energy Chemical and used without further purification. Substituted BINOL phosphoric acids were prepared from commercially available chiral BINOL. And substituted H_8-BINOL derived phosphoric acids were also prepared according to the known literature procedures.[1] Molecular Sieves (4 Å) were flame-dried under high vacuum before use. α-Aryl enamides[2] and substituted indoles[3] were known compounds and were prepared according to the literature procedures.

Thin layer chromatography was performed from Yantai TLC plates (silica gel 60 F254). Flash column chromatography was performed with Yantai silica gel (200-300 mesh). Enantiomeric excess (ee) was determined using Agilent HPLC 1260. Column conditions are reported in the experimental section below. Optical rotations were performed on a Rudolph Research Analytical Autopol IV polarimeter (λ 589) using a 700-μL cell with a path length of 1-dm. ^{1}H NMR and ^{13}C NMR were recorded on Bruker AVANCE IIITM HD NanoBAY (400 MHz) and Bruker AVANCE III (600 MHz) instruments with chemical shifts reported relative to tetramethylsilane (TMS). The HRMS data were measured on an Agilent 1100 LC/MS ESI/TOF mass spectrometer with electrospray ionization. Compounds described in the literature were characterized by comparing their data to the reported values.

2. General procedure for the synthesis of products

General procedure for the synthesis of C-7 substituted indoles 3



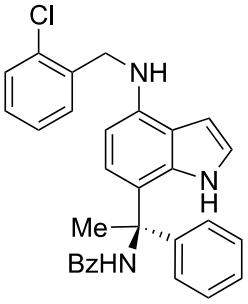
1 **2** **3**

4 Å MS (20 mg) was activated in a screw capped reaction tube (10 ml) under flame dry in situ. After cooling to room temperature, substrate **1** (1.2 equiv, 0.06 mmol), **2** (1.0 equiv, 0.05 mmol) and catalyst (*R*)-**B5** (3.5 mg, 0.005 mmol) were added. The atmosphere was exchanged with argon three times, and then anhydrous dichloroethane (1.0 mL) was added *via* syringe. The reaction mixture was stirred at room temperature for indicated time and monitored by TLC. After reaction completion, the residue was purified by silica gel chromatography (Hexane/EtOAc = 4:1 to 2:1) to give the chiral products **3**.

All the racemic products were prepared by using racemic H_8-BINOL derived phosphoric acid (10 mol%) as a catalyst and their chiral HPLC retention time data were compared just prior to authentic samples with enantiomeric excess.

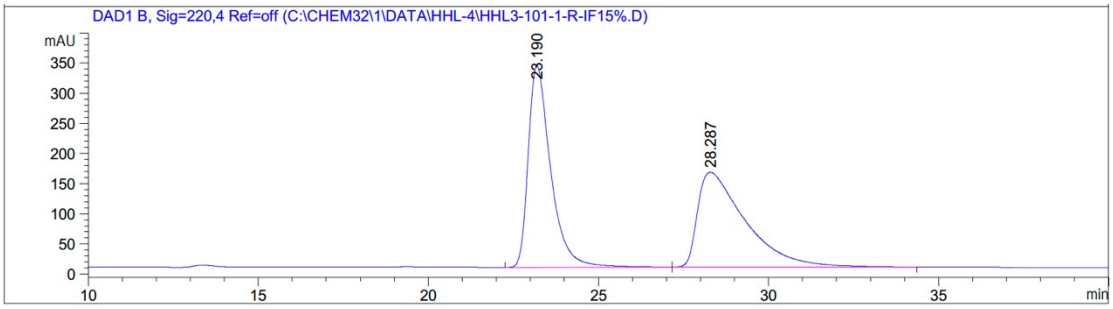
3. Characterization data for asymmetric products

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3a)



White foam, 82% yield; 93% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 85:15 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 29.041 min, t_{major} = 22.808 min; $[\alpha]_D^{20}$ = -26.08 (*c* = 0.58 in $CHCl_3$);

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.85 (s, 1H), 7.77 – 7.68 (m, 2H), 7.53 – 7.44 (m, 2H), 7.43 – 7.17 (m, 10H), 7.09 (d, *J* = 8.1 Hz, 1H), 7.00 – 6.89 (m, 1H), 6.75 (s, 1H), 6.43 (dd, *J* = 3.1, 2.1 Hz, 1H), 6.20 (d, *J* = 8.1 Hz, 1H), 4.61 (s, 2H), 4.54 (s, 1H), 2.31 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 144.2, 141.0, 136.8, 135.3, 133.7, 133.3, 131.6, 129.5, 129.2, 128.6, 128.4, 127.1, 127.0, 126.7, 122.7, 121.5, 119.2, 117.7, 98.8, 98.0, 62.3, 45.8, 29.5 ppm; HRMS (ESI) calcd for $C_{30}H_{27}ClN_3O^+$ $[M+H]^+$: 480.1837, found: 480.1849.



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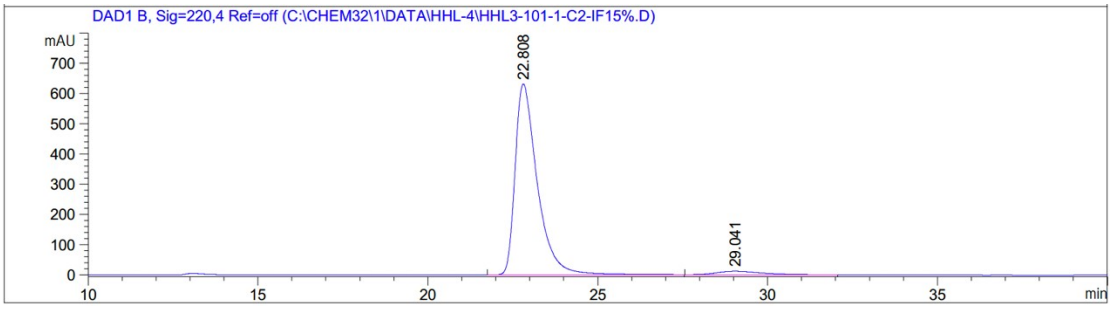
2	28.287	BB	1.4199	1.53095e4	157.23544	49.9107



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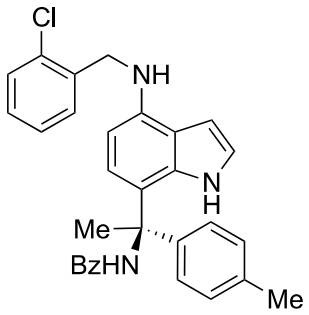
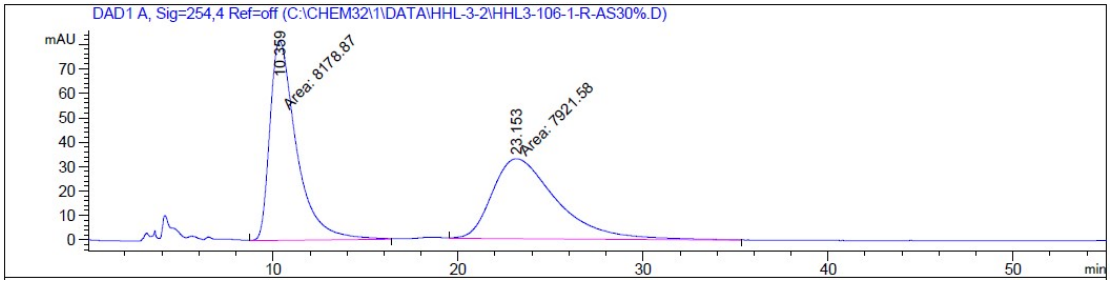
1	22.808	BB	0.6793	2.86049e4	630.44055	96.4498
2	29.041	BB	1.3076	1052.89600	11.27323	3.5502

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(*p*-tolyl)ethyl)benzamide (3b)



White foam, 82% yield; 93% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak AS, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 23.481 min, t_{major} = 10.325 min; $[\alpha]_D^{20}$ = -33.16 (c = 0.39 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.80 (s, 1H), 7.69 – 7.61 (m, 2H), 7.46 – 7.36 (m, 2H), 7.35 – 7.27 (m, 3H), 7.17 – 7.11 (m, 4H), 7.07 – 6.98 (m, 3H), 6.92 – 6.86 (m, 1H), 6.67 (s, 1H), 6.36 (dd, J = 3.2, 2.1 Hz, 1H), 6.13 (d, J = 8.1 Hz, 1H), 4.54 (s, 2H), 4.46 (s, 1H), 2.25 (s, 3H), 2.22 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.9, 141.2, 140.9, 136.8, 136.7, 135.3, 133.8, 133.3, 131.5, 129.5, 129.2, 129.1, 128.6, 128.4, 127.0, 126.6, 122.6, 121.4, 119.3, 117.7, 98.8, 97.9, 62.1, 45.9, 29.6, 21.1 ppm; HRMS (ESI) calcd for $C_{31}H_{28}ClN_3NaO^+$ $[M+Na]^+$: 516.1813, found: 516.1821.



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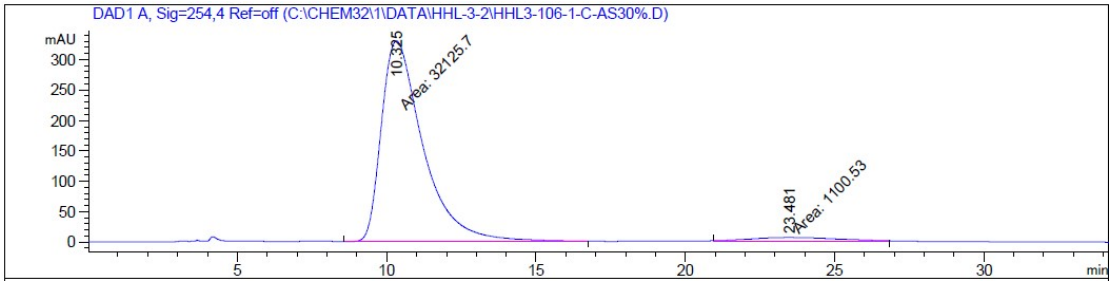
2	23.153	MM	4.0384	7921.58350	32.69284	49.2010



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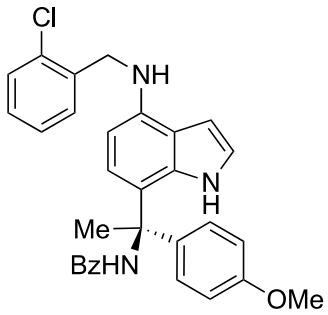
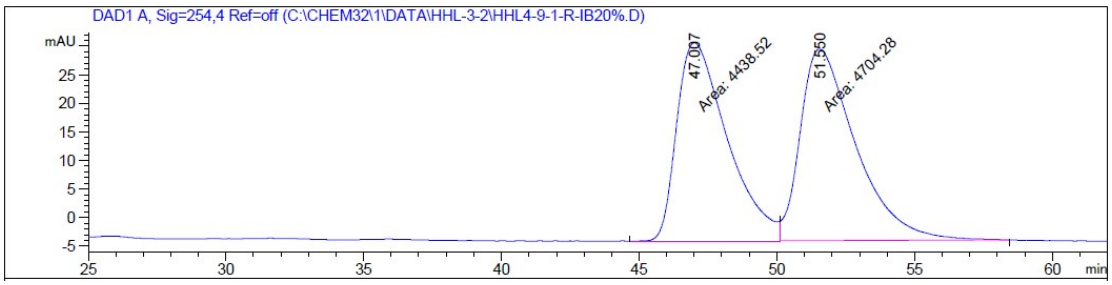
1	10.325	MM	1.6210	3.21257e4	330.31320	96.6878
2	23.481	MM	3.2474	1100.53076	5.64830	3.3122

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(4-methoxyphenyl)ethyl)benzamide (3c)



White foam, 84% yield; 93% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 47.538 min, t_{major} = 50.448 min; $[\alpha]_D^{20}$ = -10.26 (c = 0.39 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.77 (s, 1H), 7.66 (d, J = 7.4 Hz, 2H), 7.46 – 7.37 (m, 2H), 7.36 – 7.27 (m, 3H), 7.23 – 7.11 (m, 4H), 7.01 (d, J = 8.0 Hz, 1H), 6.90 (s, 1H), 6.76 (d, J = 8.7 Hz, 2H), 6.67 (s, 1H), 6.37 (s, 1H), 6.13 (d, J = 8.0 Hz, 1H), 4.54 (s, 2H), 4.46 (s, 1H), 3.71 (s, 3H), 2.22 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.9, 157.4, 139.8, 135.8, 135.2, 134.3, 132.7, 132.3, 130.5, 128.5, 128.1, 127.6, 127.3, 126.9, 125.9, 125.9, 121.6, 120.3, 118.4, 116.7, 112.7, 97.8, 96.9, 60.8, 54.2, 44.8, 28.5 ppm; HRMS (ESI) calcd for $C_{31}H_{28}ClN_3NaO_2^+$ $[M+Na]^+$: 532.1762, found: 532.1741.



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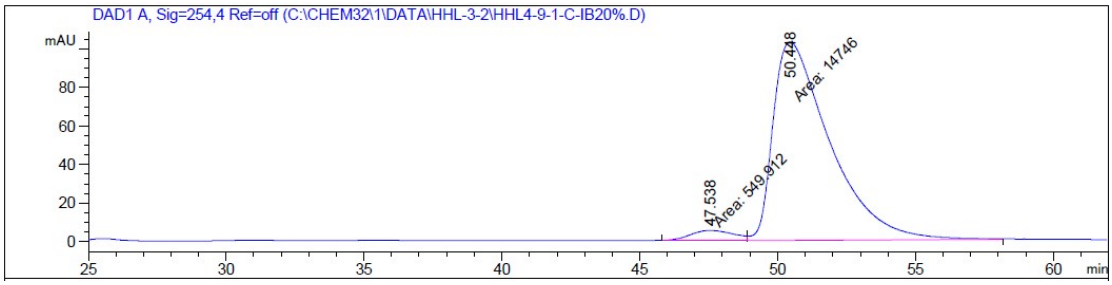
2	51.550	MM	2.3381	4704.28076	33.53396	51.4534



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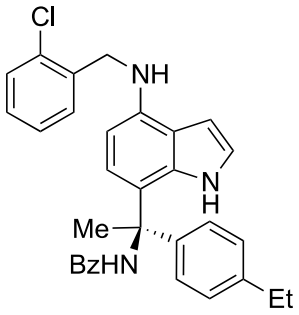
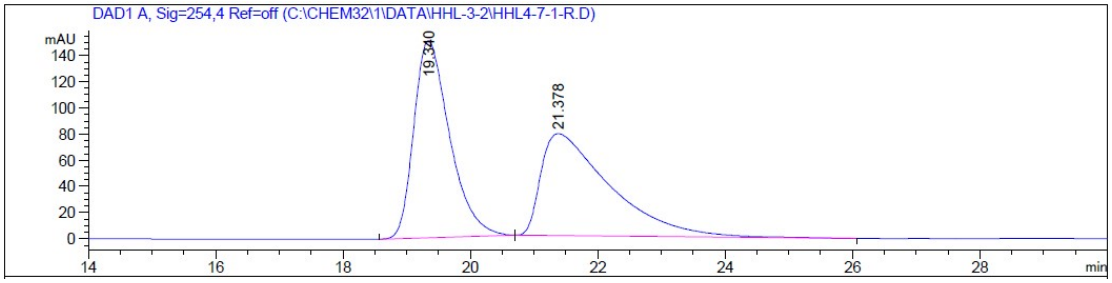
1	47.538	MM	1.7846	549.91229	5.13575	3.5952
2	50.448	MM	2.3878	1.47460e4	102.92775	96.4048

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(4-ethylphenyl)ethyl)benzamide (3d)



White foam, 96% yield; 94% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 22.332 min, t_{major} = 19.286 min; $[\alpha]_D^{20}$ = -145.81 (c = 0.24 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.81 (s, 1H), 7.73 (d, J = 7.4 Hz, 2H), 7.54 – 7.44 (m, 2H), 7.43 – 7.34 (m, 3H), 7.28 – 7.23 (m, 3H), 7.23 – 7.17 (m, 2H), 7.10 (m, 3H), 6.96 (s, 1H), 6.74 (s, 1H), 6.44 (s, 1H), 6.22 (d, J = 7.9 Hz, 1H), 4.61 (s, 2H), 2.63 (q, J = 7.6 Hz, 2H), 2.30 (s, 3H), 1.22 (t, J = 7.6 Hz, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$)

δ 166.9, 142.9, 141.4, 135.4, 133.8, 133.4, 131.5, 129.5, 129.3, 128.6, 128.4, 127.9, 127.0, 126.6, 122.7, 121.4, 98.0, 62.1, 46.0, 29.4, 28.4, 15.3 ppm; HRMS (ESI) calcd for $C_{32}H_{30}ClN_3NaO^+$ $[M+Na]^+$: 530.1970, found: 530.1970.



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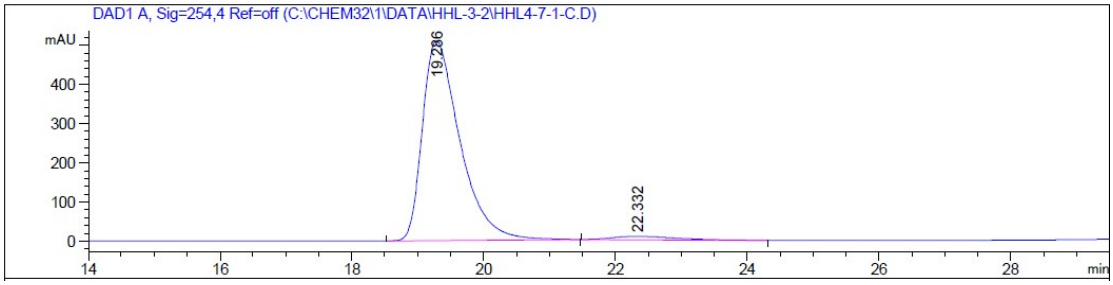
1	19.340	BB	0.5955	5888.23682	150.81691	49.9685
2	21.378	BB	1.0988	5895.65039	78.09466	50.0315



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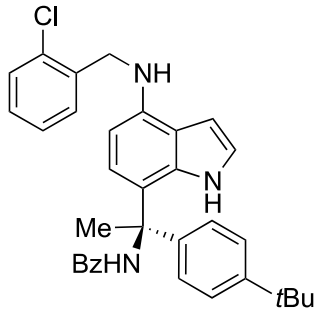
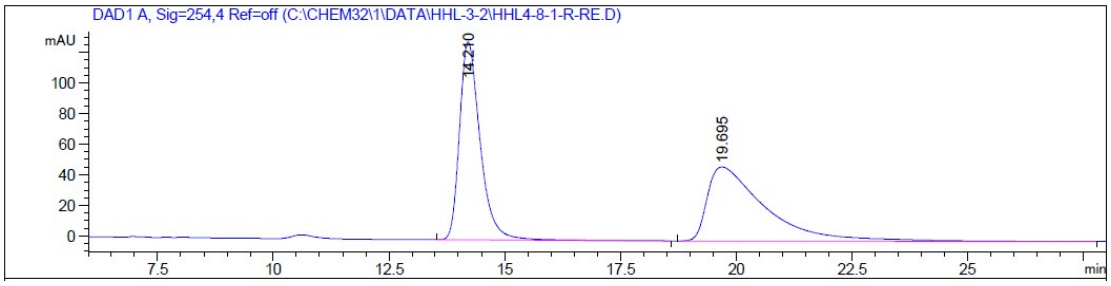
1	19.286	BB	0.5976	2.01552e4	509.39078	97.1867
2	22.332	BB	0.9789	583.44019	8.78433	2.8133

(*R*)-*N*-(1-(4-(*tert*-butyl)phenyl)-1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)ethyl) benzamide (3e)



White foam, 94% yield; 93% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 22.418 min, t_{major} = 15.570 min; $[\alpha]_D^{20}$ = -9.62 (c = 0.52 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.69 (s, 1H), 7.77 – 7.69 (m, 2H), 7.52 – 7.44 (m, 2H), 7.42 – 7.35 (m, 3H), 7.31 – 7.24 (m, 4H), 7.24 – 7.18 (m, 2H), 7.08 (d, J = 8.1 Hz, 1H), 6.96 – 6.93 (m, 1H), 6.74 (s, 1H), 6.43 (dd, J = 3.2, 2.1 Hz, 1H), 6.20 (d, J = 8.1 Hz, 1H), 4.61 (s, 2H), 4.52 (s, 1H), 2.32 (s, 3H), 1.29 (s, 9H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 149.8, 141.2, 140.8, 136.8, 135.4, 133.7, 133.3, 131.5, 129.5, 129.2, 128.6, 128.4, 127.0, 126.3, 125.4, 122.6, 121.4, 119.5, 117.7, 98.9, 98.0, 62.1, 45.8, 34.4, 31.4, 29.0 ppm; HRMS (ESI) calcd for $C_{34}H_{34}ClN_3NaO^+$ $[M+Na]^+$: 558.2282, found: 558.2276.



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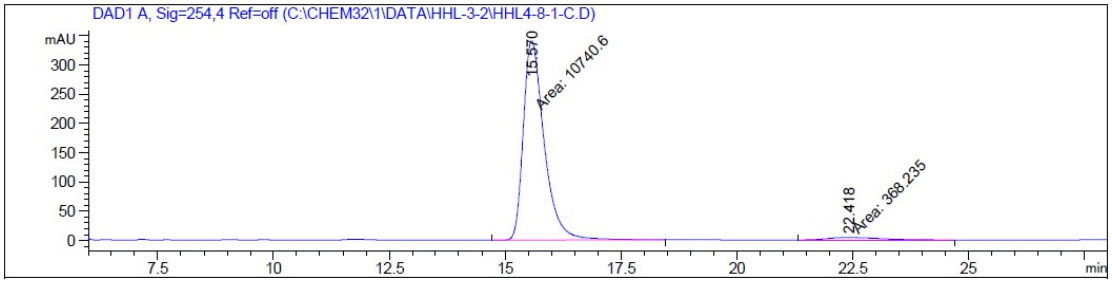
1	14.210	BB	0.4701	4016.31616	129.40468	48.9214
2	19.695	BB	1.2487	4193.41113	48.40695	51.0786



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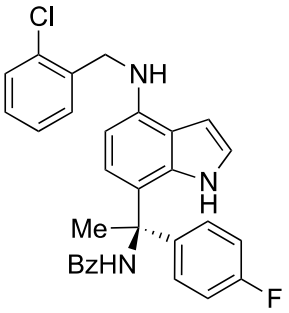
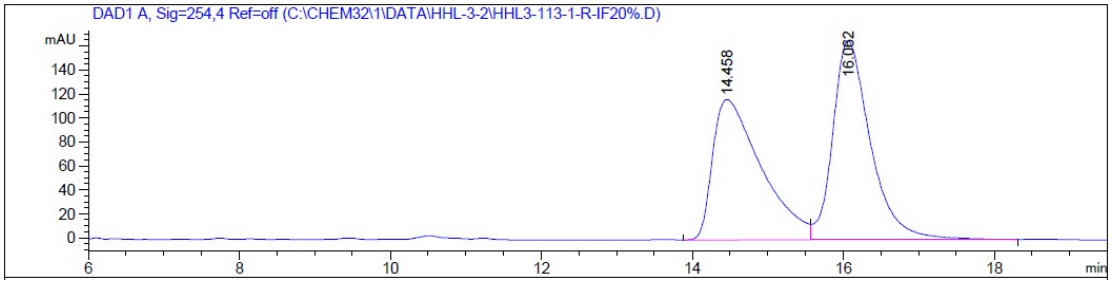
1	15.570	MM	0.5241	1.07406e4	341.52594	96.6852
2	22.418	MM	1.3567	368.23538	4.52372	3.3148

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(4-fluorophenyl)ethyl)benzamide (3f)



White foam, 82% yield; 86% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 14.875 min, t_{major} = 16.013 min; $[\alpha]_D^{20}$ = -45.63 (*c* = 0.50 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.07 (s, 1H), 7.71 (d, *J* = 7.4 Hz, 2H), 7.52 – 7.44 (m, 2H), 7.38 (t, *J* = 7.6 Hz, 3H), 7.31 – 7.24 (m, 2H), 7.24 – 7.16 (m, 2H), 7.04 (d, *J* = 8.1 Hz, 1H), 7.02 – 6.90 (m, 3H), 6.73 (s, 1H), 6.50 – 6.41 (m, 1H), 6.19 (d, *J* = 8.1 Hz, 1H), 4.61 (s, 2H), 4.56 (s, 1H), 2.26 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 161.7 (d, *J* = 244.4 Hz), 141.1, 139.7 (d, *J* = 3.3 Hz), 136.7, 135.1, 133.6, 133.3, 131.7, 129.6, 129.1, 128.7, 128.5 (d, *J* = 7.9 Hz), 128.4, 127.0, 126.9, 122.8, 121.5, 118.7, 117.7, 115.1 (d, *J* = 21.3 Hz), 98.7, 98.1, 61.9, 45.8, 30.1 ppm; HRMS (ESI) calcd for $C_{30}H_{25}ClFN_3NaO^+$ $[M+Na]^+$: 520.1562, found: 520.1546.



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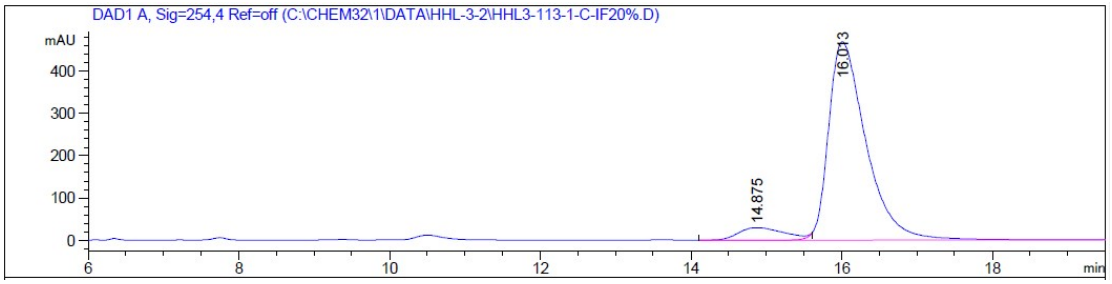
1	14.458	BV	0.6676	5239.29492	117.18404	47.6715
2	16.062	VB	0.5201	5751.11768	166.03160	52.3285



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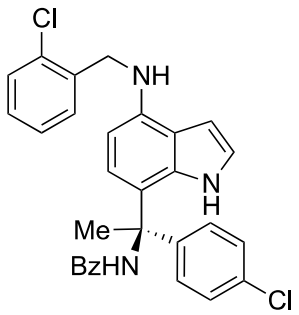
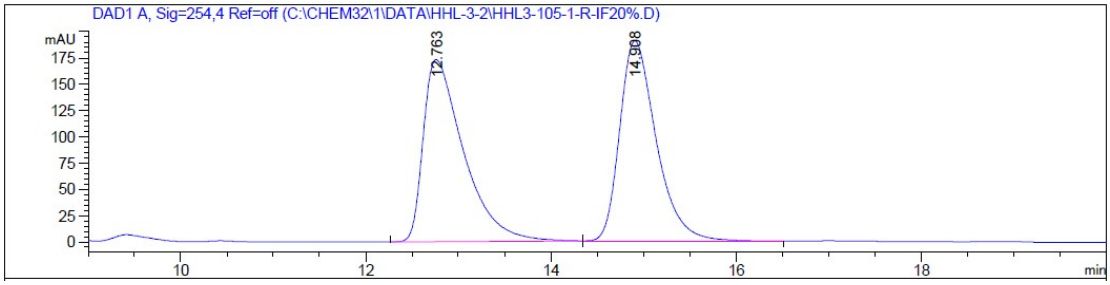
1	14.875	BV E	0.6451	1247.87024	29.76333	7.1385
2	16.013	VBAR	0.5225	1.62329e4	468.21417	92.8615

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(4-chlorophenyl)ethyl)benzamide (3g)

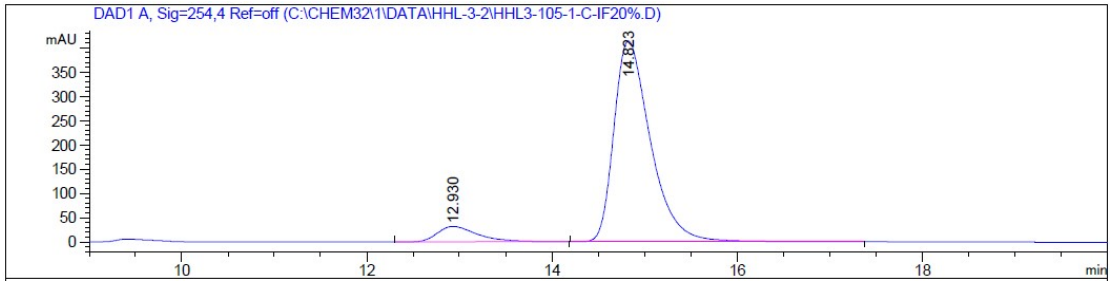


White foam, 90% yield; 84% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 12.930 min, t_{major} = 14.823 min; $[\alpha]_D^{20}$ = -27.78 (*c* = 0.36 in $CHCl_3$);

^{1}H NMR (400 MHz, $CDCl_3$) δ 9.07 (s, 1H), 7.69 – 7.60 (m, 2H), 7.45 – 7.38 (m, 2H), 7.37 – 7.29 (m, 3H), 7.19 – 7.13 (m, 6H), 7.01 – 6.91 (m, 2H), 6.64 (s, 1H), 6.38 (dd, *J* = 3.2, 2.1 Hz, 1H), 6.12 (d, *J* = 8.1 Hz, 1H), 4.54 (s, 2H), 4.49 (s, 1H), 2.18 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.0, 141.4, 140.1, 135.7, 133.9, 132.6, 132.3, 131.7, 130.7, 128.5, 128.1, 127.6, 127.4, 127.3, 125.9, 125.9, 121.8, 120.4, 117.2, 116.7, 97.7, 97.0, 60.8, 44.8, 29.1 ppm; HRMS (ESI) calcd for $C_{30}H_{25}Cl_2N_3NaO^+$ $[M+Na]^+$: 536.1267, found: 536.1268.

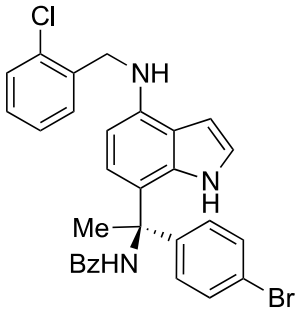


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.763	BB	0.4506	5232.33301	173.12695	50.1233
2	14.908	BB	0.4174	5206.58594	190.15634	49.8767

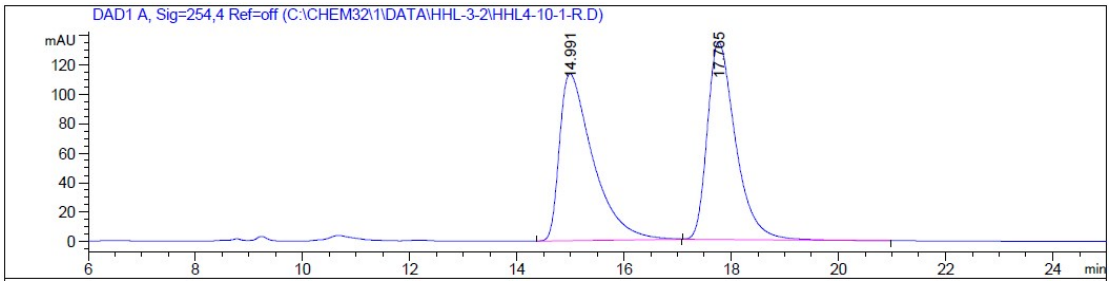


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.930	BB	0.4545	964.36237	31.91985	7.8518
2	14.823	BB	0.4152	1.13177e4	413.65198	92.1482

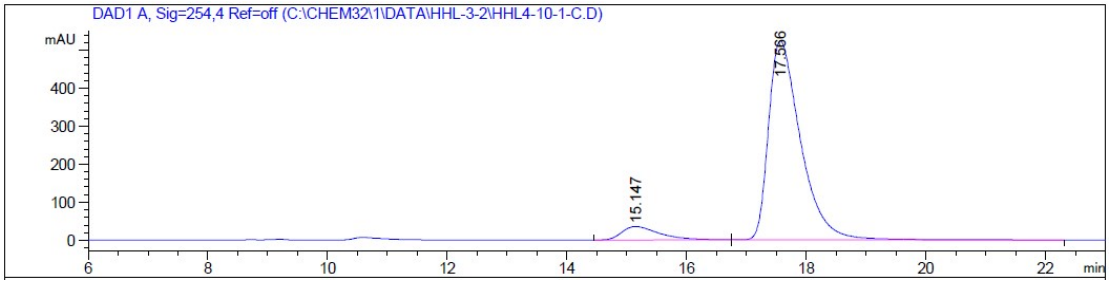
(*R*)-*N*-(1-(4-bromophenyl)-1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)ethyl)benzamide (3h)



White foam, 83% yield; 85% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 15.147 min, t_{major} = 17.566 min; $[\alpha]_D^{20}$ = -30.33 (c = 0.50 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 9.16 (s, 1H), 7.71 (d, J = 7.6 Hz, 2H), 7.56 – 7.32 (m, 7H), 7.29 – 7.12 (m, 4H), 7.10 – 6.95 (m, 2H), 6.72 (s, 1H), 6.45 (s, 1H), 6.18 (d, J = 8.0 Hz, 1H), 4.61 (s, 2H), 4.57 (s, 1H), 2.24 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 143.0, 141.2, 136.7, 134.9, 133.6, 133.3, 131.8, 131.3, 129.6, 129.1, 128.7, 128.4, 127.0, 126.9, 122.8, 121.5, 121.0, 118.2, 117.7, 98.7, 98.1, 61.9, 45.8, 30.1 ppm; HRMS (ESI) calcd for $C_{30}H_{25}BrClN_3NaO^+$ $[M+Na]^+$: 580.0762, found: 580.0779.

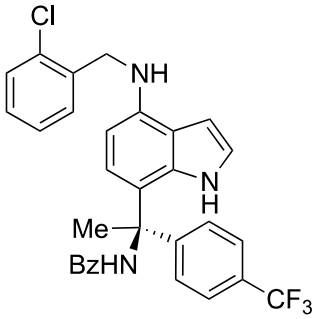


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.991	BB	0.6438	4898.54248	113.42776	50.0037
2	17.765	BB	0.5558	4897.81494	134.19502	49.9963

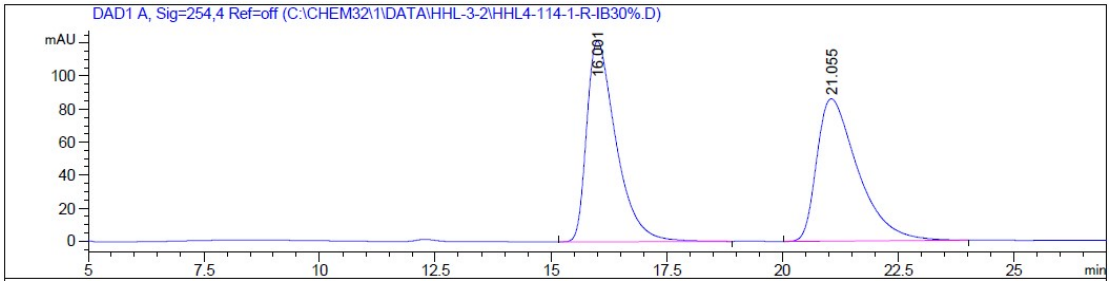


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.147	BB	0.6474	1531.49280	35.49067	7.2953
2	17.566	BB	0.5618	1.94615e4	523.39087	92.7047

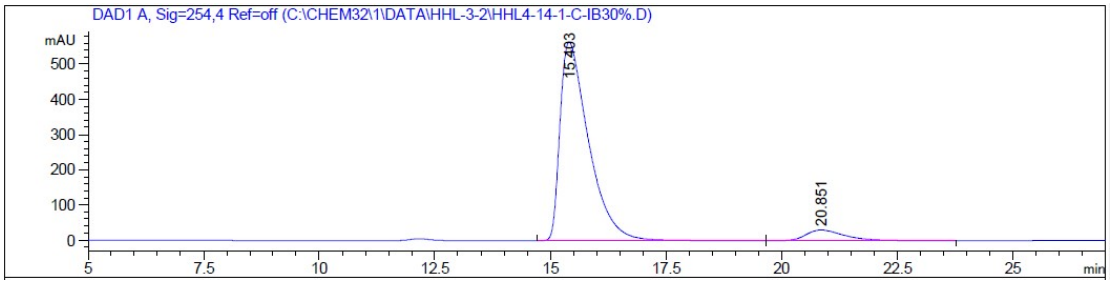
(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(4-(trifluoromethyl)phenyl) ethyl)benzamide (3i)



White foam, 72% yield; 87% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 20.851 min, t_{major} = 15.403 min; $[\alpha]_D^{20}$ = -35.92 (*c* = 1.03 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.25 (s, 1H), 7.71 (d, *J* = 7.5 Hz, 2H), 7.57 – 7.44 (m, 4H), 7.45 – 7.32 (m, 5H), 7.24 – 7.15 (m, 2H), 7.01 (d, *J* = 7.4 Hz, 2H), 6.76 (s, 1H), 6.46 (s, 1H), 6.18 (d, *J* = 8.1 Hz, 1H), 4.61 (s, 3H), 2.25 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.1, 147.8, 141.3, 136.7, 134.8, 133.6, 133.3, 131.9, 129.6, 129.1, 129.1 (q, *J* = 32.3 Hz), 128.7, 128.4, 127.2, 127.0, 125.2 (q, *J* = 3.3 Hz), 124.2 (q, *J* = 270.3 Hz), 122.9, 121.6, 117.8, 117.8, 98.7, 98.2, 62.1, 45.8, 30.3 ppm; HRMS (ESI) calcd for $C_{31}H_{25}ClF_3N_3NaO^+$ $[M+Na]^+$: 570.1530, found: 570.1549.

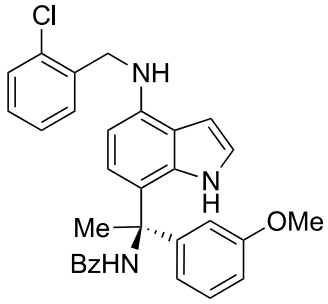


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.001	BB	0.6682	5358.56445	121.58704	50.1993
2	21.055	BB	0.9337	5316.01172	86.18028	49.8007



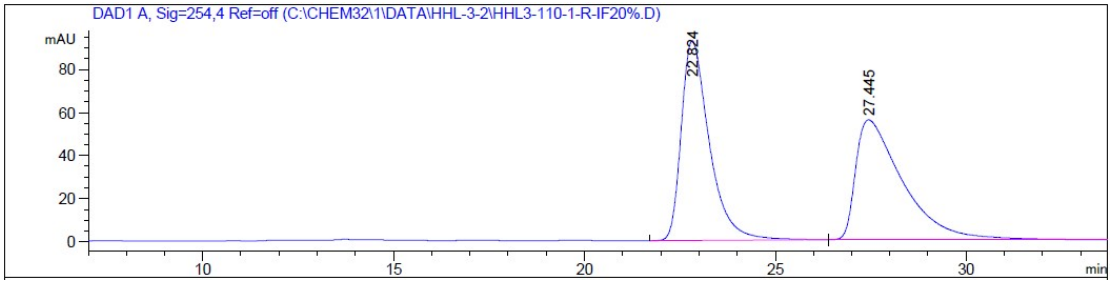
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.403	BB	0.6434	2.41338e4	563.83765	93.2808
2	20.851	BB	0.8739	1738.40247	30.27605	6.7192

(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(3-methoxyphenyl)ethyl)benzamide (3j)

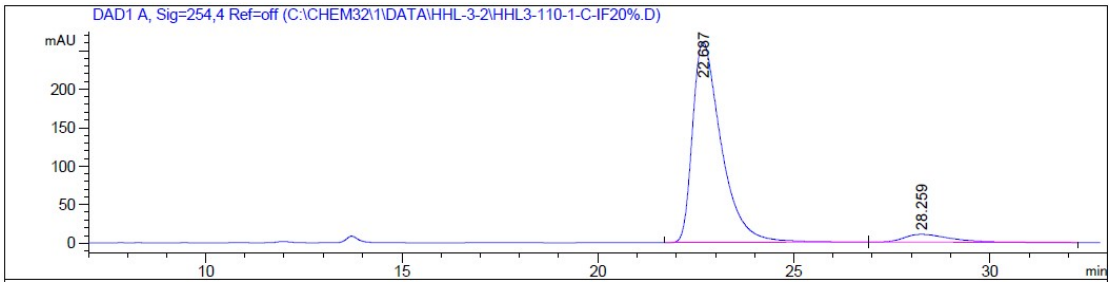


White foam, 86% yield; 88% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 28.259 min, t_{major} = 22.687 min; $[\alpha]_D^{20}$ = -6.97 (*c* = 0.43 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.74 (s, 1H), 7.78 – 7.67 (m, 2H), 7.53 – 7.44 (m, 2H), 7.43 – 7.34 (m, 3H), 7.25 – 7.18 (m, 3H), 7.07 (d, *J* = 8.1 Hz, 1H), 7.00 – 6.94 (m, 2H), 6.92 (t, *J* = 2.1 Hz, 1H), 6.83 – 6.77 (m, 1H), 6.75 (s, 1H), 6.43 (dd, *J* = 3.2, 2.1 Hz, 1H), 6.20 (d, *J* = 8.1 Hz, 1H), 4.61 (s, 2H), 4.53 (s, 1H), 3.72 (s, 3H), 2.32 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 159.6, 146.2, 140.9, 136.8, 135.3, 133.7, 133.3,

131.5, 129.5, 129.4, 129.2, 128.6, 128.4, 127.0, 126.9, 122.6, 121.4, 119.2, 119.2, 117.8, 113.4, 111.8, 98.9, 98.1, 62.2, 55.2, 45.8, 28.9 ppm; HRMS (ESI) calcd for $C_{31}H_{28}ClN_3NaO_2^+$ $[M+Na]^+$: 532.1762, found: 532.1763.

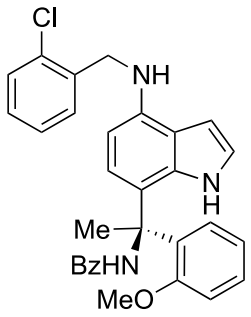


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	22.824	BB	0.7747	4740.41162	92.68456	49.7932
2	27.445	BBA	1.2561	4779.78271	55.64514	50.2068

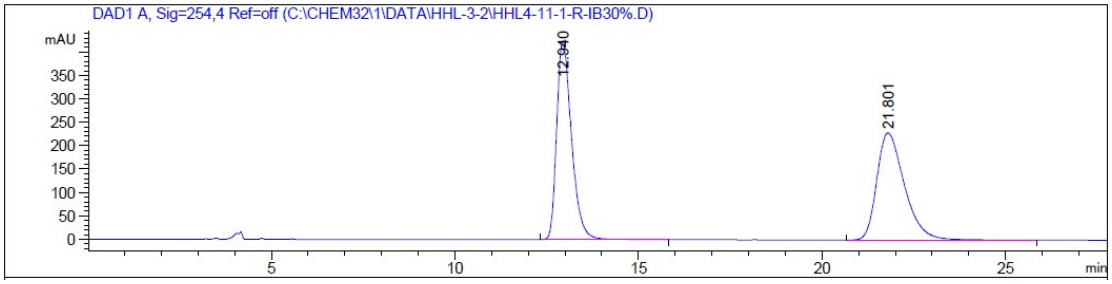


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	22.687	BB	0.7657	1.32678e4	260.72495	94.0461
2	28.259	BBA	1.1928	839.96497	10.26390	5.9539

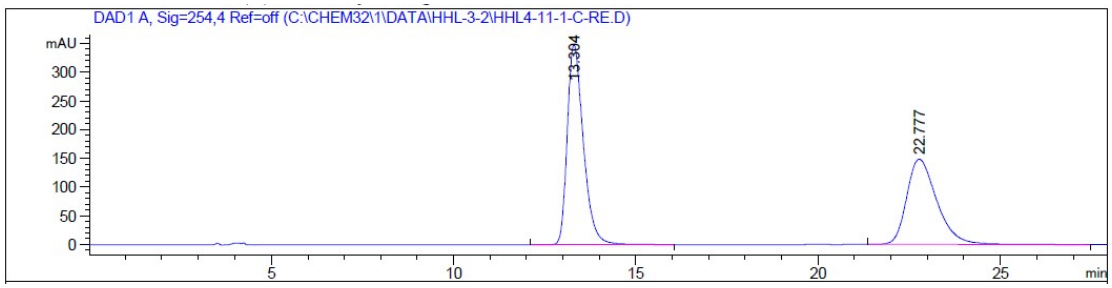
(*S*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(2-methoxyphenyl)ethyl)benzamide (3k)



White foam, 90% yield; 12% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 22.777 min, t_{major} = 13.304 min; $[\alpha]_D^{20}$ = -1.89 (c = 0.53 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 9.44 (s, 1H), 7.77 – 7.70 (m, 2H), 7.54 – 7.43 (m, 3H), 7.42 – 7.35 (m, 3H), 7.29 (td, J = 8.2, 1.7 Hz, 1H), 7.20 (dd, J = 5.9, 3.5 Hz, 2H), 7.17 (dd, J = 7.9, 1.7 Hz, 1H), 7.03 – 6.99 (m, 1H), 6.96 – 6.84 (m, 3H), 6.44 (dd, J = 3.2, 2.1 Hz, 1H), 6.15 (d, J = 8.1 Hz, 1H), 4.60 (s, 2H), 4.47 (s, 1H), 3.65 (s, 3H), 2.35 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.3, 157.6, 140.4, 137.0, 135.9, 133.6, 133.3, 131.5, 131.3, 129.5, 129.2, 129.0, 128.5, 128.3, 126.9, 126.9, 122.4, 121.1, 120.5, 119.9, 117.6, 112.0, 99.0, 97.8, 61.8, 55.8, 45.9, 26.2 ppm; HRMS (ESI) calcd for $C_{31}H_{28}ClN_3NaO_2^+$ $[M+Na]^+$: 532.1762, found: 532.1768.

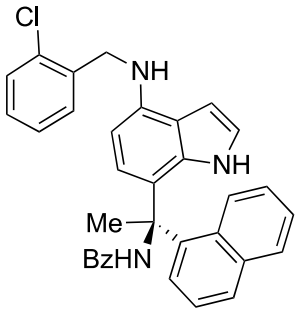


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.940	BB	0.3984	1.19602e4	424.83960	49.8872
2	21.801	BB	0.7994	1.20143e4	229.24492	50.1128

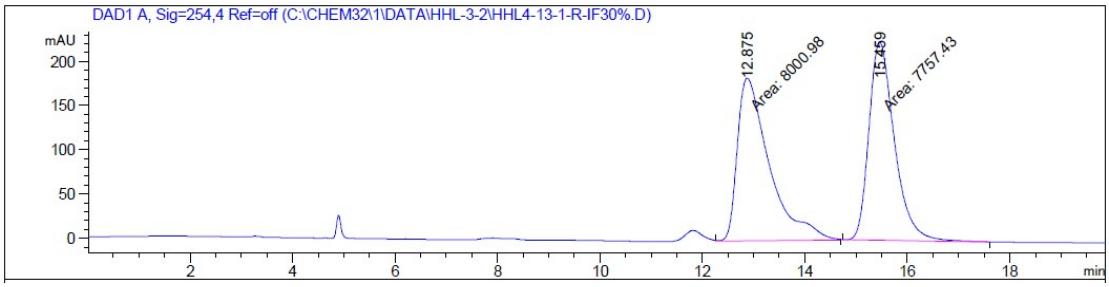


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.304	BB	0.4709	1.07089e4	348.09015	55.7606
2	22.777	BBA	0.8765	8496.22754	148.27985	44.2394

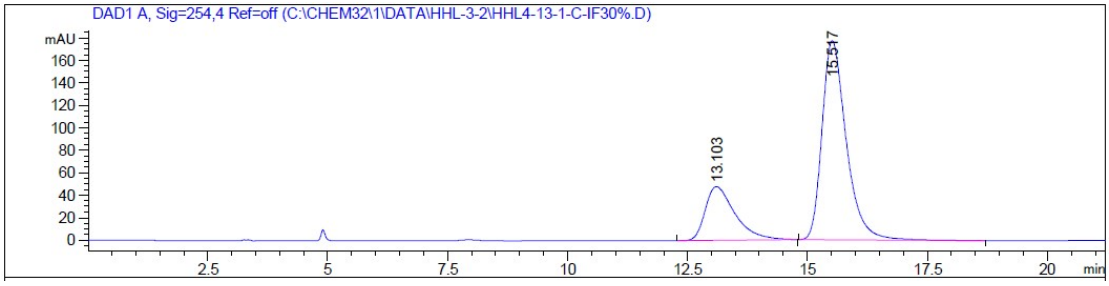
(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(naphthalen-1-yl)ethyl)benzamide (3o)



White foam, 85% yield; 50% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 13.103 min, t_{major} = 15.517 min; $[\alpha]_D^{20}$ = -7.84 (*c* = 1.14 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.87 (s, 1H), 7.74 – 7.56 (m, 6H), 7.44 – 7.24 (m, 8H), 7.16 – 7.07 (m, 2H), 7.01 (d, *J* = 8.0 Hz, 1H), 6.84 – 6.71 (m, 2H), 6.33 (s, 1H), 6.12 (d, *J* = 8.0 Hz, 1H), 4.52 (s, 2H), 4.47 (s, 1H), 2.28 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.1, 141.6, 141.1, 136.8, 135.3, 133.8, 133.3, 133.2, 132.5, 131.6, 129.6, 129.2, 128.7, 128.4, 128.1, 127.5, 127.0, 126.1, 126.0, 125.4, 125.1, 122.8, 121.6, 118.9, 117.8, 98.9, 98.0, 62.4, 45.9, 29.4 ppm; HRMS (ESI) calcd for $C_{34}H_{28}ClN_3NaO^+$ $[M+Na]^+$: 552.1813, found: 552.1823.

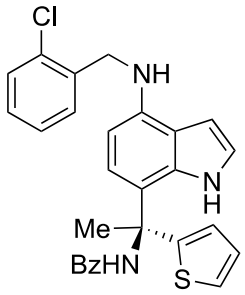


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.875	MM	0.7249	8000.97754	183.94426	50.7728
2	15.459	MM	0.5767	7757.42920	224.19890	49.2272

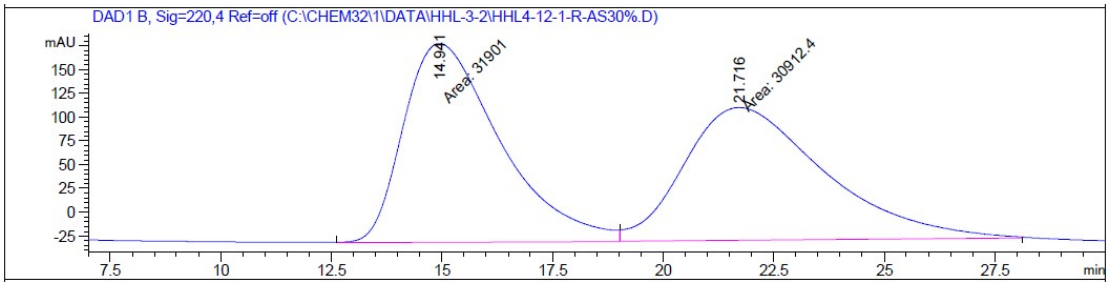


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.103	BB	0.6495	2065.55786	47.86380	24.9204
2	15.517	BB	0.5335	6223.05566	177.28590	75.0796

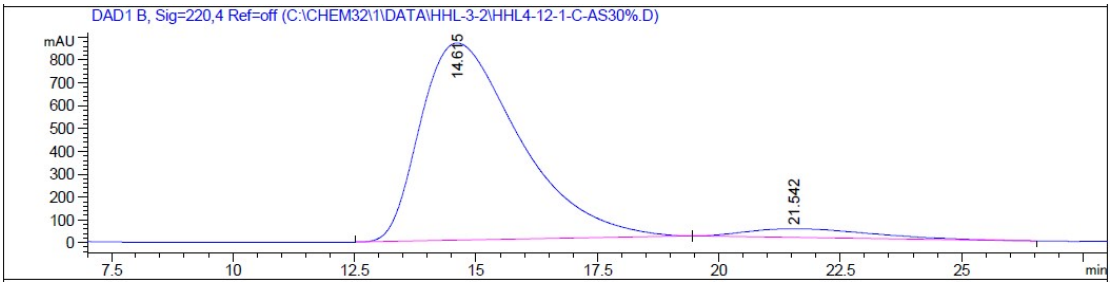
(*S*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-(thiophen-2-yl)ethyl)benzamide (3p)



White foam, 90% yield; 89% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak AS, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 21.542 min, t_{major} = 14.615 min; $[\alpha]_D^{20}$ = -43.92 (*c* = 0.59 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.63 (s, 1H), 7.75 – 7.69 (m, 2H), 7.50 – 7.44 (m, 2H), 7.42 – 7.35 (m, 3H), 7.26 – 7.17 (m, 3H), 7.03 – 6.98 (m, 2H), 6.97 – 6.92 (m, 2H), 6.88 (s, 1H), 6.47 (dd, *J* = 3.2, 2.1 Hz, 1H), 6.17 (d, *J* = 8.1 Hz, 1H), 4.59 (s, 2H), 4.55 (s, 1H), 2.44 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 150.5, 141.0, 136.7, 135.1, 133.4, 133.3, 131.6, 129.5, 129.2, 128.7, 128.4, 127.0, 127.0, 126.5, 125.5, 125.0, 122.6, 121.2, 119.4, 117.8, 99.1, 98.4, 60.5, 45.8, 28.9 ppm; HRMS (ESI) calcd for $C_{28}H_{24}ClN_3NaOS^+$ $[M+Na]^+$: 508.1221, found: 508.1229.

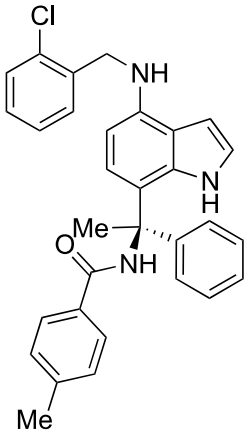


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.941	MM	2.5412	3.19010e4	209.22437	50.7870
2	21.716	MM	3.6884	3.09124e4	139.68114	49.2130



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.615	BB	2.1784	1.22733e5	864.47717	94.7369
2	21.542	BB	2.5564	6818.39795	38.38358	5.2631

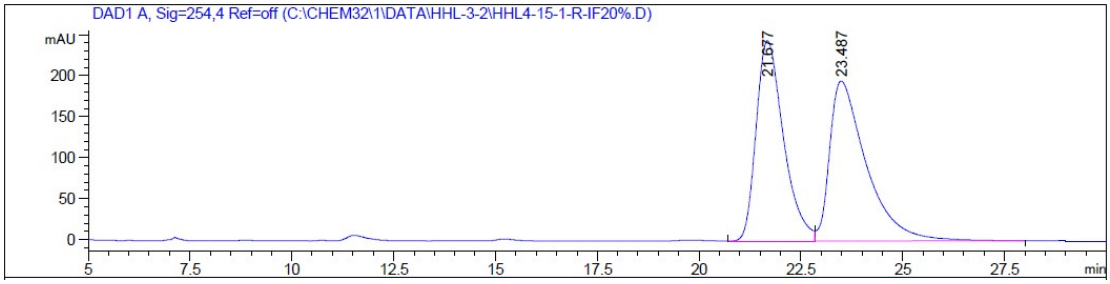
(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-phenylethyl)-4-methylbenzamide (3q)



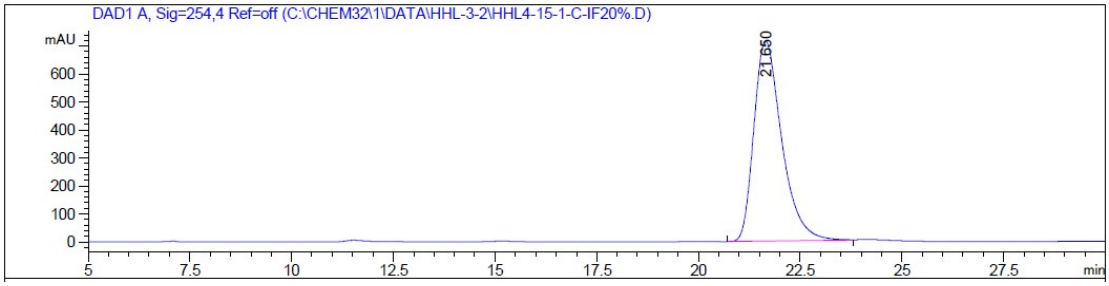
White foam, 91% yield; >99% ee. The enantiomeric excess was determined by HPLC

(Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{major} = 21.650 min; $[\alpha]_D^{20}$ = -28.81 (*c* = 0.59 in $CHCl_3$);

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.91 (s, 1H), 7.62 (d, *J* = 8.2 Hz, 2H), 7.52 – 7.46 (m, 1H), 7.42 – 7.37 (m, 1H), 7.35 – 7.24 (m, 5H), 7.23 – 7.15 (m, 4H), 7.07 (d, *J* = 8.1 Hz, 1H), 6.98 – 6.92 (m, 1H), 6.71 (s, 1H), 6.43 (dd, *J* = 3.2, 2.1 Hz, 1H), 6.19 (d, *J* = 8.1 Hz, 1H), 4.61 (s, 2H), 4.53 (s, 1H), 2.36 (s, 3H), 2.29 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.9, 144.2, 142.0, 140.9, 136.8, 133.8, 133.3, 132.4, 129.5, 129.3, 129.2, 128.4, 128.3, 127.0, 127.0, 126.7, 122.7, 121.4, 119.3, 117.7, 98.8, 97.9, 62.2, 45.8, 29.6, 21.4 ppm; HRMS (ESI) calcd for $C_{31}H_{28}ClN_3NaO^+$ $[M+Na]^+$: 516.1813, found: 516.1826.

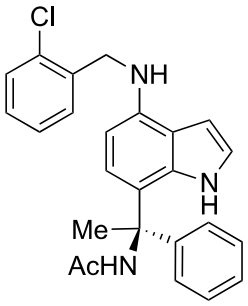


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	21.677	BV	0.7136	1.14280e4	244.38385	48.3650
2	23.487	VB	0.9212	1.22007e4	195.20183	51.6350

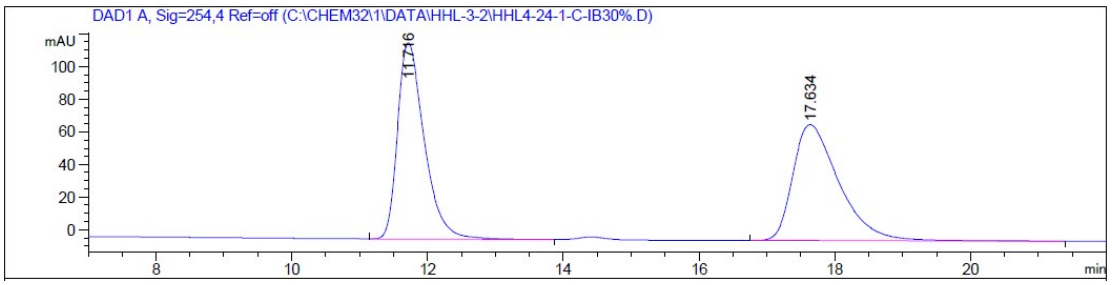


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	21.650	BB	0.7249	3.40134e4	715.10956	100.0000

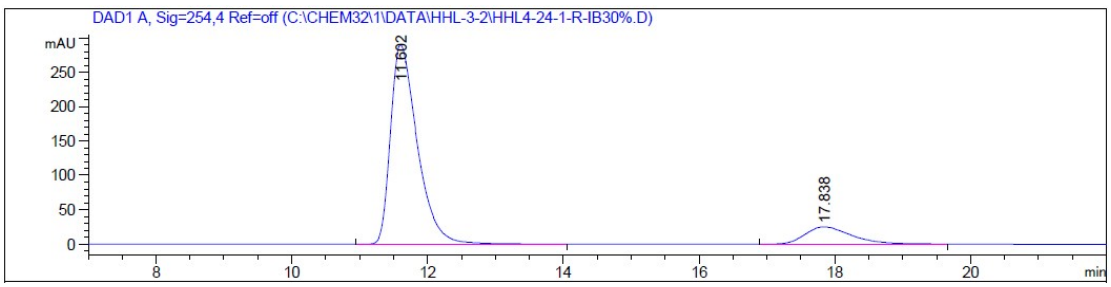
(*R*)-*N*-(1-(4-((2-chlorobenzyl)amino)-1*H*-indol-7-yl)-1-phenylethyl)acetamide (3r)



White foam, 90% yield; 74% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 17.838 min, t_{major} = 11.602 min; $[\alpha]_D^{20}$ = -30.77 (c = 0.26 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.81 (s, 1H), 7.42 (dd, J = 5.7, 3.6 Hz, 1H), 7.36 – 7.30 (m, 1H), 7.24 – 7.10 (m, 7H), 7.00 (d, J = 8.1 Hz, 1H), 6.85 (t, J = 2.9 Hz, 1H), 6.34 (dd, J = 3.3, 2.1 Hz, 1H), 6.11 (d, J = 8.0 Hz, 1H), 5.97 (s, 1H), 4.54 (s, 2H), 4.46 (s, 1H), 2.08 (s, 3H), 1.91 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 169.8, 144.1, 140.9, 136.8, 133.7, 133.3, 129.5, 129.2, 128.4, 128.3, 127.0, 126.9, 126.6, 122.6, 121.3, 119.0, 117.6, 98.6, 97.9, 61.9, 45.8, 29.9, 24.8 ppm; HRMS (ESI) calcd for $C_{25}H_{24}ClN_3NaO^+$ $[M+Na]^+$: 440.1500, found: 440.1508.

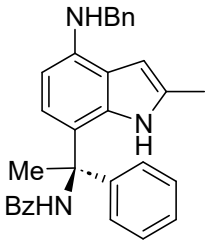


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.716	BB	0.4166	3285.85107	120.30492	49.4255
2	17.634	BB	0.7177	3362.23828	71.09778	50.5745

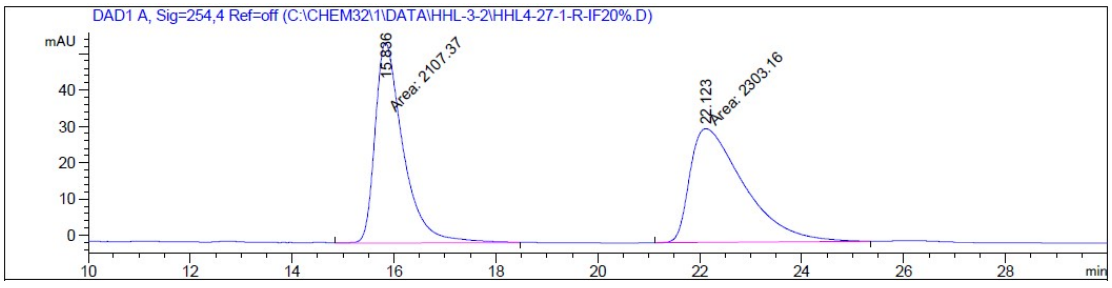


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.602	BB	0.4162	7969.49121	290.33951	86.9030
2	17.838	BB	0.7276	1201.06519	25.22025	13.0970

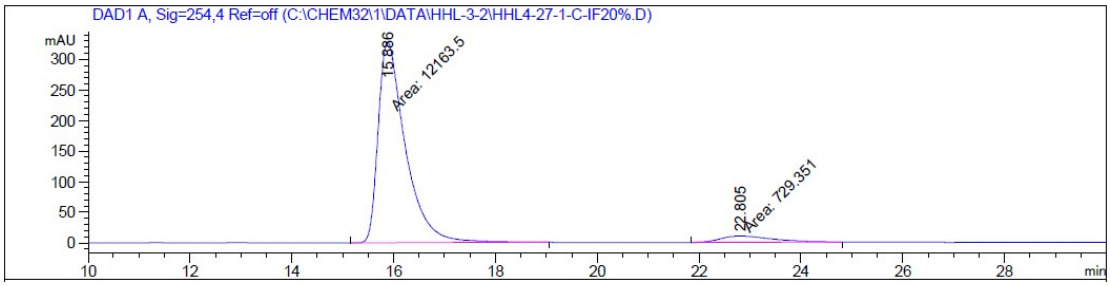
(*R*)-*N*-(1-(4-(benzylamino)-2-methyl-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3s)



White foam, 83% yield; 89% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 22.805 min, t_{major} = 15.886 min; $[\alpha]_D^{20}$ = -19.02 (c = 0.74 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.24 (s, 1H), 7.66 (d, J = 7.4 Hz, 2H), 7.44 – 7.16 (m, 13H), 6.95 (d, J = 8.0 Hz, 1H), 6.70 (s, 1H), 6.18 (d, J = 8.1 Hz, 1H), 5.98 (s, 1H), 4.40 (s, 2H), 4.17 (s, 1H), 2.25 (s, 3H), 2.15 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 166.9, 144.4, 140.6, 139.7, 135.4, 133.6, 133.2, 131.6, 128.7, 128.6, 128.4, 127.7, 127.2, 127.1, 127.0, 126.8, 120.4, 118.9, 118.5, 99.0, 95.9, 62.3, 48.4, 29.2, 13.6 ppm; HRMS (ESI) calcd for $C_{31}H_{29}N_3NaO^+$ $[M+Na]^+$: 482.2202, found: 482.2211.

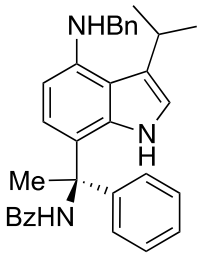


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.836	MM	0.6376	2107.36743	55.08710	47.7804
2	22.123	MM	1.2276	2303.16016	31.26961	52.2196

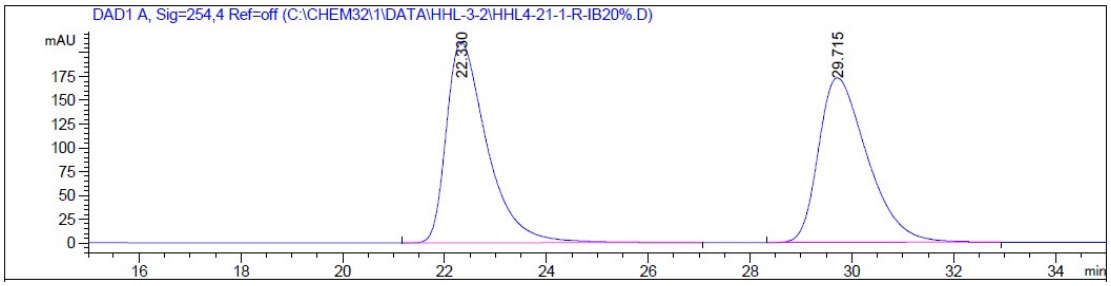


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.886	MM	0.6178	1.21635e4	328.15744	94.3430
2	22.805	MM	1.1762	729.35120	10.33529	5.6570

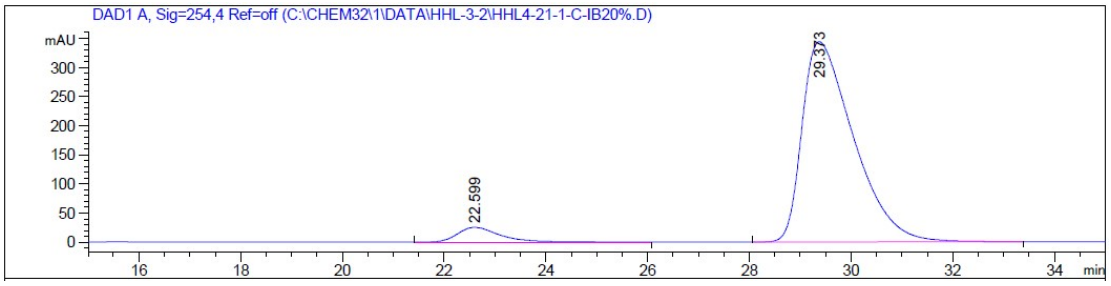
(*R*)-*N*-(1-(4-(benzylamino)-3-isopropyl-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3t)



White foam, 89% yield; 89% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 22.599 min, t_{major} = 29.373 min; $[\alpha]_D^{20}$ = +13.83 (*c* = 0.94 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.31 (s, 1H), 7.69 – 7.60 (m, 2H), 7.42 – 7.34 (m, 3H), 7.33 – 7.25 (m, 6H), 7.25 – 7.14 (m, 4H), 6.96 (d, *J* = 8.1 Hz, 1H), 6.70 (s, 1H), 6.60 (d, *J* = 2.0 Hz, 1H), 6.15 (d, *J* = 8.2 Hz, 1H), 4.78 (s, 1H), 4.39 (s, 2H), 3.17 (dt, *J* = 13.3, 6.7 Hz, 1H), 2.25 (s, 3H), 1.24 (d, *J* = 6.6 Hz, 6H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.1, 144.4, 143.0, 139.6, 135.4, 134.9, 131.5, 128.7, 128.6, 128.4, 127.5, 127.2, 127.0, 126.7, 123.4, 121.4, 118.9, 118.1, 115.7, 99.0, 62.4, 48.5, 28.7, 27.0, 24.7, 24.3 ppm; HRMS (ESI) calcd for $C_{33}H_{33}N_3NaO^+$ $[M+Na]^+$: 510.2516, found: 510.2538.

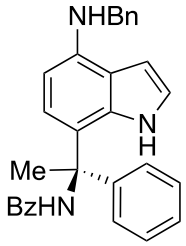


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	22.330	BB	0.8334	1.16848e4	211.20952	50.3487
2	29.715	BB	1.0206	1.15229e4	173.09613	49.6513



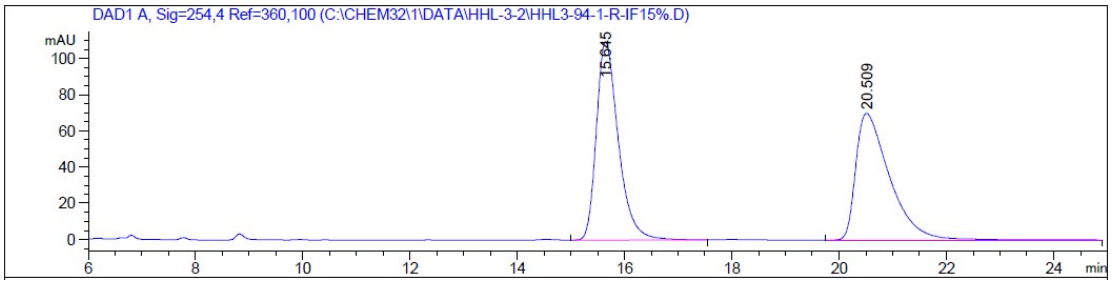
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	22.599	BB	0.8716	1467.72852	25.34419	5.7331
2	29.373	BB	1.0682	2.41331e4	344.12473	94.2669

(*R*)-*N*-(1-(4-(benzylamino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3u)

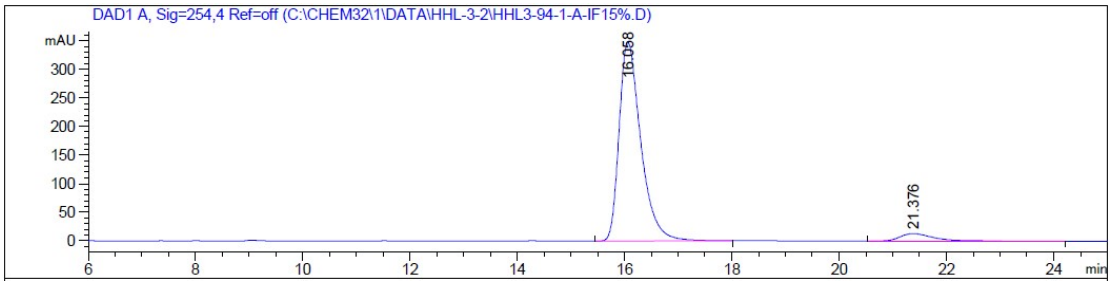


White foam, 80% yield; 89% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 85:15 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 21.376 min, t_{major} = 16.058 min; $[\alpha]_D^{20}$ = -10.91 (c = 0.55 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.80 (s, 1H), 7.79 – 7.66 (m, 2H), 7.51 – 7.42 (m, 3H), 7.42 – 7.33 (m, 6H), 7.33 – 7.23 (m, 4H), 7.12 (d, J = 8.1 Hz, 1H), 6.97 – 6.89 (m, 1H), 6.75 (s, 1H), 6.39 (dd, J = 3.2, 2.1 Hz, 1H), 6.28 (d, J = 8.1 Hz, 1H), 4.50 (s, 2H), 4.39

(s, 1H), 2.32 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 144.2, 141.4, 139.6, 135.3, 133.7, 131.6, 128.7, 128.6, 128.4, 127.7, 127.3, 127.1, 127.0, 126.7, 122.6, 121.4, 119.1, 117.7, 98.7, 98.0, 62.3, 48.4, 29.5 ppm; HRMS (ESI) calcd for $C_{30}H_{27}N_3NaO^+$ $[M+Na]^+$: 468.2046, found: 468.2062.

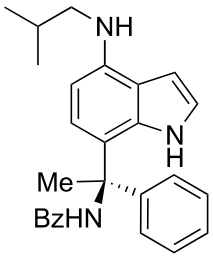


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.645	BB	0.4321	3120.94409	109.63330	50.3409
2	20.509	BBA	0.6606	3078.66992	70.07137	49.6591

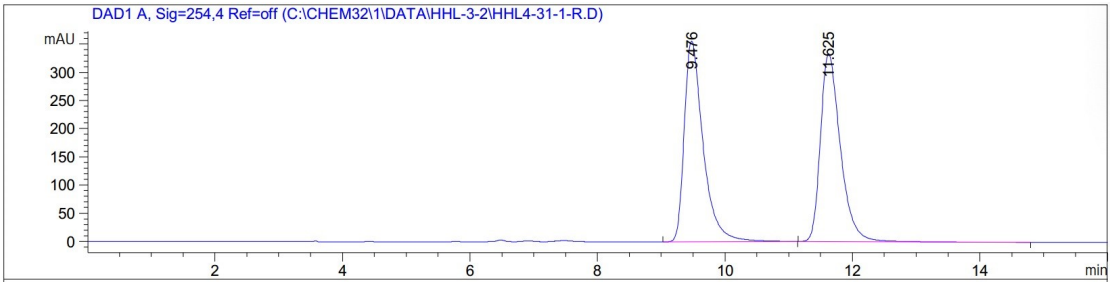


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.058	BB	0.4259	9794.70117	348.50870	94.3502
2	21.376	BB	0.6631	586.51819	13.33529	5.6498

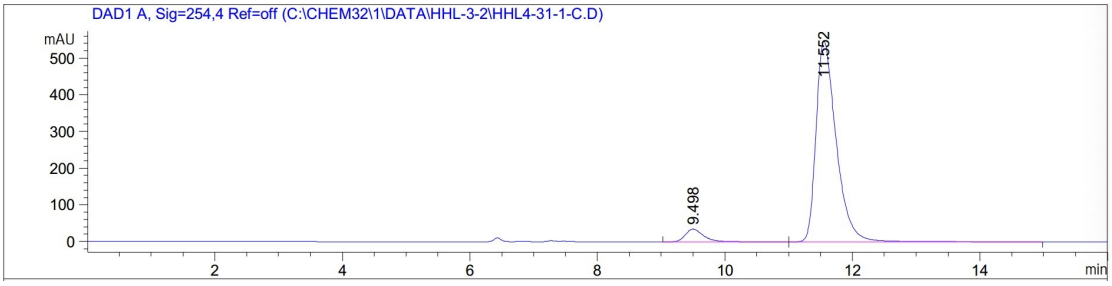
(*R*)-*N*-(1-(4-(isobutylamino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3v)



White foam, 87% yield; 89% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 9.498 min, t_{major} = 11.552 min; $[\alpha]_D^{20}$ = -37.23 (c = 0.52 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.74 (s, 1H), 7.73 (d, J = 7.4 Hz, 2H), 7.51 – 7.44 (m, 1H), 7.43 – 7.33 (m, 4H), 7.33 – 7.22 (m, 3H), 7.14 (d, J = 8.0 Hz, 1H), 6.92 (t, J = 2.7 Hz, 1H), 6.76 (s, 1H), 6.39 (s, 1H), 6.26 (d, J = 8.0 Hz, 1H), 4.08 (s, 1H), 3.11 (d, J = 6.7 Hz, 2H), 2.33 (s, 3H), 2.08 – 1.95 (m, 1H), 1.04 (d, J = 6.6 Hz, 6H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 144.3, 141.8, 135.3, 133.7, 131.5, 128.6, 128.4, 127.0, 127.0, 126.7, 122.4, 121.5, 118.4, 117.6, 98.2, 97.9, 62.3, 51.7, 29.4, 28.2, 20.7 ppm; HRMS (ESI) calcd for $C_{27}H_{30}N_3O^+$ $[M+H]^+$: 412.2383, found: 412.2390.

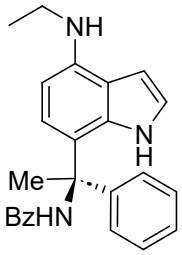


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.476	BB	0.3105	7336.43115	355.90085	50.3874
2	11.625	BB	0.3289	7223.60938	333.28308	49.6126

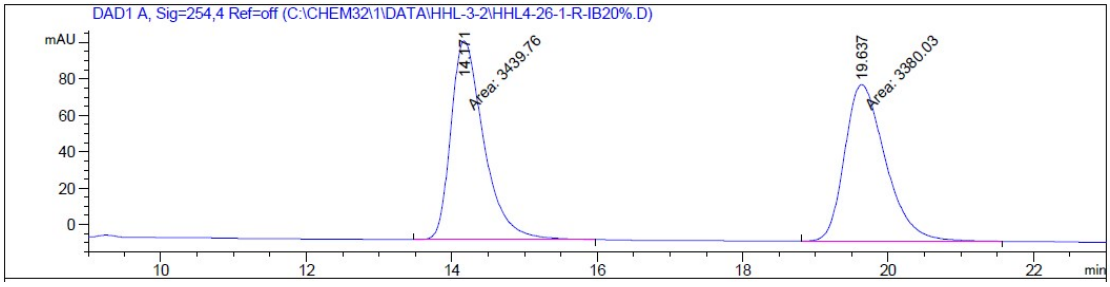


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.498	BB	0.3039	699.40833	34.89292	5.4850
2	11.552	BB	0.3347	1.20519e4	547.84796	94.5150

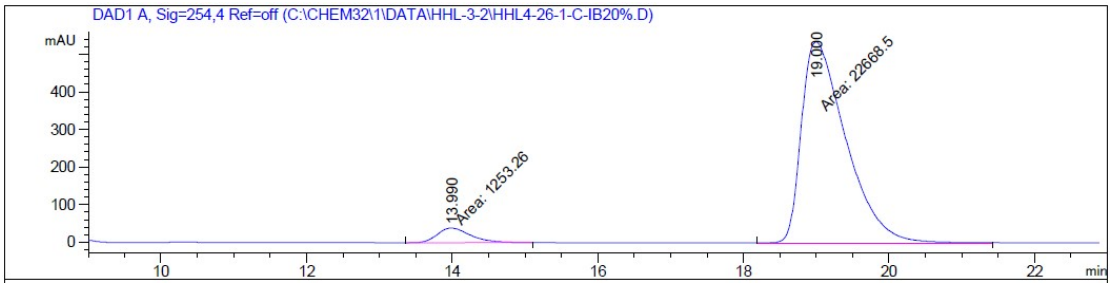
(*R*)-*N*-(1-(4-(ethylamino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3w)



White foam, 85% yield; 90% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 13.990 min, t_{major} = 19.000 min; $[\alpha]_D^{20}$ = -8.87 (*c* = 0.68 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.67 (s, 1H), 7.71 – 7.58 (m, 2H), 7.43 – 7.35 (m, 1H), 7.34 – 7.25 (m, 4H), 7.25 – 7.14 (m, 3H), 7.07 (d, *J* = 8.0 Hz, 1H), 6.88 – 6.79 (m, 1H), 6.69 (s, 1H), 6.34 – 6.26 (m, 1H), 6.20 (d, *J* = 8.1 Hz, 1H), 3.85 (s, 1H), 3.26 (q, *J* = 7.1 Hz, 2H), 2.26 (s, 3H), 1.28 (t, *J* = 7.1 Hz, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 144.3, 141.7, 135.3, 133.7, 131.5, 128.6, 128.4, 127.0, 127.0, 126.7, 122.5, 121.5, 118.7, 117.6, 98.3, 98.0, 62.3, 38.4, 29.4, 15.1 ppm; HRMS (ESI) calcd for $C_{25}H_{25}N_3NaO^+$ $[M+Na]^+$: 406.1890, found: 406.1890.

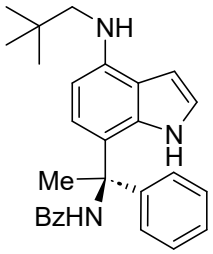


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	14.171	MM	0.5247	3439.75830	109.25144	50.4379
2	19.637	MM	0.6540	3380.03125	86.13779	49.5621

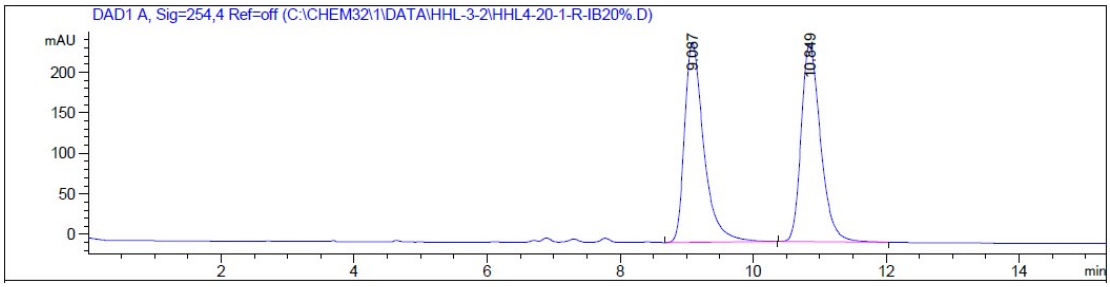


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	13.990	MM	0.5317	1253.26440	39.28506	5.2390
2	19.000	MM	0.7057	2.26685e4	535.36603	94.7610

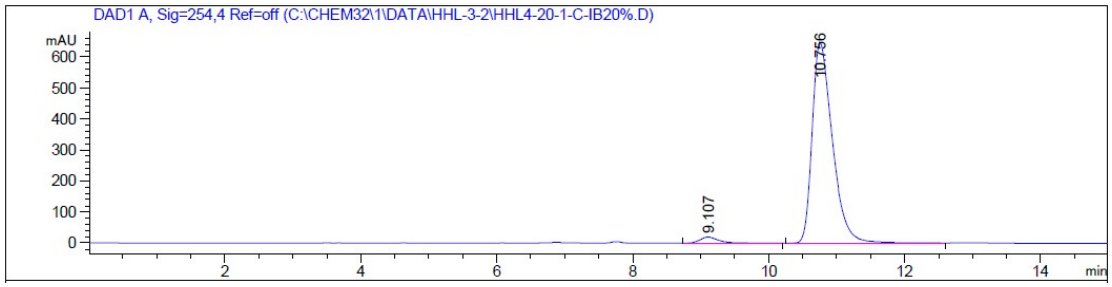
(*R*)-*N*-(1-(4-(*tert*-butylamino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3x)



White foam, 87% yield; 95% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 9.107 min, t_{major} = 10.756 min; $[\alpha]_D^{20}$ = -14.79 (*c* = 0.68 in $CHCl_3$); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.68 (s, 1H), 7.65 (d, *J* = 7.4 Hz, 2H), 7.39 (t, *J* = 7.2 Hz, 1H), 7.35 – 7.25 (m, 4H), 7.25 – 7.15 (m, 3H), 7.07 (d, *J* = 8.1 Hz, 1H), 6.89 – 6.81 (m, 1H), 6.68 (s, 1H), 6.32 (s, 1H), 6.21 (d, *J* = 8.1 Hz, 1H), 3.95 (s, 1H), 3.00 (s, 2H), 2.26 (s, 3H), 0.99 (s, 9H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.9, 143.3, 141.2, 134.3, 132.6, 130.5, 127.6, 127.3, 126.0, 125.9, 125.7, 121.4, 120.4, 117.3, 116.5, 97.0, 96.8, 61.3, 54.5, 30.9, 28.4, 26.7 ppm; HRMS (ESI) calcd for $C_{28}H_{32}N_3O^+$ $[M+H]^+$: 426.2540, found: 426.2521.

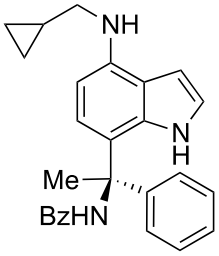


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.087	BB	0.3042	4955.52539	246.89923	50.1591
2	10.849	BB	0.3095	4924.09717	243.89355	49.8409



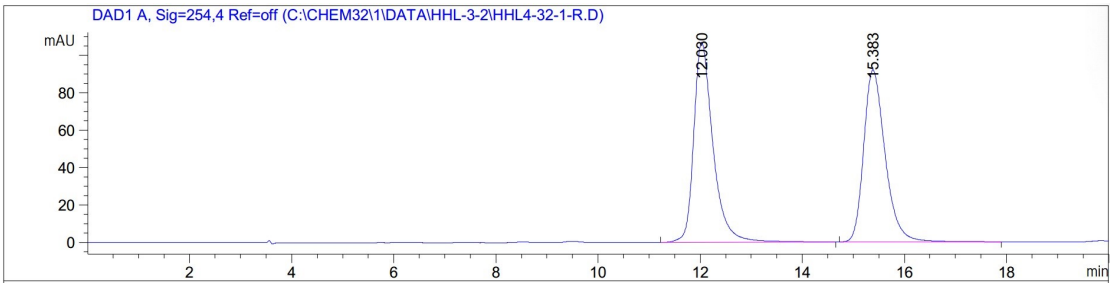
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.107	BB	0.2930	368.63385	19.11131	2.6853
2	10.756	BB	0.3148	1.33593e4	647.28369	97.3147

(*R*)-*N*-(1-(4-((cyclopropylmethyl)amino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3y)

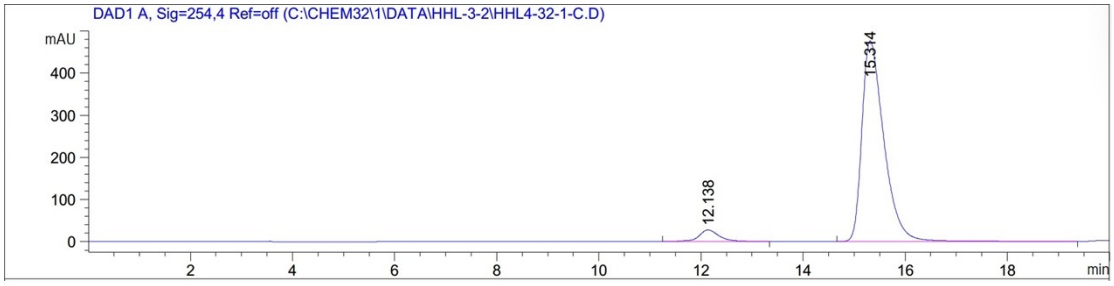


White foam, 90% yield; 90% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 12.138 min, t_{major} = 15.314 min; $[\alpha]_D^{20}$ = -27.63 (*c* = 0.43 in $CHCl_3$);

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.75 (s, 1H), 7.77 – 7.68 (m, 2H), 7.50 – 7.43 (m, 1H), 7.42 – 7.33 (m, 4H), 7.33 – 7.23 (m, 3H), 7.14 (d, *J* = 8.1 Hz, 1H), 6.96 – 6.89 (m, 1H), 6.76 (s, 1H), 6.43 (dd, *J* = 3.1, 2.1 Hz, 1H), 6.25 (d, *J* = 8.1 Hz, 1H), 4.15 (s, 1H), 3.13 (d, *J* = 6.9 Hz, 2H), 2.33 (s, 3H), 1.29 – 1.16 (m, 1H), 0.65 – 0.53 (m, 2H), 0.29 (q, *J* = 4.6 Hz, 2H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 144.3, 141.7, 135.3, 133.7, 131.6, 128.6, 128.4, 127.0, 127.0, 126.7, 122.5, 121.4, 118.7, 117.6, 98.3, 98.1, 62.3, 49.0, 29.4, 11.0, 3.6 ppm; HRMS (ESI) calcd for $C_{27}H_{28}N_3O^+$ $[M+H]^+$: 410.2226, found: 410.2223.

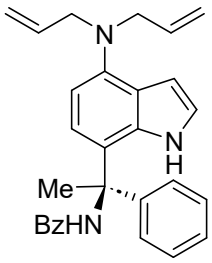


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.030	BB	0.3951	2814.62036	106.92809	51.1489
2	15.383	BB	0.4470	2688.18042	91.96286	48.8511

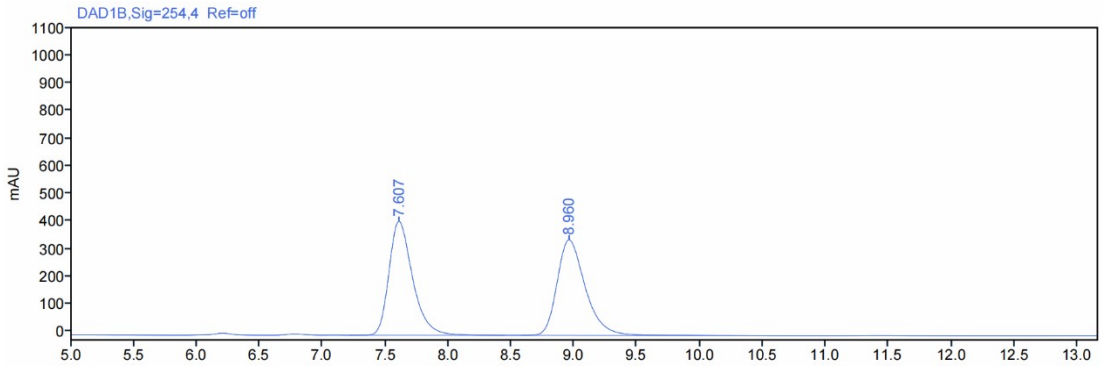


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	12.138	BB	0.4064	747.89044	27.40690	4.9939
2	15.314	BB	0.4545	1.42281e4	476.37952	95.0061

(*R*)-*N*-(1-(4-(diallylamino)-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3z)

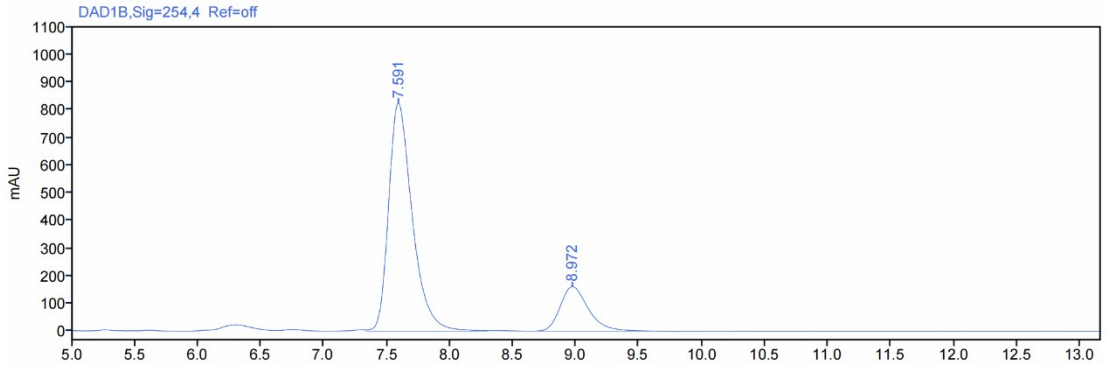


White foam, 33% yield; 62% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IF, hexane/i-PrOH = 80:20 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 8.972 min, t_{major} = 7.591 min; $[\alpha]_D^{20}$ = +25.86 (c = 0.29 in $CHCl_3$); ^1H NMR (400 MHz, $CDCl_3$) δ 8.79 (s, 1H), 7.81 – 7.75 (m, 2H), 7.56 – 7.49 (m, 1H), 7.47 – 7.31 (m, 7H), 7.14 (d, J = 8.1 Hz, 1H), 6.98 (t, J = 2.9 Hz, 1H), 6.82 (s, 1H), 6.61 (t, J = 2.6 Hz, 1H), 6.55 (d, J = 8.1 Hz, 1H), 6.00 (ddt, J = 17.1, 10.4, 5.3 Hz, 2H), 5.40 – 5.22 (m, 4H), 4.05 (d, J = 5.3 Hz, 4H), 2.39 (s, 3H) ppm; ^{13}C NMR (100 MHz, $CDCl_3$) δ 167.0, 144.6, 144.1, 135.2, 135.2, 134.6, 131.6, 128.6, 128.4, 127.1, 126.9, 126.7, 122.4, 120.8, 120.7, 120.7, 116.7, 105.6, 101.5, 62.3, 53.9, 29.1 ppm; HRMS (ESI) calcd for $C_{29}H_{30}N_3O^+$ $[M+H]^+$: 436.2384, found: 436.2390.



Signal: DAD1B,Sig=254,4 Ref=off

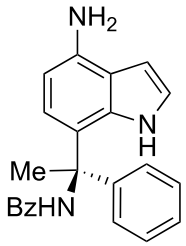
Peak #	RT [min]	Type	Width [min]	Area	Height	Area%
1	7.607	BB	1.24	5394.61	412.66	50.00
2	8.960	BB	2.11	5393.62	345.96	50.00



Signal: DAD1B,Sig=254,4 Ref=off

Peak #	RT [min]	Type	Width [min]	Area	Height	Area%
1	7.591	VV	0.96	10758.43	824.38	81.18
2	8.972	BB	1.17	2493.77	160.72	18.82

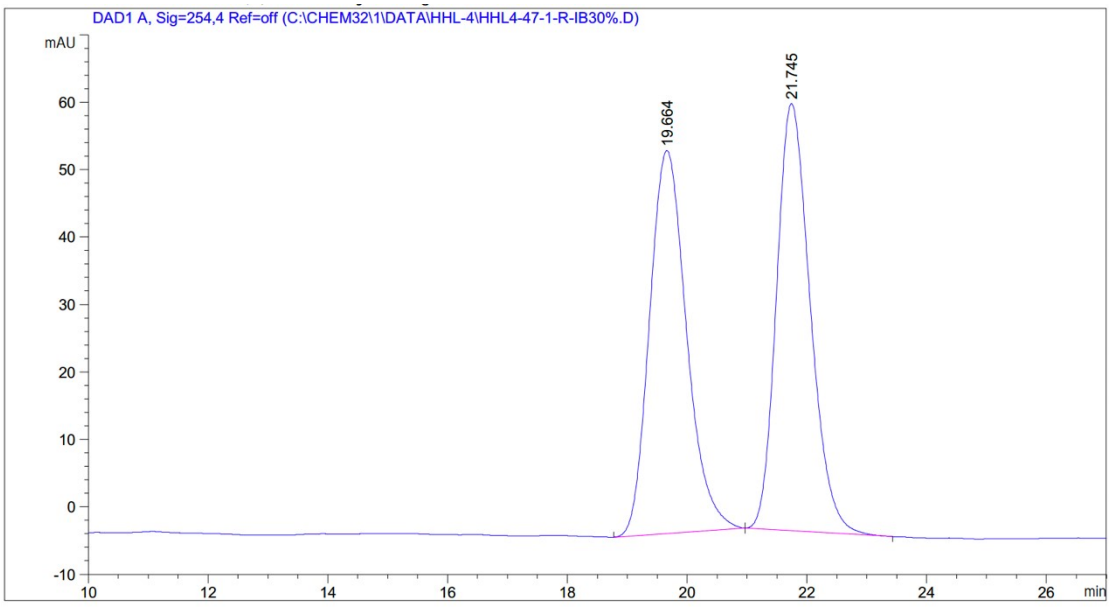
(*R*)-*N*-(1-(4-amino-1*H*-indol-7-yl)-1-phenylethyl)benzamide (3aa)



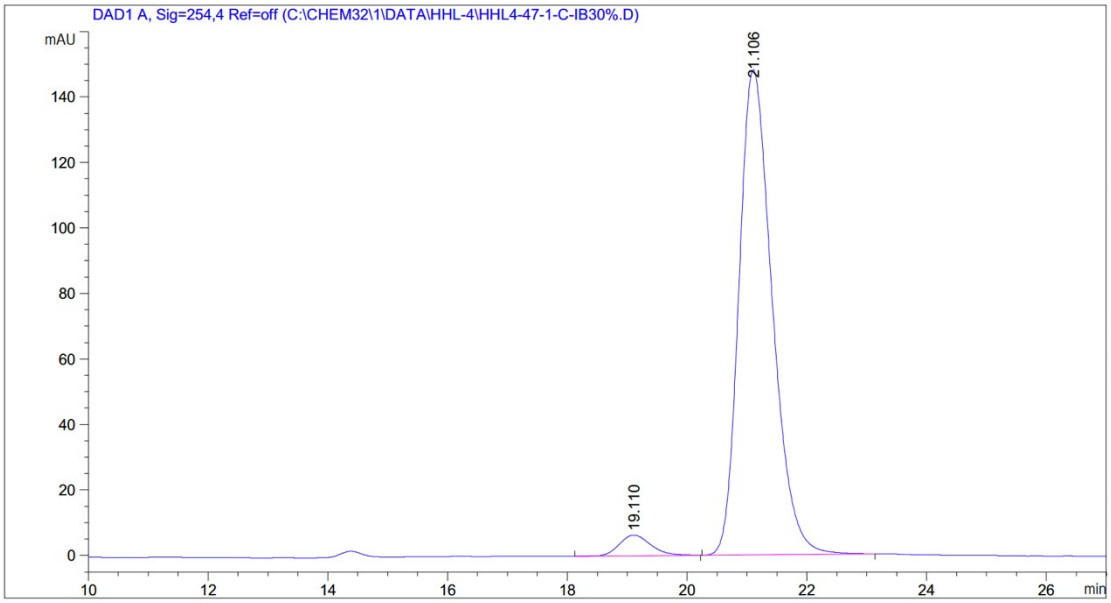
The **3a** (48 mg, 0.1 mmol) was dissolved in methanol (2.0 mL), palladium (10% on carbon, 5 mg) and ammonium formate was (32.0 mg, 0.5 mmol) added. The mixture was heated in an oil bath to flux for 1 h. After completion, the reaction mixture was then filtered off through Celite, the residue was washed with methanol and the filtrate was concentrated and purified by silica gel chromatography (Petroleum ether/EtOAc = 2:1) to give the corresponding product **3aa**.

White foam, 94% yield; 92% ee. The enantiomeric excess was determined by HPLC (Daicel Chiralpak IB, hexane/i-PrOH = 70:30 (v/v), λ = 254 nm, flow rate = 1.0 mL/min): t_{minor} = 19.110 min, t_{major} = 21.106 min; $[\alpha]_D^{20}$ = -27.63 (*c* = 0.43 in $CHCl_3$); ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.72 (s, 1H), 7.69 – 7.64 (m, 2H), 7.40 (t, *J* = 7.4 Hz, 1H), 7.32 (t, *J* = 7.6 Hz, 2H), 7.28 – 7.22 (m, 4H), 7.20 (d, *J* = 7.1 Hz, 1H), 7.05 (d, *J* = 7.9 Hz, 1H), 6.89 (s, 1H), 6.69 (s, 1H), 6.48 (d, *J* = 7.9 Hz, 1H), 6.42 (t, *J* = 2.7 Hz, 1H), 2.26 (s, 3H) ppm; ^{13}C NMR (150 MHz, $CDCl_3$) δ 166.0, 143.3, 138.6, 134.3, 133.1, 130.5, 127.6, 127.4, 126.1, 125.9, 125.7, 121.9, 120.2, 118.8, 117.4, 102.3, 97.4,

61.3, 28.3 ppm; HRMS (ESI) calcd for $C_{23}H_{21}N_3NaO^+$ $[M+Na]^+$: 378.1577, found:378.1572.



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.664	BB	0.6679	2432.59644	56.77214	49.5918
2	21.745	BB	0.6054	2472.64722	63.34358	50.4082



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	19.110	BB	0.5715	233.71722	6.34810	3.9438
2	21.106	BB	0.5922	5692.43652	148.18576	96.0562

4. Determination of the absolute configuration of 3a by X-ray crystallography

Crystals of **3a** were formed by slow evaporation of a mixture of minimal ethyl acetate and an appropriate amount of hexane at room temperature. Single crystals suitable for X-ray diffraction were selected and mounted in inert oil and their X-ray diffraction intensity data was collected at 160 K on a Rigaku XtaLAB FRX diffractometer equipped with a Hypix6000HE detector, using Cu Kα radiation (λ = 1.54184 Å) under the program CrysAlisPro.

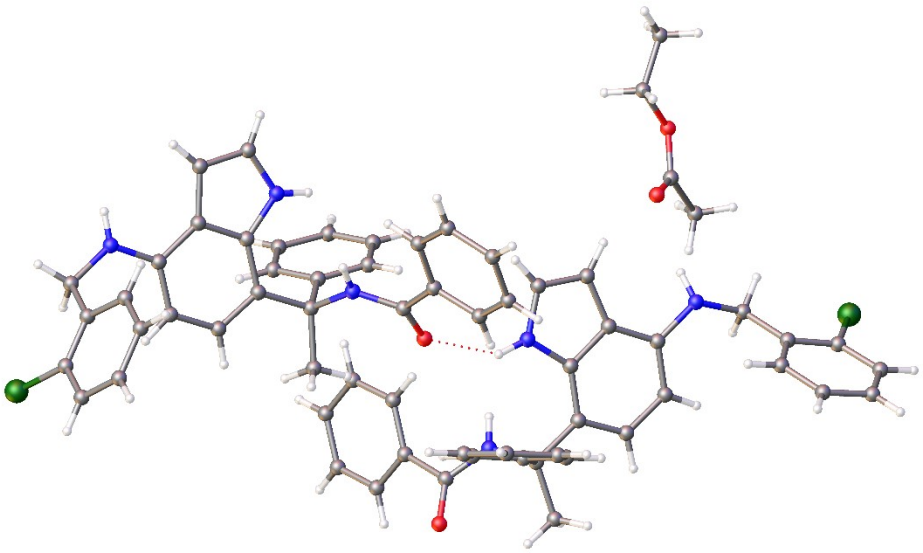


Figure S1: Molecular structure of **3a**-dimer with one equivalent ethyl acetate (EA) solvent obtained by single-crystal X-ray diffraction studies with the ellipsoid contour at 50% probability levels.

Identification code	CCDC 2027306
Empirical formula	$C_{64}H_{60}Cl_2N_6O_4$
Formula weight	1048.133
Temperature/K	159.99(10)
Crystal system	monoclinic

Space group	$P2_1$
a/Å	8.4767(1)
b/Å	34.4041(2)
c/Å	9.54320(1)
α/°	90
β/°	99.5370(1)
γ/°	90
Volume/Å^3	2744.65(5)
Z	2
ρ_{calc}g/cm^3	1.268
μ/mm^{-1}	1.496
F(000)	1108.8
Crystal size/mm^3	0.2 × 0.2 × 0.15
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	5.14 to 150.3
Index ranges	$-10 \leq h \leq 10$, $-42 \leq k \leq 42$, $-11 \leq l \leq 11$
Reflections collected	52565
Independent reflections	10988 [R_{int} = 0.0314, R_{sigma} = 0.0219]
Data/restraints/parameters	10988/7/714
Goodness-of-fit on F^2	1.042
Final R indexes [I>=2σ (I)]	R_1 = 0.0398, wR_2 = 0.1099
Final R indexes [all data]	R_1 = 0.0415, wR_2 = 0.1127
Largest diff. peak/hole / e Å^{-3}	0.60/-0.43
Flack parameter	-0.003(4)

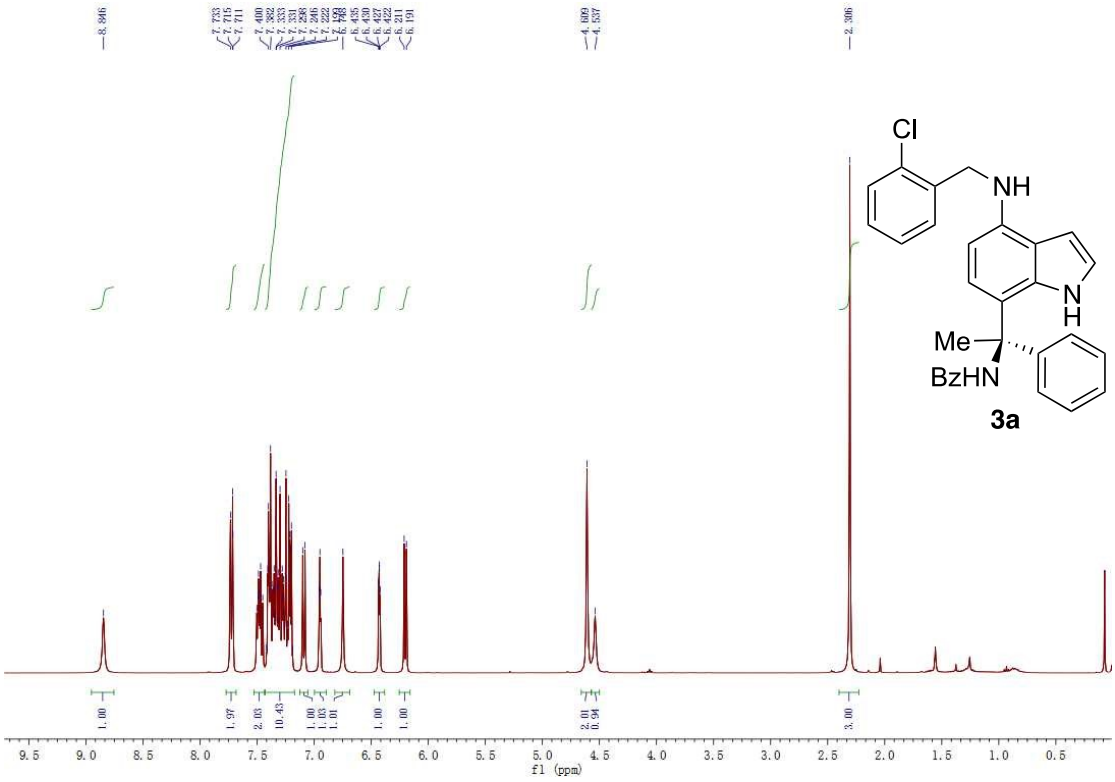
5. References

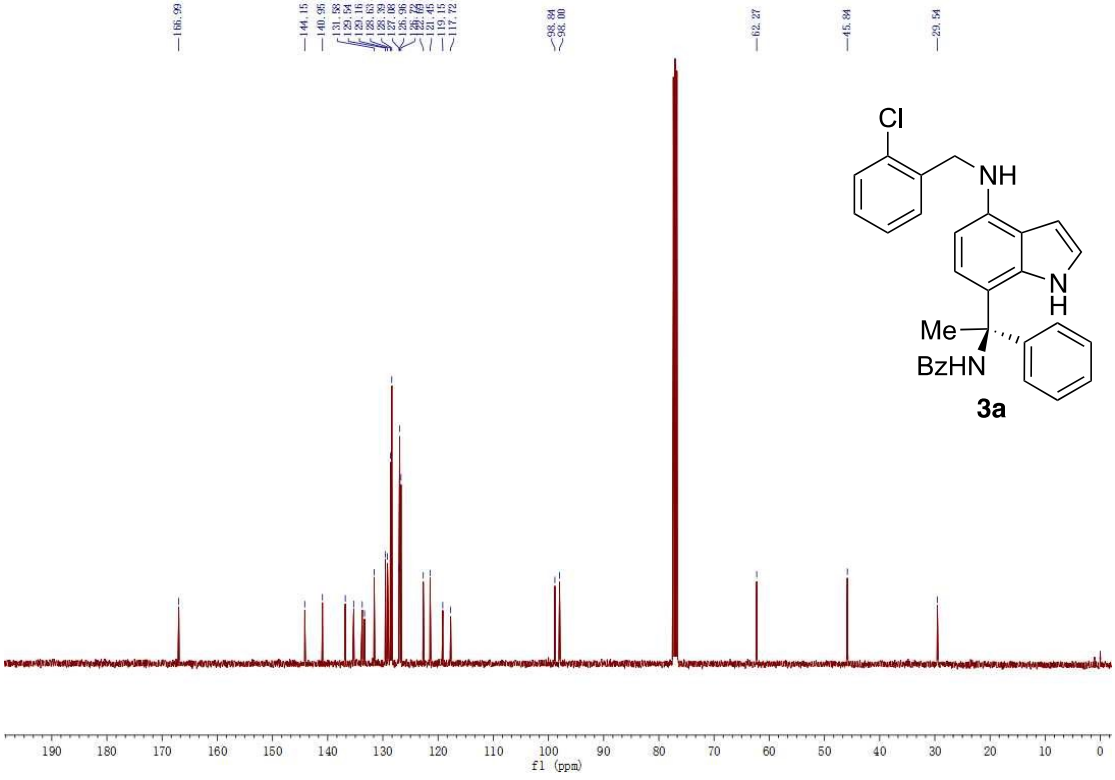
[1] a) M. Bartoszek, M. Beller, J. Deutsch, M. Klawonn, A. Köckritz, N. Nemati, A. Pews-Davtyan, *Tetrahedron* **2008**, *64*, 1316-1322; b) J. Jiang, J. Yu, X.-X. Sun, Q.-Q. Rao, L.-Z. Gong, *Angew. Chem. Int. Ed.* **2008**, *47*, 2458-2462; c) M. Rueping, E. Sugiono, F. Schoepke, *Synlett* **2010**, *2010*, 852-865.

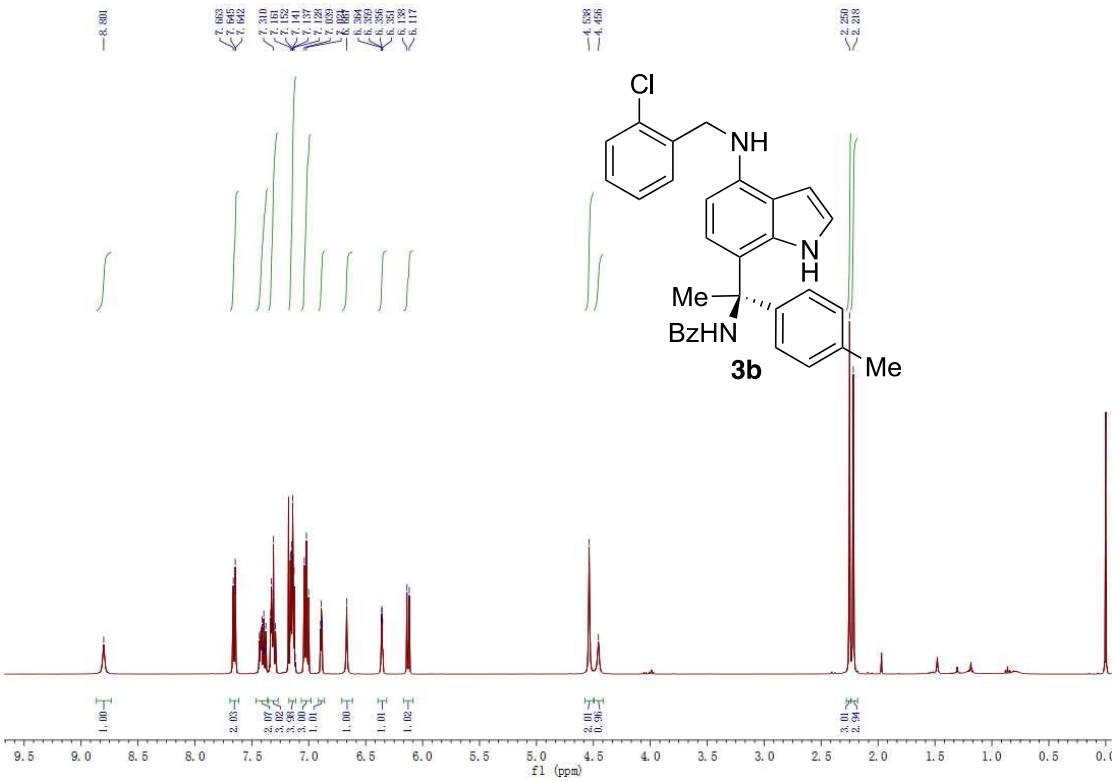
[2] a) H. Kiyohara, R. Matsubara, S. Kobayashi, *Org. Lett.* **2006**, *8*, 5333-5335; b) R. Matsubara, N. Kawai, S. Kobayashi, *Angew. Chem. Int. Ed.* **2006**, *45*, 3814-3816; c) R. Matsubara, Y. Nakamura, S. Kobayashi, *Angew. Chem. Int. Ed.* **2004**, *43*, 1679-1681; d) L. Tang, X.-M. Li, J. H. Matuska, Y.-H. He, Z. Guan, *Org. Lett.* **2018**, *20*, 5618-5621.

[3] a) L. Gremaud, A. Alexakis, *Angew. Chem. Int. Ed.* **2012**, *51*, 794-797; b) Q. Meng, L. Zhu, Z. Zhang, *J. Org. Chem.* **2008**, *73*, 7209-7212; c) V. Thangavel, A. Chadha, *Tetrahedron* **2007**, *63*, 4126-4133; d) W. Xun, B. Xu, B. Chen, S.-S. Meng, A. S. C. Chan, F. G. Qiu, J.-L. Zhao, *Org. Lett.* **2018**, *20*, 590-593; e) J. Zhou, B. Li, F. Hu, B.-F. Shi, *Org. Lett.* **2013**, *15*, 3460-3463.

6. ^{1}H-NMR, ^{13}C-NMR Spectra



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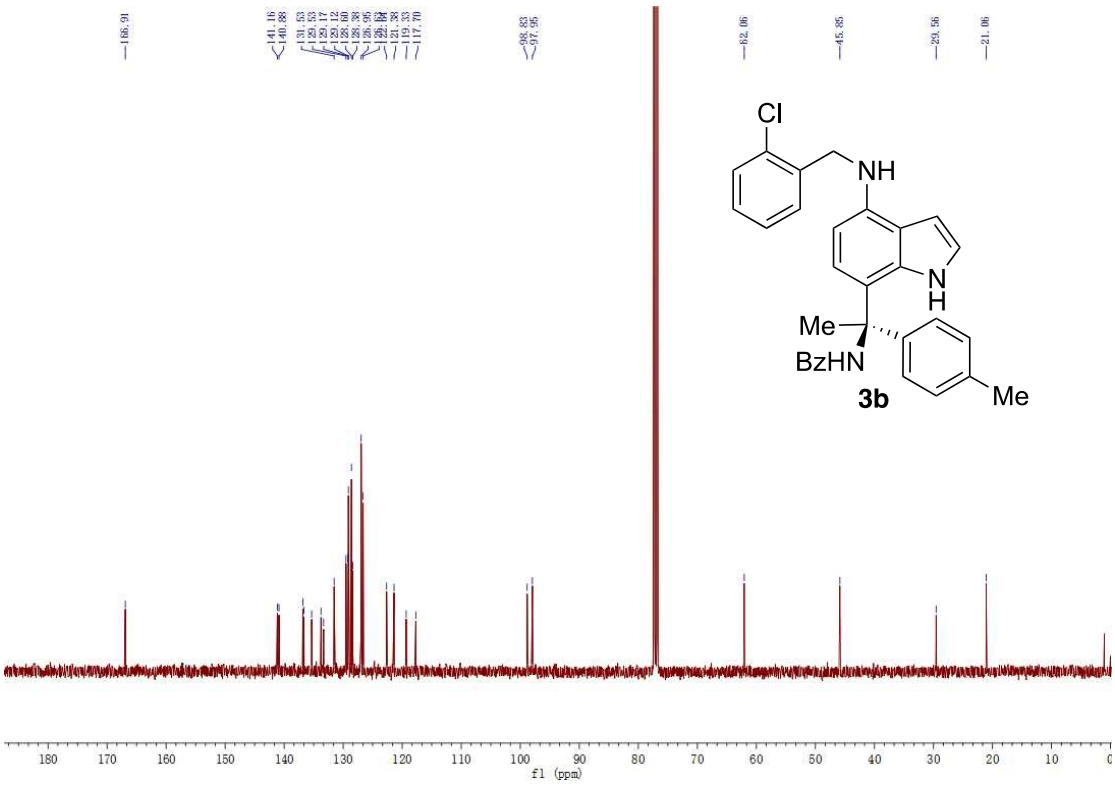
NH
N
H
Me
BzHN
3b
Me
f1 (ppm)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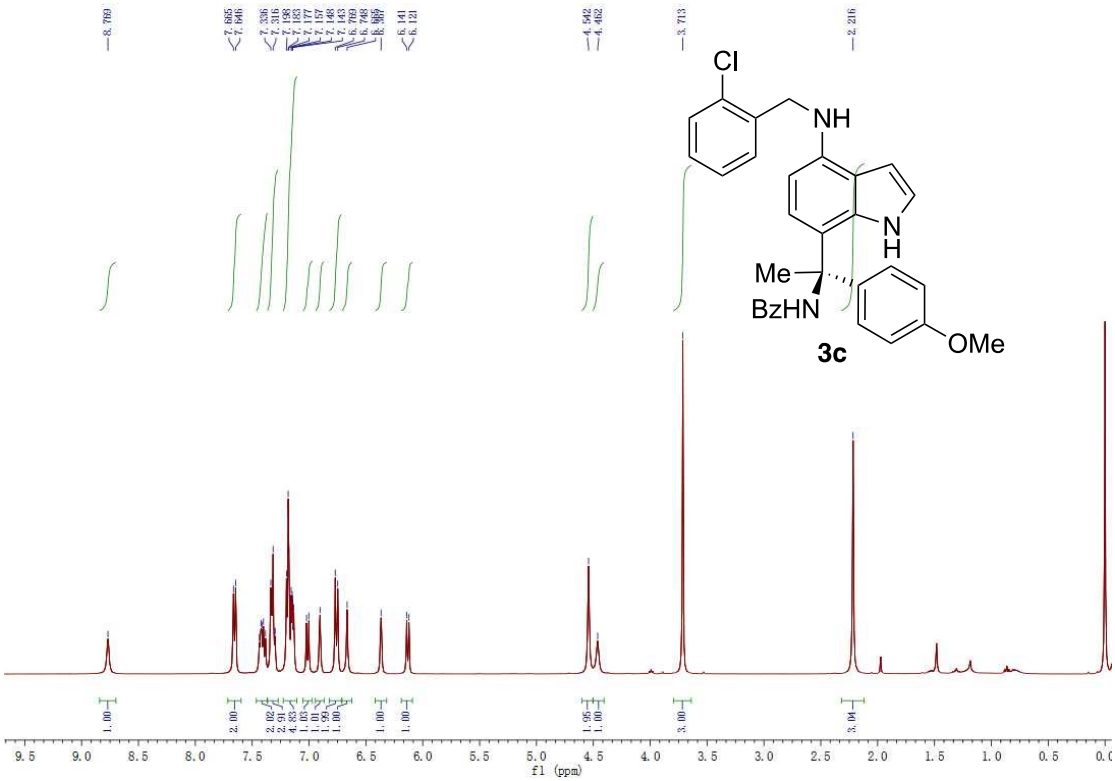
NH
N
H
Me
BzHN
3b
Me
f1 (ppm)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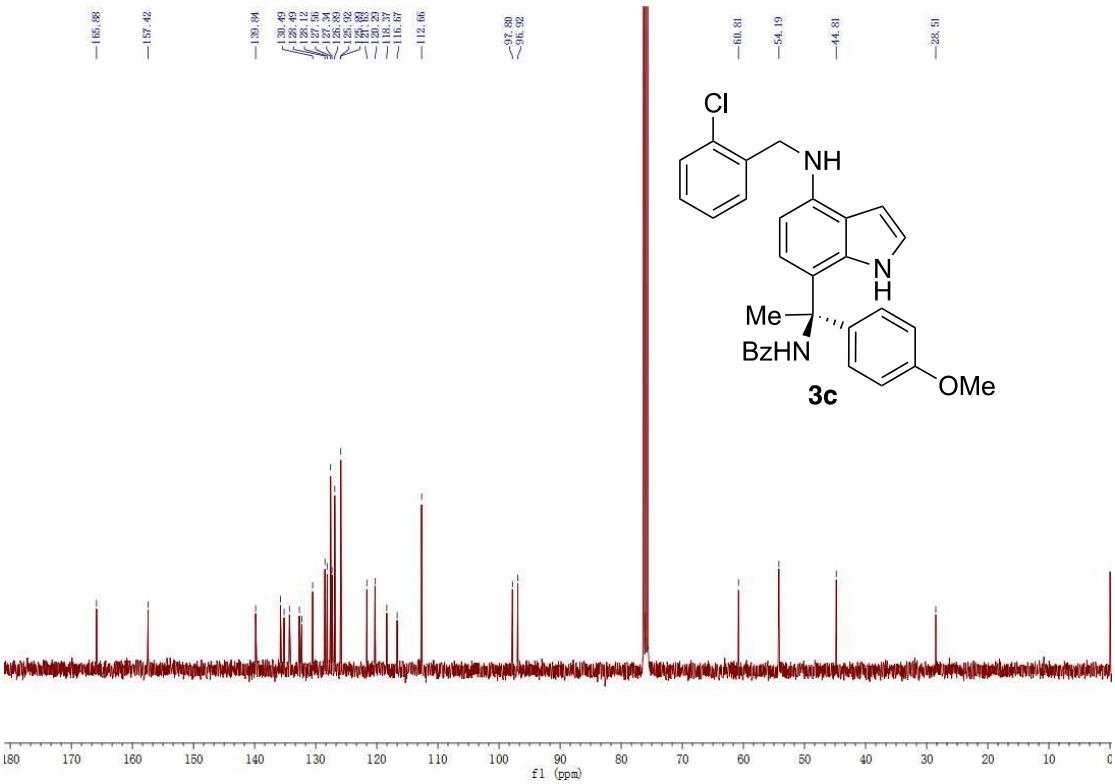
OMe
3c
f1 (ppm)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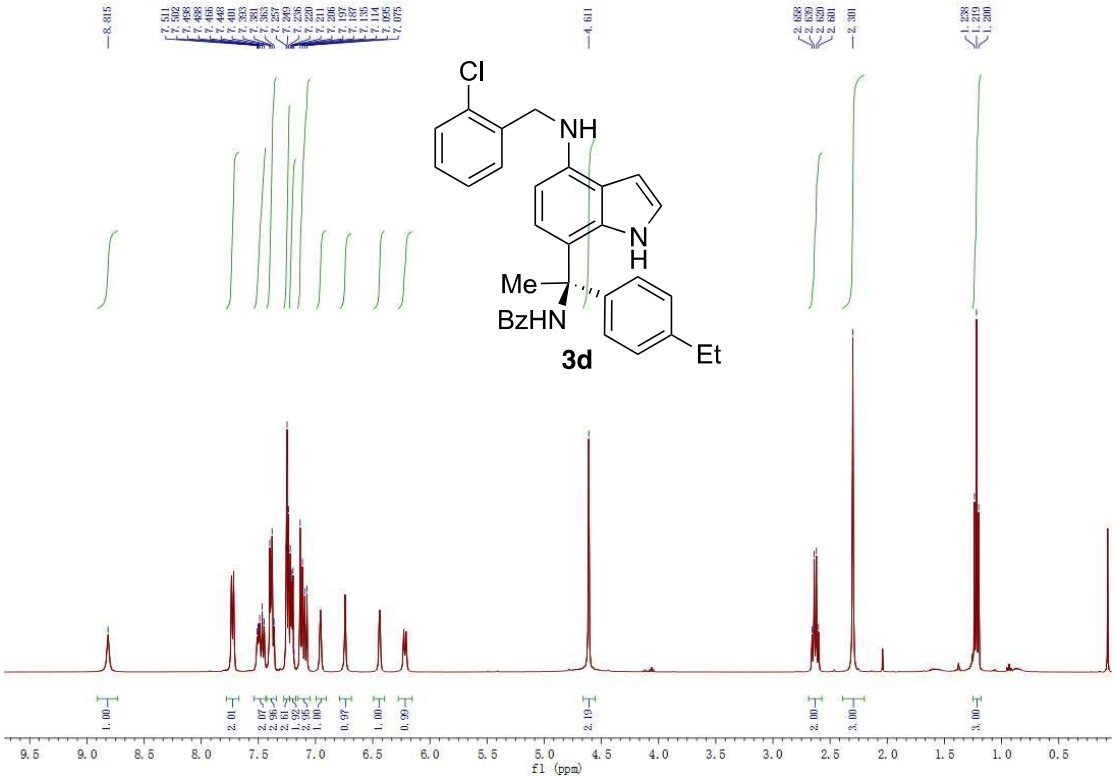
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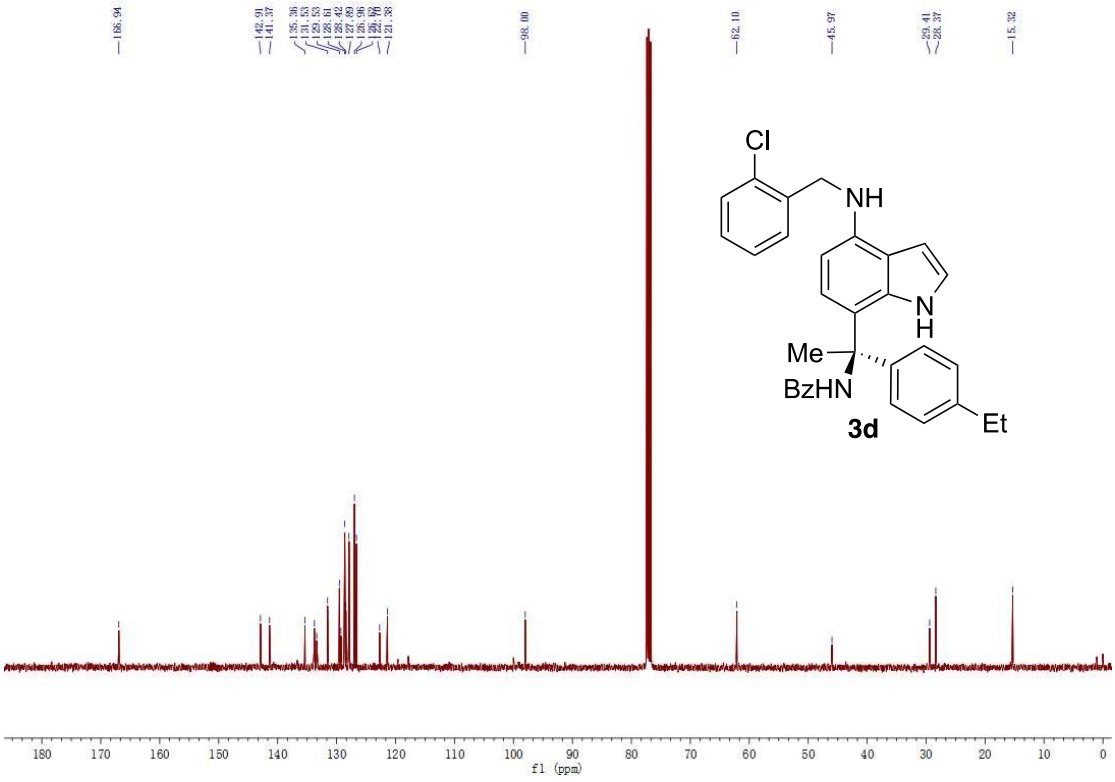
Et
3d
f1 (ppm)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H
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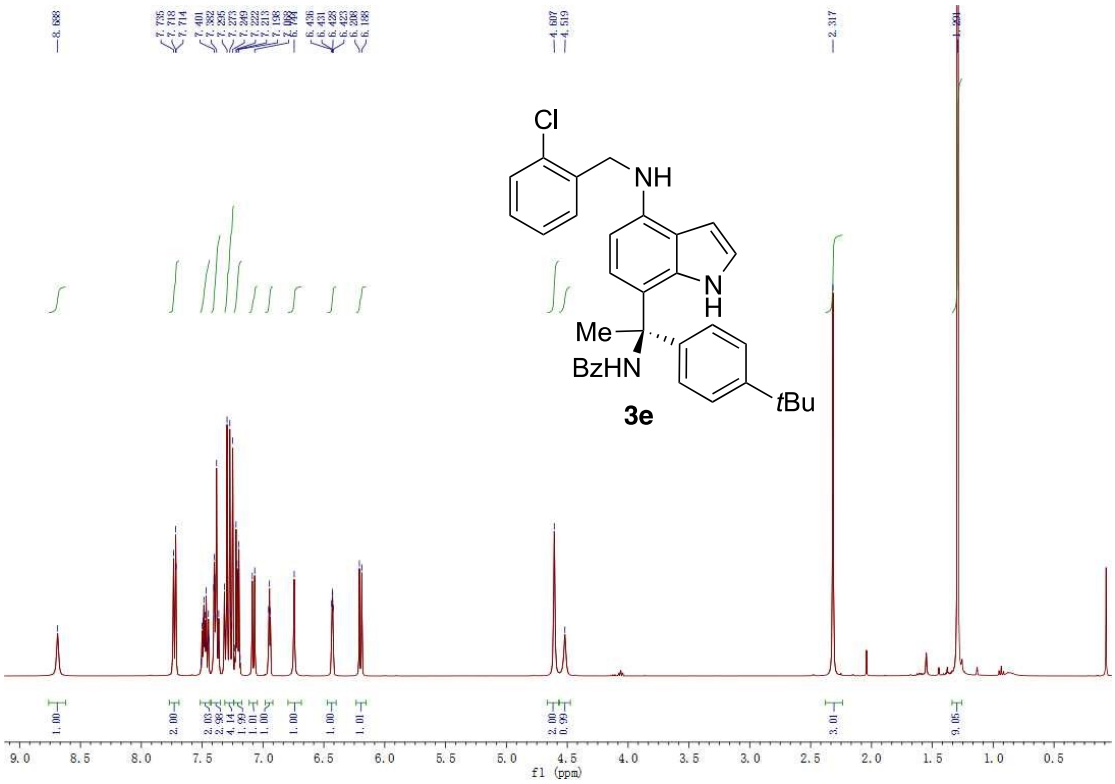
BzHN
Et
3d
f1 (ppm)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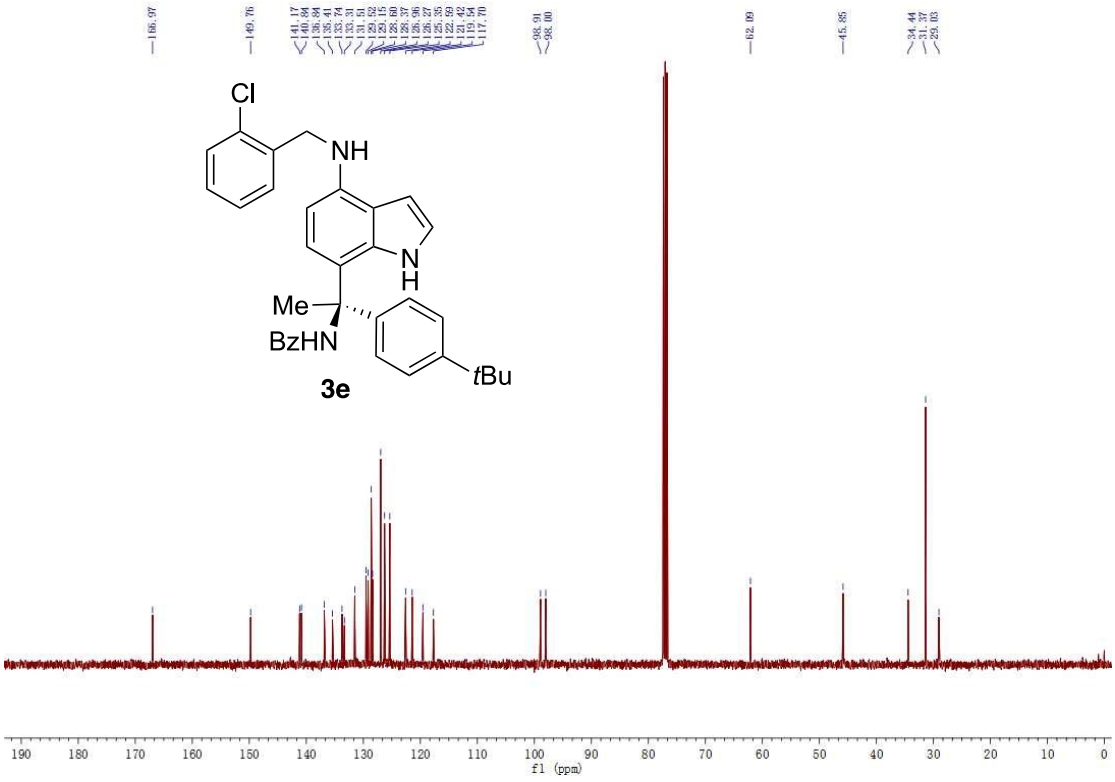
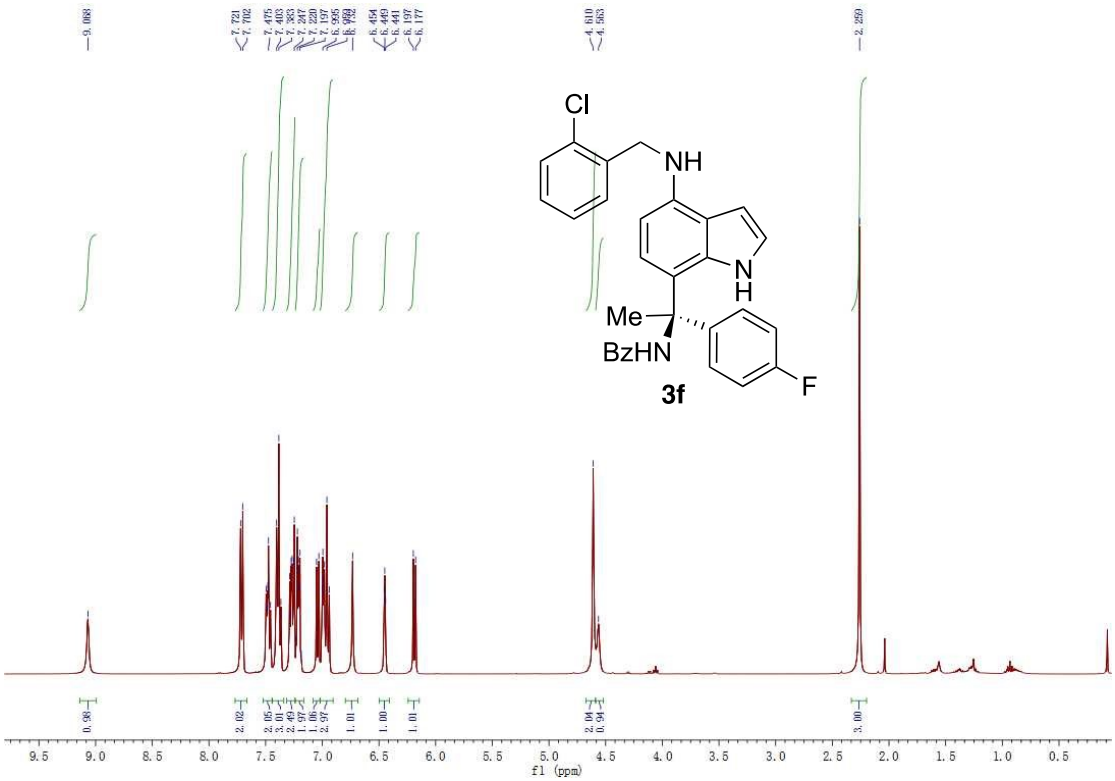
NH
N
H
Me
BzHN
tBu
3e
f1 (ppm)


Cl
NH
N
H
Me
BzHN
tBu
3e
f1 (ppm)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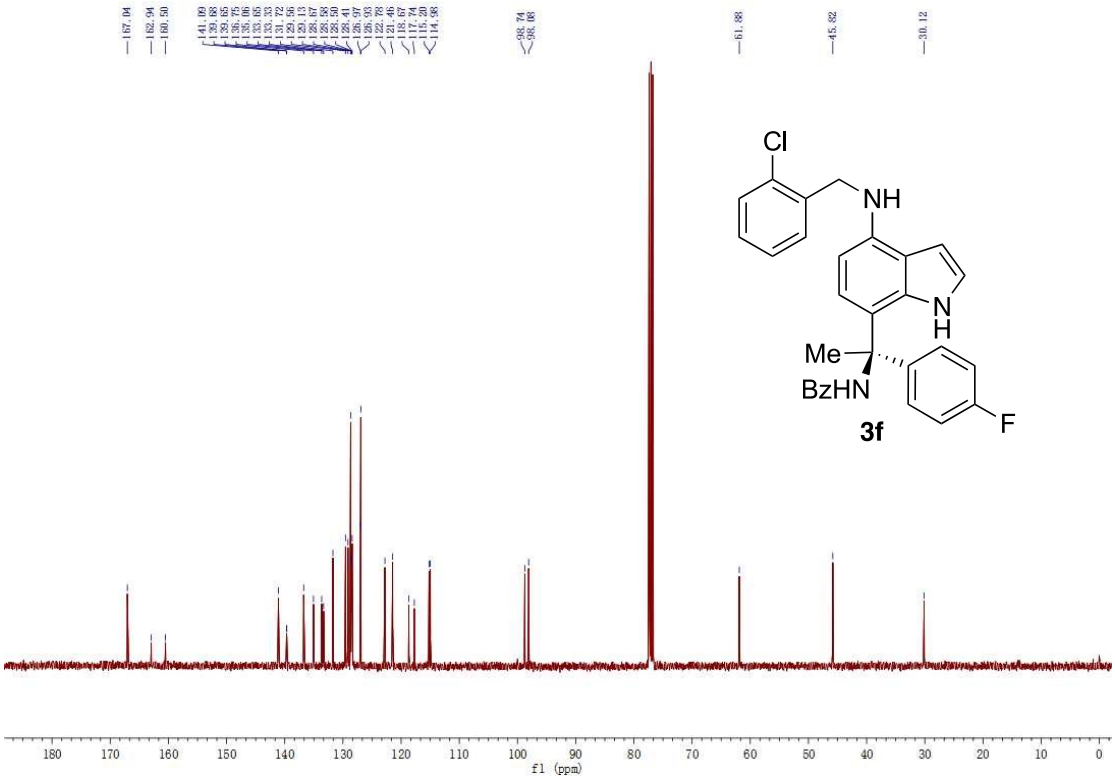
NH
N
H
Me
BzHN
F
3f
f1 (ppm)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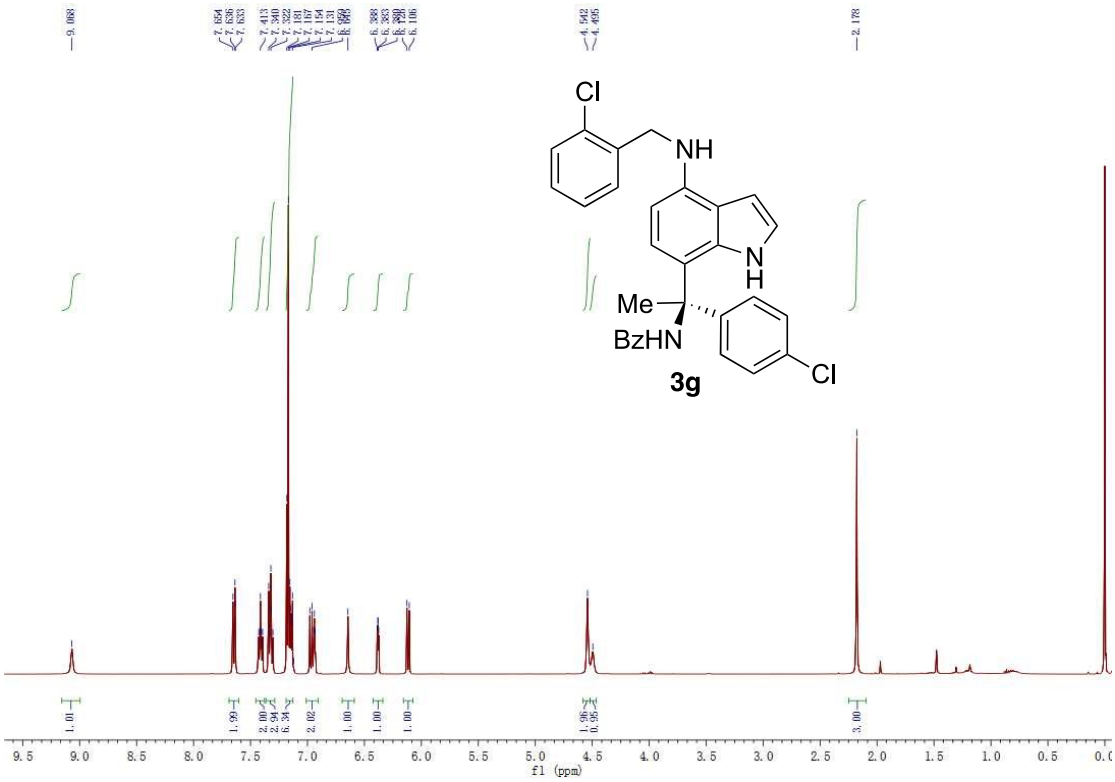
NH
N
H
Me
BzHN
F
3f
f1 (ppm)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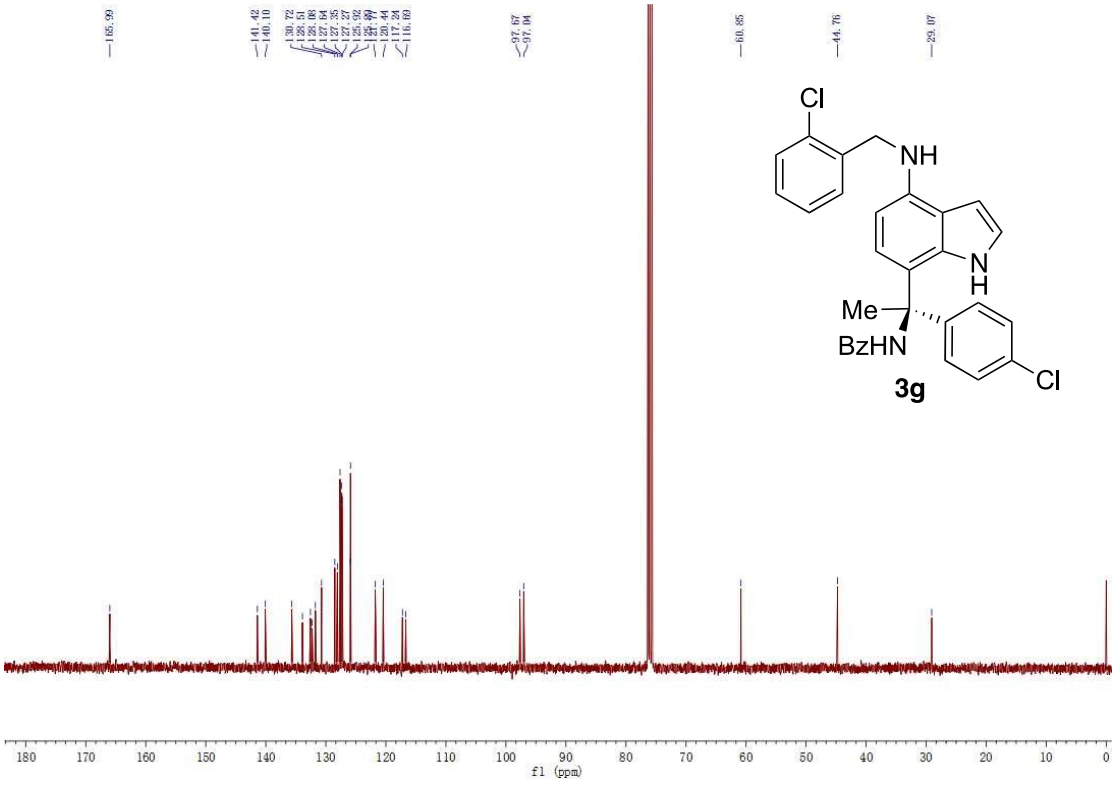
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Cl
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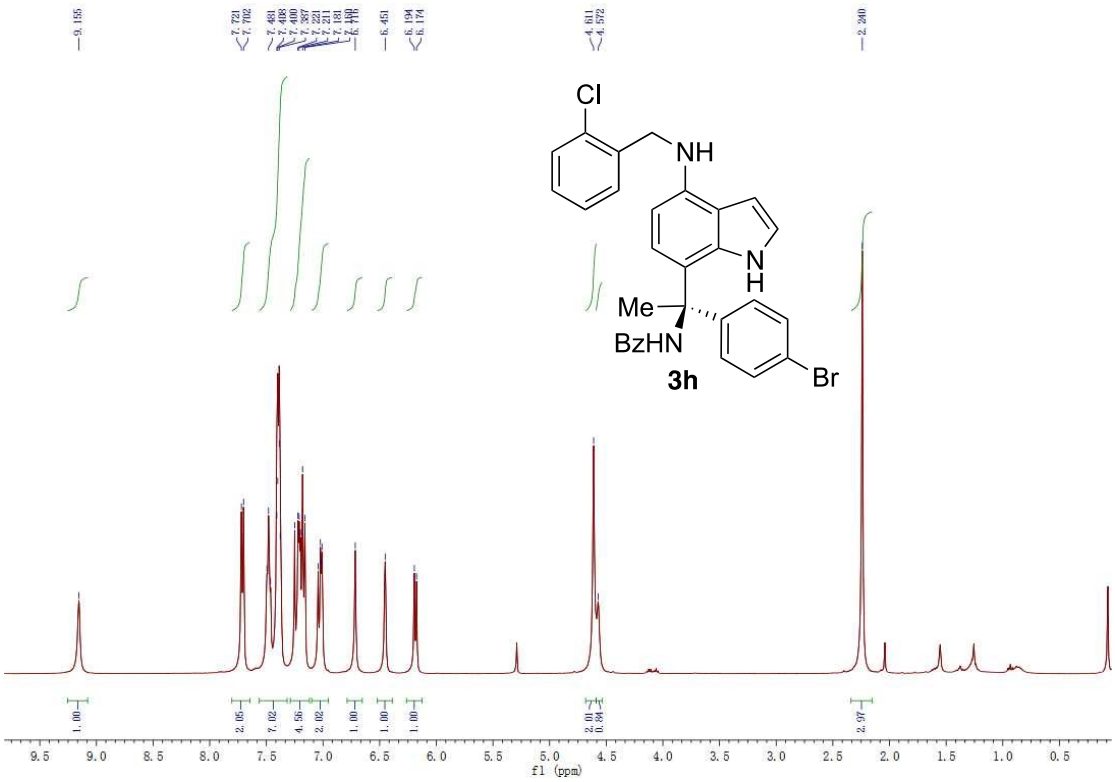
f1 (ppm)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H
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Br
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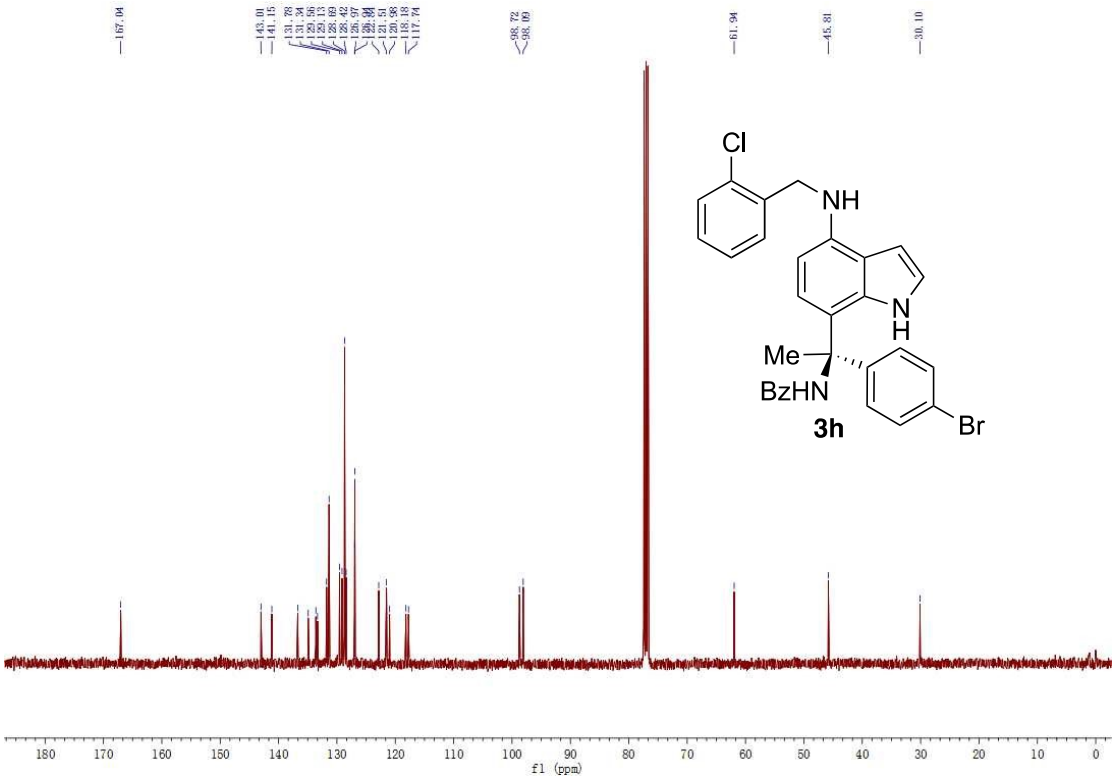
f1 (ppm)


Cl
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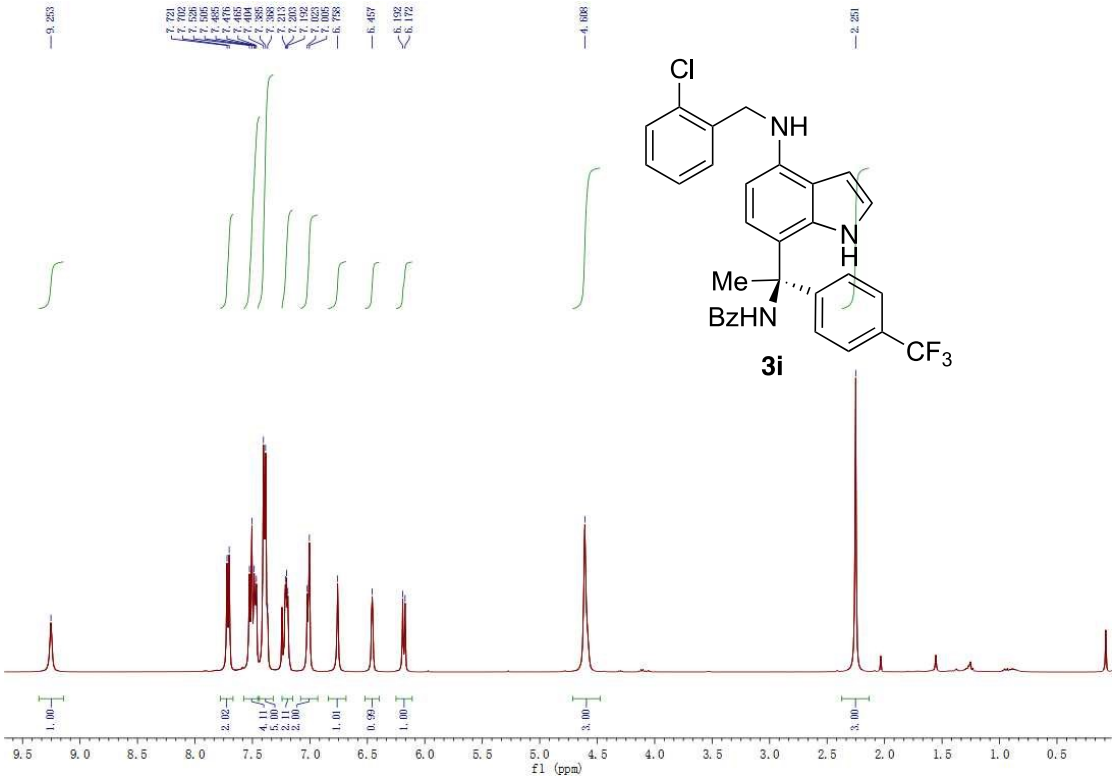
N
H
Me
BzHN
Br
3h
f1 (ppm)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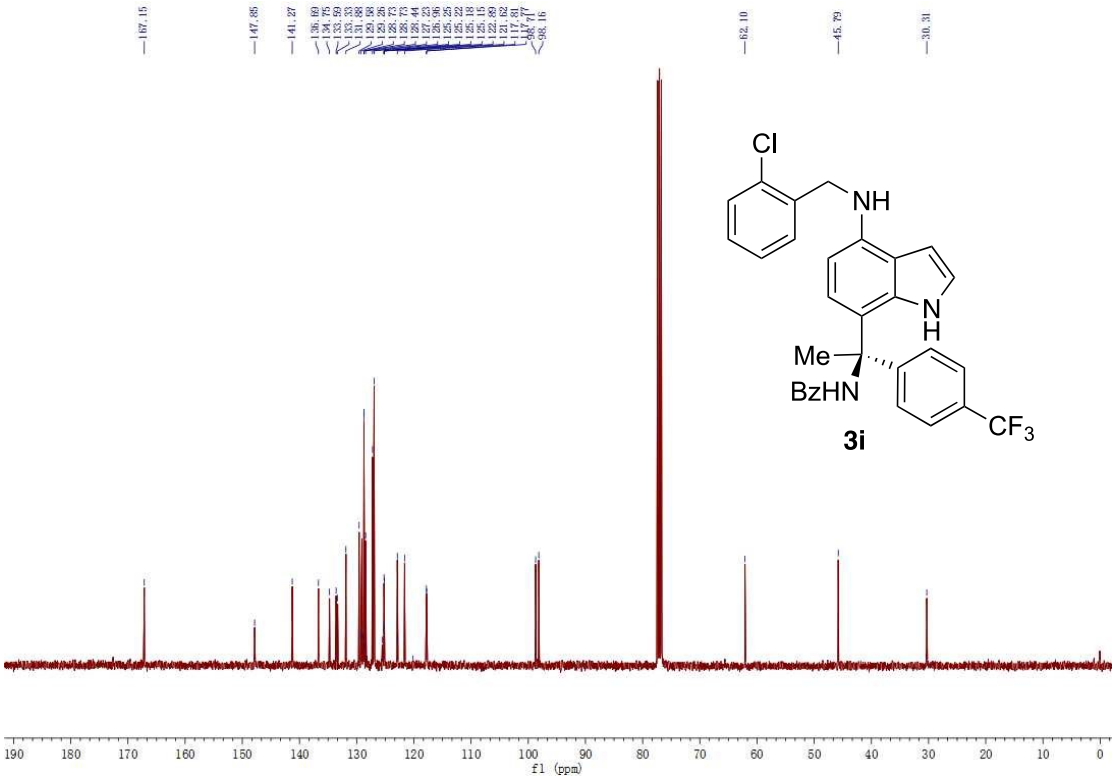
N
H
Me
BzHN
CF3
3i
f1 (ppm)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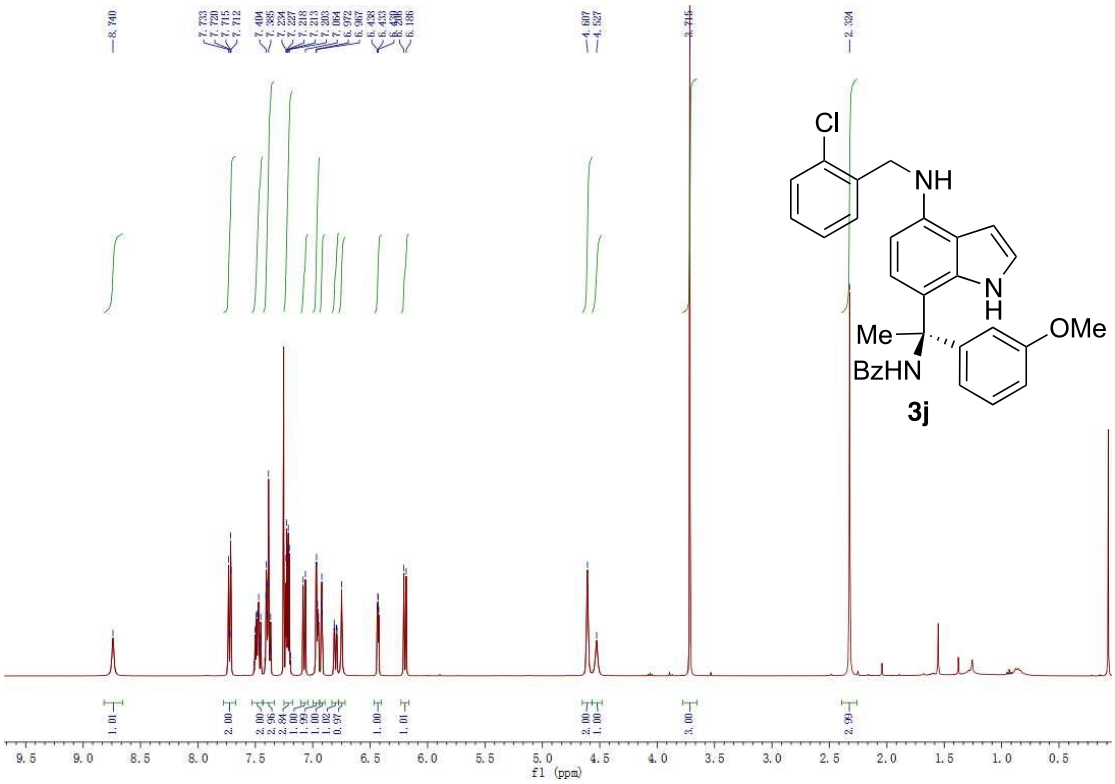
H
Me
BzHN
CF3
3i
f1 (ppm)


Cl
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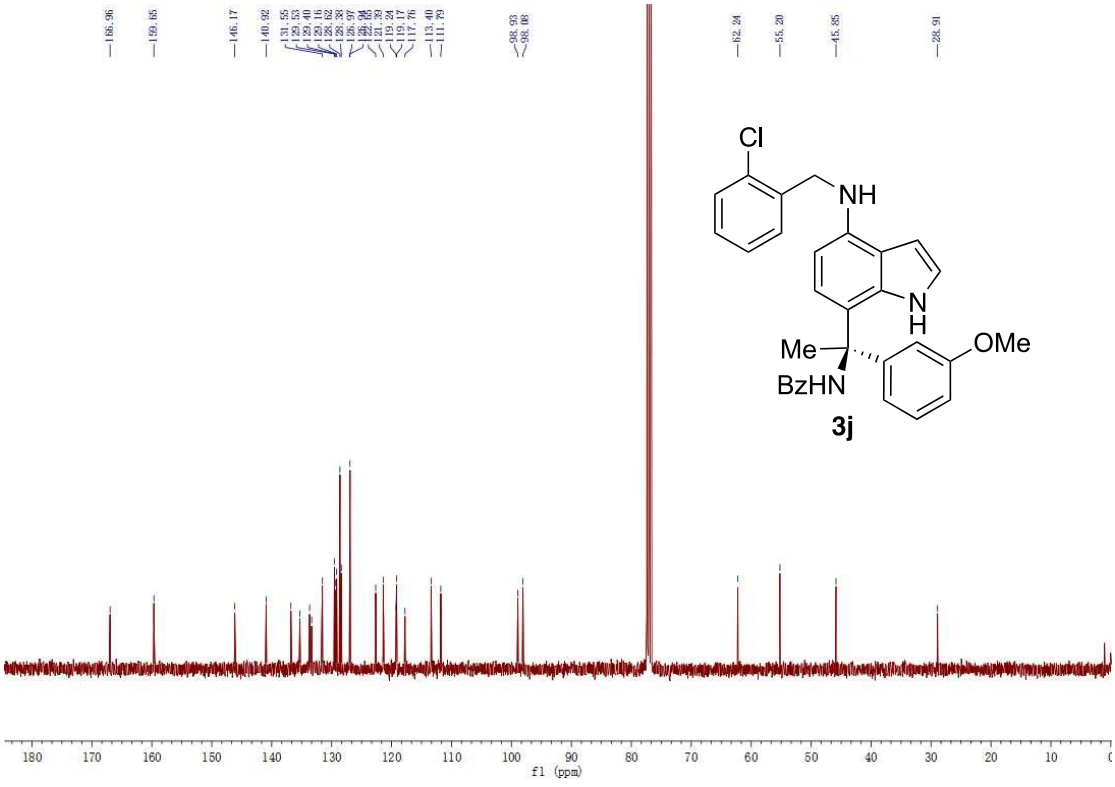
N
H
Me
BzHN
OMe
3j
f1 (ppm)


Cl
NH
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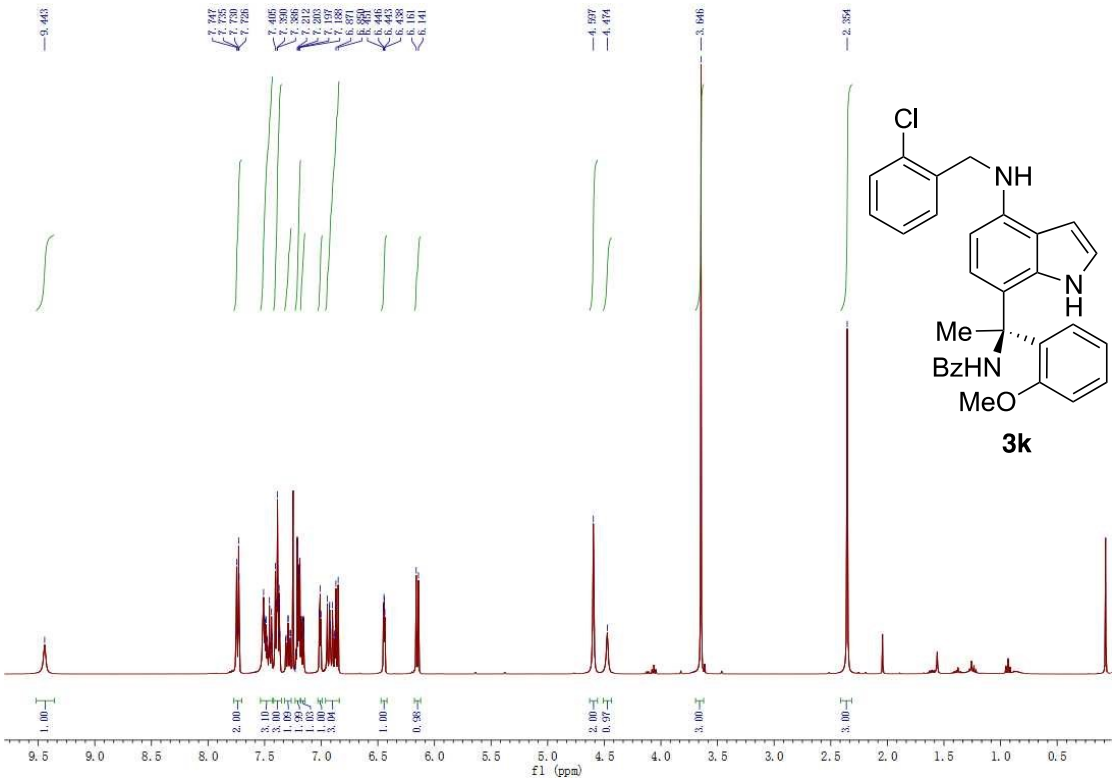
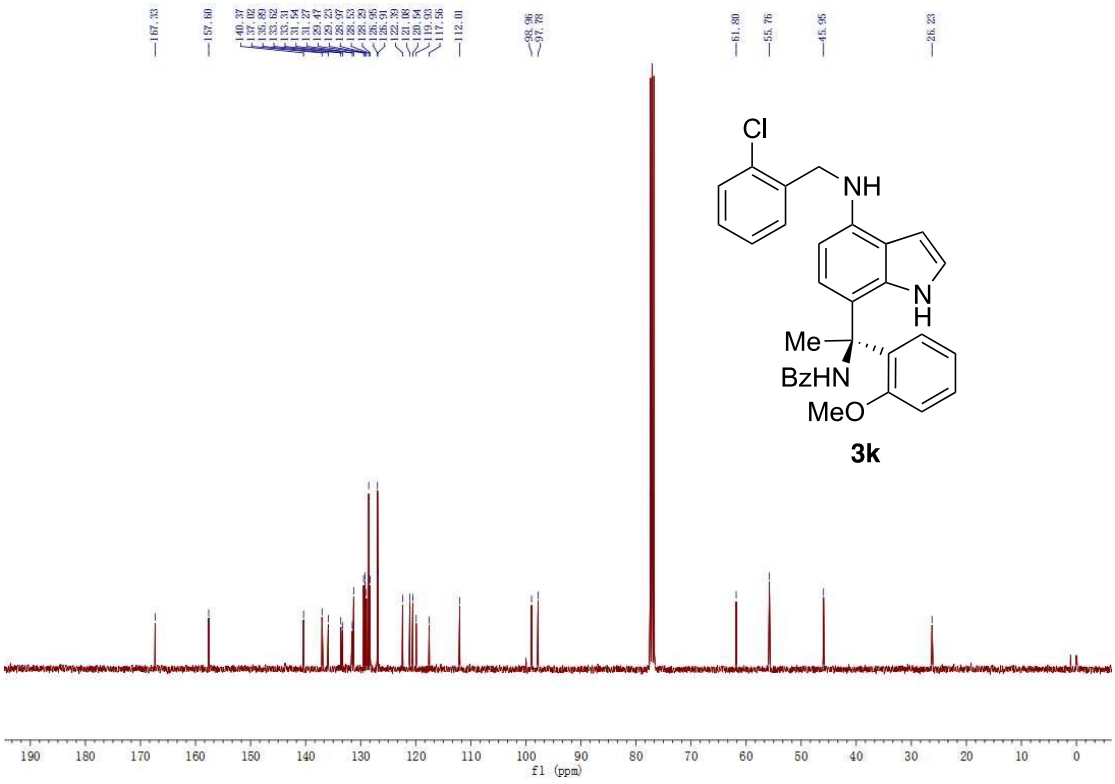
H
Me
BzHN
OMe
3j
f1 (ppm)


Cl
NH
N
H
Me
BzHN
MeO
3k
f1 (ppm)


Cl
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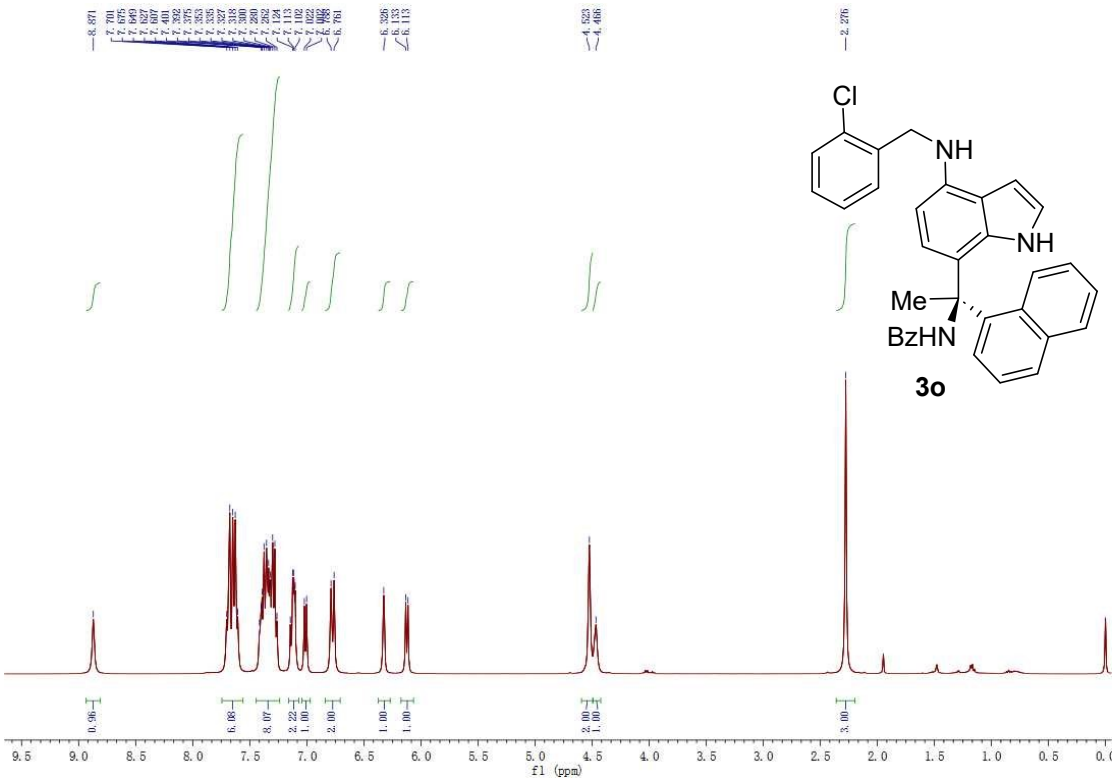
H
Me
BzHN
MeO
3k
f1 (ppm)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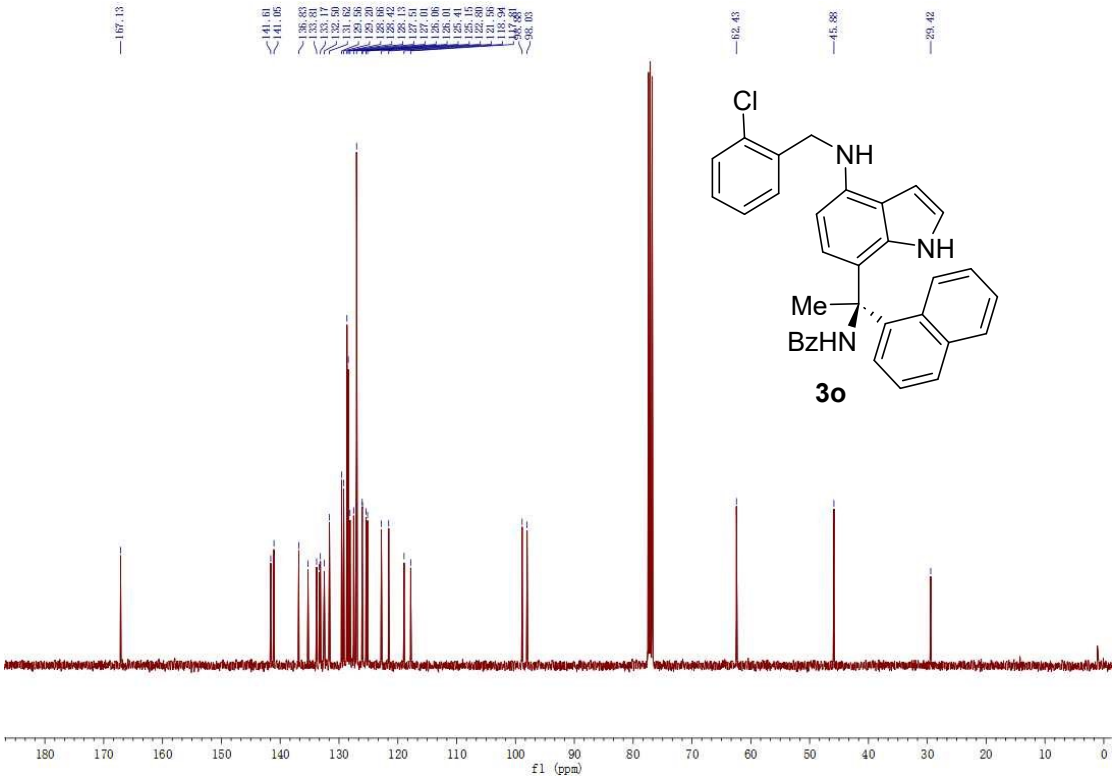
NH
Me
BzHN
3o
f1 (ppm)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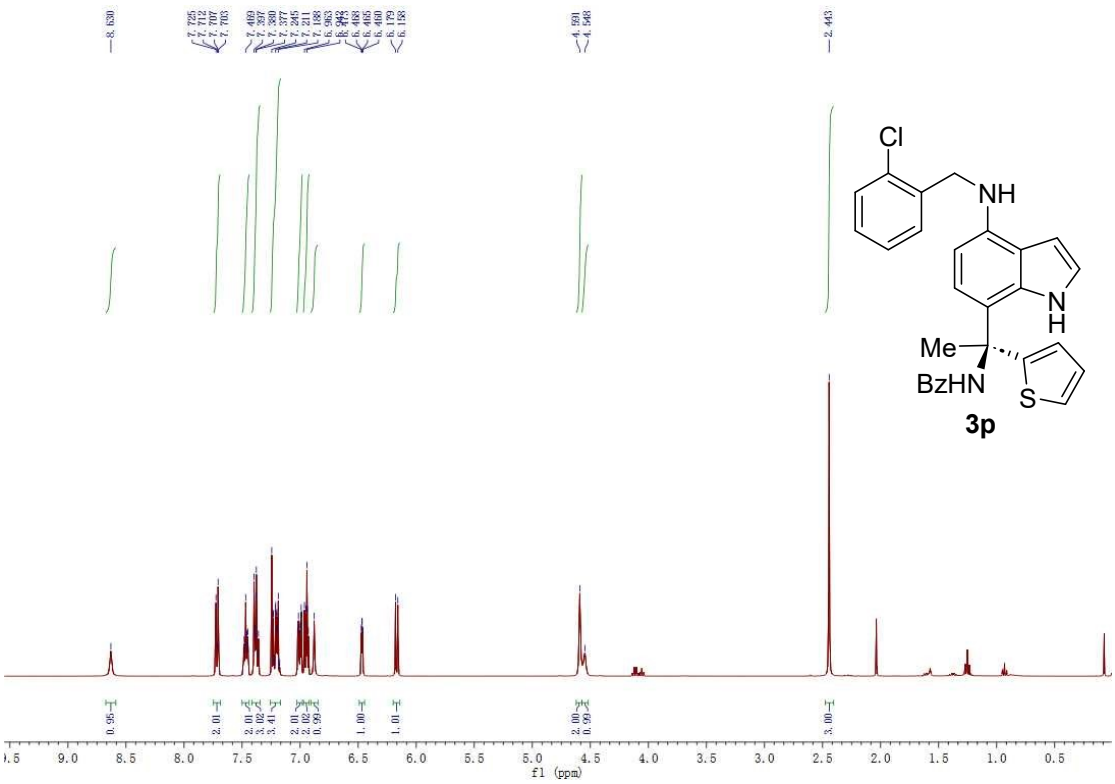
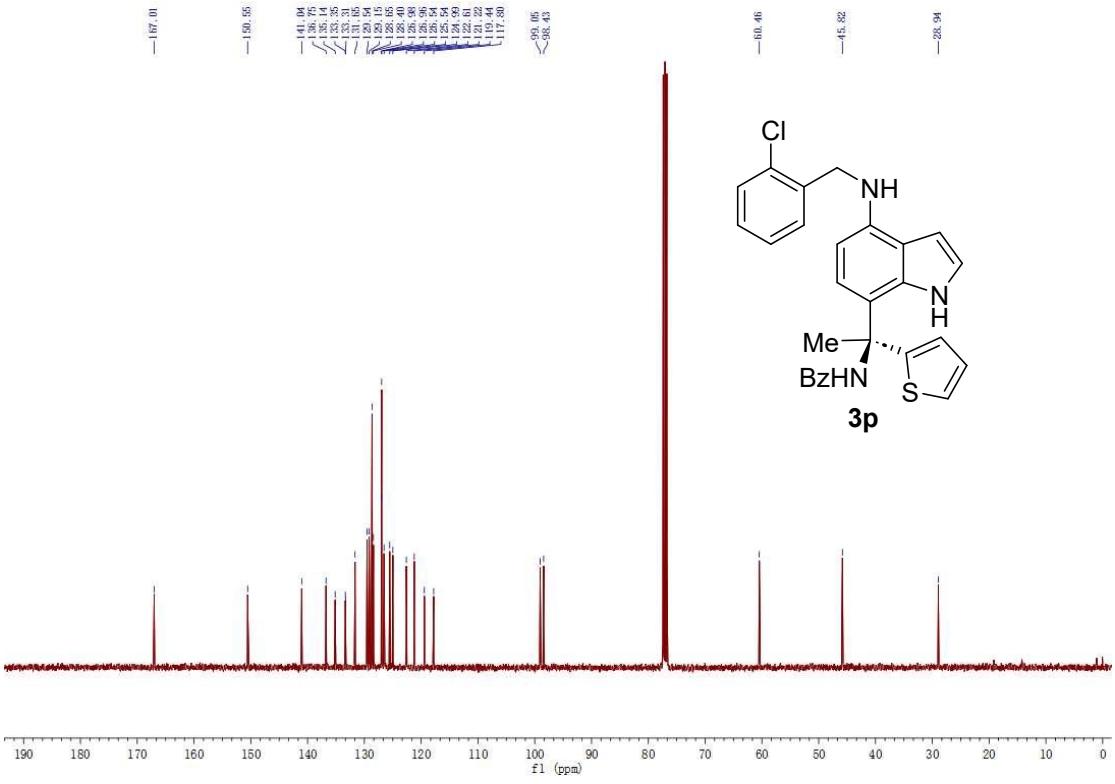
NH
Me
BzHN
3o
f1 (ppm)


Cl
NH
N
H
Me
BzHN
S
3p
f1 (ppm)


Cl
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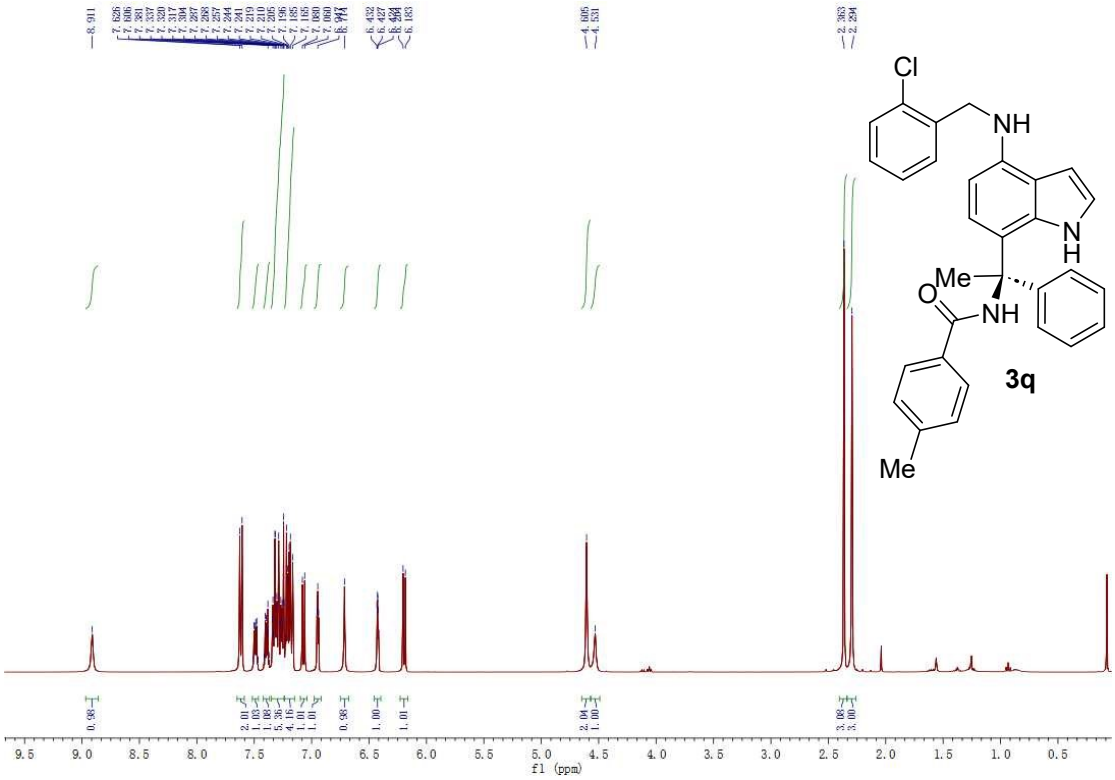
H
Me
BzHN
S
3p
f1 (ppm)


Cl
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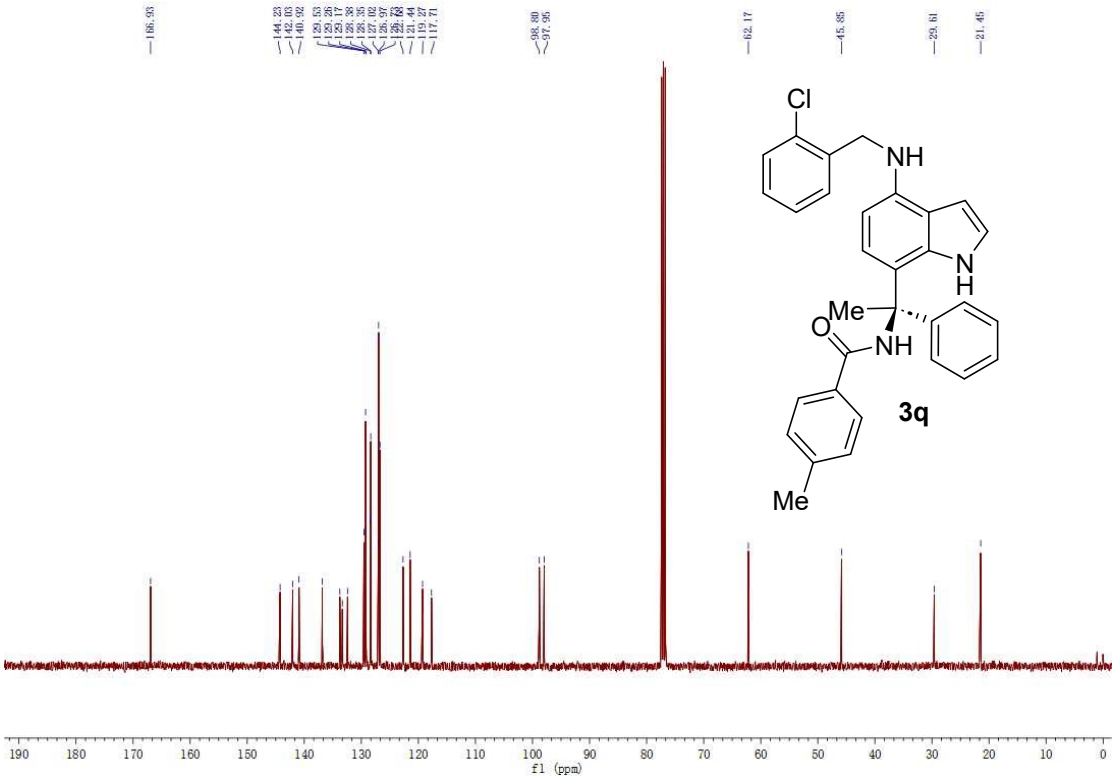
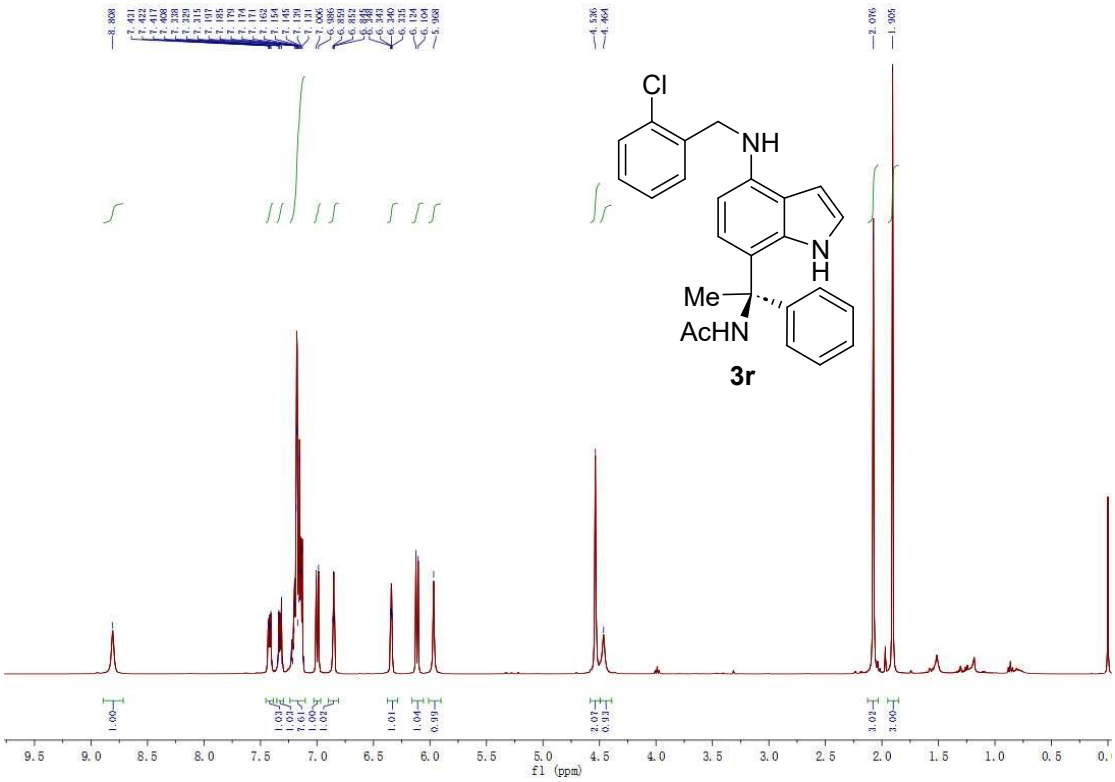
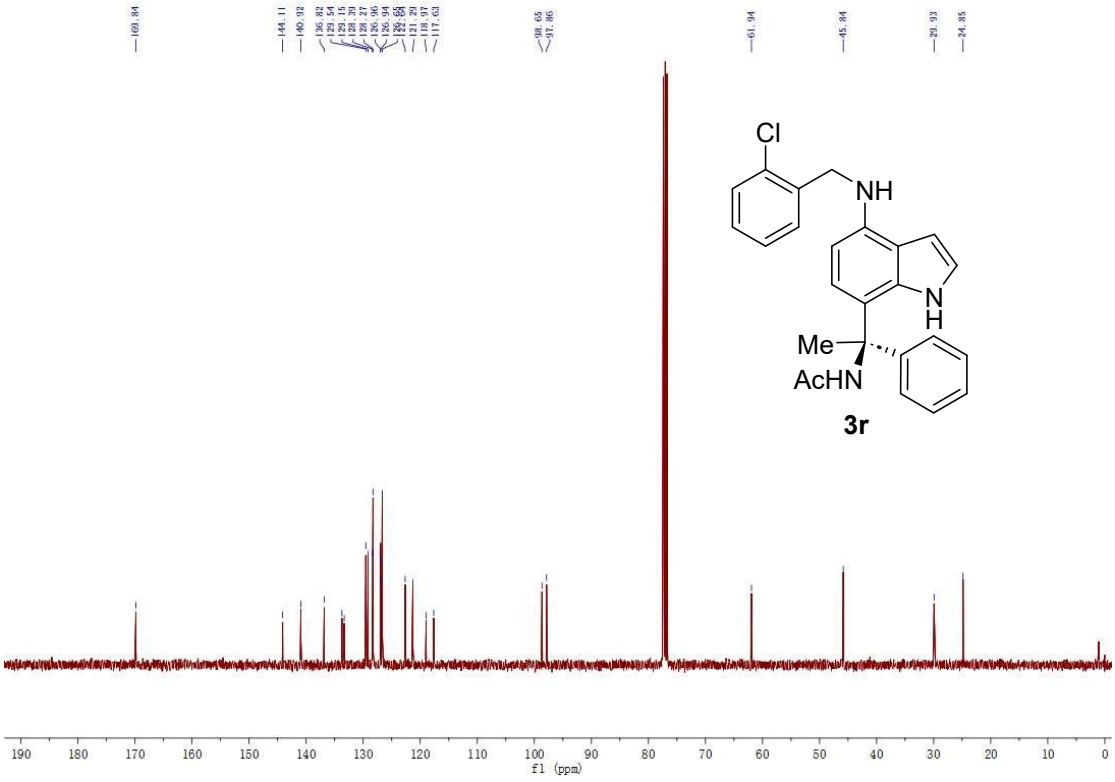
H
Me
O
NH
3q
Me
f1 (ppm)


Cl
NH
N
H
Me
O
NH
3q
Me
f1 (ppm)


Cl
NH
N
H
Me
AcHN
3r
f1 (ppm)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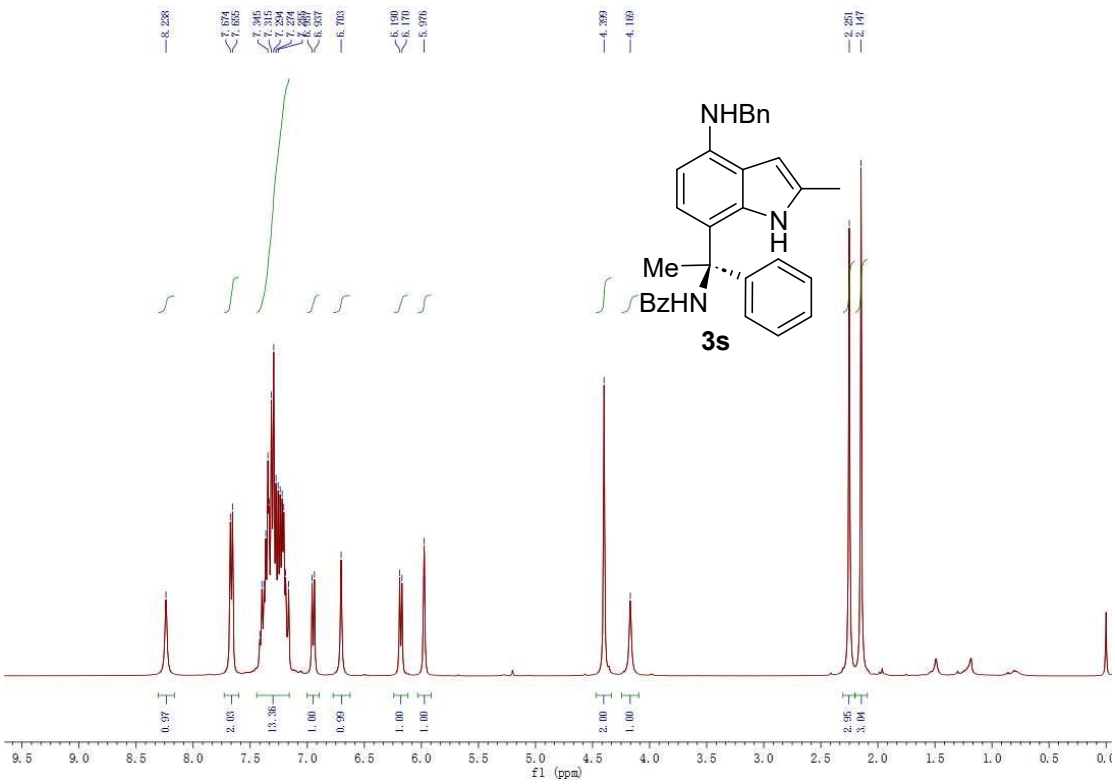
H
Me
AcHN
3r
f1 (ppm)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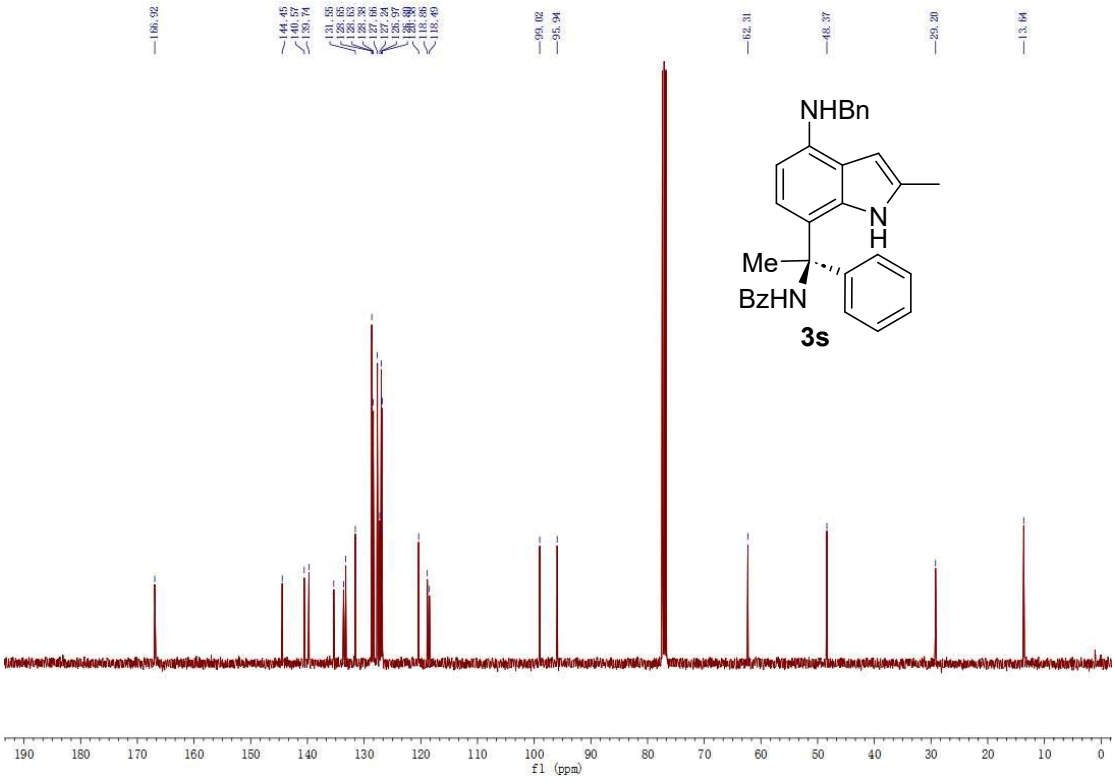
N
H
Me
BzHN
3s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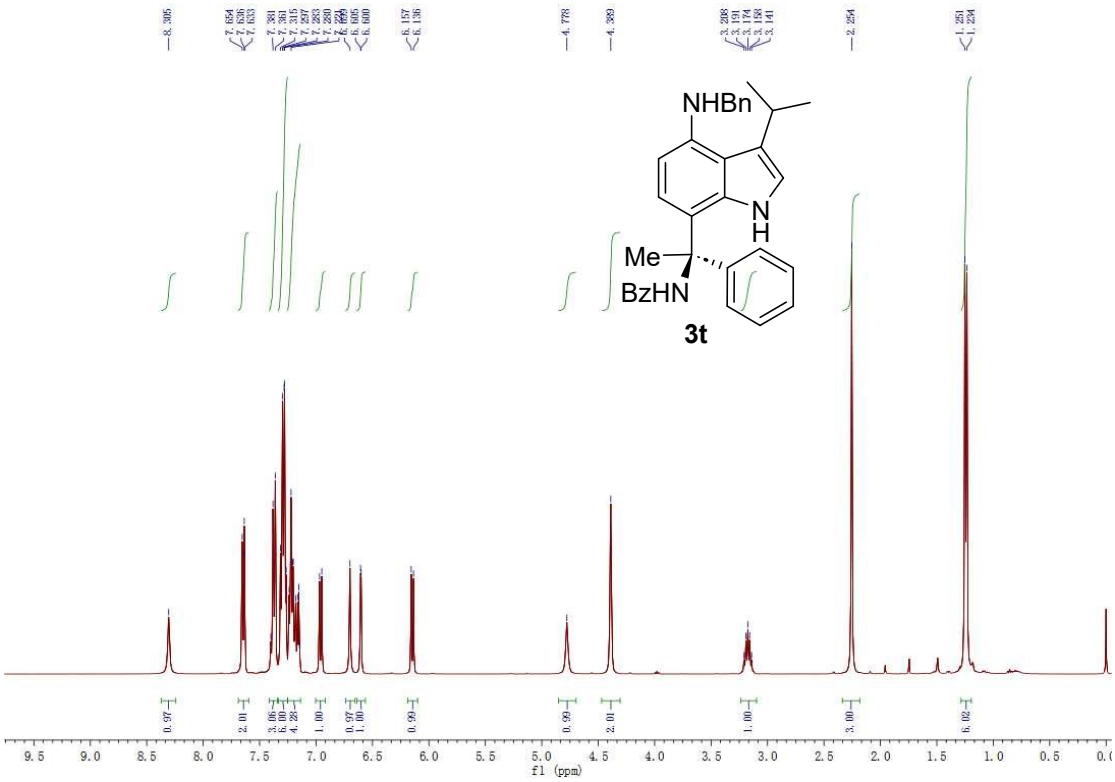
N
H
Me
BzHN
3s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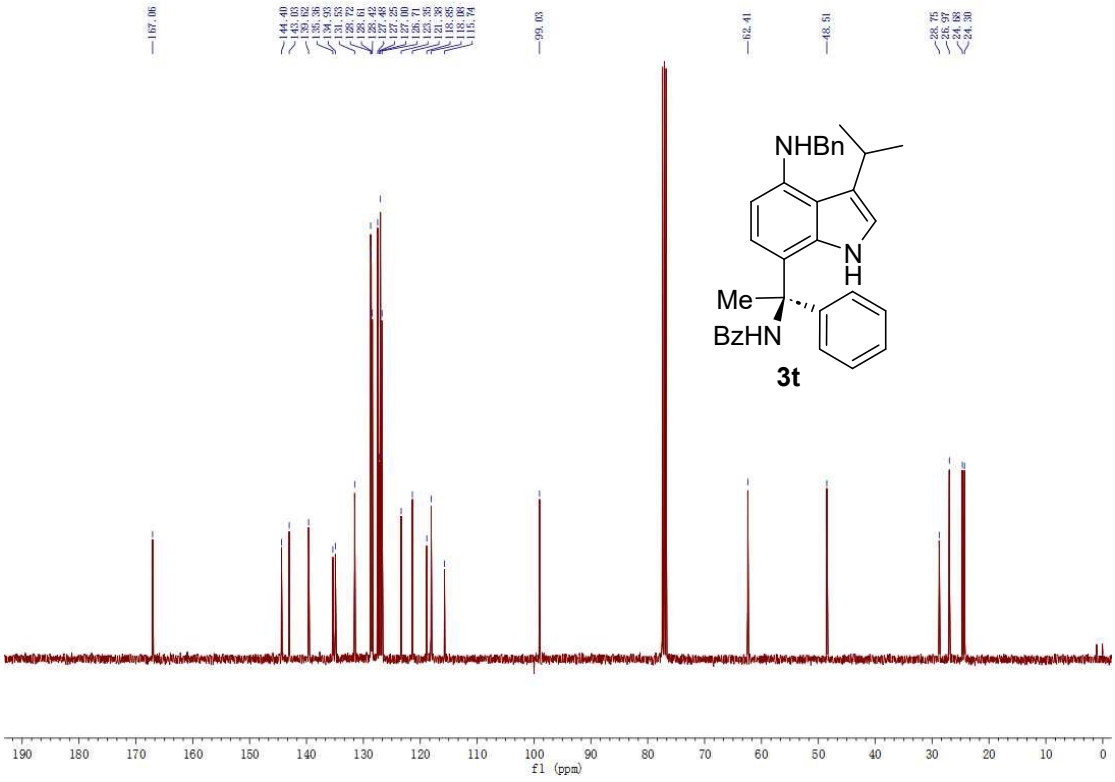
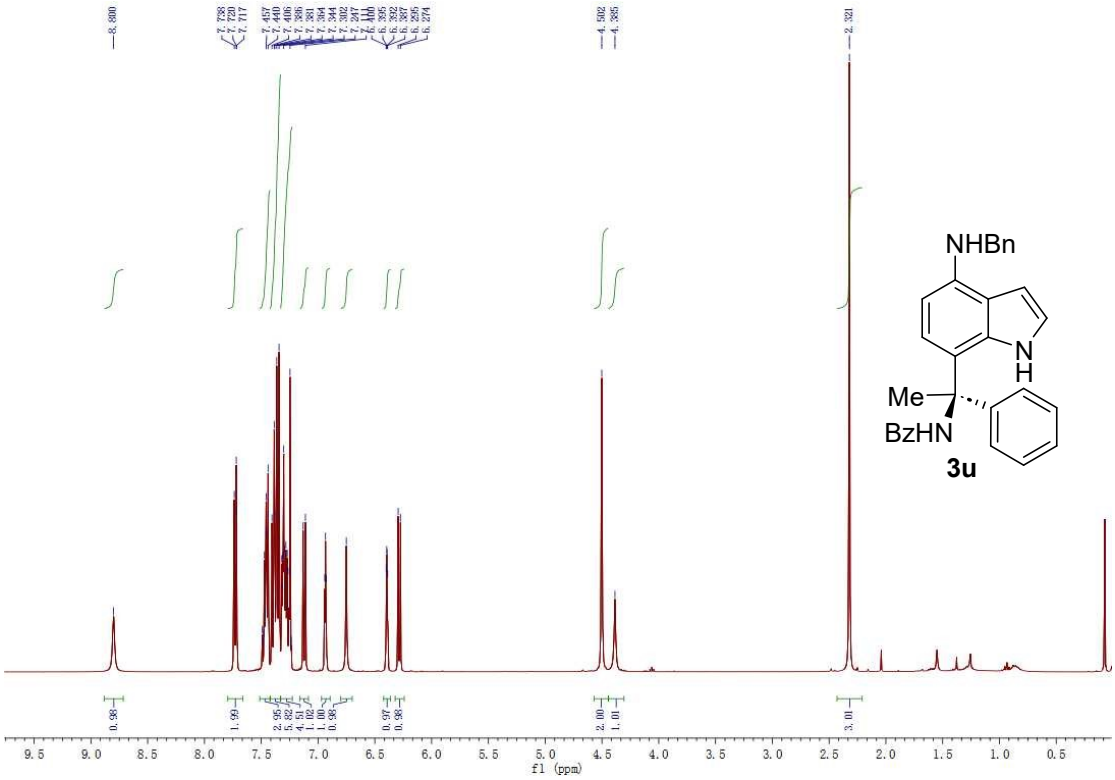
N
H
Me
BzHN
3t
f1 (ppm)


NHBn
N
H
Me
BzHN
3t
f1 (ppm)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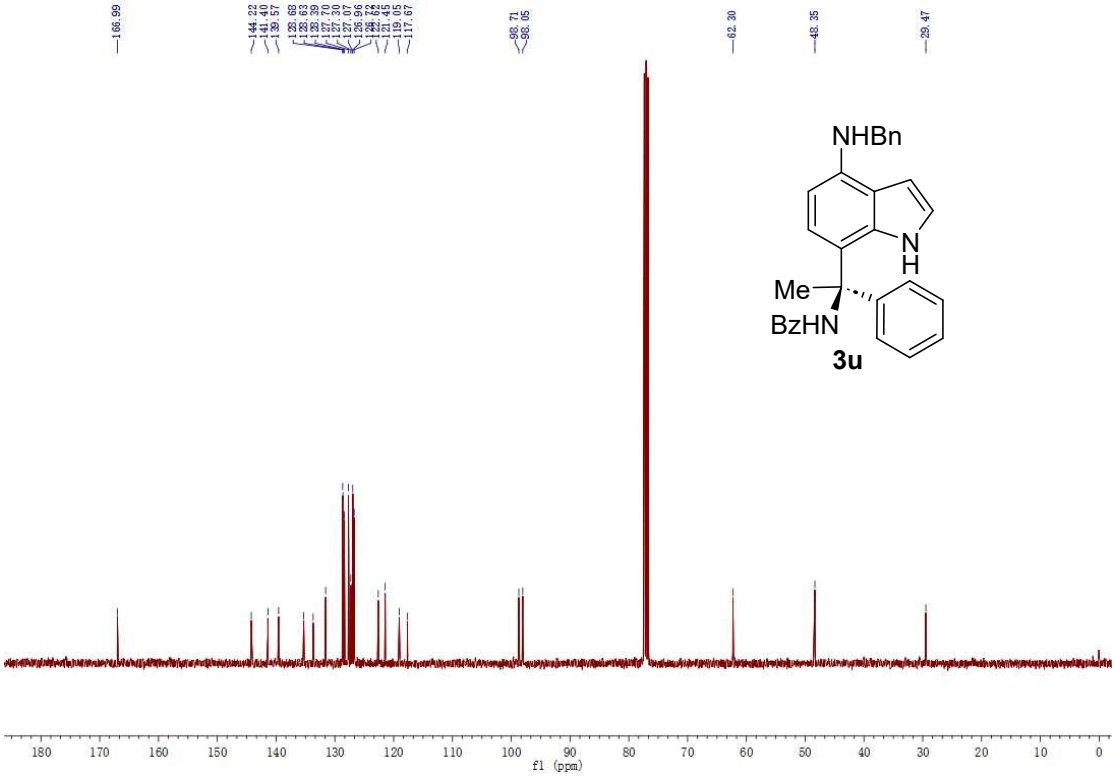
N
H
Me
BzHN
3u
f1 (ppm)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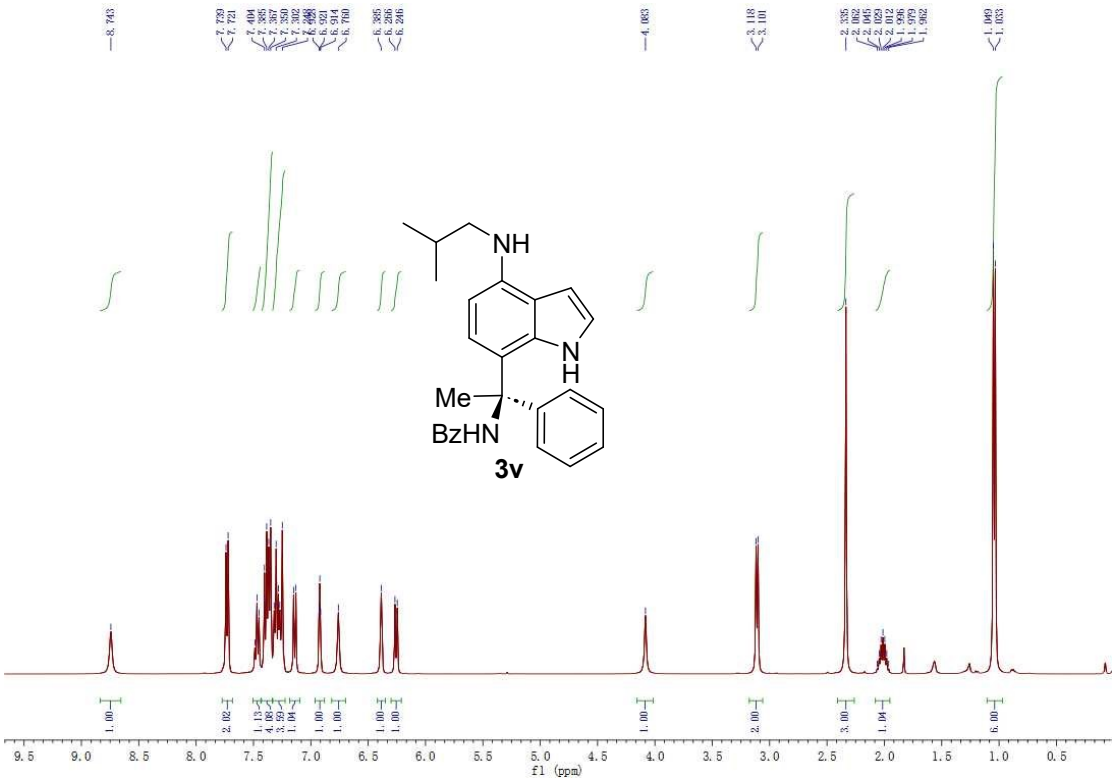
BzHN
3u
f1 (ppm)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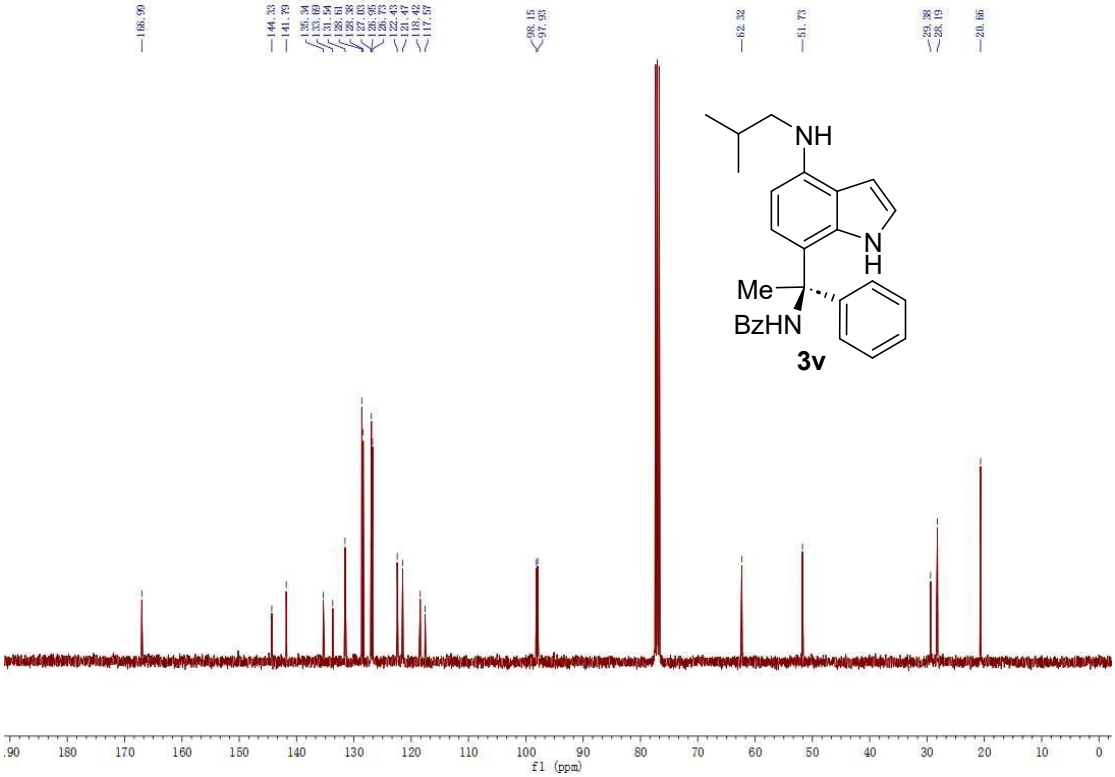
H
Me
BzHN
3v
f1 (ppm)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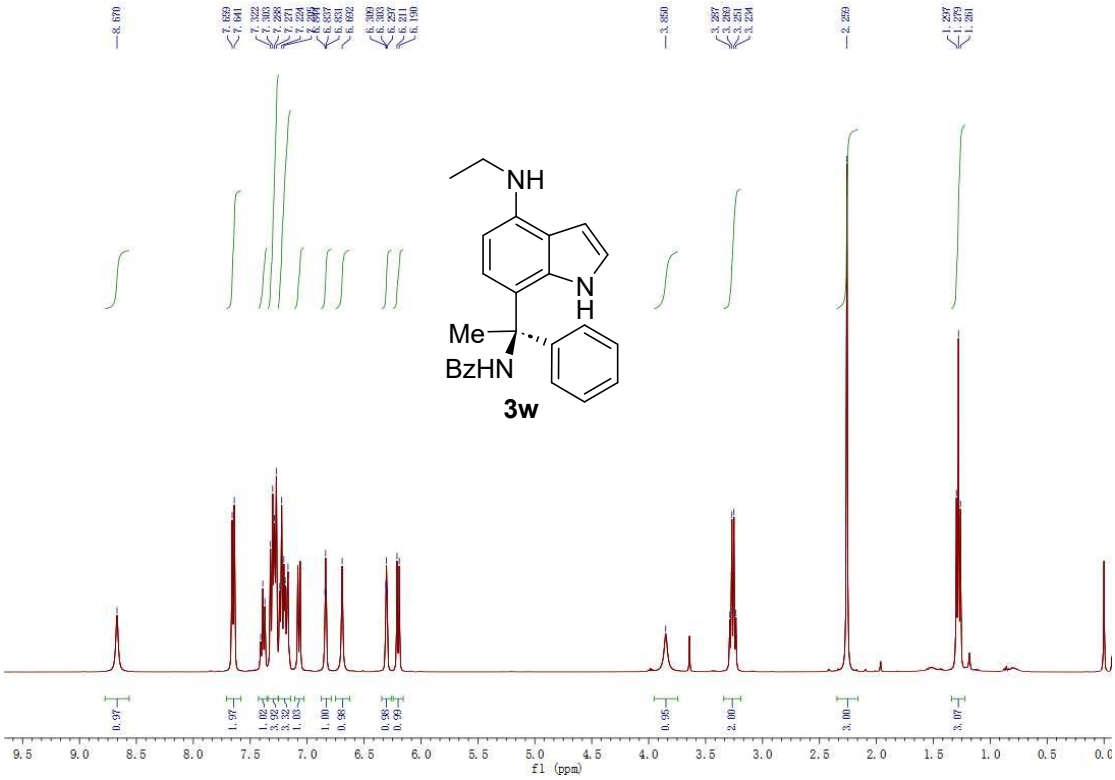
H
Me
BzHN
3v
f1 (ppm)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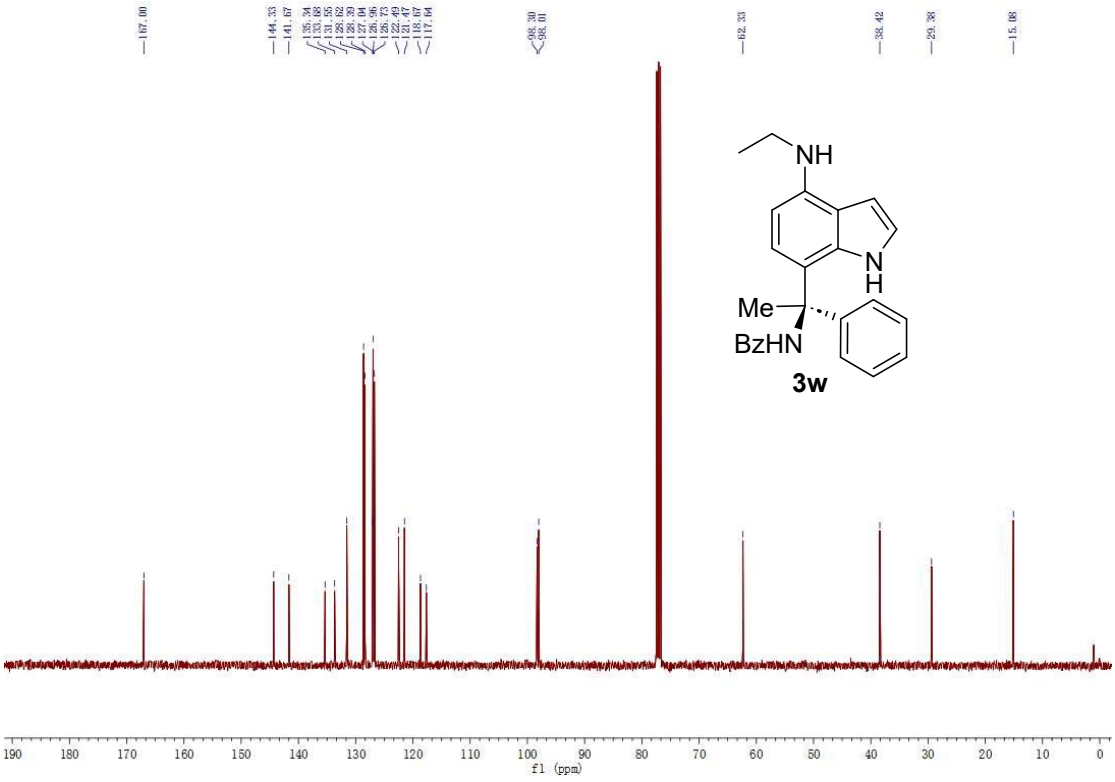
H
Me
BzHN
3w
f1 (ppm)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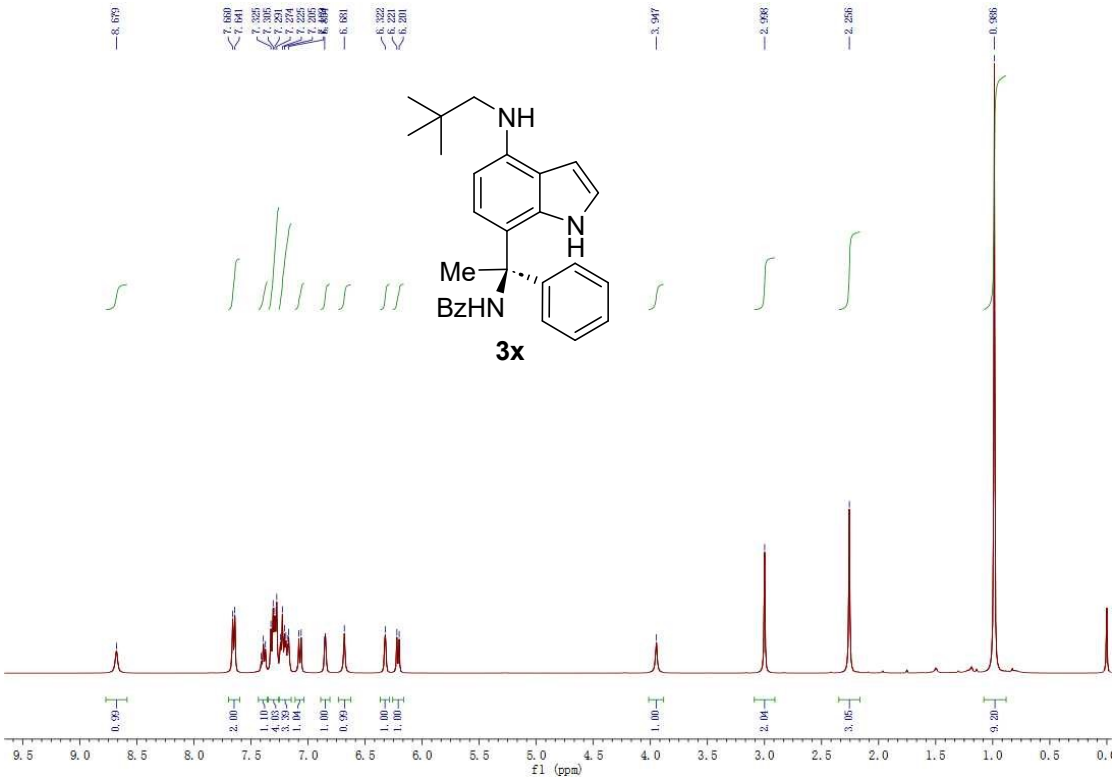
H
Me
BzHN
3w
f1 (ppm)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H
Me
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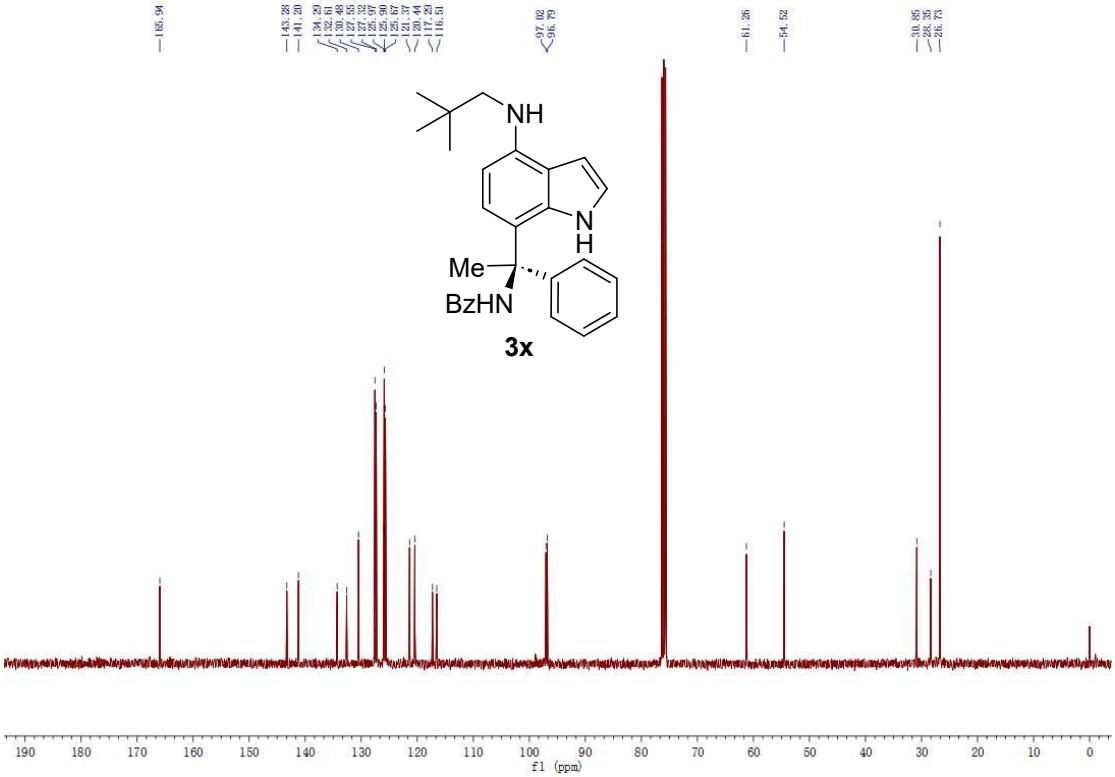
3x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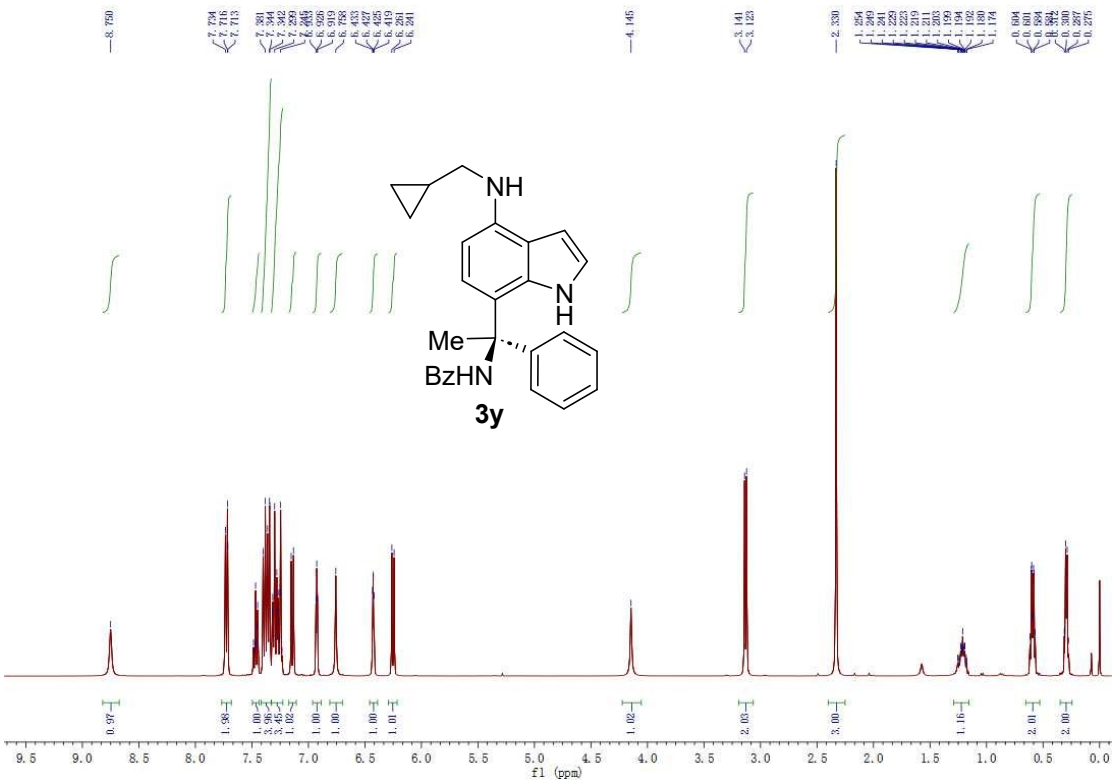
H
Me
BzHN
3x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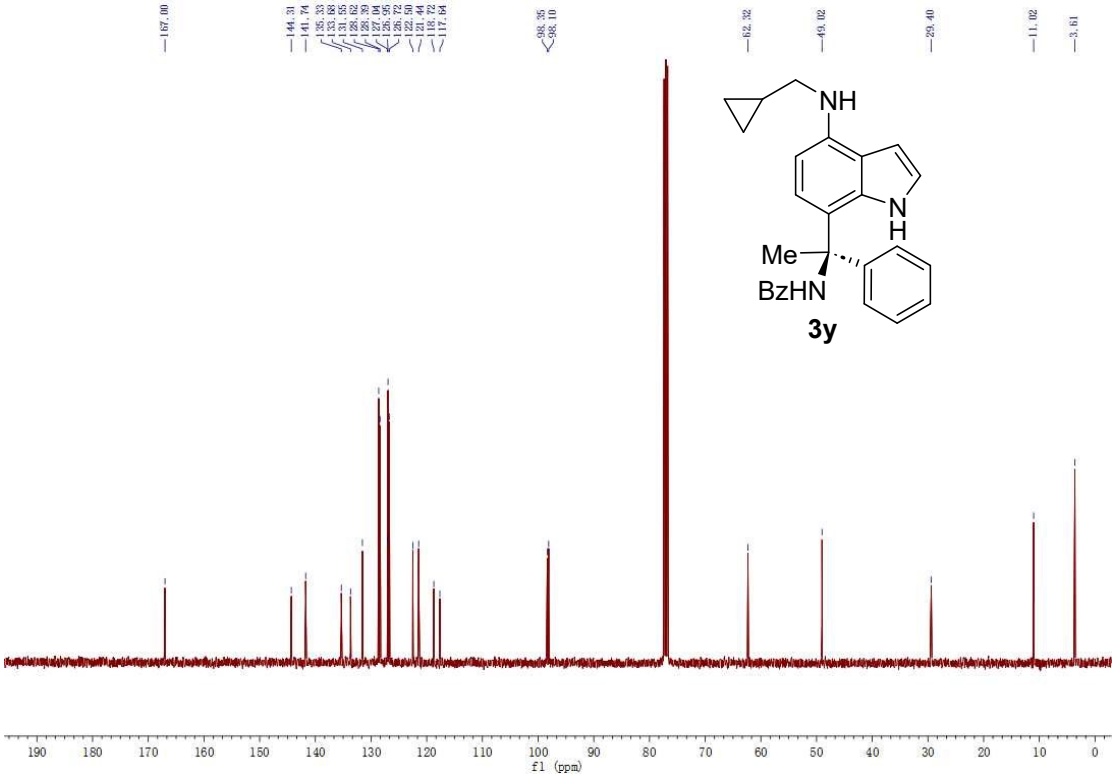
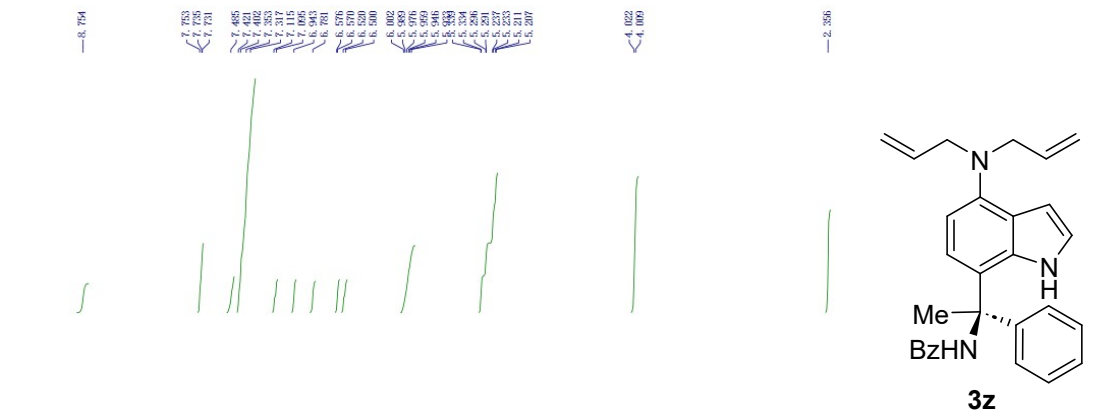
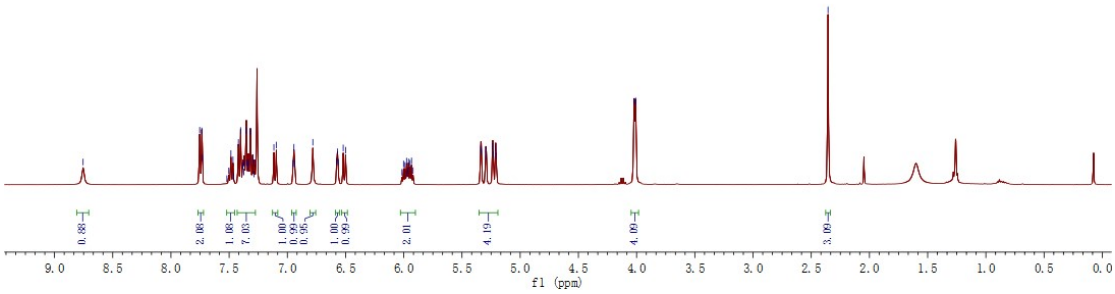
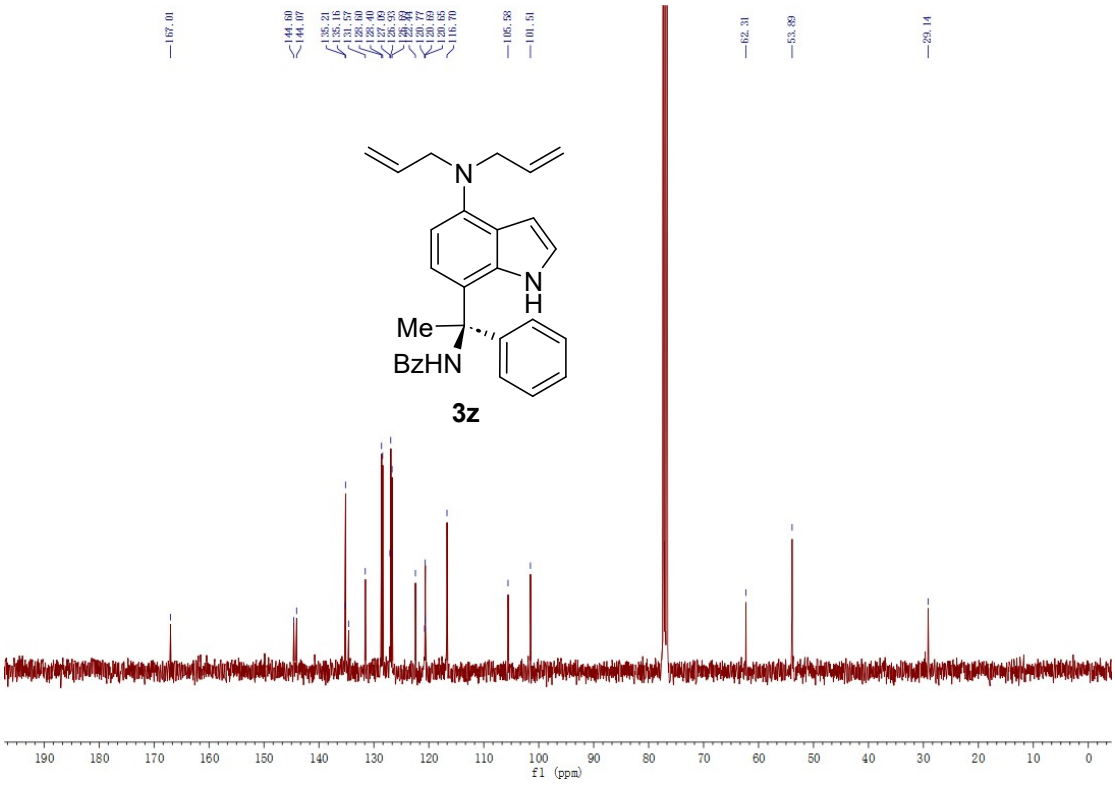
H
Me
BzHN
3y
f1 (ppm)


NH
N
H
Me
BzHN
3y
f1 (ppm)

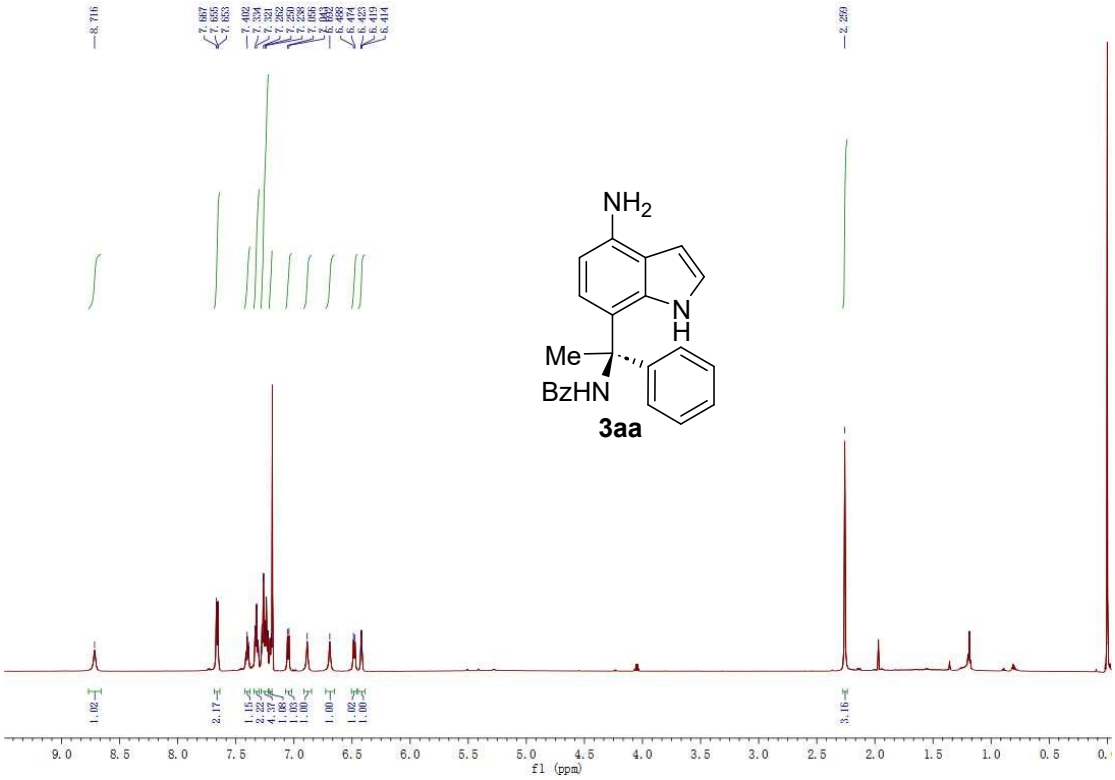


3z





3z


NH2
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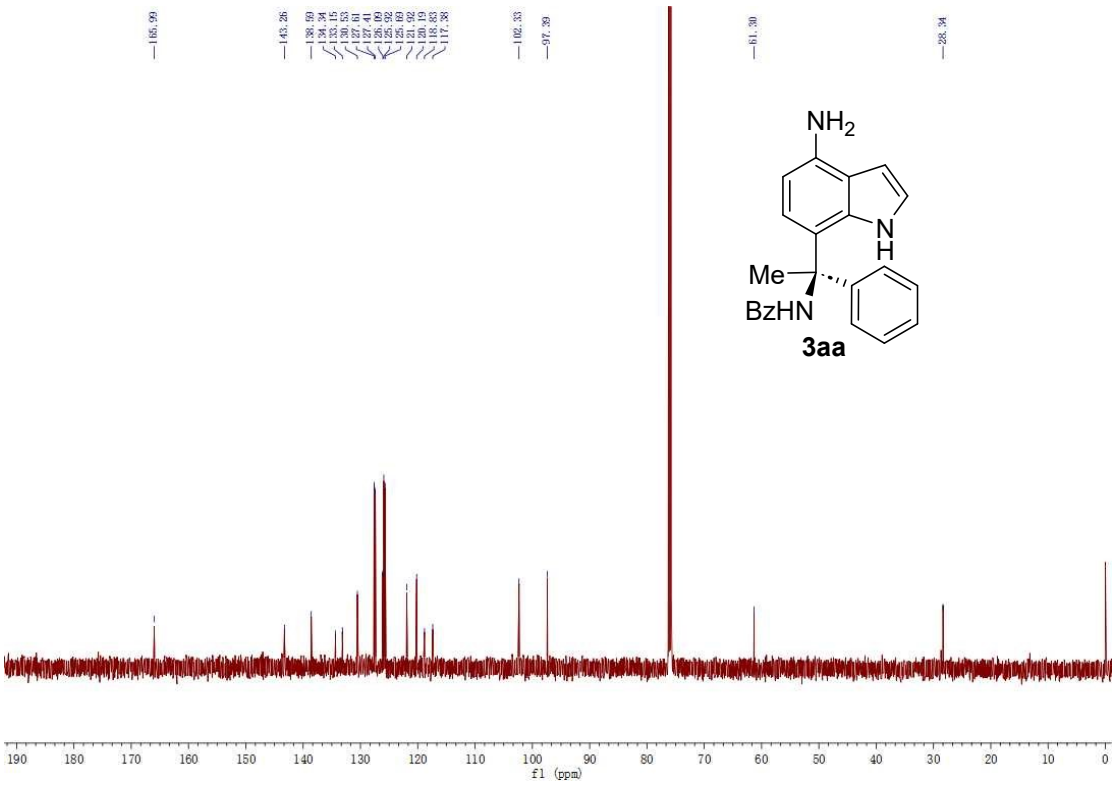
H
Me
BzHN
3aa
f1 (ppm)


NH2
N
H
Me
BzHN
3aa
f1 (ppm)