

Supporting Information

Conversion of Two Stereocenters to One or Two Chiral Axes:

Atroposelective Synthesis of 2, 3-Diarylbenzoindoles

Yu-Long Hu,[†] Zhe Wang,[†] Hui Yang,[†] Jie Chen, Zi-Bo Wu, Yibo Lei, and Ling Zhou*

*Key Laboratory of Synthetic and Natural Functional Molecule Chemistry of Ministry of Education,
Department of Chemistry & Materials Science, National Demonstration Center for Experimental
Chemistry Education, Northwest University, Xi'an 710127, P. R. China*

E-mail: zhou@nwu.edu.cn

[[†]] These authors contributed equally to this work.

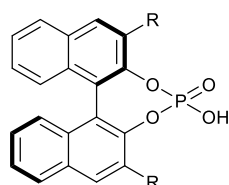
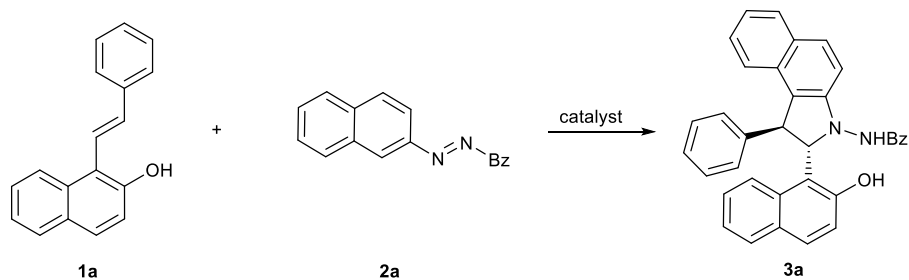
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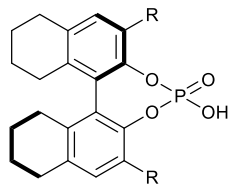
1 General information

All reactions that required anhydrous conditions were carried by standard procedures under nitrogen atmosphere. Commercially available reagents were used as received. The solvents were dried by distillation over the appropriate drying reagents. Infrared spectra were recorded on a TENSOR 27 FT-IR spectrophotometer and reported in wave numbers (cm^{-1}). ^1H and ^{13}C NMR spectra were recorded on Bruker (400 MHz) spectrometer and JEOL(600 MHz) spectrometer. Chemical shifts (δ) are reported in ppm relative to TMS (δ 0.00) for the ^1H NMR and to chloroform (δ 77.0), dimethylsulfoxide (δ 39.5) for the ^{13}C NMR measurements. High resolution mass spectra were obtained on an UltiMate 3000 spectrometer. Reactions were followed with TLC (GF 254 silica gel plates). Visualization was accomplished with UV light. Flash chromatography separations were performed on 200-300 mesh silica gel. Analytical grade solvents for the column chromatography were distilled before use. All starting materials commercially available were used directly. Substrates **2** were synthesized according to the literature method.¹

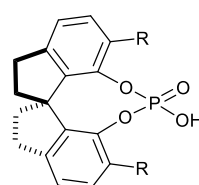
2. Table S1. Optimization of the [3+2] Formal Cycloaddition Reaction Conditions^a



4a: R = Ph
 4b: R = 2,4,6-(i-Pr)₃C₆H₂
 4c: R = 9-Phenanthrenyl
 4d: R = 9-anthracenyl
 4e: R = 2,4,6-(CH₃)₃C₆H₂



4f: R = 9-anthracenyl
 4g: R = 2,4,6-(i-Pr)₃C₆H₂

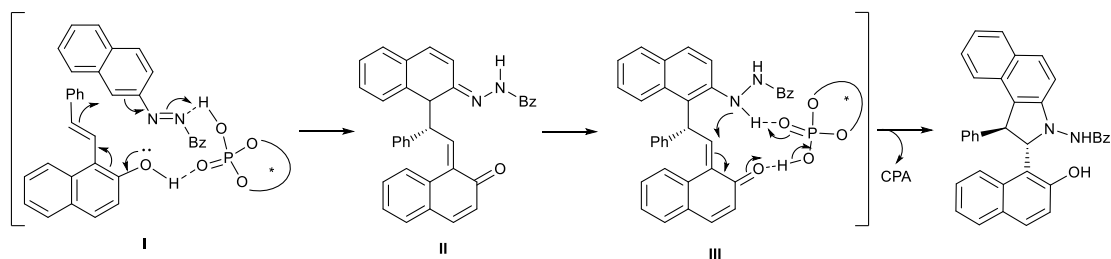


4h: R = 9-Phenanthrenyl
 4i: R = 2,4,6-(CH₃)₃C₆H₂

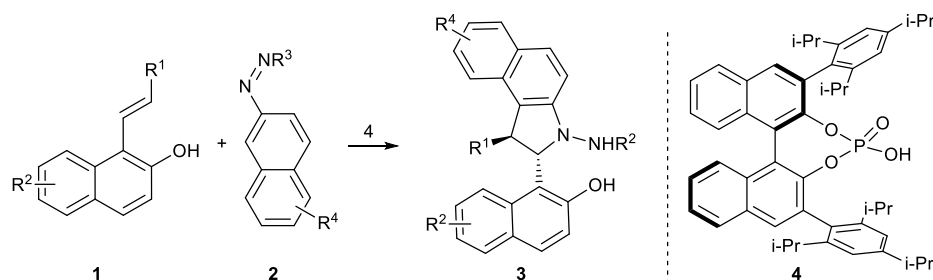
entry	4 (X mol %)	solvent	yield (%) ^b	ee (%) ^c	dr ^d
1	4a (10)	DCM	10	15	>20:1
2	4b (10)	DCM	99	>99	>20:1
3	4c (10)	DCM	89	84	>20:1
4	4d (10)	DCM	85	90	>20:1
5	4e (10)	DCM	65	92	>20:1
6	4f (10)	DCM	67	90	>20:1
7	4g (10)	DCM	63	99	11:1
8	4h (10)	DCM	81	-95	>20:1
9	4i (10)	DCM	39	-95	>20:1
10	4b (10)	DCE	47	47	>20:1
11	4b (10)	Toluene	40	98	>20:1
12	4b (10)	CH ₃ CN	16	95	>20:1
13	4b (5)	DCM	93	95	>20:1

^a Unless otherwise noted, the reaction was carried out with 0.1 mmol scale in 2 mL solvent for 36 h at -30 °C, and the ratio of **1a** : **2a** was 1.5 : 1. ^b Isolated yield. ^c Determined by chiral HPLC analysis. ^d Determined by HPLC.

3. Scheme S1 Proposed Mechanism of the [3+2] Formal Cycloaddition Reaction



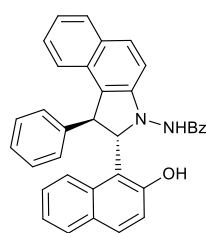
4. General procedure for the synthesis of products 3



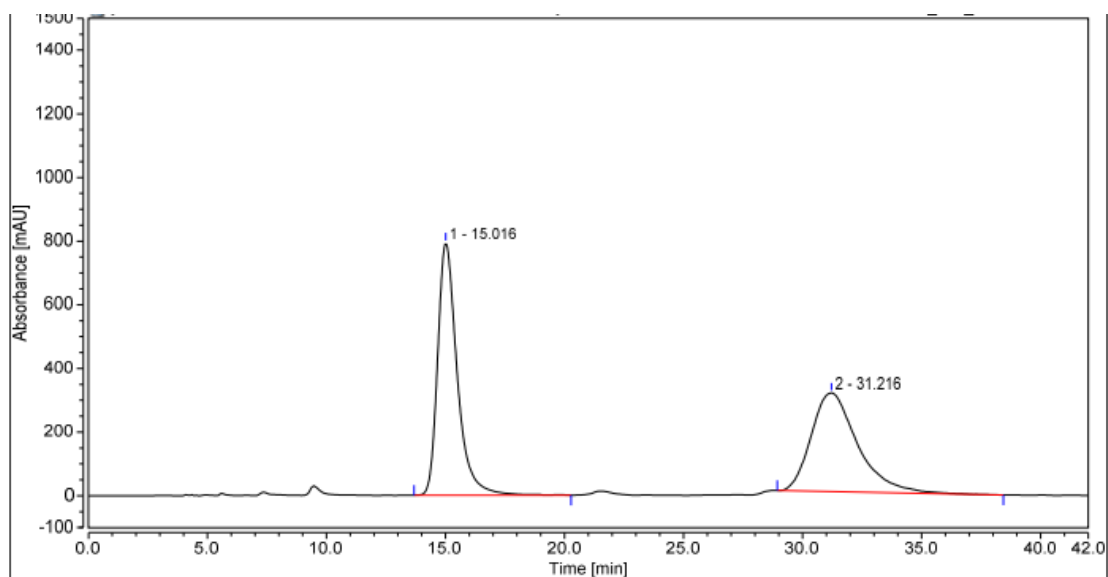
To a stirred solution of 1-styrylnaphthols **1** (0.15 mmol), azonaphthalene derivatives **2** (0.1 mmol), 100 mg 3 Å MS, in dichloromethane (2 mL) was added chiral phosphoric acid **4** (0.01 mmol) under N₂ atmosphere at -30 °C. The reaction mixture was stirred at -30 °C for 36 h (monitored by TLC). After removal of the solvent, the residue was purified by flash column chromatography (petroleum ether/AcOEt) to yield the corresponding product.

5. Characterization data of products 3

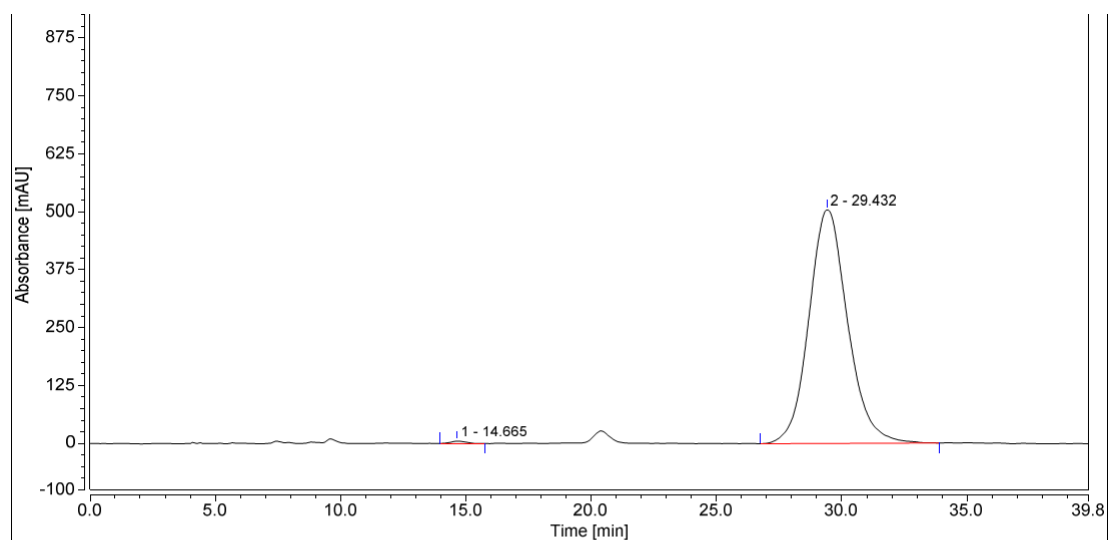
N-((1S,2S)-2-(2-Hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)benzamide (**3a**)



Following the general procedure, the compound was isolated as a white solid (50 mg, 99%); mp 210-211 °C; $[\alpha]_D^{21} = -343.2$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3423, 2924, 1654, 1267, 822, 746, 684 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.79 (s, 1H), 8.41 (s, 1H), 7.80 (d, *J* = 8.2 Hz, 1H), 7.72 – 7.59 (m, 5H), 7.46 – 7.38 (m, 1H), 7.31 (ddd, *J* = 8.3, 6.0, 2.1 Hz, 1H), 7.28 – 7.05 (m, 12H), 6.97 – 6.88 (m, 2H), 6.11 (s, 1H), 4.99 (d, *J* = 10.7 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 166.8, 155.0, 146.9, 141.1, 133.4, 132.3, 131.8, 131.5, 130.4, 130.2, 130.1, 128.9, 128.9, 128.7, 128.6, 128.6, 128.2, 127.2, 127.1, 126.6, 125.9, 123.8, 122.8, 122.7, 121.6, 120.2, 114.1, 112.7, 97.23, 69.8, 54.4; HRMS (ESI) calcd for C₃₅H₂₆N₂O₂Na *m/z* [M + Na]⁺: 529.1886, found: 529.1878; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 14.7 min, *t*₂ (major) = 29.4 min.

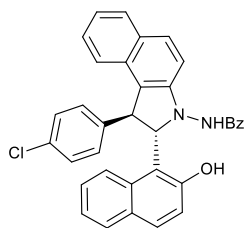


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		15.016	753.170	792.212	51.79	71.87	n.a.
2		31.216	701.085	310.068	48.21	28.13	n.a.
Total:			1454.255	1102.280	100.00	100.00	



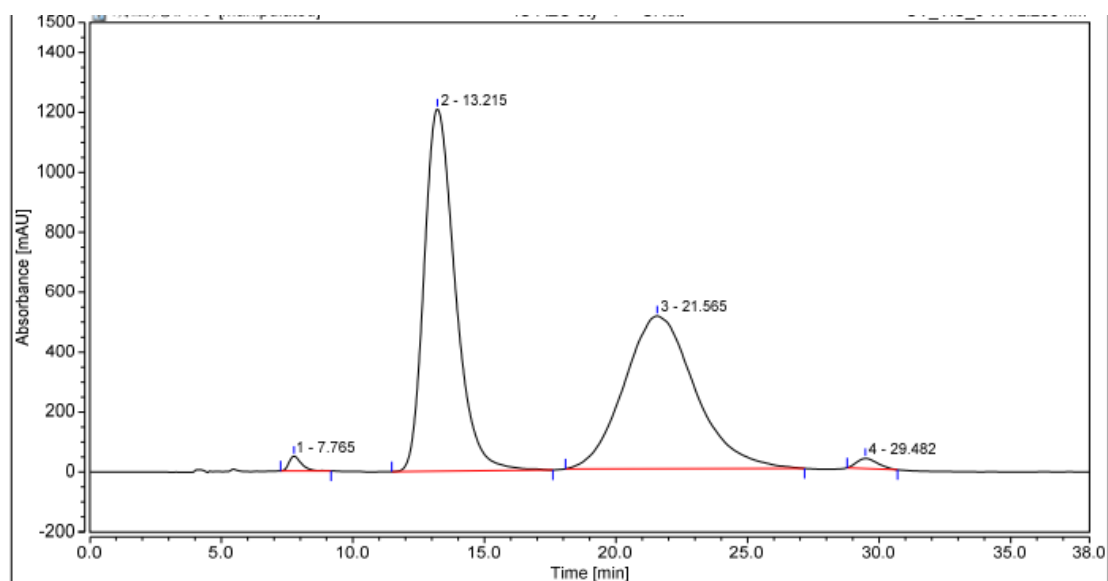
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		14.665	3.243	4.969	0.36	0.97	n.a.
2		29.432	904.509	504.741	99.64	99.03	n.a.
Total:			907.752	509.710	100.00	100.00	

***N*-((1*S*,2*S*)-1-(4-Chlorophenyl)-2-(2-hydroxynaphthalen-1-yl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3b)**

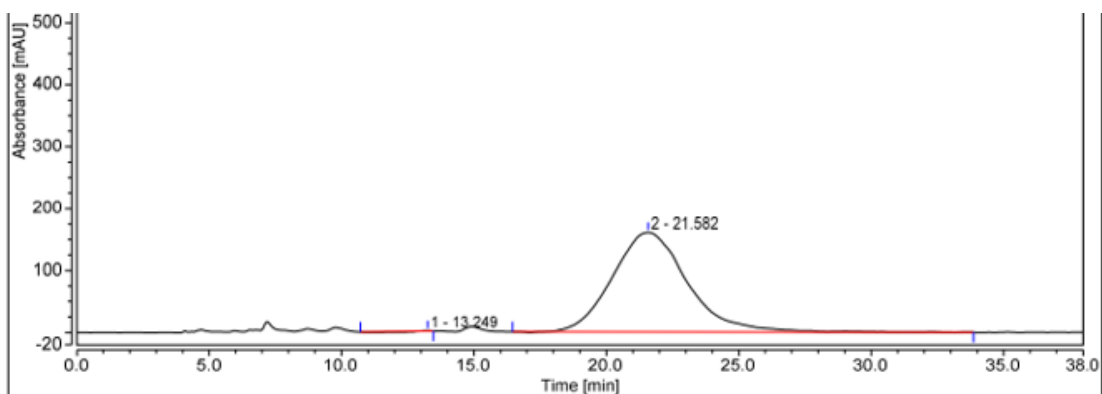


Following the general procedure, the compound was isolated as a white solid (49 mg, 90%); mp 151-152 °C; $[\alpha]_D^{21} = -436.0$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3411, 2922, 2849, 1625, 1349, 1172, 957, 815, 677 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.71 (s, 1H), 8.50 (s, 1H), 7.82 (d, *J* = 8.3 Hz, 1H),

7.68 (dt, $J = 21.5$, 7.2 Hz, 5H), 7.44 (t, $J = 7.6$ Hz, 1H), 7.36 (t, $J = 7.5$ Hz, 1H), 7.32 – 6.95 (m, 13H), 6.12 (s, 1H), 4.98 (d, $J = 10.6$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.9, 155.0, 147.0, 139.8, 133.3, 132.9, 132.3, 131.7, 131.5, 130.4, 130.3, 130.2, 130.2, 129.0, 128.9, 128.7, 128.6, 128.3, 127.2, 126.8, 126.2, 123.9, 123.6, 122.9, 122.1, 121.4, 120.2, 113.9, 112.7, 69.8, 53.9; HRMS (ESI) calcd for $\text{C}_{35}\text{H}_{25}\text{N}_2\text{O}_2\text{ClNa}$ m/z $[\text{M} + \text{Na}]^+$: 563.1497, found: 563.1485; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, $\lambda = 250$ nm): t_1 (minor) = 13.2 min, t_2 (major) = 21.5 min.

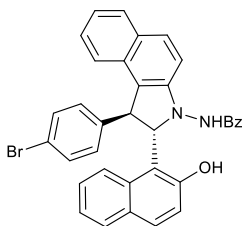


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		7.765	26.627	49.071	0.80	2.72	n.a.
2		13.215	1653.132	1208.864	49.96	67.12	n.a.
3		21.565	1597.572	509.351	48.29	28.28	n.a.
4		29.482	31.290	33.842	0.95	1.88	n.a.
Total:			3308.621	1801.128	100.00	100.00	

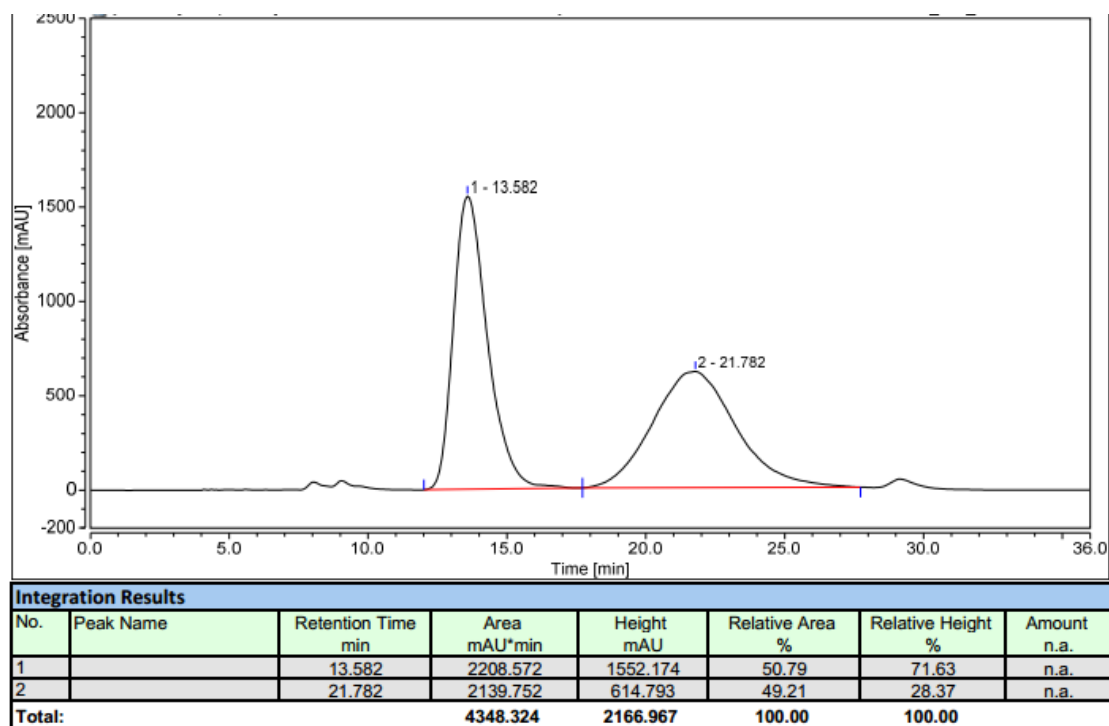


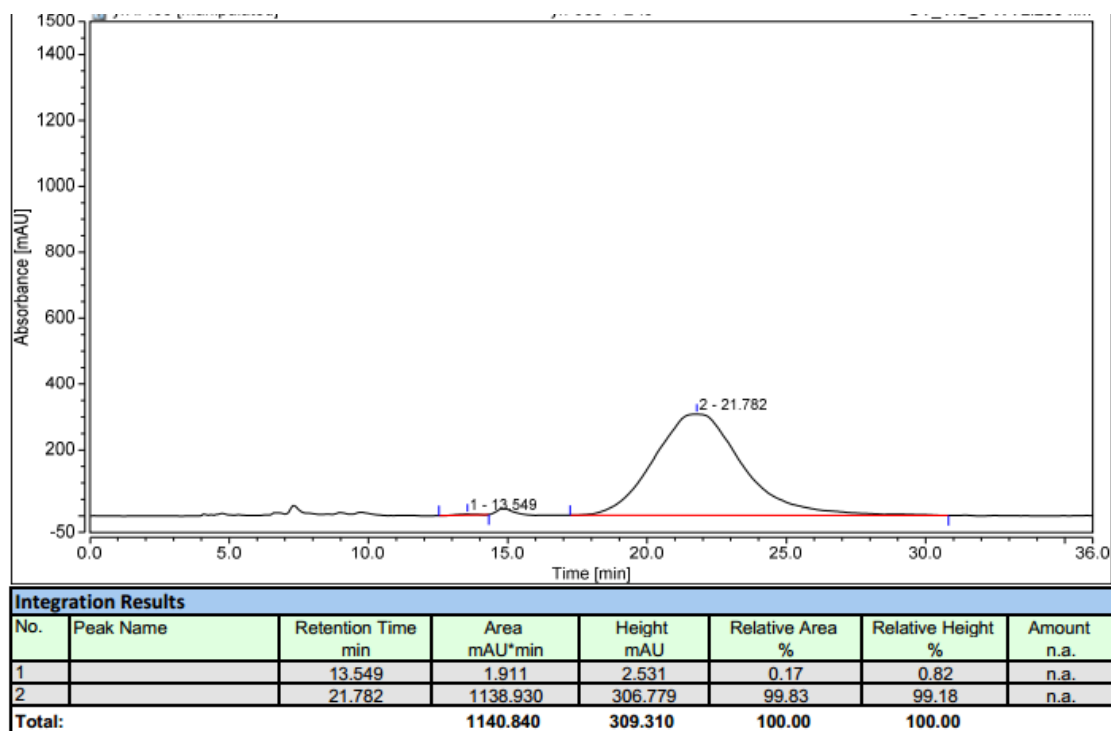
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		13.249	1.225	0.414	0.23	0.26	n.a.
2		21.582	525.842	160.569	99.77	99.74	n.a.
Total:			527.067	160.984	100.00	100.00	

***N*-((1*S*,2*S*)-1-(4-Bromophenyl)-2-(2-hydroxynaphthalen-1-yl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3c)**

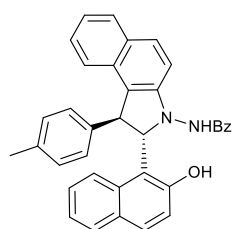


Following the general procedure, the compound was isolated as a white solid (54 mg, 92%); mp 158-159 °C; $[\alpha]_D^{21} = -308.4$ (c 1.0, CHCl₃, 99% ee); IR (KBr): 3406, 2924, 1678, 1353, 1173, 956, 816, 671 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.53 (s, 1H), 8.05 (s, 1H), 7.86 – 7.80 (m, 2H), 7.75 – 7.67 (m, 4H), 7.53 – 7.45 (m, 1H), 7.38 – 7.27 (m, 5H), 7.26 – 7.11 (m, 5H), 7.11 – 6.94 (m, 3H), 6.90 (d, *J* = 8.7 Hz, 1H), 6.19 (d, *J* = 81.4 Hz, 1H), 4.95 (d, *J* = 10.6 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 166.9, 155.0, 147.0, 140.4, 133.3, 132.4, 131.8, 131.7, 131.5, 130.5, 130.4, 130.3, 130.2, 129.0, 128.7, 128.6, 128.3, 127.2, 126.8, 126.2, 123.9, 123.6, 122.9, 122.0, 121.4, 121.1, 120.2, 113.9, 112.7, 69.8, 53.9; HRMS (ESI) calcd for C₃₅H₂₅N₂O₂BrNa *m/z* [M + Na]⁺: 607.0992, found: 607.0985; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 13.5 min, *t*₂ (major) = 21.7 min.

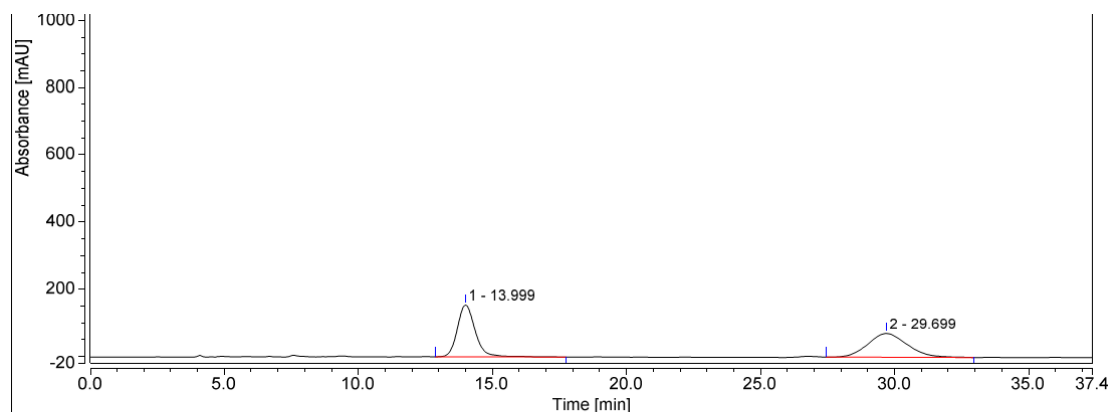




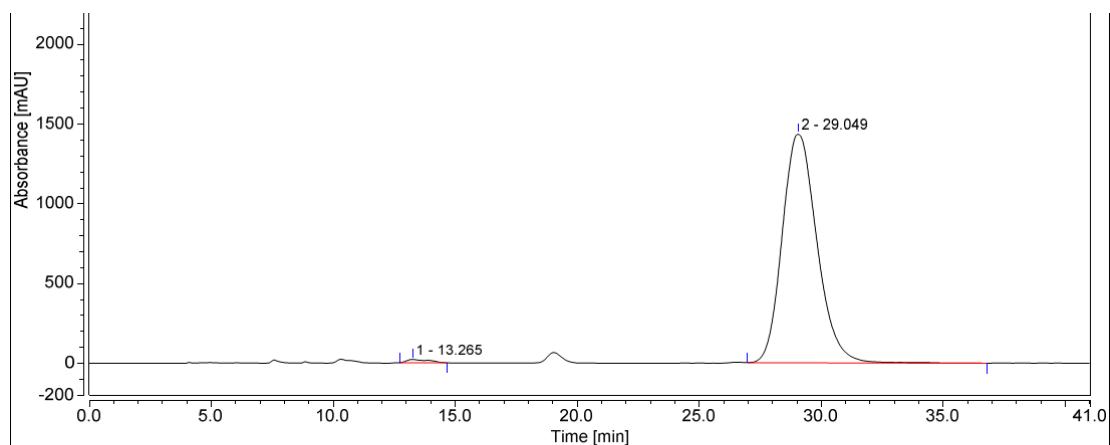
***N*-((1*S*,2*S*)-2-(2-Hydroxynaphthalen-1-yl)-1-(*p*-tolyl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3d)**



Following the general procedure, the compound was isolated as a white solid (47 mg, 91%); mp 167-168 °C; $[\alpha]_D^{21} = -475.6$ (c 1.0, CHCl₃, 98% ee); IR (KBr): 3238, 2924, 2852, 1518, 1265, 1022, 813, 746 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.82 (s, 1H), 8.41 (s, 1H), 7.82 (d, J = 8.2 Hz, 1H), 7.73 – 7.66 (m, 4H), 7.44 (t, J = 7.4 Hz, 1H), 7.39 – 7.10 (m, 9H), 7.10 – 6.88 (m, 6H), 6.10 (s, 1H), 4.99 (d, J = 10.6 Hz, 1H), 2.30 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.8, 155.0, 146.9, 138.1, 136.6, 133.5, 132.2, 131.8, 131.5, 130.9, 130.4, 130.1, 130.0, 129.4, 128.9, 128.7, 128.7, 128.6, 128.2, 127.2, 126.5, 125.8, 123.9, 123.8, 123.1, 122.7, 121.8, 120.2, 114.3, 112.8, 69.9, 54.1; HRMS (ESI) calcd for C₃₆H₂₈N₂O₂Na *m/z* [M + Na]⁺: 543.2043, found: 543.2033; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 13.3 min, *t*₂ (major) = 29.0 min.

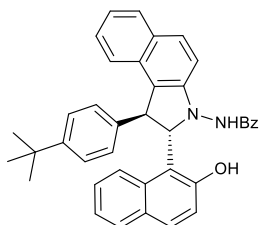


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		13.999	119.296	154.812	49.72	68.62	n.a.
2		29.699	120.663	70.787	50.28	31.38	n.a.
Total:			239.959	225.598	100.00	100.00	



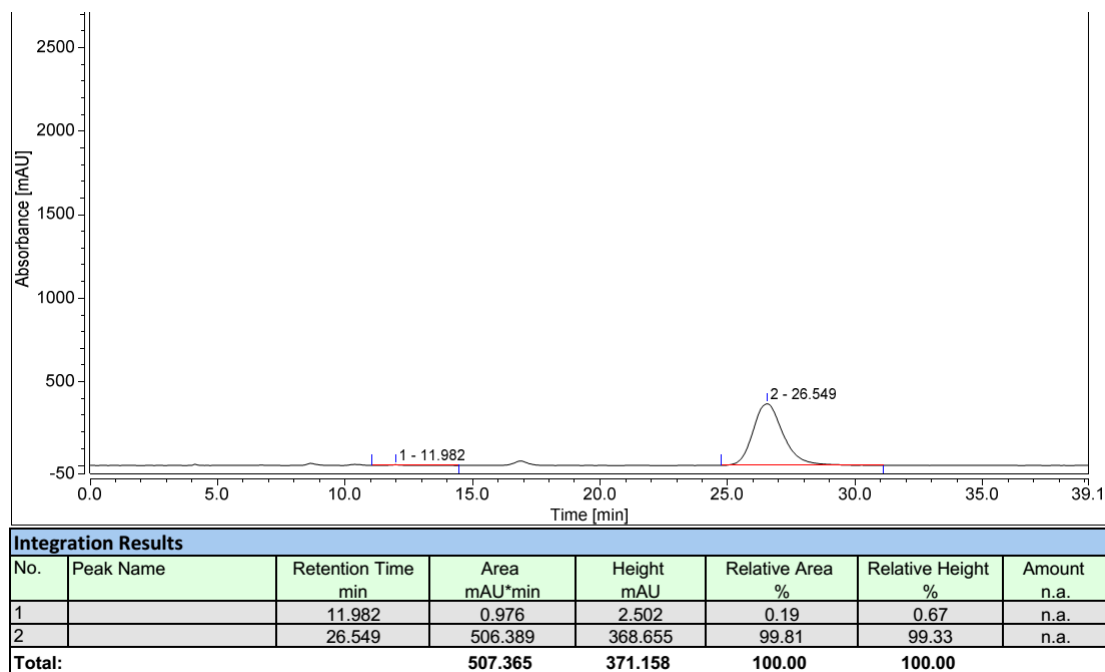
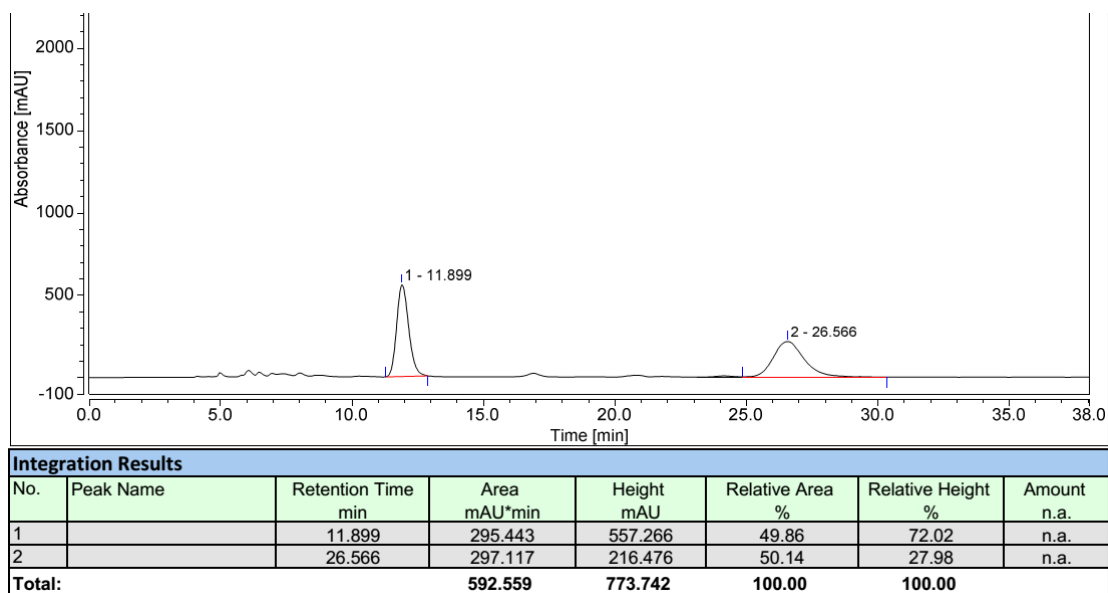
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		13.265	22.237	20.805	0.93	1.43	n.a.
2		29.049	2363.369	1433.368	99.07	98.57	n.a.
Total:			2385.606	1454.172	100.00	100.00	

***N*-((1*S*,2*S*)-1-(4-(*tert*-Butyl)phenyl)-2-(2-hydroxynaphthalen-1-yl)-1,2-dihydro-3*H*-benzo[*e*]indol-3-yl)benzamide (3e)**

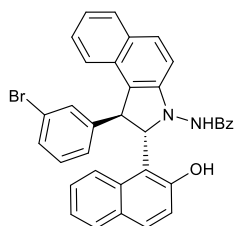


Following the general procedure, the compound was isolated as a white solid (53 mg, 94%); mp 233-234 °C; $[\alpha]_D^{21} = -323.6$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3226, 2960, 1654, 1269, 810, 746 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.83 (s, 1H), 8.16 (s, 1H), 7.92 – 7.80 (m, 2H), 7.78 – 7.69 (m, 4H), 7.52 (t, *J* = 7.1 Hz, 1H), 7.42 – 7.34 (m, 4H), 7.32 – 7.26 (m, 3H), 7.22 – 7.13 (m, 3H), 7.09 (d, *J* = 8.0 Hz, 2H), 6.93 – 6.85 (m, 1H), 6.80 (d, *J* = 8.7 Hz, 1H), 6.29 – 5.81 (m, 1H), 4.98 (d, *J* = 10.7 Hz, 1H), 1.32 (s, 8H); ¹³C NMR (100 MHz, CDCl₃) δ 166.6,

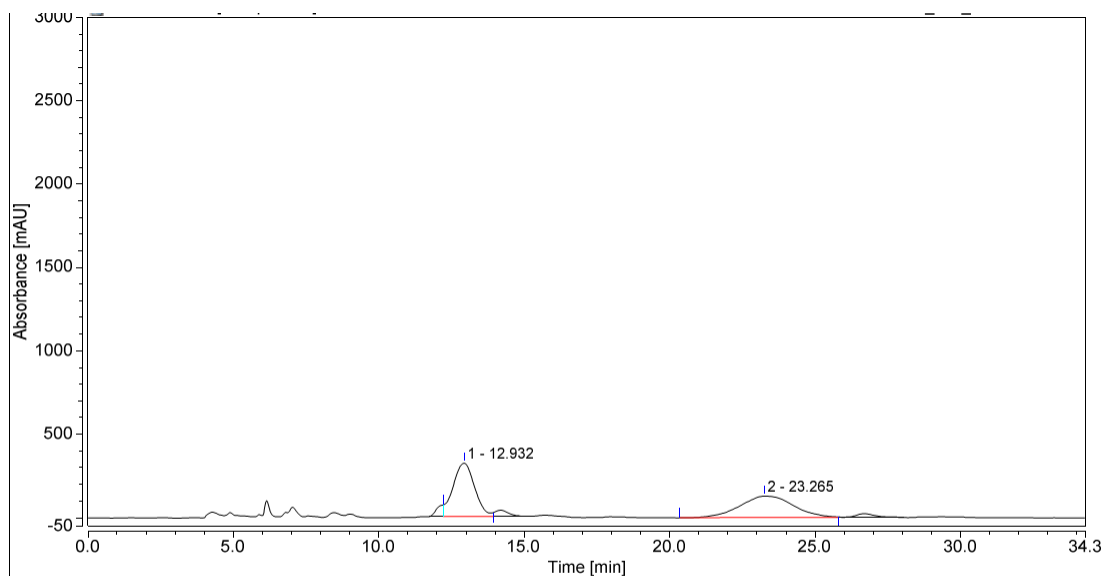
155.0, 150.2, 146.9, 137.9, 133.5, 132.4, 131.9, 131.6, 130.4, 130.1, 130.1, 128.9, 128.7, 128.6, 128.4, 128.1, 127.2, 126.6, 125.6, 125.6, 124.1, 123.9, 123.0, 122.6, 121.8, 120.2, 113.8, 112.8, 70.1, 54.1, 34.4, 31.4; HRMS (ESI) calcd for $C_{39}H_{34}N_2O_2Na$ m/z $[M + Na]^+$: 585.2512, found: 585.2495; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 11.9 min, t_2 (major) = 26.5 min.



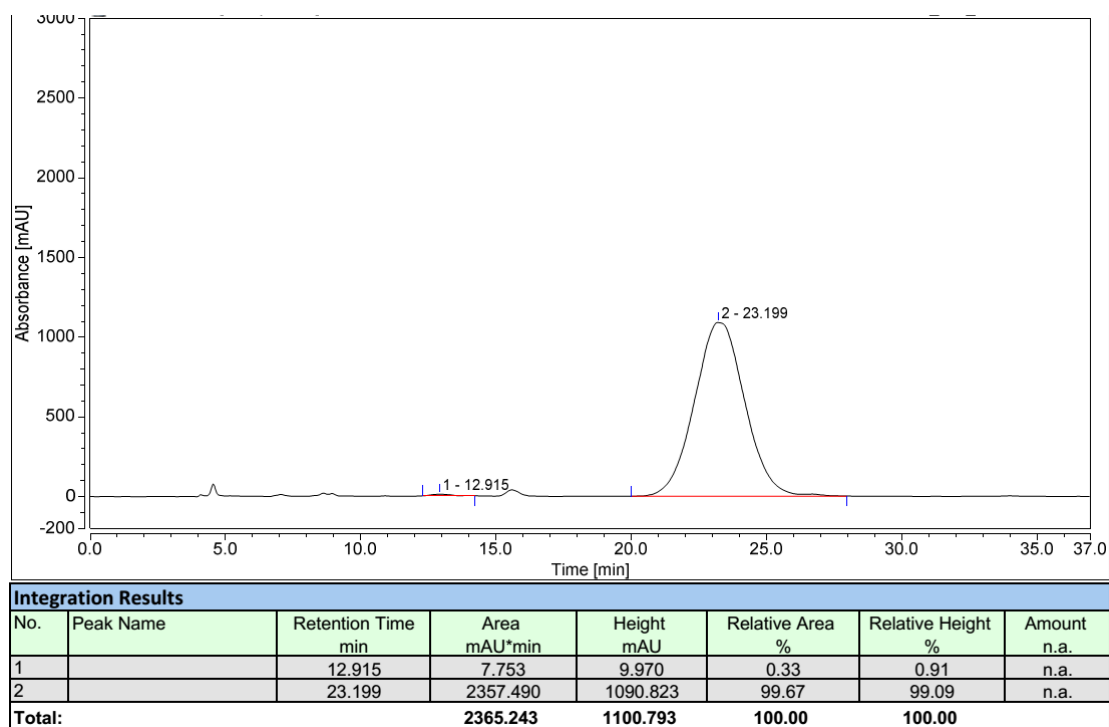
***N*-((1*S*,2*S*)-1-(3-Bromophenyl)-2-(2-hydroxynaphthalen-1-yl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3f)**



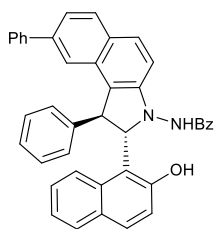
Following the general procedure, the compound was isolated as a white solid (57 mg, 97%); mp 154-155 °C; $[\alpha]_{\text{D}}^{21} = -346.4$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3423, 2924, 1654, 1261, 820, 748, 687 cm⁻¹; ¹H NMR (600 MHz, CDCl₃) δ 9.54 (s, 1H), 7.99 (s, 1H), 7.84 (dd, *J* = 8.3, 3.2 Hz, 2H), 7.78 – 7.64 (m, 4H), 7.48 (t, *J* = 7.4 Hz, 1H), 7.36 (t, *J* = 7.4 Hz, 3H), 7.34 – 7.30 (m, 2H), 7.25 – 7.21 (m, 3H), 7.16 (t, *J* = 8.4 Hz, 3H), 7.03 (s, 1H), 6.99 (t, *J* = 7.6 Hz, 1H), 6.88 (d, *J* = 8.7 Hz, 1H), 6.04 (s, 1H), 4.92 (d, *J* = 10.7 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 166.9, 155.1, 147.2, 143.6, 133.4, 132.4, 131.8, 131.6, 130.6, 130.4, 130.4, 130.2, 129.1, 128.8, 128.7, 128.4, 127.7, 127.3, 126.9, 126.2, 124.1, 123.7, 122.9, 122.8, 121.9, 121.4, 120.3, 113.8, 112.8, 69.9, 54.2; HRMS (ESI) calcd for C₃₅H₂₅N₂O₂BrNa *m/z* [M + Na]⁺: 607.0992, found: 607.0989; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 12.9 min, *t*₂ (major) = 23.2 min.



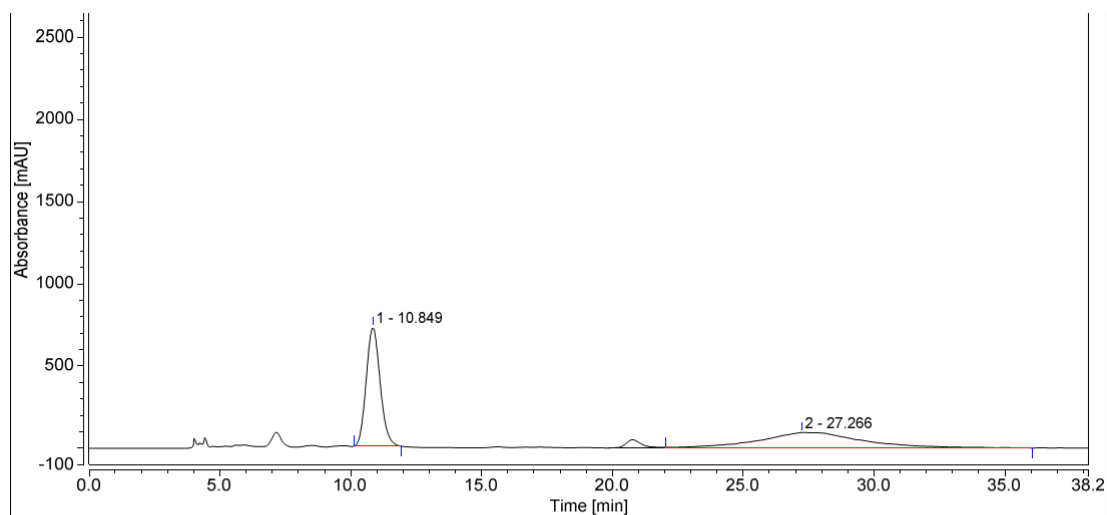
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		12.932	275.649	320.750	49.98	71.33	n.a.
2		23.265	275.852	128.908	50.02	28.67	n.a.
Total:			551.501	449.657	100.00	100.00	



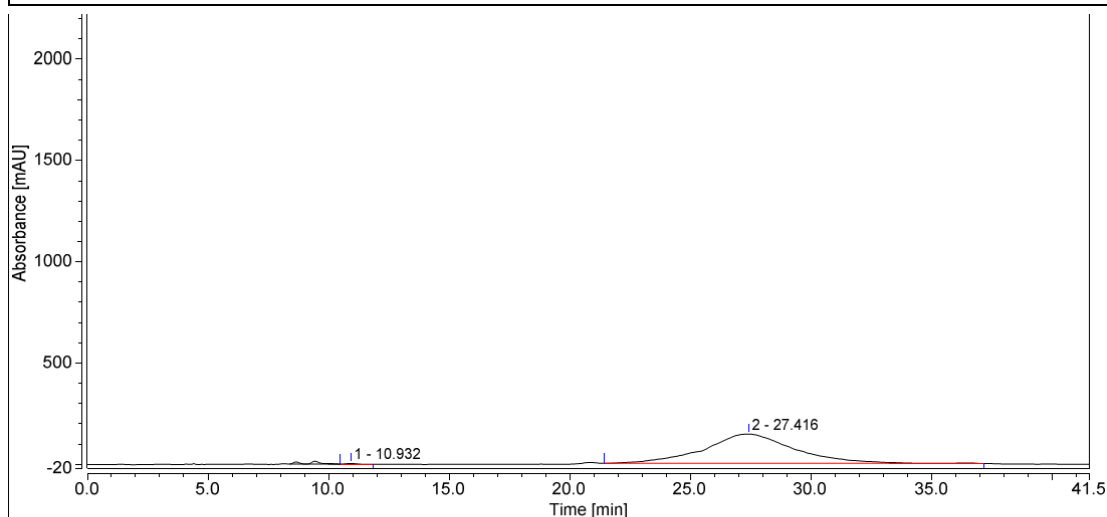
***N*-((1*S*,2*S*)-2-(2-Hydroxynaphthalen-1-yl)-1,8-diphenyl-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3g)**



Following the general procedure, the compound was isolated as a white solid (57 mg, 90%); mp 186-187 °C; $[\alpha]_D^{21} = -610.4$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3373, 2924, 1701, 1261, 1170, 943, 750, 704 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.92 (s, 1H), 8.63 (s, 1H), 7.87 – 7.63 (m, 6H), 7.55 (m, 1H), 7.44 (t, *J* = 7.5 Hz, 1H), 7.40 – 6.93 (m, 18H), 6.00 (s, 1H), 4.99 (d, *J* = 10.8 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 167.0, 155.1, 147.4, 140.9, 140.9, 138.8, 133.6, 132.4, 131.9, 131.9, 130.7, 130.5, 130.2, 129.8, 129.5, 129.1, 128.8, 128.8, 128.7, 128.7, 128.3, 127.4, 127.3, 127.2, 127.2, 126.0, 123.4, 122.8, 122.0, 121.8, 120.4, 114.3, 112.8, 69.1, 54.5; HRMS (ESI) calcd for C₄₁H₃₀N₂O₂Na *m/z* [M + Na]⁺: 605.2199, found: 605.2186; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 10.9 min, *t*₂ (major) = 27.4 min.

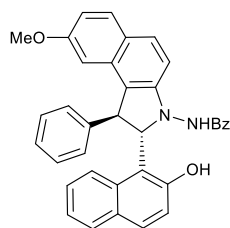


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		10.849	446.084	722.510	50.77	88.50	n.a.
2		27.266	432.521	93.919	49.23	11.50	n.a.
Total:			878.605	816.429	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		10.932	2.344	3.758	0.37	2.54	n.a.
2		27.416	630.520	144.278	99.63	97.46	n.a.
Total:			632.864	148.036	100.00	100.00	

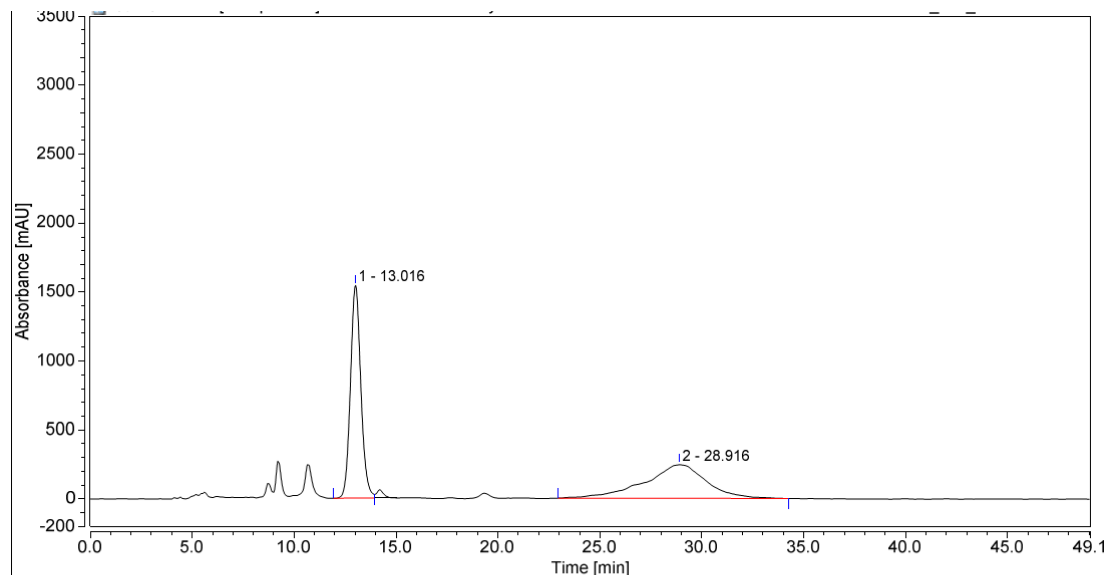
N-((1S,2S)-2-(2-Hydroxynaphthalen-1-yl)-8-methoxy-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)benzamide (3h)



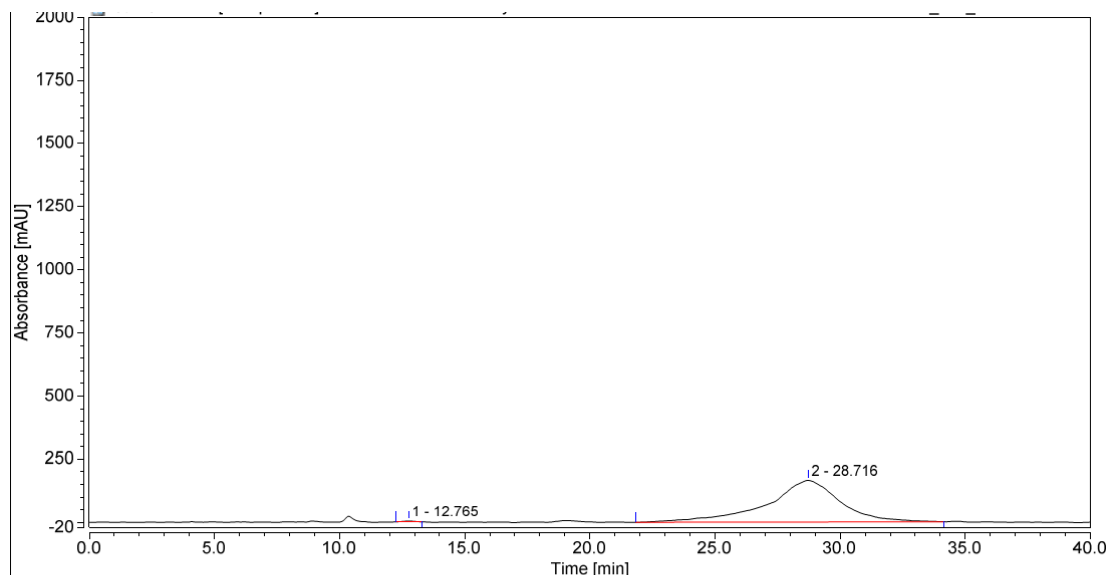
Following the general procedure, the compound was isolated as a white solid (51 mg, 95%); mp 172-173 °C; $[\alpha]_D^{21} = -561.6$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3406, 2924, 1678, 1353, 1172, 1209, 958, 815, 674 cm⁻¹; ¹H NMR (600 MHz, CDCl₃) δ 9.69 (s, 1H), 8.03 (s, 1H), 7.76 – 7.63 (m, 6H), 7.46 (t, *J* = 7.4 Hz, 1H), 7.33 (t, *J* = 7.7 Hz, 3H), 7.27 – 7.14 (m, 6H), 7.14 – 7.10 (m, 1H), 7.05 (d, *J* = 8.6 Hz, 1H), 6.98 – 6.85 (m, 3H), 6.40 (d, *J* = 2.0 Hz, 1H), 4.93 (d, *J* = 10.7 Hz, 1H),

1H), 7.05 (d, *J* = 8.6 Hz, 1H), 6.98 – 6.85 (m, 3H), 6.40 (d, *J* = 2.0 Hz, 1H), 4.93 (d, *J* = 10.7 Hz, 1H),

3.33 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 166.9, 157.9, 155.1, 147.4, 140.9, 133.5, 132.2, 131.8, 131.5, 130.2, 130.0, 129.6, 128.9, 128.6, 128.6, 128.5, 128.1, 127.2, 127.0, 126.8, 125.9, 122.7, 121.9, 121.7, 120.2, 116.6, 114.2, 110.2, 102.3, 69.1, 54.6, 54.4; HRMS (ESI) calcd for $\text{C}_{36}\text{H}_{28}\text{N}_2\text{O}_3\text{Na}$ m/z $[\text{M} + \text{Na}]^+$: 559.1992, found: 559.1989; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 12.8 min, t_2 (major) = 28.7 min.

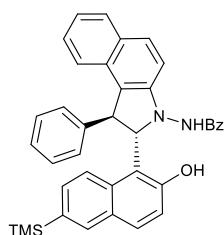


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		13.016	914.681	1542.899	51.77	86.38	n.a.
2		28.916	852.220	243.198	48.23	13.62	n.a.
Total:			1766.901	1786.097	100.00	100.00	

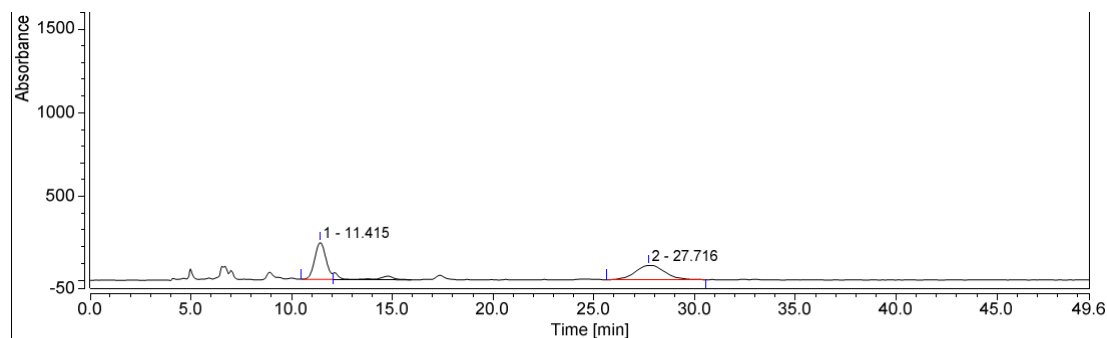


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		12.765	1.791	3.519	0.32	2.09	n.a.
2		28.716	556.496	164.913	99.68	97.91	n.a.
Total:			558.287	168.432	100.00	100.00	

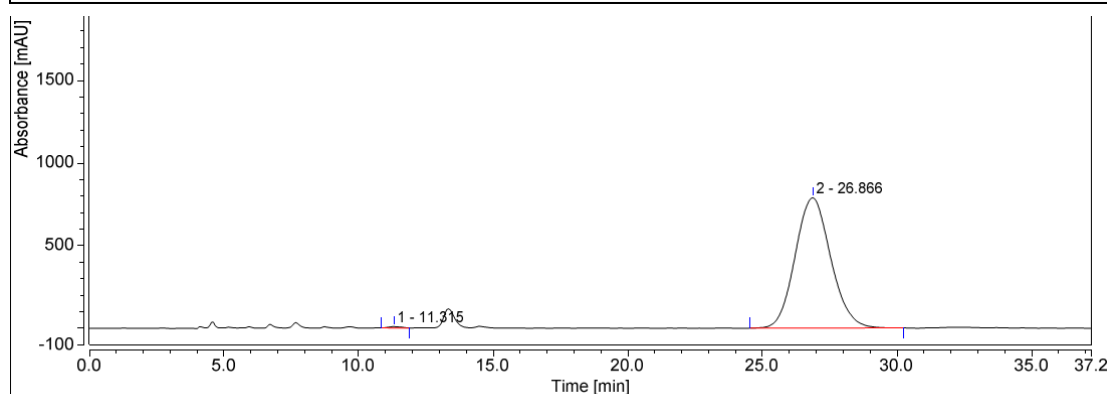
***N*-((1*S*,2*S*)-2-(2-Hydroxy-6-(trimethylsilyl)naphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3i)**



Following the general procedure, the compound was isolated as a white solid (56 mg, 97%); mp 155-156 °C; $[\alpha]_D^{21} = -368$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3240, 2956, 2924, 1654, 1247, 1109, 839, 694 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.82 (s, 1H), 8.43 (s, 1H), 7.93 – 7.79 (m, 2H), 7.78 – 7.64 (m, 4H), 7.46 (q, *J* = 7.8 Hz, 1H), 7.42 – 7.24 (m, 7H), 7.21 – 7.11 (m, 5H), 7.08 (d, *J* = 8.5 Hz, 1H), 6.97 – 6.88 (m, 1H), 6.22 (s, 1H), 5.04 (d, *J* = 10.6 Hz, 1H), 0.31 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ 166.7, 155.3, 146.9, 141.2, 134.0, 133.8, 133.7, 132.2, 131.8, 131.5, 130.3, 130.3, 130.1, 129.9, 128.9, 128.7, 128.5, 128.1, 127.2, 127.0, 126.5, 123.8, 122.8, 120.7, 120.2, 114.0, 112.7, 69.7, 54.4, -1.2; HRMS (ESI) calcd for C₃₈H₃₄N₂O₂SiNa *m/z* [M + Na]⁺: 601.2282, found: 601.2269; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 11.3 min, *t*₂ (major) = 26.9 min.

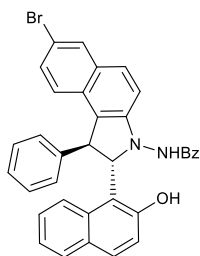


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.415	143.324	220.947	49.27	72.17	n.a.
2		27.716	147.594	85.205	50.73	27.83	n.a.
Total:			290.919	306.152	100.00	100.00	

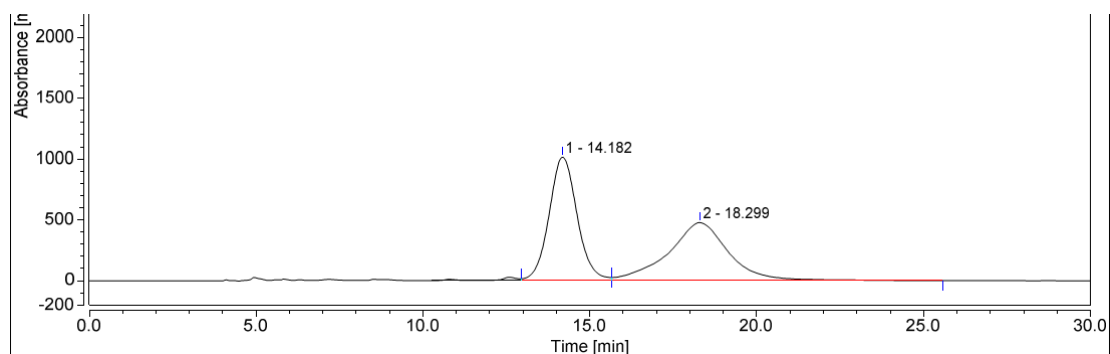


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.315	4.236	7.951	0.35	1.00	n.a.
2		26.866	1209.890	790.034	99.65	99.00	n.a.
Total:			1214.125	797.985	100.00	100.00	

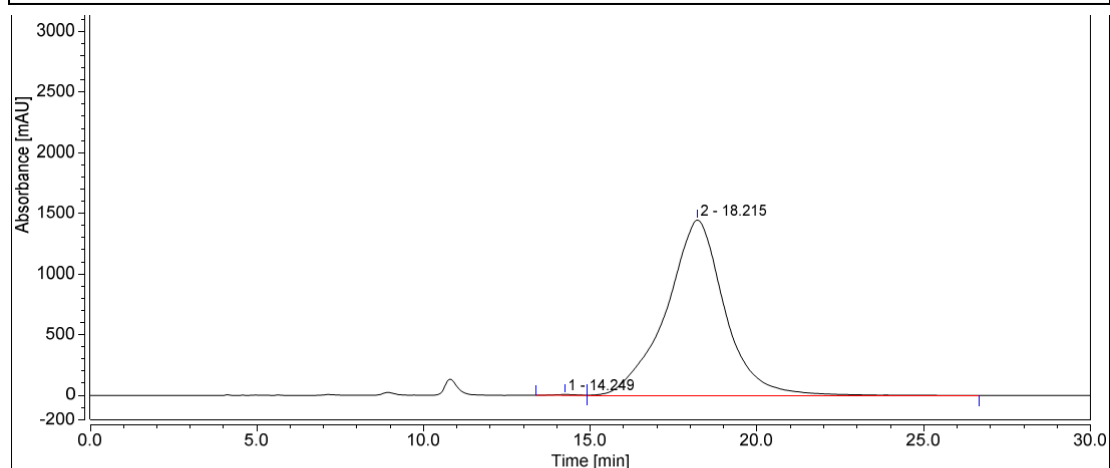
N-((1S,2S)-7-Bromo-2-(2-Hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl) benzamide (3j)



Following the general procedure, the compound was isolated as a white solid (58mg, 99%); mp 225-226 °C; $[\alpha]_D^{21} = -323.6$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3244, 2918, 1656, 1512, 1267, 818, 746, 700 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.60 (s, 1H), 8.25 (s, 1H), 7.97 – 7.92 (m, 1H), 7.78 – 7.55 (m, 5H), 7.50 – 7.41 (m, 1H), 7.40 – 6.99 (m, 12H), 6.96 – 6.83 (m, 2H), 6.23 (s, 1H), 4.95 (d, J = 10.8 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 167.1, 154.9, 147.4, 140.6, 133.4, 132.5, 132.2, 131.5, 130.7, 130.1, 129.7, 129.0, 128.8, 128.7, 128.6, 128.4, 128.1, 127.2, 125.9, 125.3, 122.9, 122.7, 121.6, 120.1, 117.4, 114.0, 113.7, 69.9, 54.1; HRMS (ESI) calcd for C₃₅H₂₅N₂O₂BrNa *m/z* [M + Na]⁺: 607.0992, found: 607.0982; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 14.2 min, *t*₂ (major) = 18.2 min.

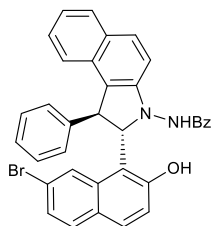


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		14.182	990.887	1014.764	49.65	68.04	n.a.
2		18.299	1004.868	476.644	50.35	31.96	n.a.
Total:			1995.755	1491.408	100.00	100.00	

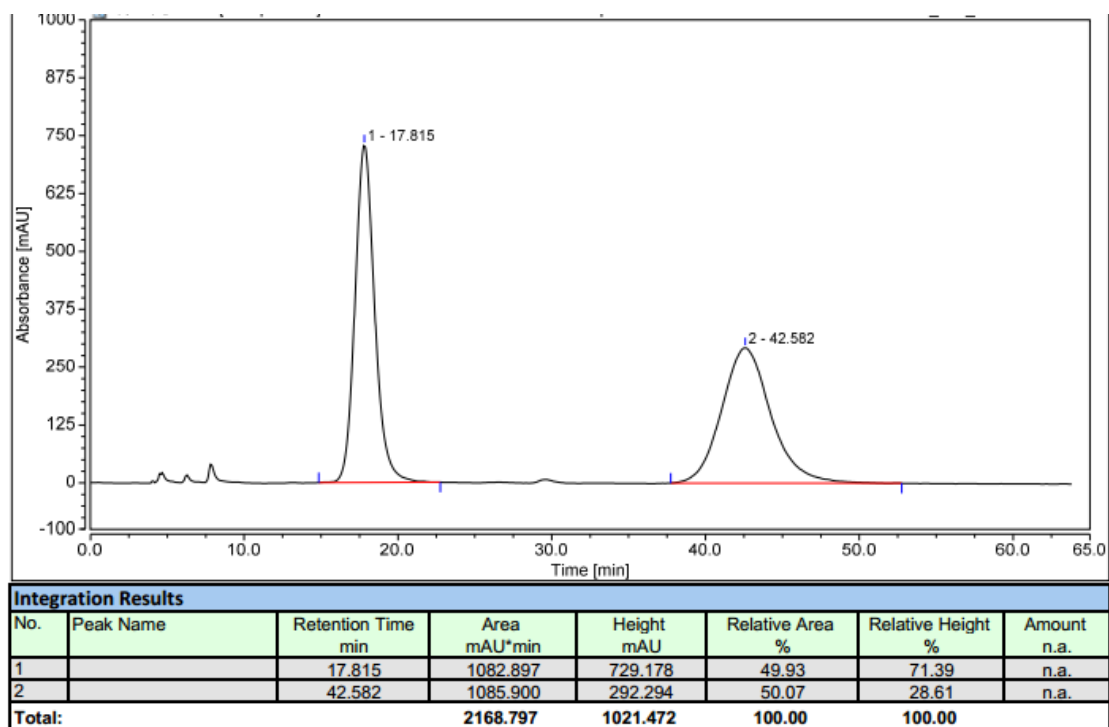


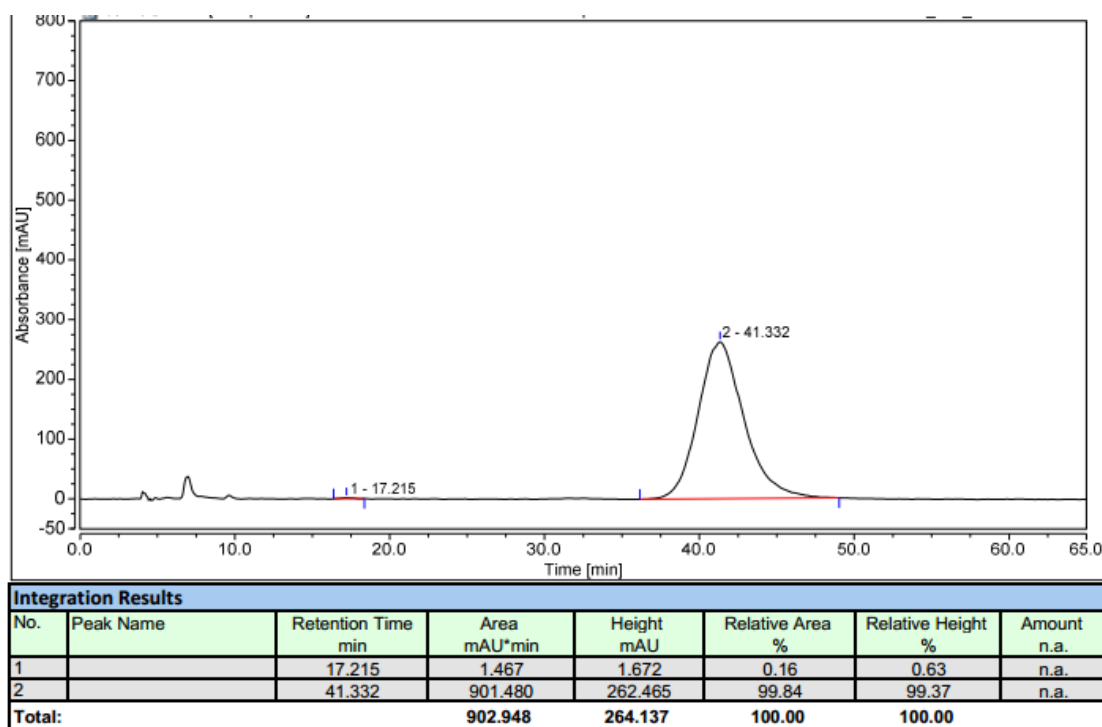
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		14.249	5.654	6.743	0.19	0.46	n.a.
2		18.215	2938.622	1445.791	99.81	99.54	n.a.
Total:			2944.276	1452.534	100.00	100.00	

***N*-((1*S*,2*S*)-2-(7-Bromo-2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3k)**

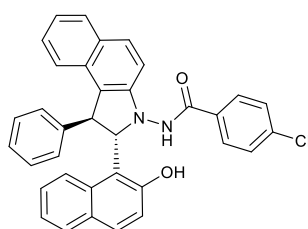


Following the general procedure, the compound was isolated as a white solid (50 mg, 85%); mp 212–213 °C; $[\alpha]_{\text{D}}^{21} = -290.4$ (c 1.0, CHCl₃, 99% ee); IR (KBr): 3219, 2922, 1658, 1286, 811, 698 cm⁻¹; ¹H NMR (400 MHz, DMSO-*d*₆) δ 10.75 (s, 0.39H), 10.63 (s, 0.76H), 10.25 (s, 0.3H), 9.53 (s, 0.69H), 8.28 (d, *J* = 32.2 Hz, 1H), 7.98 – 7.65 (m, 7H), 7.57 – 7.50 (m, 1H), 7.49 – 7.31 (m, 4H), 7.31 – 6.98 (m, 7H), 6.50 – 5.84 (s, 1H), 5.26 – 4.53 (d, *J* = 9.5 Hz, 1H); ¹³C NMR (150 MHz, DMSO-*D*₆) δ 166.9, 157.0, 156.1, 150.5, 135.4, 133.9, 132.7, 132.1, 131.4, 130.8, 130.7, 130.5, 129.9, 129.8, 129.7, 129.6, 129.5, 129.3, 129.3, 128.6, 128.5, 128.4, 127.4, 127.2, 126.1, 123.3, 123.1, 120.6, 119.3, 70.6, 54.8; HRMS (ESI) calcd for C₃₅H₂₅N₂O₂BrNa *m/z* [M + Na]⁺: 607.0992, found: 607.0999; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 17.2 min, *t*₂ (major) = 41.3 min.

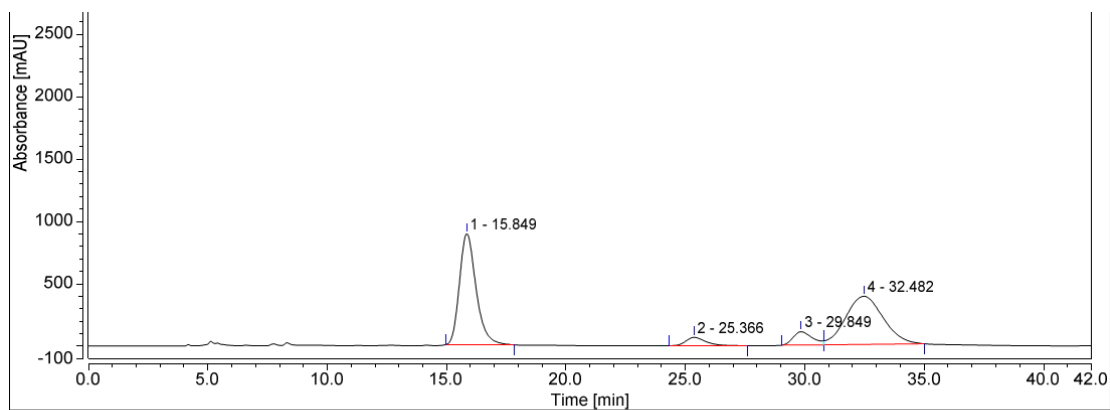




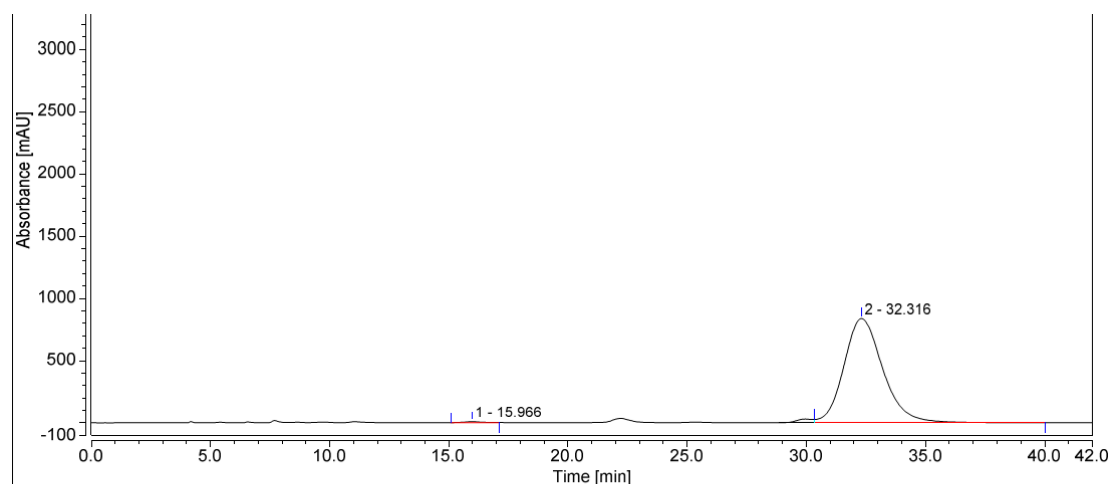
4-Chloro-*N*-((1*S*,2*S*)-2-(2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3I)



Following the general procedure, the compound was isolated as a white solid (52 mg, 96%); mp 140-141 °C; $[\alpha]_D^{21} = -340.4$ (c 1.0, CHCl₃, >99% ee); IR (KBr): 3239, 2925, 1652, 1267, 1100, 820, 744, 699 cm⁻¹; ¹H NMR (600 MHz, CDCl₃) δ 9.63 (s, 1H), 8.14 (s, 1H), 7.80 (d, *J* = 8.2 Hz, 1H), 7.75 (d, *J* = 8.6 Hz, 1H), 7.67 (dd, *J* = 14.0, 8.5 Hz, 2H), 7.57 (d, *J* = 8.2 Hz, 2H), 7.29 (t, *J* = 7.2 Hz, 1H), 7.24 – 7.07 (m, 12H), 6.90 (t, *J* = 7.5 Hz, 1H), 6.85 (d, *J* = 8.6 Hz, 1H), 6.03 (s, 1H), 4.96 (d, *J* = 10.7 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 166.2, 155.1, 146.8, 140.9, 138.5, 133.5, 131.6, 131.6, 130.4, 130.2, 130.2, 130.1, 129.0, 128.8, 128.8, 128.7, 128.6, 128.3, 127.1, 126.7, 126.0, 124.0, 123.9, 123.0, 122.8, 121.6, 120.2, 114.1, 112.8, 69.8, 54.5; HRMS (ESI) calcd for C₃₅H₂₅N₂O₂ClNa *m/z* [M + Na]⁺: 563.1497, found: 563.1489; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 10/90, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 15.9 min, *t*₂ (major) = 32.3 min.

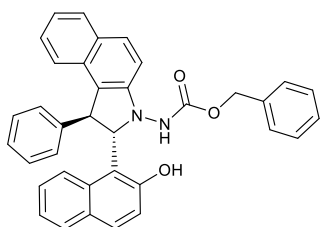


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		15.849	721.365	892.520	45.36	61.49	n.a.
2		25.366	65.582	67.252	4.12	4.63	n.a.
3		29.849	99.535	106.237	6.26	7.32	n.a.
4		32.482	703.824	385.571	44.26	26.56	n.a.
Total:			1590.306	1451.579	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		15.966	6.455	7.786	0.40	0.92	n.a.
2		32.316	1591.388	838.687	99.60	99.08	n.a.
Total:			1597.842	846.473	100.00	100.00	

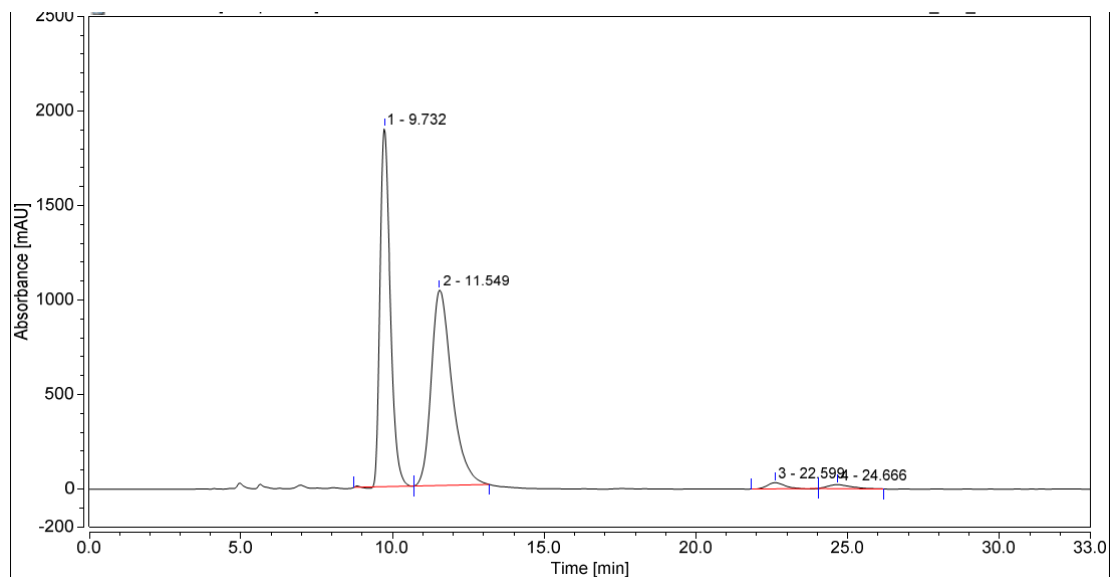
Benzyl((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)carbamate (3m)



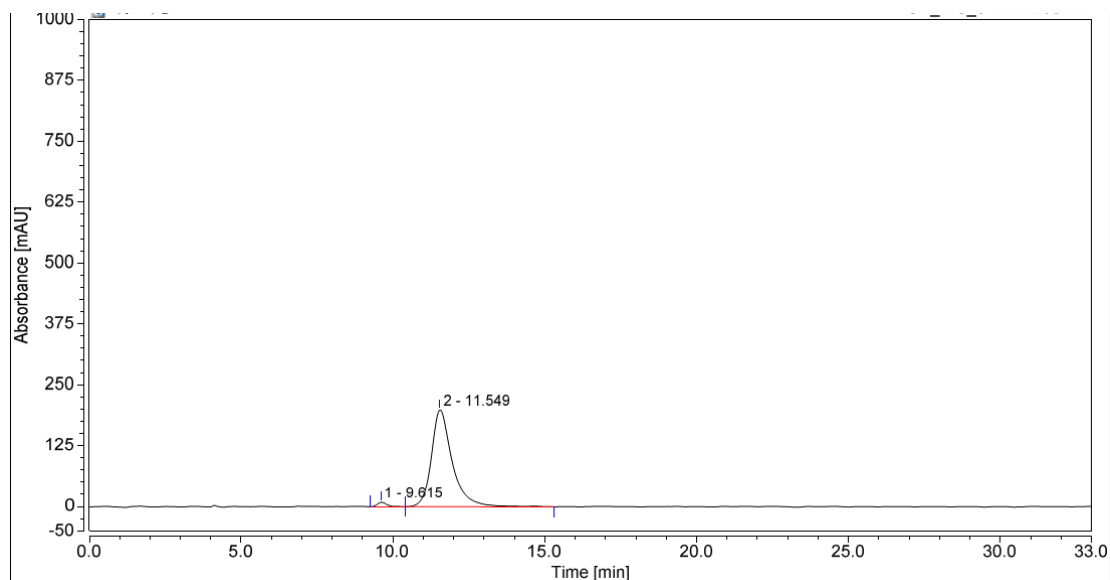
Following the general procedure, the compound was isolated as a white solid (51 mg, 95%); mp 116-117 °C; $[\alpha]_D^{21} = -302.4$ (c 1.0, CHCl₃, 96% ee); IR (KBr): 3265, 2925, 1654, 1267, 820, 748, 687 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.37 (s, 0.81H), 9.04 (s, 0.29H), 7.88 (dd, J = 8.8, 4.6 Hz, 2H), 7.75 (dd, J = 8.6, 5.2 Hz, 2H), 7.38 – 7.10 (m, 16H),

7.03 – 6.83 (m, 3H), 5.90 (s, 1H), 5.12 (s, 2H), 4.96 (d, J = 10.9 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 155.0, 146.9, 140.8, 135.4, 133.5, 131.6, 130.2, 130.2, 128.9, 128.8, 128.7, 128.5, 128.3, 128.2,

128.0, 127.1, 126.6, 125.9, 123.9, 123.9, 122.7, 121.4, 120.1, 113.6, 112.8, 69.9, 67.5, 53.9; HRMS (ESI) calcd for $C_{36}H_{28}N_2O_3Na$ m/z $[M + Na]^+$: 559.1992, found: 559.1982; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 9.6 min, t_2 (major) = 11.5 min.

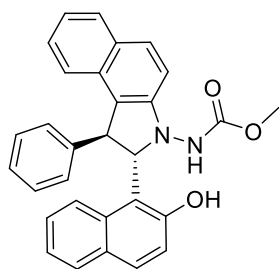


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.732	748.097	1894.104	46.70	63.55	n.a.
2		11.549	814.729	1033.136	50.86	34.66	n.a.
3		22.599	20.556	32.453	1.28	1.09	n.a.
4		24.666	18.404	20.809	1.15	0.70	n.a.
Total:			1601.787	2980.502	100.00	100.00	

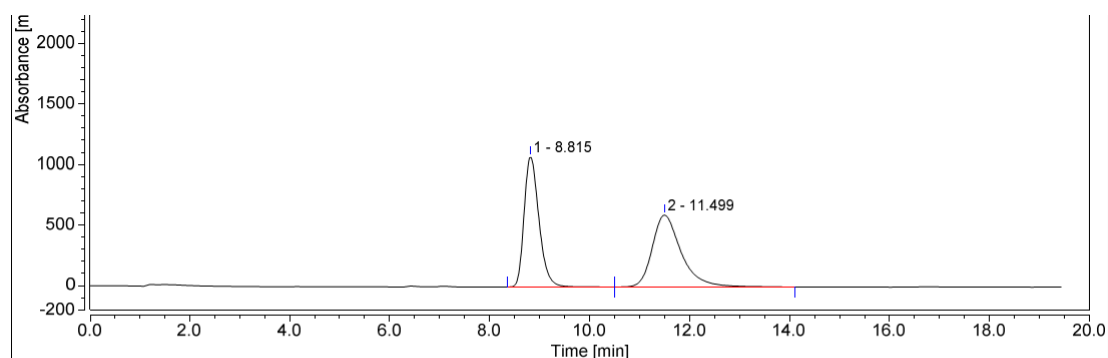


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.615	3.339	9.106	2.07	4.38	n.a.
2		11.549	158.367	198.887	97.93	95.62	n.a.
Total:			161.706	207.993	100.00	100.00	

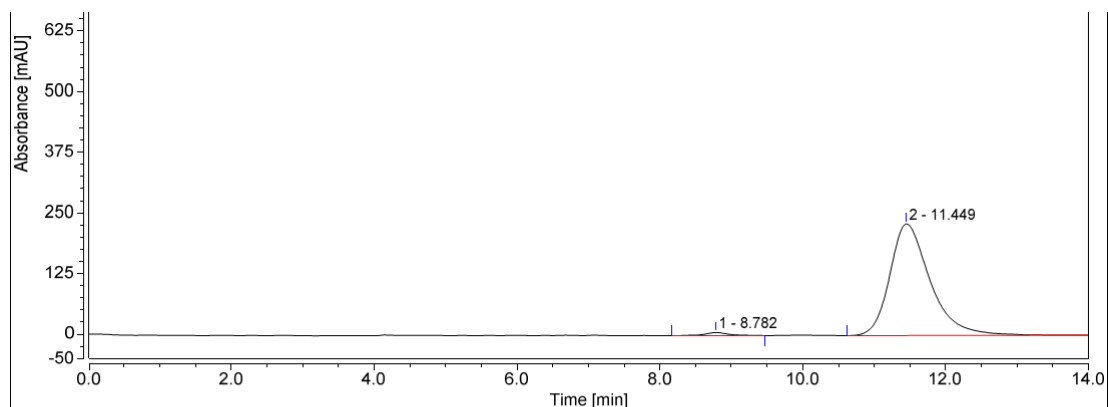
Methyl((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)carbamate (3n)



Following the general procedure, the compound was isolated as a white solid (39 mg, 85%); mp 145-146 °C; $[\alpha]_D^{21} = -335.2$ (c 1.0, CHCl₃, 97% ee); IR (KBr): 3251, 2924, 1517, 1267, 1225, 810, 744 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.46 (s, 1H), 7.93 – 7.82 (m, 2H), 7.80 – 7.62 (m, 2H), 7.47 – 7.04 (m, 11H), 7.05 – 6.90 (m, 1H), 6.86 (d, J = 8.8 Hz, 2H), 5.86 (s, 1H), 4.94 (d, J = 10.8 Hz, 1H), 3.68 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 154.9, 146.9, 141.0, 133.4, 131.6, 130.2, 130.2, 128.8, 128.8, 128.6, 128.2, 127.1, 126.6, 125.8, 123.9, 123.8, 122.7, 121.5, 120.1, 113.6, 112.7, 69.0, 54.3, 52.7; HRMS (ESI) calcd for C₃₀H₂₄N₂O₃Na *m/z* [M + Na]⁺: 483.1679, found: 483.1669; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 8.8 min, *t*₂ (major) = 11.4 min.

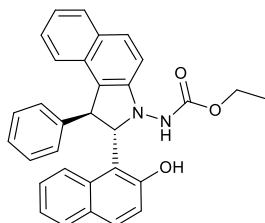


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		8.815	369.863	1075.306	48.11	64.42	n.a.
2		11.499	398.885	593.978	51.89	35.58	n.a.
Total:			768.748	1669.284	100.00	100.00	

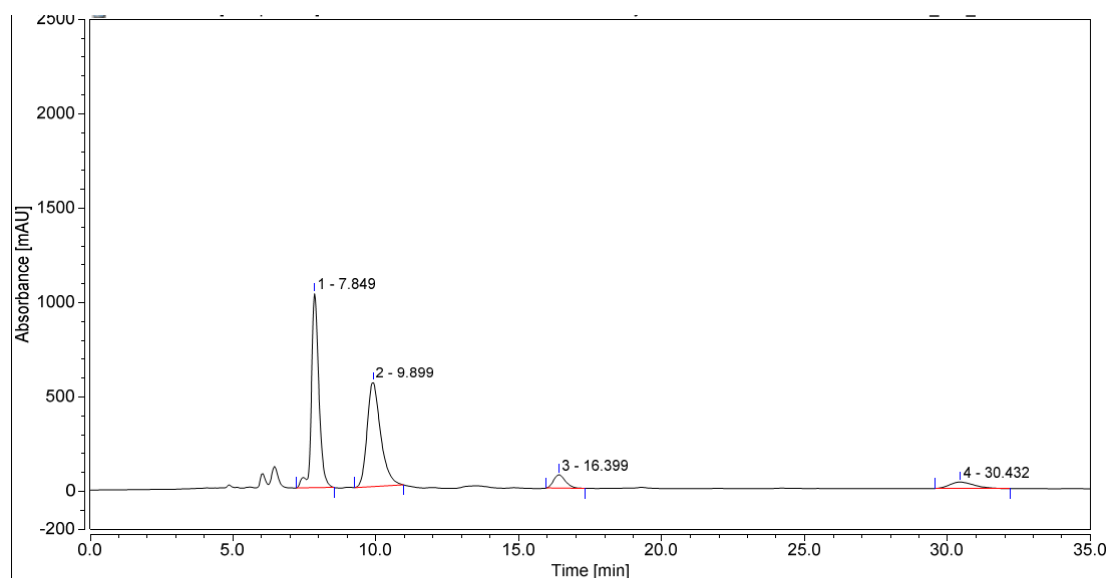


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		8.782	2.504	6.291	1.64	2.66	n.a.
2		11.449	150.570	230.173	98.36	97.34	n.a.
Total:			153.074	236.464	100.00	100.00	

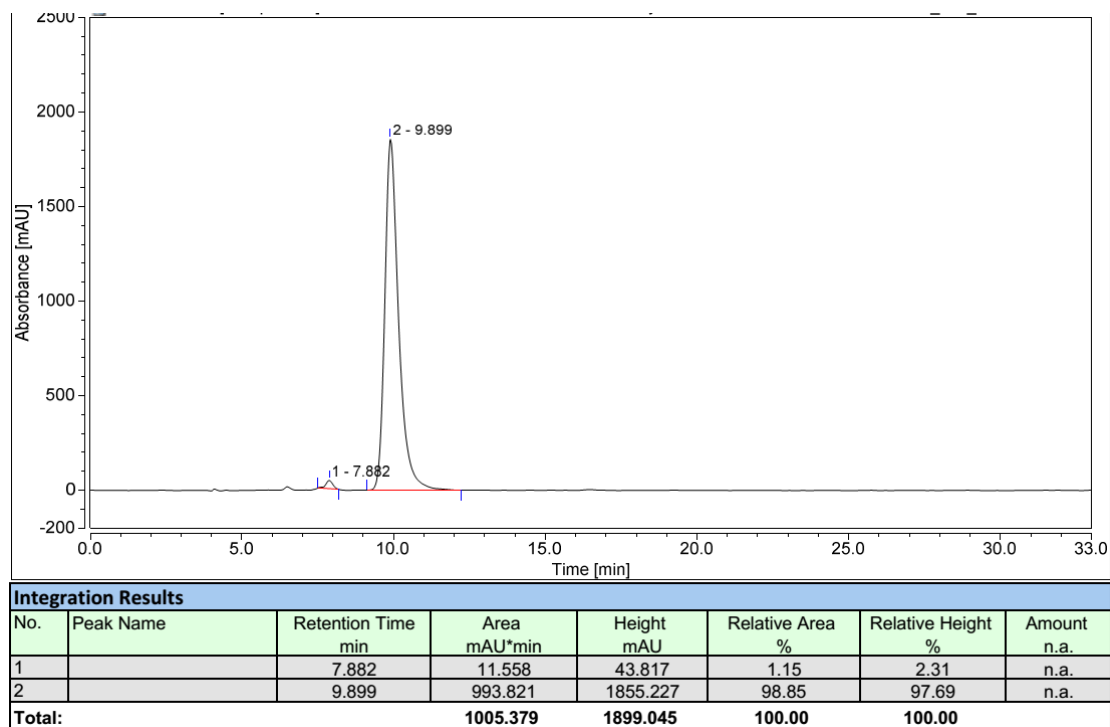
Ethyl((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)carbamate (3o)



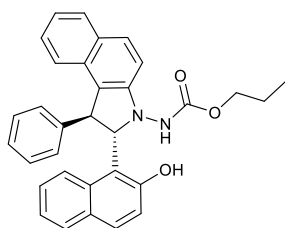
Following the general procedure, the compound was isolated as a white solid (47 mg, 99%); mp 139-140 °C; $[\alpha]_D^{21} = -288.8$ (c 1.0, CHCl₃, 98% ee); IR (KBr): 3448, 2924, 1718, 1270, 1230, 813, 744 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.49 (s, 1H), 7.93 – 7.84 (m, 2H), 7.81 – 7.67 (m, 2H), 7.39 – 7.27 (m, 4H), 7.26 – 7.06 (m, 8H), 6.87 (d, *J* = 8.9 Hz, 2H), 5.89 (s, 1H), 4.94 (d, *J* = 10.8 Hz, 1H), 4.15 (q, *J* = 7.3 Hz, 2H), 1.21 (t, *J* = 7.3 Hz, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 154.9, 147.1, 140.9, 133.4, 131.6, 130.2, 130.2, 130.1, 128.8, 128.7, 128.6, 128.2, 127.1, 126.5, 125.8, 123.9, 122.7, 121.4, 120.1, 113.7, 112.7, 70.0, 61.8, 53.9, 14.2; HRMS (ESI) calcd for C₃₁H₂₆N₂O₃Na *m/z* [M + Na]⁺: 497.1836, found: 497.1823; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 7.9 min, *t*₂ (major) = 9.9 min.



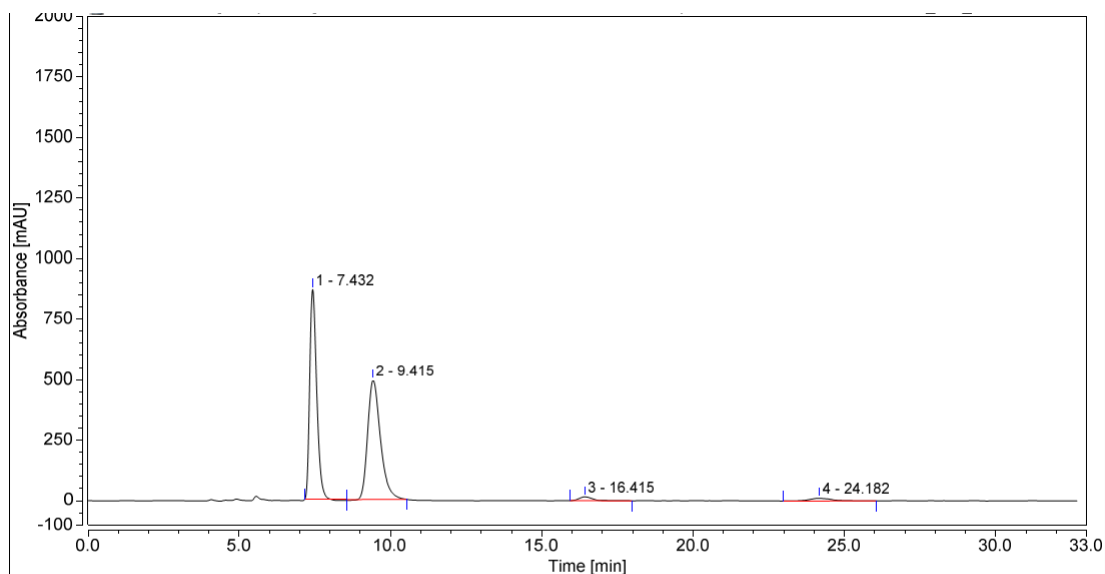
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		7.849	312.806	1027.658	45.69	60.96	n.a.
2		9.899	303.034	552.780	44.26	32.79	n.a.
3		16.399	33.913	70.589	4.95	4.19	n.a.
4		30.432	34.941	34.728	5.10	2.06	n.a.
Total:			684.695	1685.754	100.00	100.00	



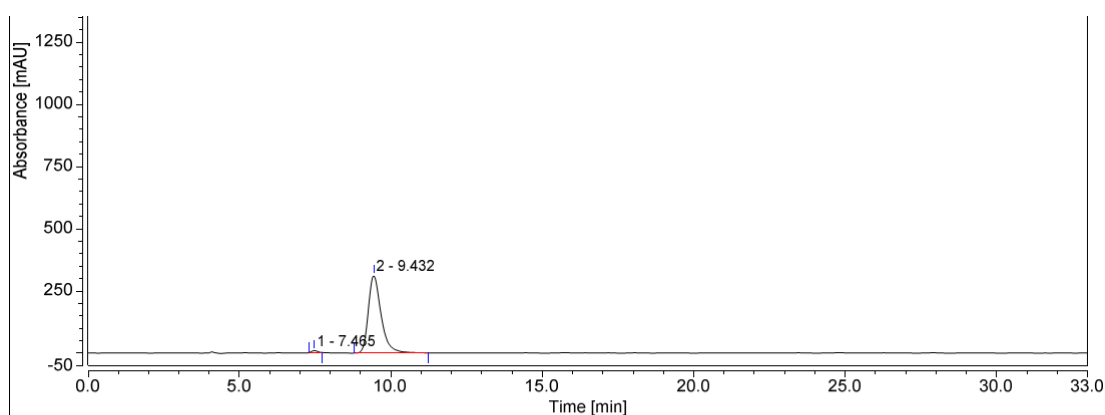
Propyl((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)carbamate (3p)



Following the general procedure, the compound was isolated as a white solid (42 mg, 86%); mp 105-106 °C; $[\alpha]_D^{21} = -318.2$ (c 1.0, CHCl₃, 98% ee); IR (KBr): 3448, 2940, 2362, 1624, 1263, 1229, 809, 748 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.40 (s, 0.7H), δ 9.07 (s, 0.3H), 7.90 (dd, *J* = 18.7, 8.4 Hz, 2H), 7.81 – 7.69 (m, 2H), 7.43 – 7.26 (m, 3H), 7.26 – 7.02 (m, 7H), 6.96 (t, *J* = 7.7 Hz, 1H), 6.84 (d, *J* = 8.8 Hz, 1H), 4.93 (d, *J* = 10.8 Hz, 1H), 4.06 (s, 2H), 1.61 (s, 2H), 0.86 (t, *J* = 7.4 Hz, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 154.9, 147.1, 141.0, 133.4, 131.6, 130.2, 130.2, 130.1, 128.8, 128.7, 128.6, 128.2, 127.1, 126.6, 125.8, 123.9, 122.7, 121.3, 120.2, 113.7, 112.8, 69.9, 67.3, 54.0, 22.0, 10.1; HRMS (ESI) calcd for C₃₂H₂₈N₂O₃Na *m/z* [M + Na]⁺: 511.1992, found: 511.1979; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 7.5 min, *t*₂ (major) = 9.4 min.

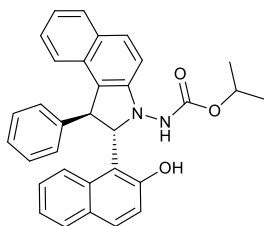


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		7.432	231.206	868.324	47.19	62.57	n.a.
2		9.415	240.908	492.758	49.17	35.51	n.a.
3		16.415	8.237	15.981	1.68	1.15	n.a.
4		24.182	9.627	10.692	1.96	0.77	n.a.
Total:			489.978	1387.754	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		7.465	1.748	8.443	1.13	2.64	n.a.
2		9.432	153.251	311.806	98.87	97.36	n.a.
Total:			154.999	320.249	100.00	100.00	

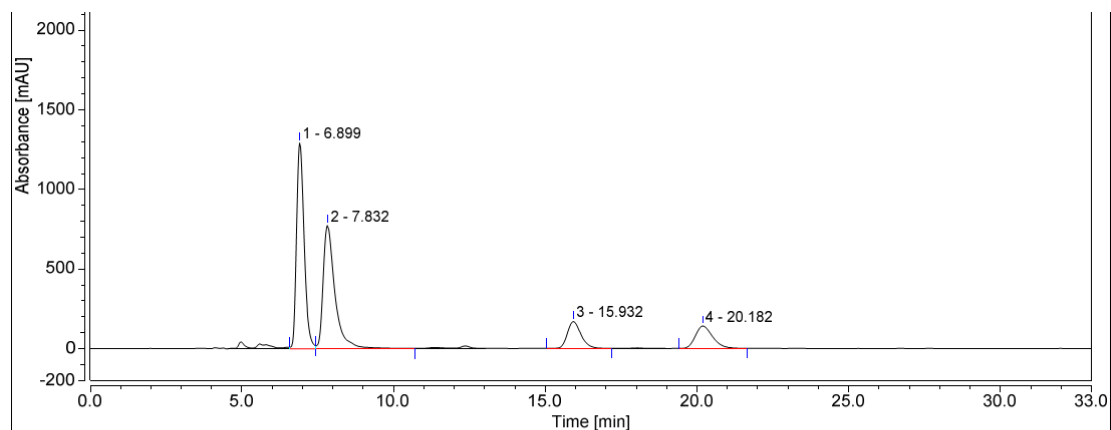
Isopropyl((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-phenyl-1,2-dihydro-3H-benzo[e]indol-3-yl)carbamate (3q)



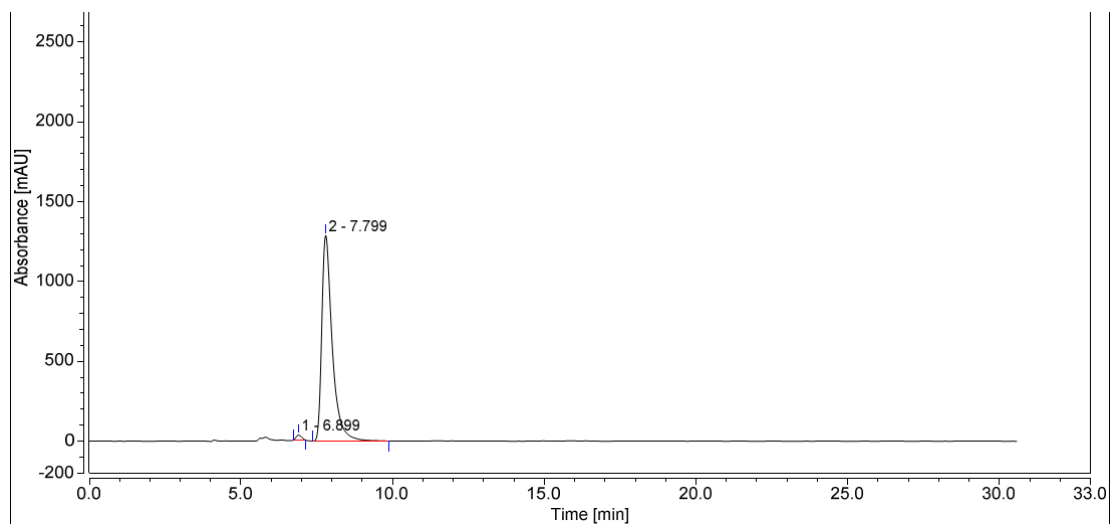
Following the general procedure, the compound was isolated as a white solid (43 mg, 88%); mp 119-120 °C; $[\alpha]_D^{21} = -283.8$ (c 1.0, CHCl₃, 98% ee); IR (KBr): 3433, 2924, 1712, 1517, 1268, 810, 746 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.42 (s, 0.6H), δ 9.03 (s, 0.4H), 7.90 (dd, $J = 17.2$, 8.4 Hz, 2H), 7.80 – 7.70 (m, 2H), 7.38 – 7.31 (m, 3H), 7.27 – 7.01 (m, 6H),

6.97 (t, $J = 7.7$ Hz, 1H), 6.85 (s, 1H), 6.60 (s, 1H), 4.94 (d, $J = 10.8$ Hz, 2H), 1.24 (d, $J = 36.8$ Hz, 6H);

^{13}C NMR (100 MHz, CDCl_3) δ 155.0, 144.5, 141.0, 133.5, 131.6, 130.2, 130.2, 130.1, 128.8, 128.7, 128.6, 128.2, 127.1, 126.6, 125.8, 123.9, 122.7, 121.5, 120.2, 113.7, 112.8, 69.7, 54.0, 53.6, 21.9; HRMS (ESI) calcd for $\text{C}_{32}\text{H}_{28}\text{N}_2\text{O}_3\text{Na}$ m/z $[\text{M} + \text{Na}]^+$: 511.1992, found: 511.1988; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 6.9 min, t_2 (major) = 7.8 min.

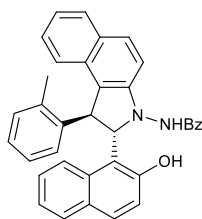


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		6.899	377.804	1292.696	41.57	54.36	n.a.
2		7.832	348.485	774.546	38.35	32.57	n.a.
3		15.932	88.763	169.307	9.77	7.12	n.a.
4		20.182	93.755	141.607	10.32	5.95	n.a.
Total:			908.807	2378.156	100.00	100.00	

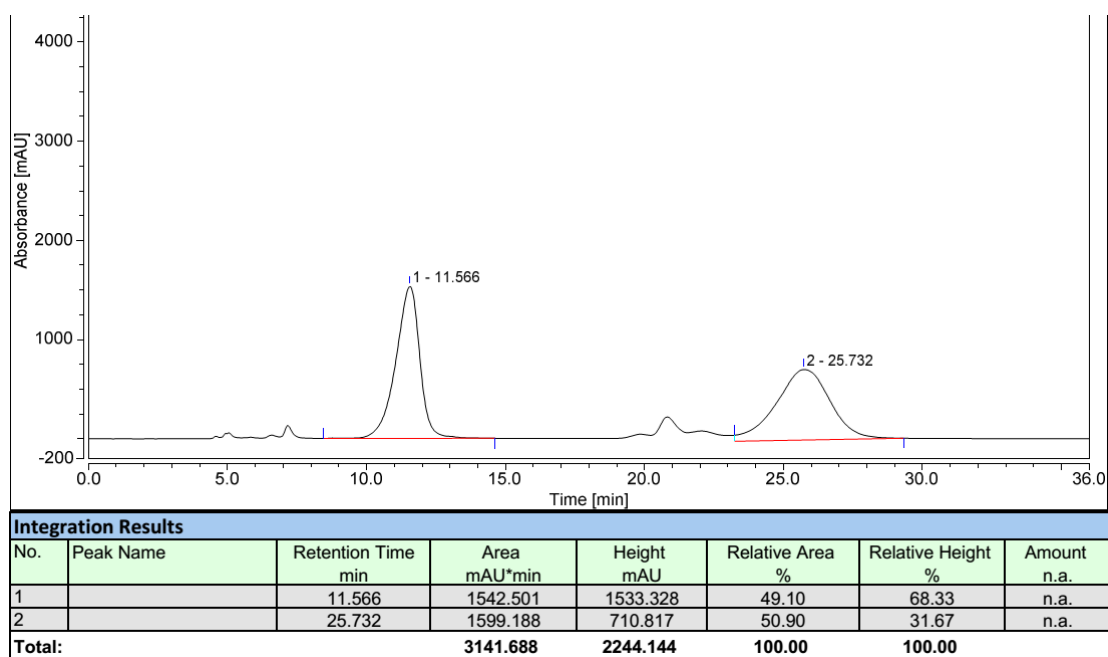


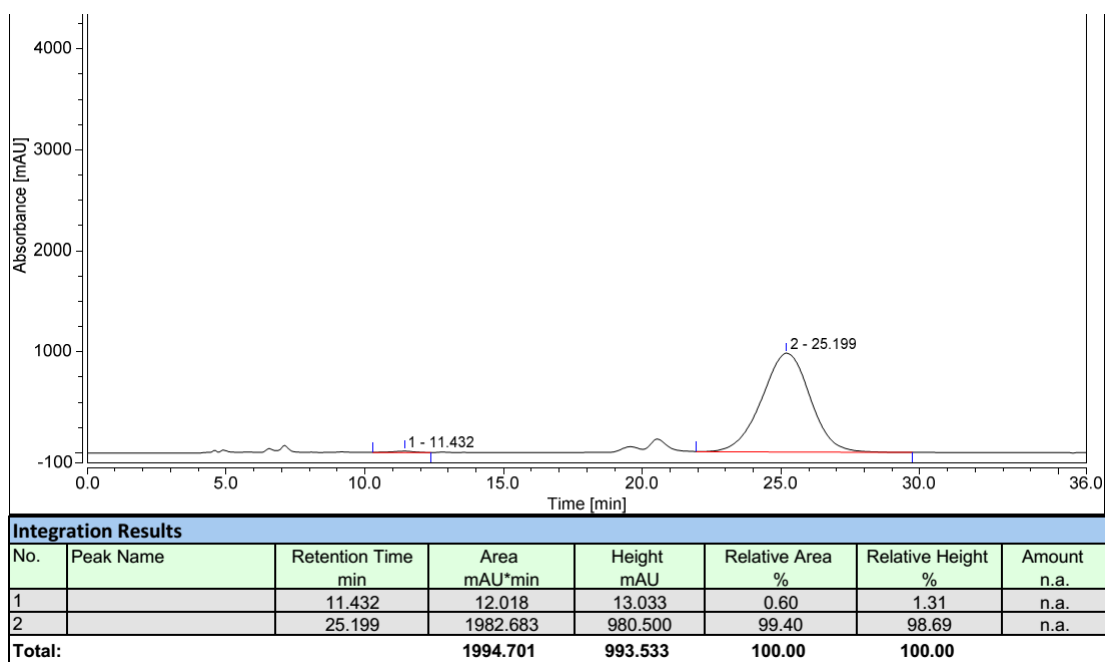
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		6.899	6.285	30.865	1.21	2.34	n.a.
2		7.799	513.490	1288.582	98.79	97.66	n.a.
Total:			519.775	1319.447	100.00	100.00	

***N*-((1*S*,2*S*)-2-(2-Hydroxynaphthalen-1-yl)-1-(*o*-tolyl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3r)**

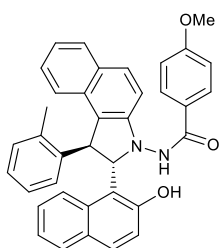


Following the general procedure, the compound was isolated as a white solid (96.0 mg, 92%); mp 132.0-133.0 °C; $[\alpha]_D^{19}$ -264.8(c 1.0, CHCl₃, 99% ee); IR (KBr): 3232, 2925, 1652, 1267, 813, 746 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.87 (s, 1H), 8.20 (s, 1H), 7.84 (d, *J* = 8.2 Hz, 1H), 7.80 – 7.64 (m, 5H), 7.47 (t, *J* = 7.5 Hz, 2H), 7.32 (t, *J* = 7.8 Hz, 3H), 7.23 (t, *J* = 8.3 Hz, 3H), 7.19 – 7.07 (m, 3H), 6.95 (d, *J* = 6.6 Hz, 2H), 6.85 (d, *J* = 7.3 Hz, 1H), 6.08 (s, 1H), 5.42 (d, *J* = 10.8 Hz, 1H), 1.59 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.7, 155.2, 147.1, 139.5, 136.3, 133.3, 132.4, 131.8, 131.6, 130.2, 130.2, 130.0, 130.0, 129.0, 128.9, 128.7, 128.6, 128.2, 127.2, 126.9, 126.7, 126.6, 125.9, 123.9, 123.8, 123.7, 122.8, 121.3, 120.2, 114.0, 112.8, 70.1, 49.0, 18.8; HRMS (ESI) calcd for C₃₆H₂₈N₂O₂Na *m/z* [M + Na]⁺: 543.2043; found: 543.2052; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 11.4 min, *t*₂ (major) = 25.1 min.

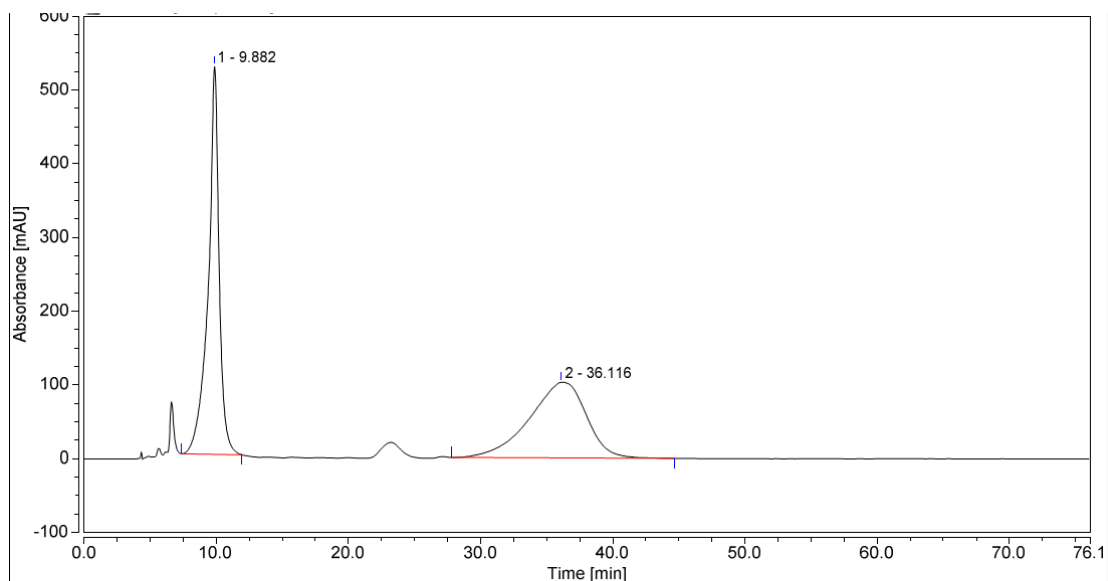




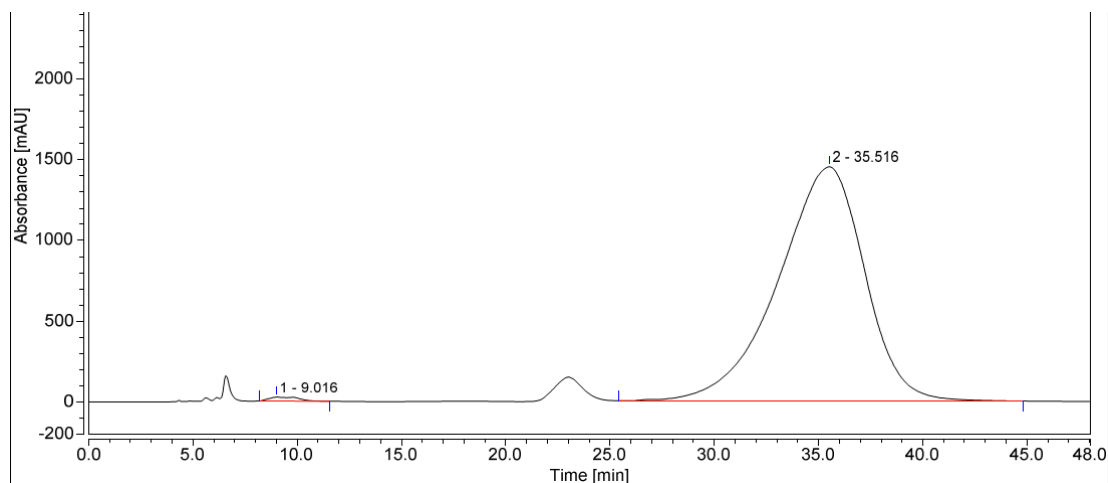
***N*-((1*S*,2*S*)-2-(2-Hydroxynaphthalen-1-yl)-1-(*o*-tolyl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)-4-methoxybenzamide (3s)**



Following the general procedure, the compound was isolated as a white solid (102.1 mg, 93%); mp 181.0-182.0 °C; $[\alpha]_{\text{D}}^{19}$ -403.4 (c 1.0, CHCl₃, 99% ee); IR (KBr): 3422, 2976, 2880, 1383, 1252, 1153, 750 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.87 (s, 1H), 7.86 (d, *J* = 8.1 Hz, 2H), 7.74 (t, *J* = 9.0 Hz, 3H), 7.69 (d, *J* = 8.1 Hz, 1H), 7.52 (d, *J* = 19.0 Hz, 1H), 7.35 – 7.25 (m, 4H), 7.24 – 7.11 (m, 3H), 7.11 – 7.04 (m, 2H), 6.96 – 6.82 (m, 5H), 6.02 (s, 1H), 5.39 (d, *J* = 10.8 Hz, 1H), 3.83 (s, 3H), 1.60 (s, 3H); ¹³C NMR (100 MHz, DMSO) δ 166.4, 165.7, 162.6, 162.3, 155.6, 154.7, 150.7, 134.9, 133.7, 130.8, 130.2, 130.1, 129.9, 129.7, 129.5, 129.3, 129.2, 128.7, 128.5, 127.1, 126.8, 126.7, 126.3, 126.2, 125.7, 124.5, 122.7, 122.4, 120.2, 114.1, 114.0, 70.5, 55.8, 48.4, 19.1; HRMS (ESI) calcd for C₃₇H₃₀N₂O₃Na *m/z* [M + Na]⁺: 573.2149; found: 573.2165; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 9.0 min, *t*₂ (major) = 35.5 min.

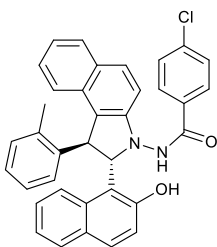


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.882	507.477	526.308	49.84	83.68	n.a.
2		36.116	510.758	102.626	50.16	16.32	n.a.
Total:			1018.235	628.934	100.00	100.00	



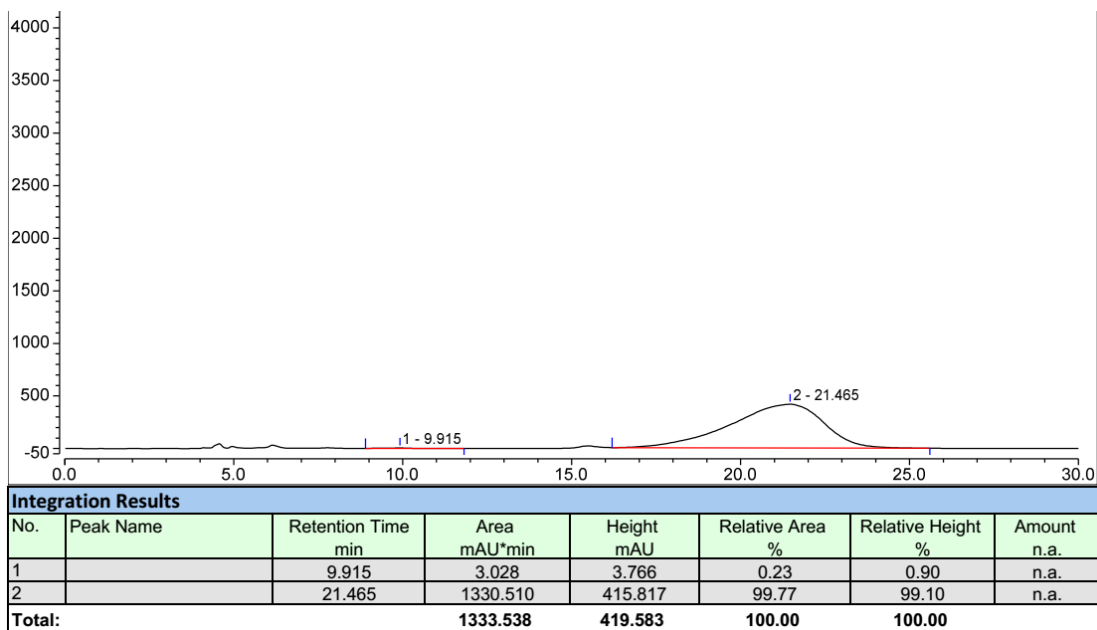
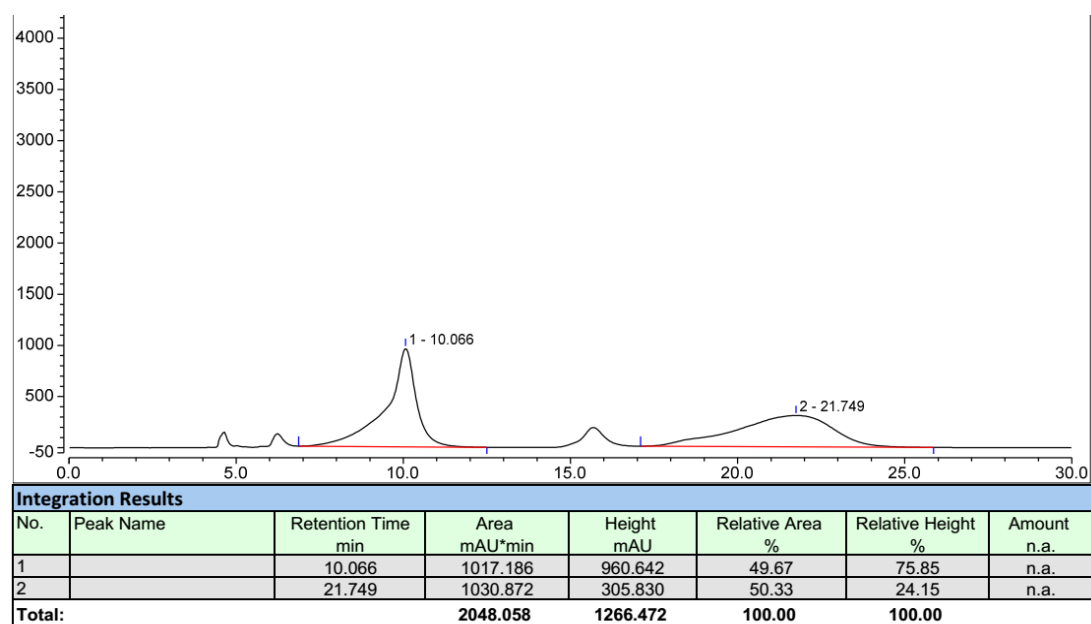
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.016	40.211	24.451	0.57	1.66	n.a.
2		35.516	6983.013	1452.275	99.43	98.34	n.a.
Total:			7023.223	1476.726	100.00	100.00	

4-Chloro-N-((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-(o-tolyl)-1H-benzo[e]indol-3(2H)-yl)benzamide (3t)



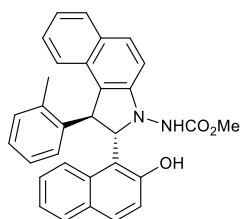
Following the general procedure, the compound was isolated as a white solid (102.1 mg, 92%); mp 162.0-163.0 °C; $[\alpha]_D^{19}$ -281.4 (c 1.0, CHCl₃, 99% ee); IR (KBr): 3258, 2926, 1653, 1269, 1093, 814, 742 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.79 (s, 1H), 8.14 (s, 1H), 7.78 (dd, *J* = 20.3, 8.4 Hz, 2H), 7.68

(dd, $J = 14.2, 8.5$ Hz, 2H), 7.59 (d, $J = 8.5$ Hz, 2H), 7.41 (s, 1H), 7.30 (t, $J = 7.2$ Hz, 1H), 7.26 – 7.02 (m, 9H), 6.90 (d, $J = 3.1$ Hz, 2H), 6.82 (d, $J = 7.1$ Hz, 1H), 5.99 (s, 1H), 5.37 (d, $J = 10.9$ Hz, 1H), 1.55 (s, 3H); ^{13}C NMR (100 MHz, Chloroform- d) δ 166.0, 155.1, 146.8, 139.2, 138.5, 136.3, 133.9, 133.2, 131.5, 130.1, 130.1, 130.0, 129.9, 128.8, 128.7, 128.6, 128.5, 128.1, 126.8, 126.7, 126.6, 125.8, 123.9, 123.8, 123.7, 122.8, 121.1, 120.0, 117.6, 113.8, 112.8, 48.9, 18.8; HRMS (ESI) calcd for $\text{C}_{36}\text{H}_{27}\text{ClN}_2\text{NaO}_2$ m/z $[\text{M} + \text{Na}]^+$: 577.1653; found: 577.1664; HPLC (Daicel Chiralpak IC, i -PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 230$ nm): t_1 (minor) = 9.9 min, t_2 (major) = 21.4 min.

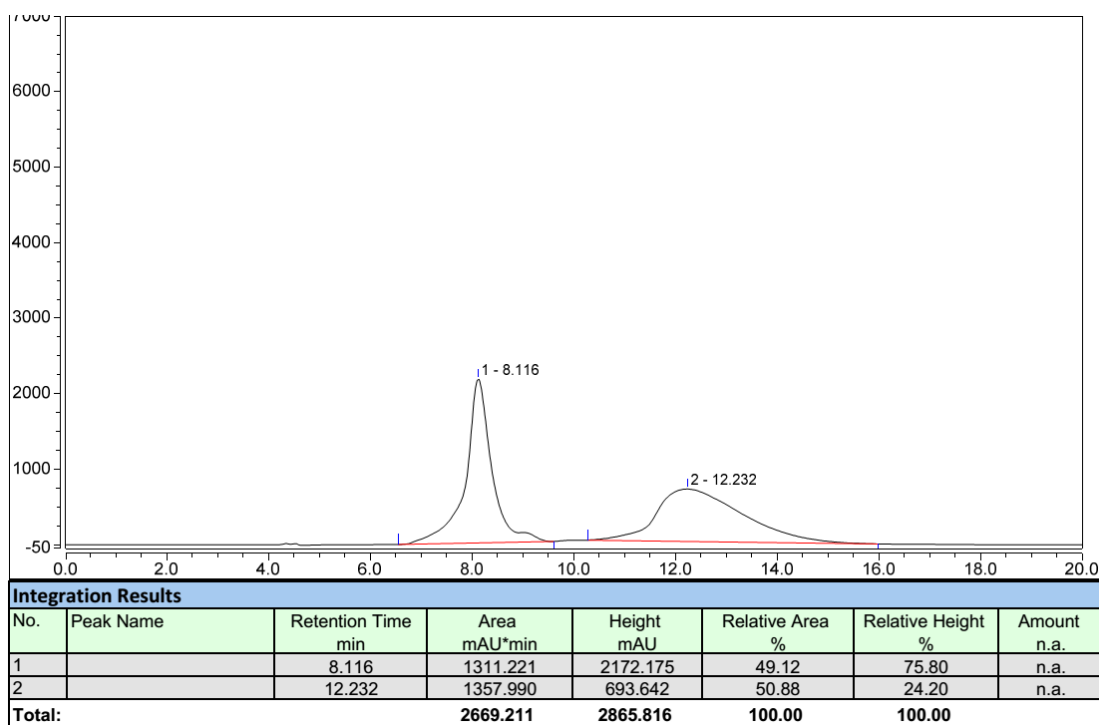


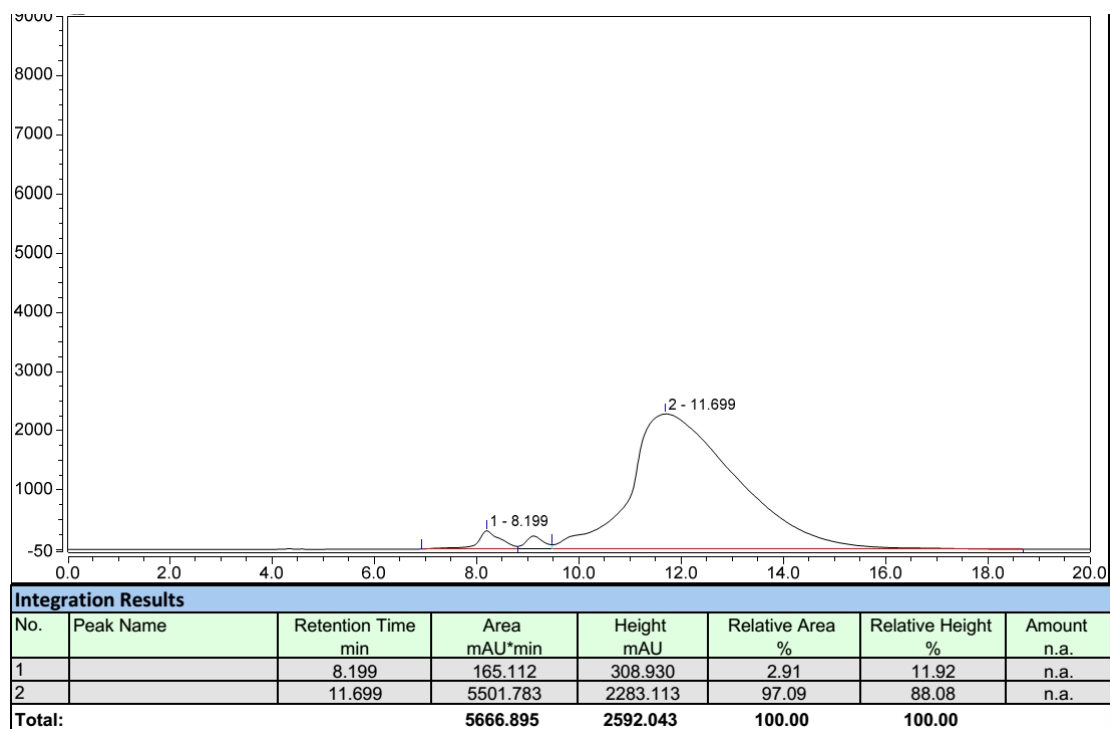
Methyl ((1S,2S)-2-(2-hydroxynaphthalen-1-yl)-1-(o-tolyl)-1,2-dihydro-3H-benzo[e]indol-3-yl)carbamate (3u)

Rbamate (3u)

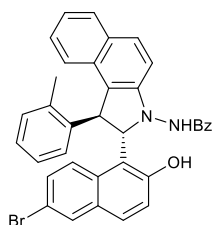


Following the general procedure, the compound was isolated as a white solid (86.3 mg, 91%); mp 163.0-164.0 °C; $[\alpha]_D^{19} +20.4$ (c 1.0, CHCl₃, 94% ee); IR (KBr): 3421, 3235, 3067, 2924, 1649, 1275, 748 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.62 (s, 0.83H), 9.22 (s, 0.23H), 7.91 – 7.84 (m, 2H), 7.82 – 7.69 (m, 2H), 7.42 (s, 3H), 7.39 – 7.25 (m, 3H), 7.25 – 7.15 (m, 2H), 7.15 – 7.05 (m, 2H), 7.04 – 6.82 (m, 3H), 5.86 (s, 1H), 5.36 (d, *J* = 10.8 Hz, 1H), 3.69 (s, 3H), 1.59 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 155.1, 147.1, 139.4, 136.4, 133.3, 131.7, 130.2, 130.1, 130.0, 128.9, 128.7, 128.6, 128.2, 126.9, 126.8, 126.7, 125.9, 124.0, 123.8, 123.7, 122.8, 121.3, 120.0, 113.7, 112.9, 70.1, 52.8, 48.6, 18.9; HRMS (ESI) calcd for C₃₁H₂₆N₂O₃Na *m/z* [M + Na]⁺: 497.1836; found: 497.1843; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 8.1 min, *t*₂ (major) = 11.6 min.

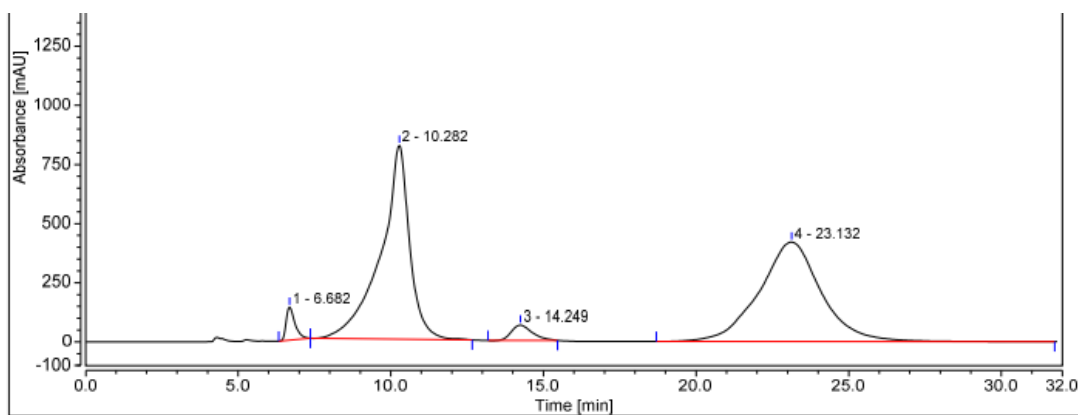




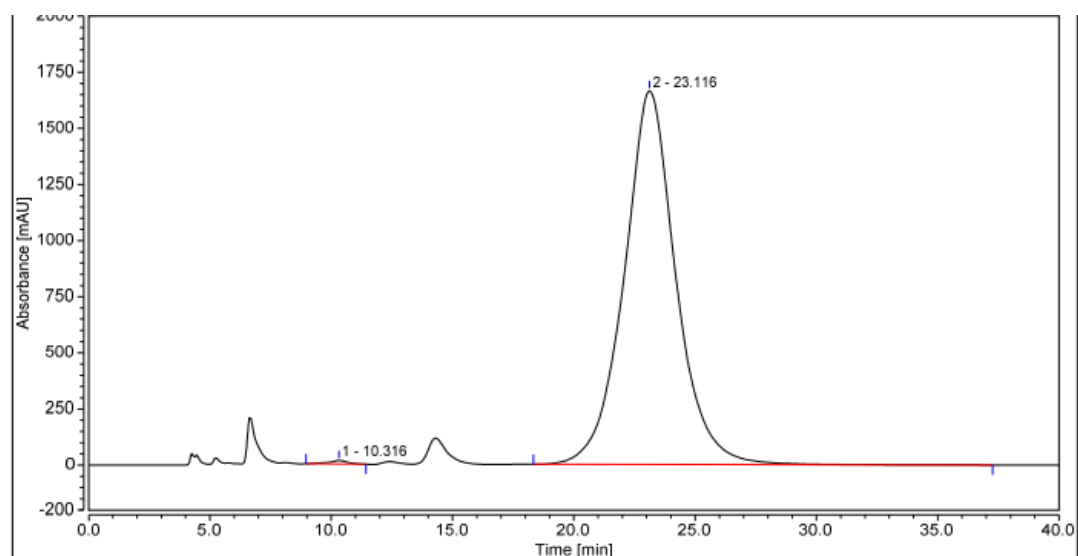
***N*-((1*S*,2*S*)-2-(6-Bromo-2-hydroxynaphthalen-1-yl)-1-(*o*-tolyl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3v)**



Following the general procedure, the compound was isolated as a white solid (101.1 mg, 84%); mp 154.0-155.0 °C; $[\alpha]_D^{19}$ -421.2 (*c* 0.5, CHCl₃, 99% ee); IR (KBr): 3421, 2929, 1651, 1460, 1269, 812, 742 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.88 (s, 1H), 8.09 (s, 1H), 7.90 – 7.78 (m, 4H), 7.72 (d, *J* = 7.5 Hz, 2H), 7.63 (d, *J* = 8.9 Hz, 1H), 7.50 (t, *J* = 7.4 Hz, 1H), 7.44 (s, 1H), 7.35 (dt, *J* = 12.0, 7.5 Hz, 3H), 7.28 – 7.20 (m, 2H), 7.18 – 7.10 (m, 2H), 7.07 (d, *J* = 8.3 Hz, 1H), 6.97 (dd, *J* = 9.2, 2.0 Hz, 1H), 6.91 – 6.86 (m, 1H), 6.76 (d, *J* = 9.3 Hz, 1H), 5.98 (s, 1H), 5.38 (d, *J* = 10.9 Hz, 1H), 1.60 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 166.7, 160.7, 155.4, 146.9, 139.2, 136.2, 132.5, 131.8, 131.7, 131.6, 130.2, 130.1, 130.1, 130.0, 129.8, 129.2, 128.9, 128.7, 127.2, 127.0, 126.9, 126.7, 124.0, 123.7, 123.1, 116.4, 114.1, 112.8, 70.2, 48.9, 18.9; HRMS (ESI) calcd for C₃₆H₂₇BrN₂O₂Na *m/z* [M + Na]⁺: 621.1148; found: 621.1139; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 10.3 min, *t*₂ (major) = 23.1 min.

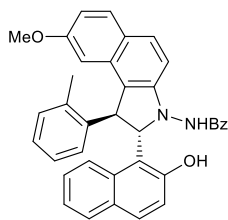


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		6.682	46.584	139.540	2.33	9.66	n.a.
2		10.282	902.807	819.921	45.22	56.74	n.a.
3		14.249	51.568	64.724	2.58	4.48	n.a.
4		23.132	995.495	420.804	49.86	29.12	n.a.
Total:			1996.454	1444.990	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		10.316	14.672	15.820	0.36	0.94	n.a.
2		23.116	4112.176	1664.658	99.64	99.06	n.a.
Total:			4126.848	1680.478	100.00	100.00	

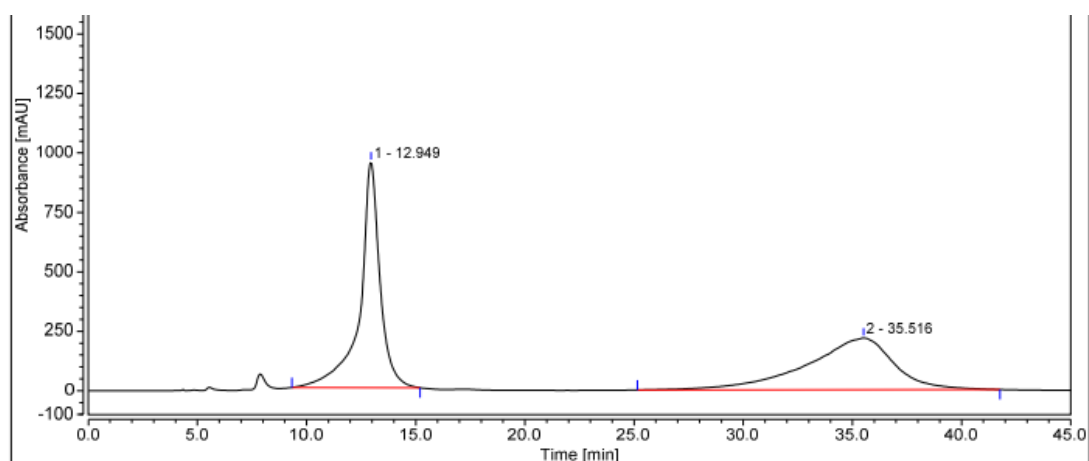
***N*-((1*S*,2*S*)-2-(2-Hydroxynaphthalen-1-yl)-8-methoxy-1-(*o*-tolyl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide (3w)**



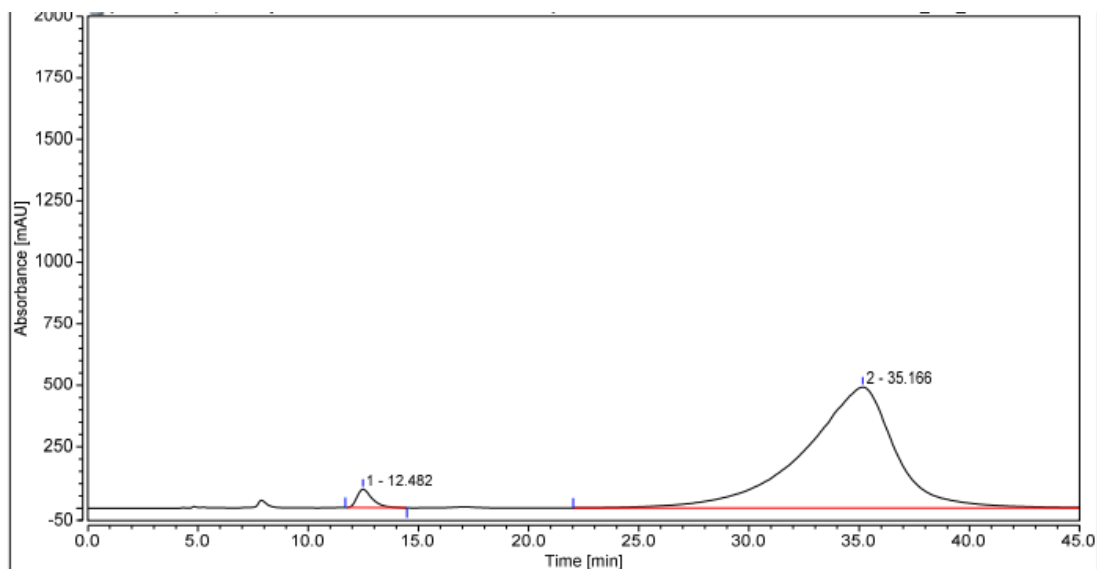
Following the general procedure, the compound was isolated as a white solid (95.5 mg, 87%); mp 232.0-233.0 °C; $[\alpha]_D^{19}$ -502.0 (c 0.5, CHCl₃, 95% ee); IR (KBr): 3421, 2924, 1620, 1462, 1228, 1024, 823, 622 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.87 (s, 1H), 8.07 (s, 1H), 7.80 – 7.63 (m, 6H), 7.53 – 7.43 (m, 2H),

7.34 (d, *J* = 6.9 Hz, 2H), 7.24 (d, *J* = 13.1 Hz, 2H), 7.18 – 7.09 (m, 2H), 7.05 (d, *J* = 7.5 Hz, 2H), 7.00

(d, $J = 8.4$ Hz, 1H), 6.92 (d, $J = 7.8$ Hz, 2H), 6.83 (d, $J = 7.2$ Hz, 1H), 6.26 (s, 1H), 5.33 (d, $J = 10.5$ Hz, 1H), 3.32 (s, 3H), 1.61 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 167.0, 162.2, 157.8, 155.1, 147.5, 139.0, 136.2, 133.3, 132.1, 131.7, 131.2, 130.2, 130.0, 129.8, 129.4, 129.1, 128.6, 128.5, 128.1, 127.2, 126.8, 126.6, 125.8, 122.9, 122.7, 121.4, 120.1, 116.6, 114.1, 110.3, 102.0, 70.1, 54.5, 48.9, 18.9; HRMS (ESI) calcd for $\text{C}_{37}\text{H}_{30}\text{N}_2\text{O}_3\text{Na}$ m/z $[\text{M} + \text{Na}]^+$: 573.2149; found: 573.2159; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 230$ nm): t_1 (minor) = 12.5 min, t_2 (major) = 35.2 min.

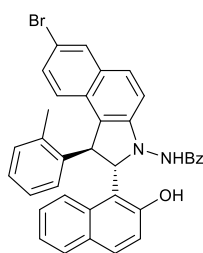


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		12.949	1013.842	949.057	50.24	81.34	n.a.
2		35.516	1004.068	217.665	49.76	18.66	n.a.
Total:			2017.910	1166.722	100.00	100.00	

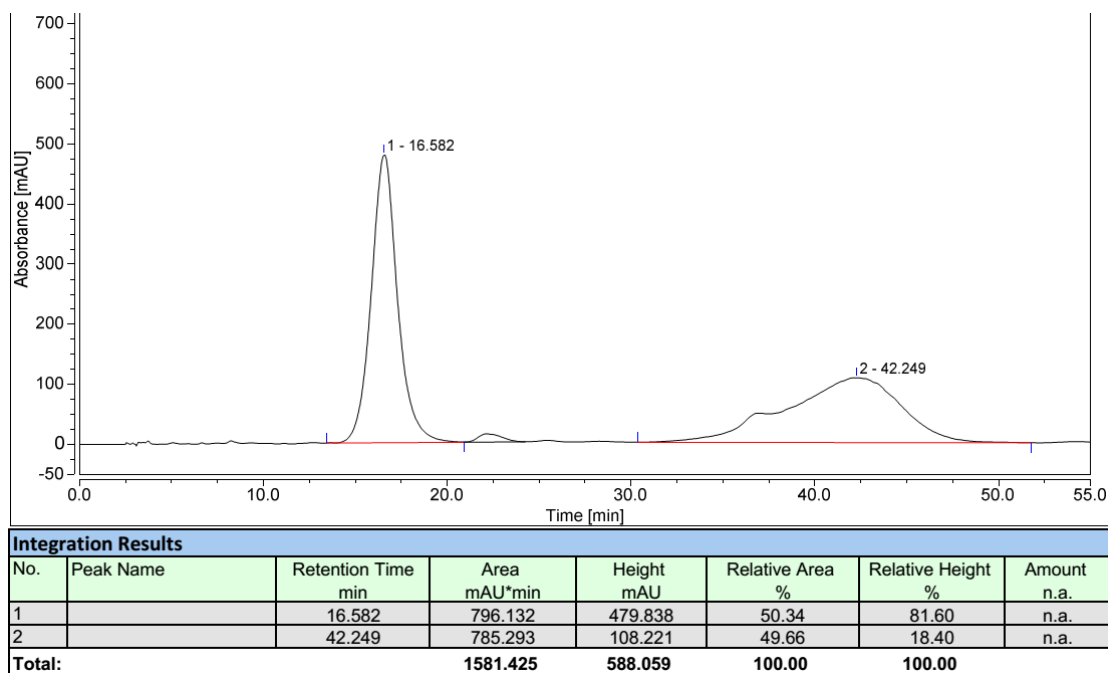


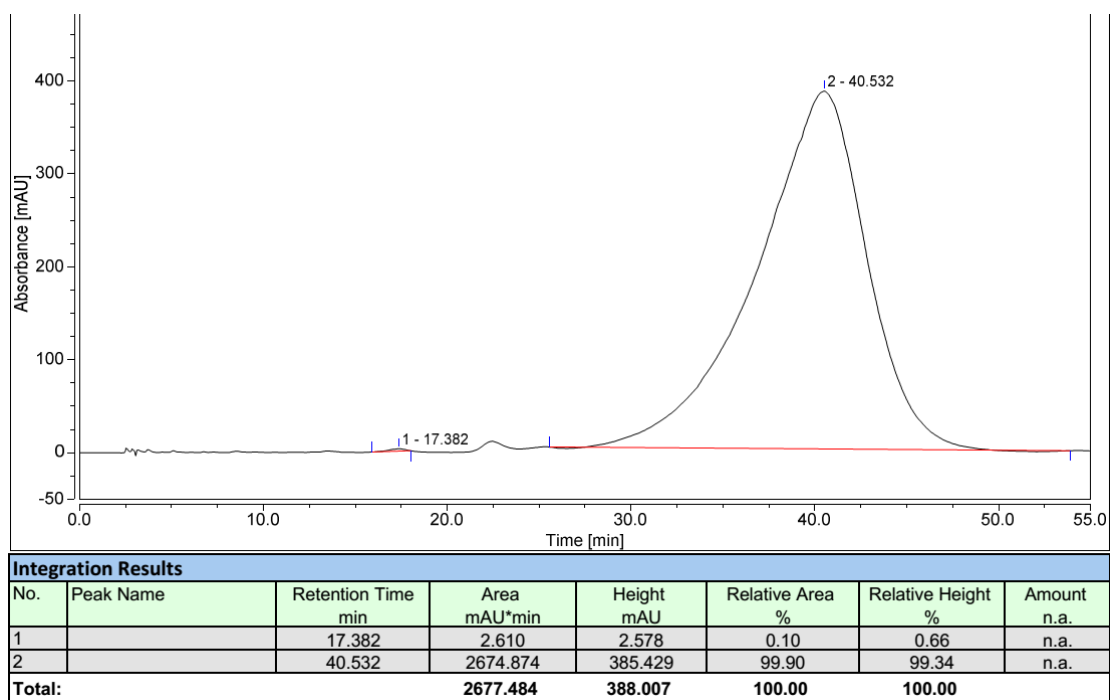
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		12.482	60.501	74.858	2.52	13.22	n.a.
2		35.166	2344.921	491.227	97.48	86.78	n.a.
Total:			2405.422	566.085	100.00	100.00	

***N*-((1*S*,2*S*)-7-Bromo-2-(2-hydroxynaphthalen-1-yl)-1-(*o*-tolyl)-1,2-dihydro-3*H*-benzo[*e*]indol-3-yl)benzamide (3x)**

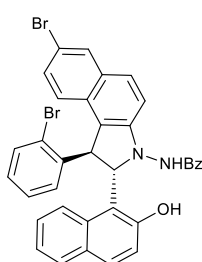


Following the general procedure, the compound was isolated as a white solid (114.1 mg, 95%); mp 145.0-146.0 °C; $[\alpha]_D^{19}$ -329.2 (*c* 1.0, CHCl₃, 99% ee); IR (KBr): 3436, 3246, 2926, 1655, 1271, 818, 748 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.74 (s, 1H), 8.19 (s, 1H), 8.01 – 7.94 (m, 1H), 7.79 – 7.63 (m, 6H), 7.55 – 7.39 (m, 2H), 7.39 – 7.30 (m, 2H), 7.27 – 7.20 (m, 2H), 7.21 – 7.06 (m, 3H), 6.93 (dd, *J* = 6.4, 2.3 Hz, 3H), 6.84 (d, *J* = 7.4 Hz, 1H), 6.09 (s, 1H), 5.38 (d, *J* = 10.8 Hz, 1H), 1.57 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 167.2, 155.1, 147.6, 139.0, 136.3, 133.4, 132.6, 132.3, 131.6, 130.8, 130.3, 130.2, 129.9, 128.8, 128.8, 128.7, 128.5, 128.5, 128.2, 127.5, 127.3, 126.9, 126.0, 125.4, 124.0, 122.9, 121.3, 120.0, 117.6, 114.0, 113.9, 70.2, 48.8, 18.9; HRMS (ESI) calcd for C₃₆H₂₇BrN₂O₂Na *m/z* [M + Na]⁺: 621.1148; found: 621.1156; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 10/90, flow rate 1.2 mL/min, λ = 250 nm): *t*₁ (minor) = 17.4 min, *t*₂ (major) = 40.5 min.

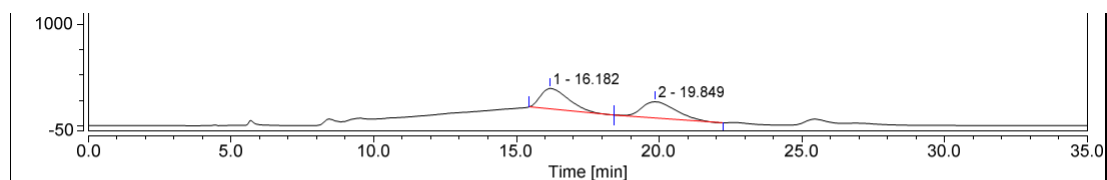




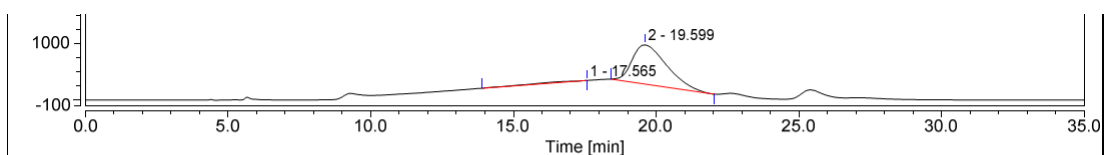
***N*-((1*S*,2*R*)-7-Bromo-1-(2-bromophenyl)-2-(2-hydroxynaphthalen-1-yl)-1,2-dihydro-3*H*-benzo[*e*]indol-3-yl)benzamide (3y)**



Following the general procedure, the compound was isolated as a white solid (110.2 mg, 83%); mp 192.0-193.0 °C; $[\alpha]_D^{19}$ -343.6 (*c* 0.5, CHCl₃, 96% ee); IR (KBr): 3416, 2924, 1650, 1456, 1267, 748 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.58 (s, 1H), 8.66 (s, 1H), 7.86 (s, 1H), 7.64 (dd, *J* = 21.5, 7.3 Hz, 4H), 7.51 – 7.30 (m, 4H), 7.29 – 7.16 (m, 4H), 7.18 – 6.97 (m, 6H), 6.87 (d, *J* = 8.7 Hz, 1H), 6.21 (s, 1H), 5.69 (d, *J* = 10.4 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 167.0, 155.1, 147.4, 140.3, 133.5, 132.6, 132.5, 132.4, 131.6, 130.8, 130.4, 130.1, 129.1, 128.9, 128.6, 128.3, 127.3, 127.2, 126.0, 125.1, 124.8, 122.8, 122.7, 120.9, 119.7, 117.6, 113.6, 113.3, 70.3, 51.7; HRMS (ESI) calcd for C₃₅H₂₄Br₂N₂O₂Na *m/z* [M + Na]⁺: 685.0097; found: 685.0099; HPLC (Daicel Chiralpak IE, *i*-PrOH/hexane = 20/80, flow rate 3.0 mL/min, λ = 230 nm): *t*₁ (minor) = 16.2 min, *t*₂ (major) = 19.8 min.

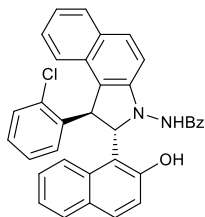


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		16.182	230.074	201.818	51.07	55.80	n.a.
2		19.849	220.460	159.844	48.93	44.20	n.a.
Total:			450.534	361.662	100.00	100.00	

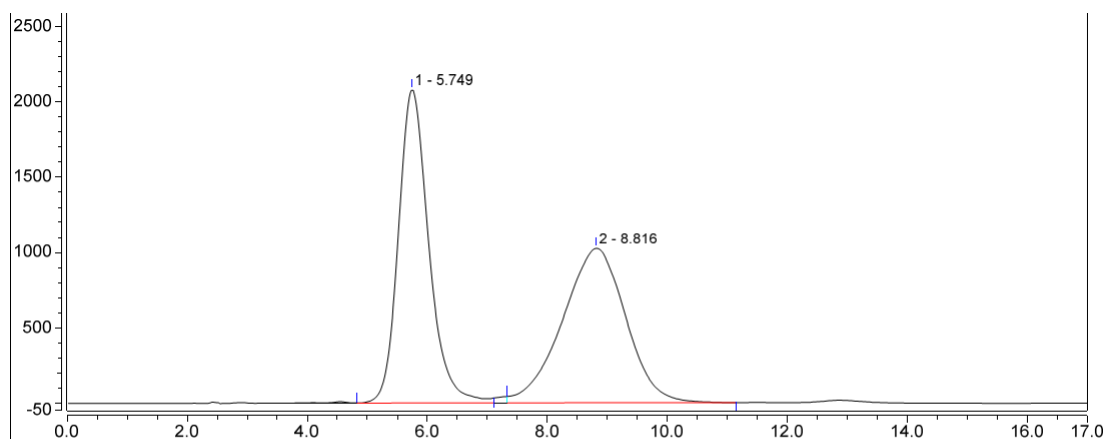


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		17.565	24.013	0.000	2.36	0.00	n.a.
2		19.599	992.741	698.768	97.64	100.00	n.a.
Total:			1016.754	698.768	100.00	100.00	

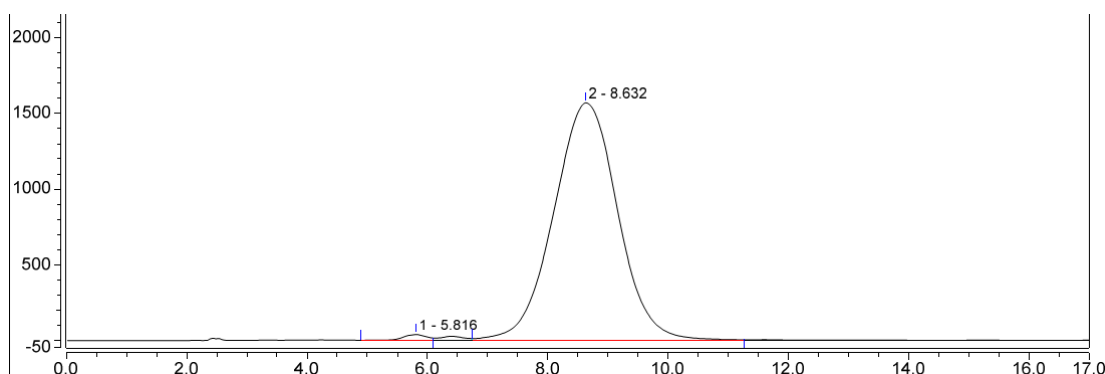
***N*-((1*S*,2*R*)-1-(2-Chlorophenyl)-2-(2-hydroxynaphthalen-1-yl)-1*H*-benzo[*e*]indol-3(2*H*)-yl)benzamide (3*z*)**



Following the general procedure, the compound was isolated as a white solid (101.0 mg, 94%); mp 151.0-152.0 °C; $[\alpha]_{\text{D}}^{19}$ -373.6 (*c* 1.0, CHCl₃, 96 % ee); IR (KBr): 3424, 2922, 1660, 1218, 1024, 773, 700 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.58 (s, 1H), 8.07 (s, 1H), 7.89 – 7.80 (m, 2H), 7.79 – 7.67 (m, 4H), 7.62 (s, 1H), 7.50 (t, *J* = 7.4 Hz, 1H), 7.38 (t, *J* = 7.7 Hz, 2H), 7.31 (t, *J* = 7.3 Hz, 1H), 7.23 (t, *J* = 7.9 Hz, 4H), 7.18 – 7.11 (m, 2H), 7.06 (d, *J* = 8.1 Hz, 2H), 6.99 – 6.87 (m, 2H), 6.22 (s, 1H), 5.74 (d, *J* = 10.7 Hz, 1H); ¹³C NMR (100 MHz, DMSO) δ 166.0, 155.3, 154.1, 150.0, 142.2, 133.2, 132.9, 132.0, 131.8, 130.1, 129.8, 129.7, 129.5, 129.0, 129.0, 128.6, 128.5, 128.3, 128.0, 127.8, 127.6, 127.4, 126.7, 125.8, 123.8, 122.2, 121.6, 120.5, 118.9, 117.7, 112.5, 48.4; HRMS (ESI) calcd for C₃₅H₂₅ClN₂NaO₂ *m/z* [M + Na]⁺: 563.1497; found: 563.1508; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 1.4 mL/min, λ = 230 nm): *t*₁ (minor) = 5.8 min, *t*₂ (major) = 8.6 min.

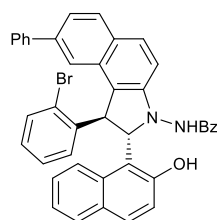


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		5.749	1221.213	2082.166	49.41	66.98	n.a.
2		8.816	1250.500	1026.269	50.59	33.02	n.a.
Total:			2471.712	3108.435	100.00	100.00	



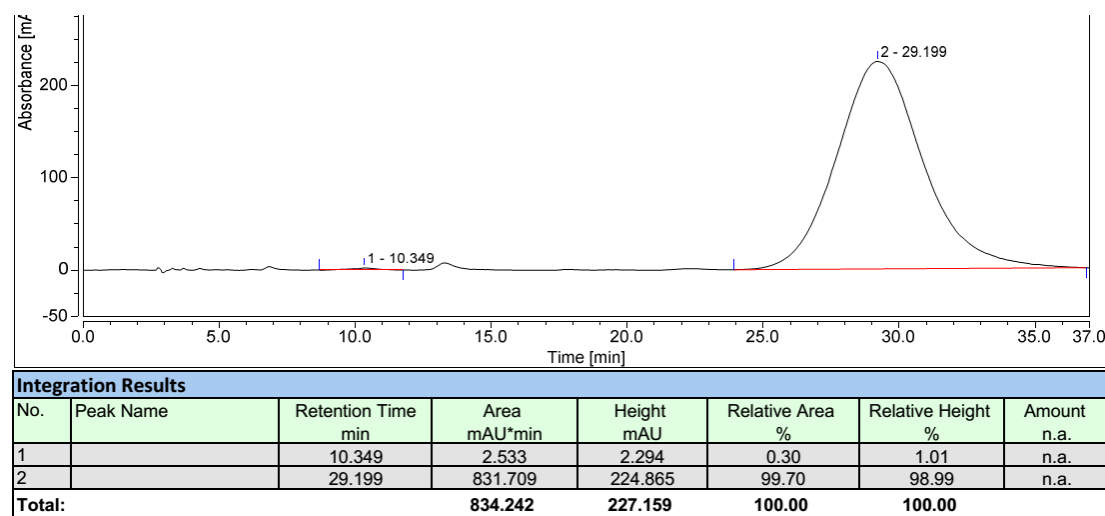
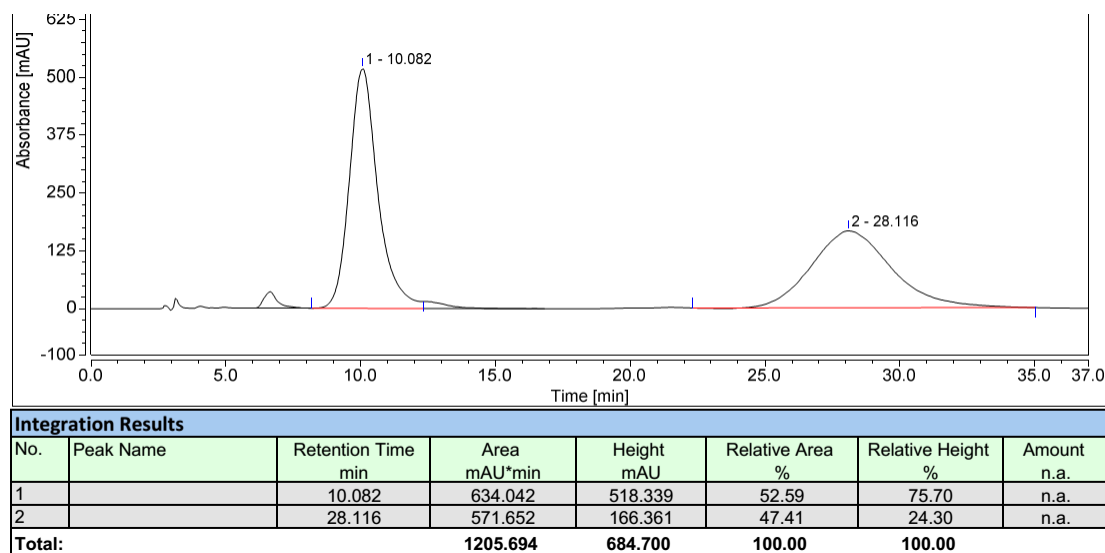
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		5.816	16.230	36.737	0.83	2.29	n.a.
2		8.632	1933.838	1570.864	99.17	97.71	n.a.
Total:			1950.068	1607.601	100.00	100.00	

***N*-((1*S*,2*R*)-1-(2-Bromophenyl)-2-(2-hydroxynaphthalen-1-yl)-8-phenyl-1,2-dihydro-3*H*-benzo[*e*]indol-3-yl)benzamide (3aa)**

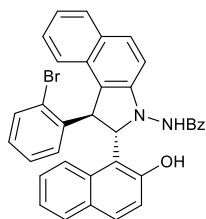


Following the general procedure, the compound was isolated as a white solid (126.0 mg, 95%); mp 168.0-169.0 °C; $[\alpha]_D^{19}$ -359.8 (c 1.0, CHCl₃, 99% ee); IR (KBr): 3146, 2920, 2863, 1641, 1275, 1232, 1047, 764 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 10.08 (s, 0.04H), δ 9.69 (s, 0.86H) 8.28 (s, 1H), 7.89 (t, *J* = 7.9 Hz, 1H), 7.85 – 7.65 (m, 6H), 7.66 – 7.57 (m, 1H), 7.52 (dt, *J* = 10.6, 5.2 Hz, 1H), 7.45 – 7.26 (m, 10H), 7.26 – 7.15 (m, 3H), 7.14 – 7.07 (m, 1H), 7.05 – 6.91 (m, 2H), 6.56 – 6.06 (m, 1H), 5.80 (d, *J* = 10.7 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 167.0, 155.2, 147.3, 138.9, 133.6, 132.5, 132.4, 131.8, 131.1, 130.6, 130.3, 130.2, 129.8, 129.5, 128.9, 128.8, 128.7, 128.6, 128.5, 128.4,

128.3, 127.3, 127.2, 127.1, 127.0, 126.0, 124.9, 123.4, 123.0, 122.7, 121.5, 121.1, 119.8, 113.6, 112.6, 70.0, 52.0; HRMS (ESI) calcd for $C_{41}H_{29}BrN_2O_2Na$ m/z $[M + Na]^+$: 683.1305; found: 683.1324; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 10/90, flow rate 1.2 mL/min, λ = 250 nm): t_1 (minor) = 10.3 min, t_2 (major) = 29.2 min.

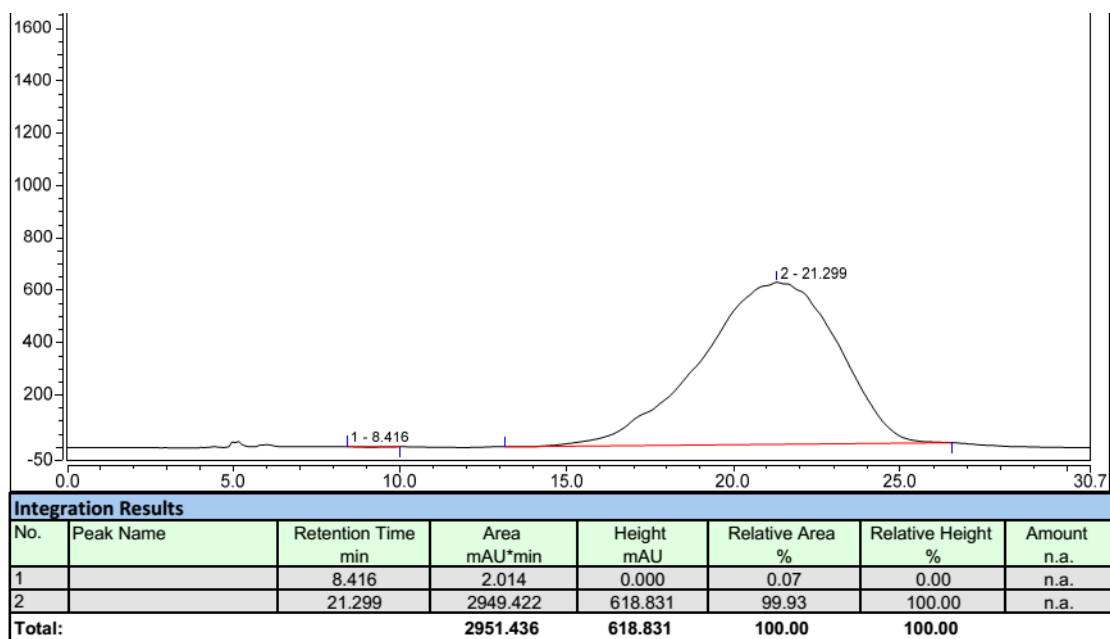
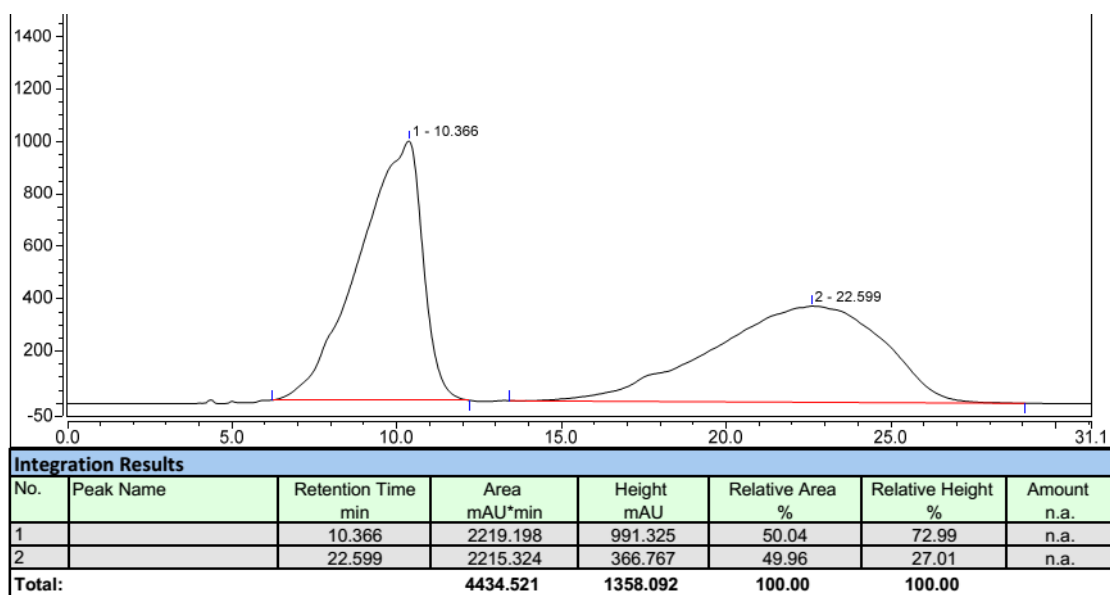


***N*-((1*S*,2*R*)-1-(2-Bromophenyl)-2-(2-hydroxynaphthalen-1-yl)-1,2-dihydro-3H-benzo[*e*]indol-3-yl)benzamide(3ab)**

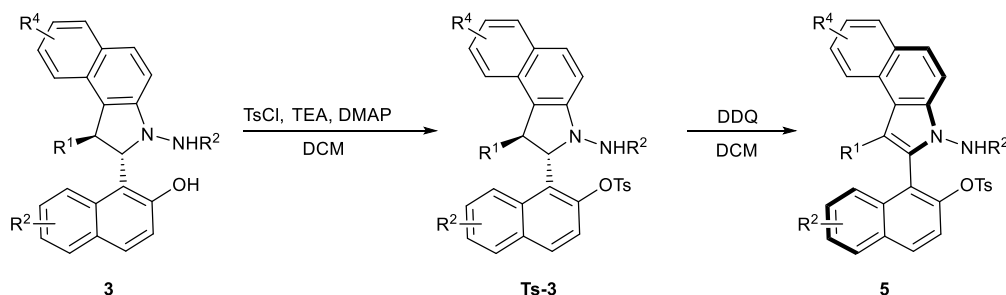


Following the general procedure, the compound was isolated as a white solid (88.0 mg, 75%); mp 157.0-158.0 °C; $[\alpha]_D^{19}$ -337.8 (*c* 1.0, $CHCl_3$, >99% ee); IR (KBr): 3346, 2924, 1675, 1175, 1237, 805, 674 cm^{-1} ; 1H NMR (400 MHz, $CDCl_3$) δ 9.61 (s, 1H), 8.14 (d, J = 19.7 Hz, 1H), 7.84 (t, J = 8.4 Hz, 2H), 7.74 (dd, J = 16.2, 8.5 Hz, 4H), 7.62 (d, J = 18.3 Hz, 1H), 7.51 (t, J = 7.4 Hz, 1H), 7.38 (t, J = 7.7 Hz, 2H), 7.36 –

7.29 (m, 2H), 7.28 – 7.21 (m, 4H), 7.20 – 7.14 (m, 1H), 7.07 (dd, $J = 7.4, 4.3$ Hz, 2H), 7.01 – 6.87 (m, 2H), 6.30 (d, $J = 61.1$ Hz, 1H), 5.76 (d, $J = 10.7$ Hz, 1H); ^{13}C NMR (151 MHz, DMSO) δ 167.04, 156.33, 155.17, 150.91, 144.95, 134.35, 133.95, 132.96, 132.79, 132.66, 131.08, 130.85, 130.75, 130.64, 130.44, 130.02, 129.93, 129.85, 129.39, 129.27, 128.51, 128.35, 127.59, 126.71, 124.08, 123.20, 123.13, 122.75, 121.47, 118.68, 113.53, 70.91, 52.30; HRMS (ESI) calcd for $\text{C}_{35}\text{H}_{25}\text{BrN}_2\text{O}_2\text{Na}$ m/z $[\text{M} + \text{Na}]^+$: 607.0992; found: 607.0981; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 230$ nm): t_1 (minor) = 8.4 min, t_2 (major) = 21.3 min.



6. General procedure for the oxidation of dihydroindole 3a-3aa to indole atropisomers 5a-5aa



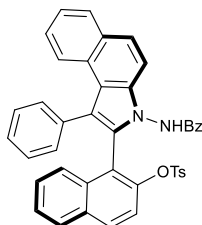
For one axis: corresponding 2,3-dihydroindole **3** (0.2 mmol, 1 equiv), *p*-toluenesulfonyl chloride (0.24 mmol, 1.2 equiv) and DMAP (0.04 mmol, 0.2 equiv) were dissolved in 15 mL of freshly distilled CH₂Cl₂. Subsequently, NEt₃ (0.3 mmol) was added to the solution. The reaction mixture was stirred for 6 h at ambient temperature. TLC revealed the absence of the starting material, the solvent was removed under reduced pressure. The residue was purified by flash column chromatography to yield the corresponding products **Ts-3**, which was then dissolved in DCM (10 mL) and was heated to 40 °C. A solution of DDQ (0.4 mmol, 2 equiv) in DCM (10 mL) was added dropwise over 1 h and the reaction mixture was stirred at 40 °C for 6 h. After the reaction was completed, it was quenched with sat. NaHCO₃ and extracted with ethyl acetate (3 x 15 mL). The organic phase was washed with water and brine, dried over Na₂SO₄, and concentrated under reduced pressure. The residue was purified by flash column chromatography on silica gel (*n*-hexane/ethyl acetate = 6:1) to afford the compounds **5a-q**.

For two axes: corresponding products **Ts-3** (0.01 mmol, 0.005M) was dissolved in DCE (1.0 mL) and was heated to 80 °C. A solution of DDQ (0.02 mmol, 2eq) in DCE (1.0 mL) was added dropwise over 1 h and the reaction mixture was stirred at 80 °C for 3-4 h. After the reaction was completed, it was quenched with sat. NaHCO₃ and extracted with ethyl acetate (3 x 5 mL). The organic phase was washed with water and brine, dried over Na₂SO₄, and concentrated. The resulting residue was purified by flash column chromatography on silica gel (*n*-hexane/ethyl acetate = 6:1) to afford the compounds **5r-5aa**.

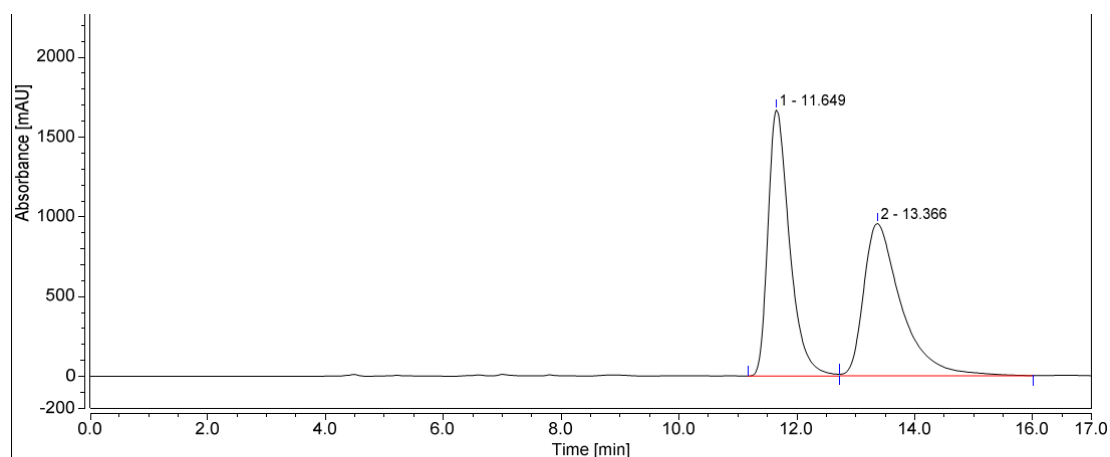
7. Characterization data of products 5

(*aR*)-1-(3-Benzamido-1-phenyl-3H-benzo[*e*]indol-2-yl)naphthalen-2-yl 4-methylbenzenesulfonate

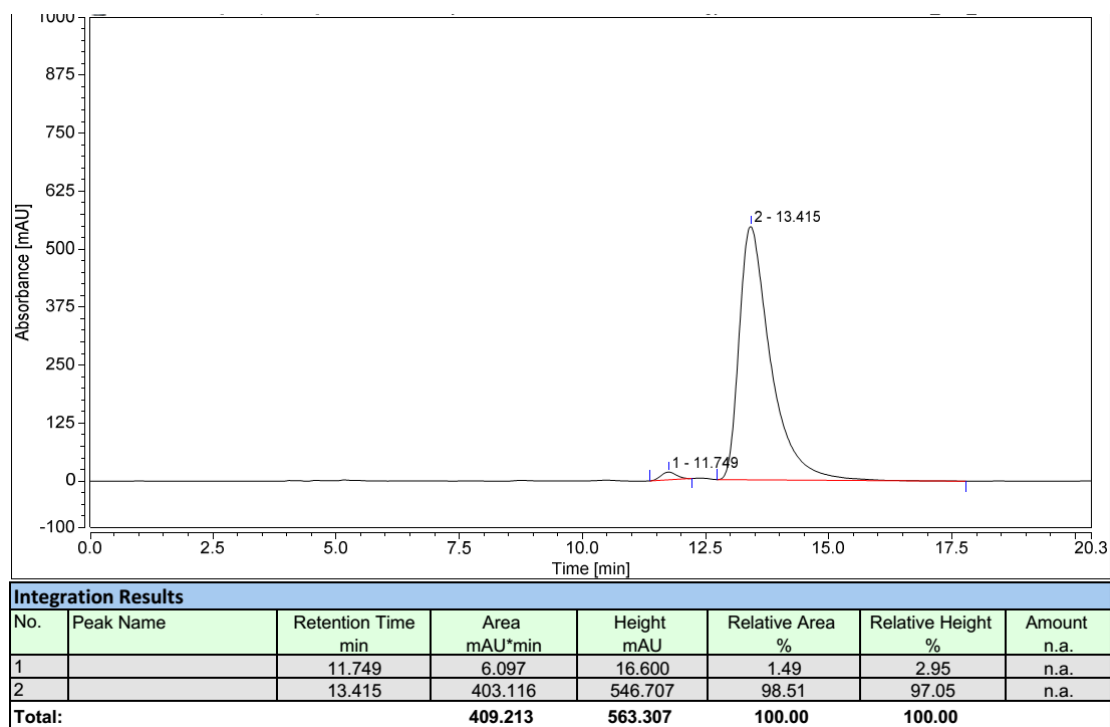
(5a)



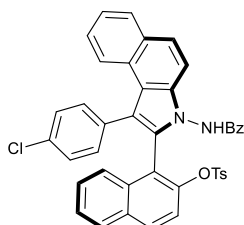
Following the general procedure, the compound was isolated as a white solid (122 mg, 93%); mp 104-105 °C; $[\alpha]_D^{21} = +4.8$ (c 1.0, CHCl₃, 97% ee); IR (KBr): 3442, 2922, 2360, 1630, 1385, 1173, 802, 706, 565 cm⁻¹; ¹H NMR (600 MHz, CDCl₃) δ 9.36 (s, 1H), 7.97 (d, *J* = 8.2 Hz, 2H), 7.86 (d, *J* = 9.0 Hz, 1H), 7.78 (m, 2H), 7.74 (d, *J* = 8.0 Hz, 1H), 7.58 (d, *J* = 8.8 Hz, 1H), 7.49 (d, *J* = 7.6 Hz, 2H), 7.45 – 7.37 (m, 5H), 7.35 – 7.26 (m, 5H), 7.20 (d, *J* = 6.6 Hz, 1H), 7.13 (s, 2H), 7.08 (s, 1H), 7.00 (s, 1H), 6.77 (d, *J* = 8.0 Hz, 2H), 2.09 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 145.8, 145.5, 135.4, 134.5, 133.9, 132.4, 132.1, 131.7, 131.6, 131.4, 130.5, 130.2, 129.9, 129.4, 128.8, 128.6, 128.0, 127.8, 127.7, 127.5, 127.4, 127.2, 127.0, 126.8, 126.7, 125.5, 124.9, 123.4, 123.3, 121.7, 120.5, 120.2, 118.8, 110.9, 21.2; HRMS (ESI) calcd for C₄₂H₃₁N₂O₄S *m/z* [M + H]⁺: 659.1999, found: 659.2012; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 11.7 min, *t*₂ (major) = 13.4 min.



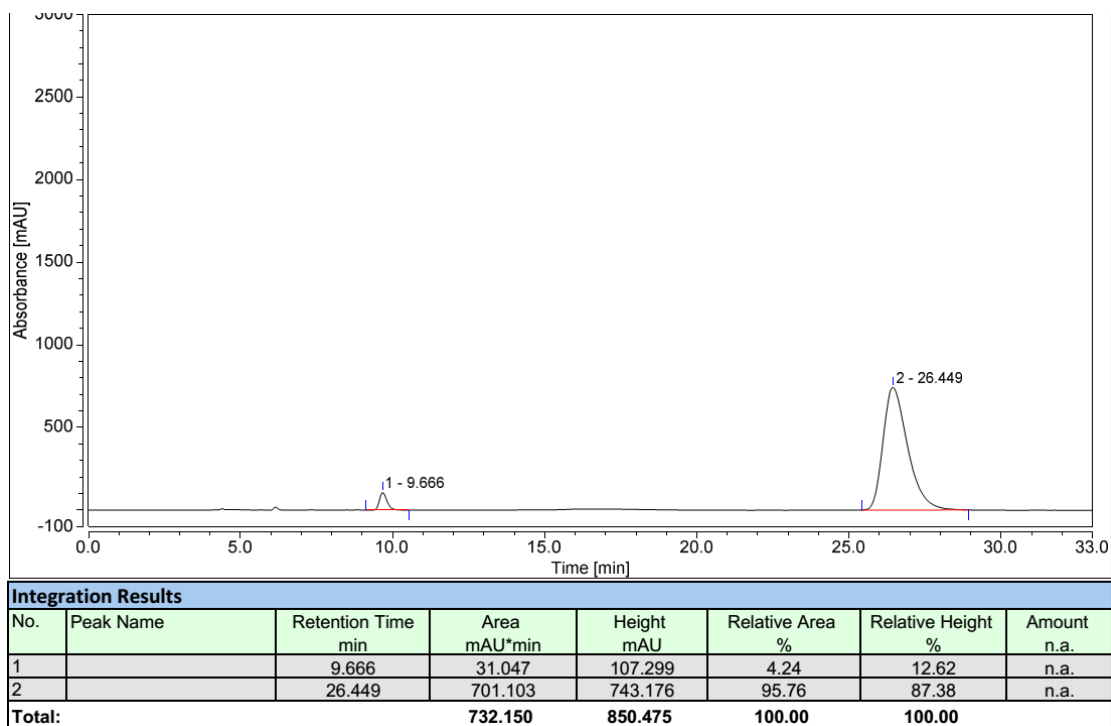
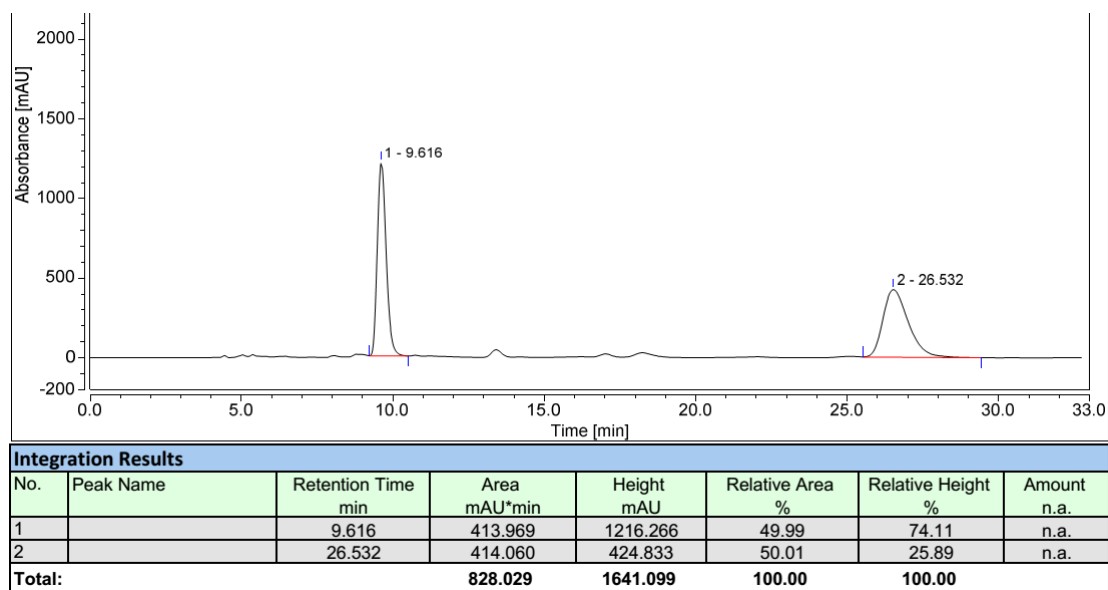
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.649	707.473	1669.068	50.08	63.57	n.a.
2		13.366	705.091	956.353	49.92	36.43	n.a.
Total:			1412.564	2625.421	100.00	100.00	



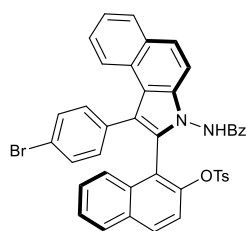
(aR)-1-(3-Benzamido-1-(4-chlorophenyl)-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5b)



Following the general procedure, the compound was isolated as a white solid (123 mg, 89%); mp 107-108 °C; $[\alpha]_D^{21} = +12.6$ (c 1.0, CHCl₃, 92% ee); IR (KBr): 3373, 2924, 1701, 1352, 1173, 941, 806, 748, 544 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.36 (s, 1H), 7.96 – 7.89 (m, 3H), 7.81 – 7.71 (m, 3H), 7.67 (d, *J* = 8.1 Hz, 1H), 7.57 – 7.51 (m, 1H), 7.49 – 7.42 (m, 2H), 7.42 – 7.29 (m, 5H), 7.26 – 7.19 (m, 4H), 7.08 (d, *J* = 10.0 Hz, 2H), 7.01 – 6.87 (m, 2H), 6.73 (d, *J* = 8.0 Hz, 2H), 2.01 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.3, 145.7, 145.6, 134.3, 133.9, 133.9, 132.6, 132.2, 132.2, 131.6, 131.4, 131.4, 131.2, 130.4, 129.4, 128.9, 128.6, 128.3, 128.2, 128.2, 128.1, 127.9, 127.4, 127.0, 126.9, 126.8, 125.7, 125.0, 123.5, 123.0, 121.3, 120.4, 118.8, 118.5, 110.9, 21.2; HRMS (ESI) calcd for C₄₂H₃₀N₂O₄SCl *m/z* [M + H]⁺: 693.1609, found: 693.1622; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 9.6 min, *t*₂ (major) = 26.4 min.

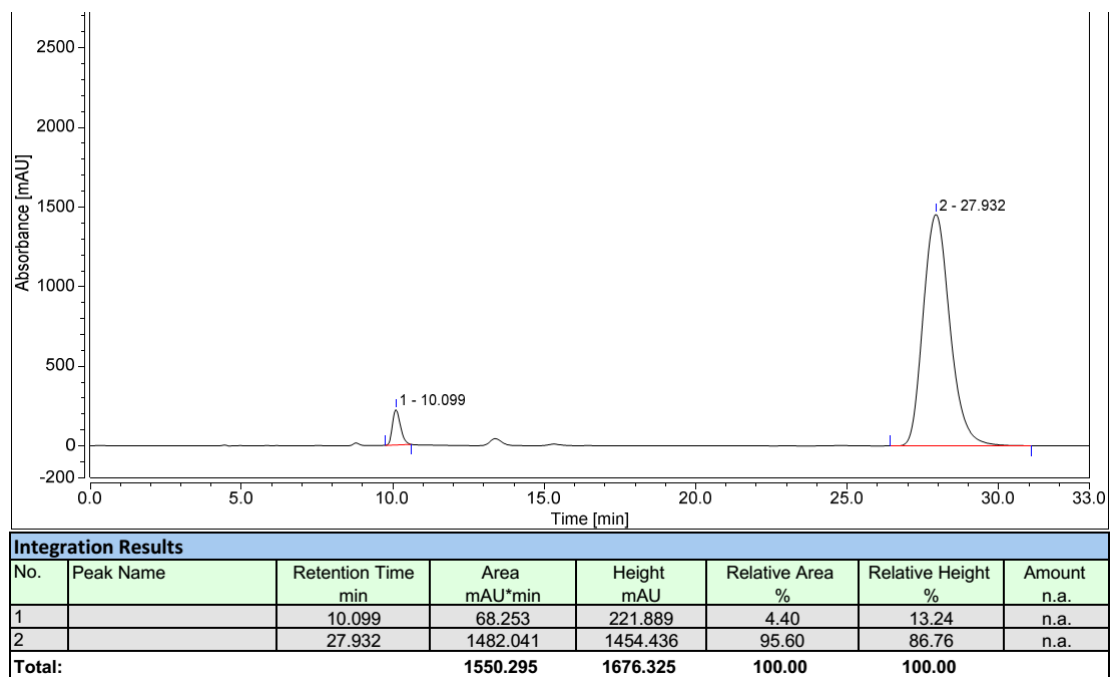
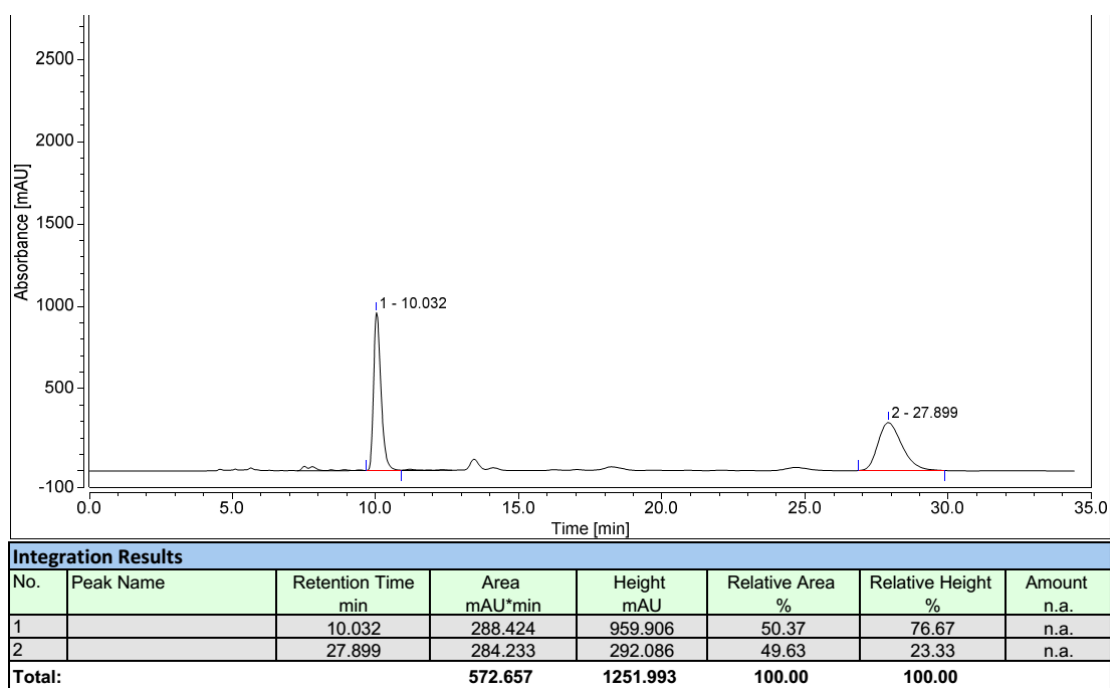


(aR)-1-(3-Benzamido-1-(4-bromophenyl)-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5c)

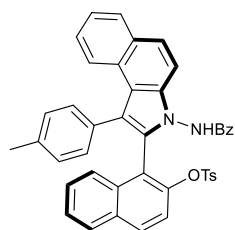


Following the general procedure, the compound was isolated as a white solid (134 mg, 91%); mp 119-120 °C; $[\alpha]_D^{21} = +10.8$ (c 1.0, CHCl₃, 91% ee); IR (KBr): 3373, 2924, 1697, 1172, 801, 748, 702 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.39(s, 1H), 8.02 – 7.93 (m, 2H), 7.89 (d, *J* = 9.0 Hz, 1H), 7.84 – 7.75 (m, 3H), 7.63 – 7.57 (m, 1H), 7.54 – 7.48 (m, 2H), 7.48 – 7.40 (m, 4H), 7.40 – 7.27 (m, 7H), 7.21 (d, *J* = 8.3 Hz, 1H), 7.06 (d, *J* = 8.3 Hz, 1H), 6.89 (s, 1H), 6.81 (d, *J* =

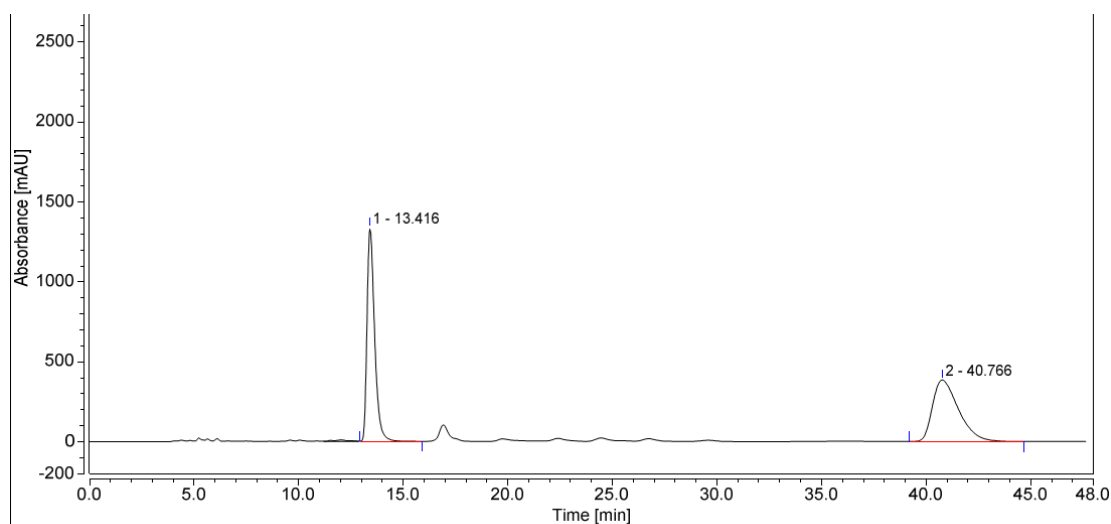
8.0 Hz, 2H), 2.11 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 165.3, 145.7, 145.6, 134.4, 134.3, 133.9, 132.3, 132.2, 131.8, 131.6, 131.4, 131.1, 131.1, 130.4, 129.5, 128.9, 128.6, 128.3, 127.9, 127.7, 127.6, 127.5, 127.0, 126.9, 126.8, 125.7, 125.1, 123.5, 123.1, 121.3, 120.9, 120.5, 118.8, 118.5, 110.9, 21.3; HRMS (ESI) calcd for $\text{C}_{42}\text{H}_{30}\text{N}_2\text{O}_4\text{SBr}$ m/z $[\text{M} + \text{H}]^+$: 737.1104, found: 737.1119; HPLC (Daicel Chiralpak Id, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 10.1 min, t_2 (major) = 27.9 min.



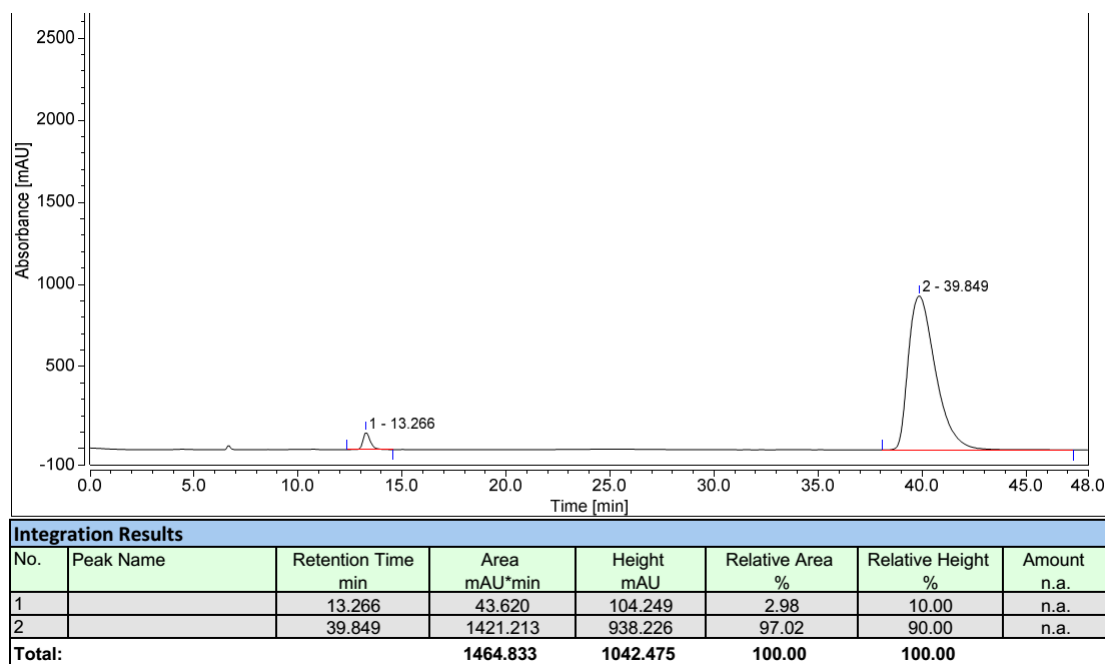
**(aR)-1-(3-Benzamido-1-(p-tolyl)-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonat
e (5d)**



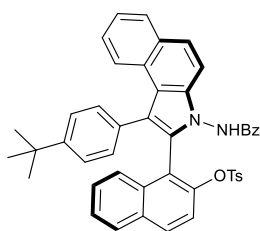
Following the general procedure, the compound was isolated as a white solid (122 mg, 91%); mp 112-113 °C; $[\alpha]_D^{21} = +4.4$ (c 1.0, CHCl₃, 94% ee); IR (KBr): 3411, 2922, 2837, 1625, 1172, 955, 815 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.56(s, 1H), 8.17 (t, *J* = 6.9 Hz, 2H), 8.08 – 7.90 (m, 4H), 7.77 (d, *J* = 8.8 Hz, 1H), 7.72 – 7.54 (m, 7H), 7.54 – 7.41 (m, 5H), 7.28 (s, 1H), 7.20 – 7.00 (m, 3H), 6.95 (d, *J* = 7.9 Hz, 2H), 2.42 (s, 3H), 2.26 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 145.7, 145.5, 136.3, 134.6, 133.8, 132.4, 132.2, 132.1, 131.7, 131.6, 131.4, 130.8, 130.4, 130.0, 129.7, 129.4, 128.8, 128.7, 128.6, 127.5, 127.4, 127.2, 127.0, 126.7, 125.5, 124.8, 123.3, 123.3, 121.9, 120.5, 120.1, 118.9, 110.9, 21.3, 21.1; HRMS (ESI) calcd for C₄₃H₃₃N₂O₄S *m/z* [M + H]⁺: 673.2156, found: 673.2169; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 13.3 min, *t*₂ (major) = 39.8 min.



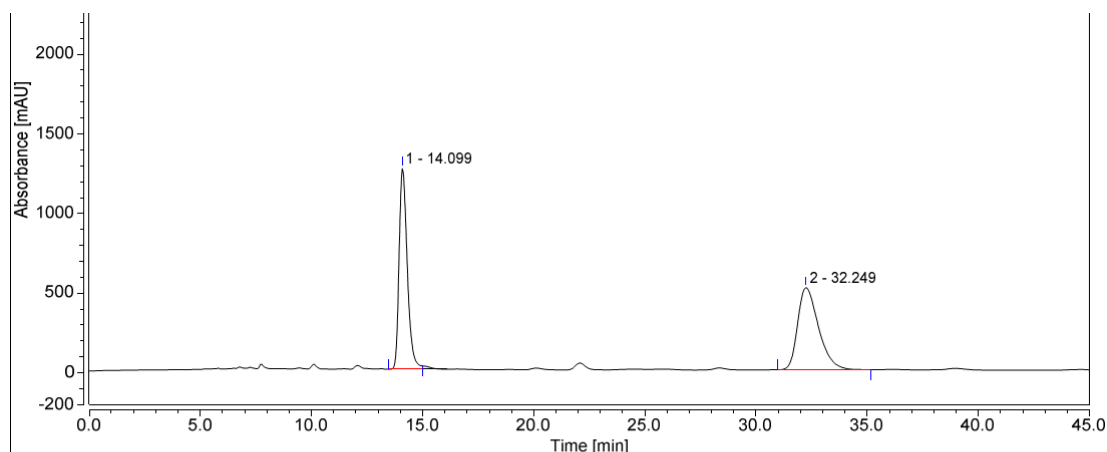
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		13.416	563.554	1334.992	50.25	77.56	n.a.
2		40.766	557.923	386.181	49.75	22.44	n.a.
Total:			1121.477	1721.173	100.00	100.00	



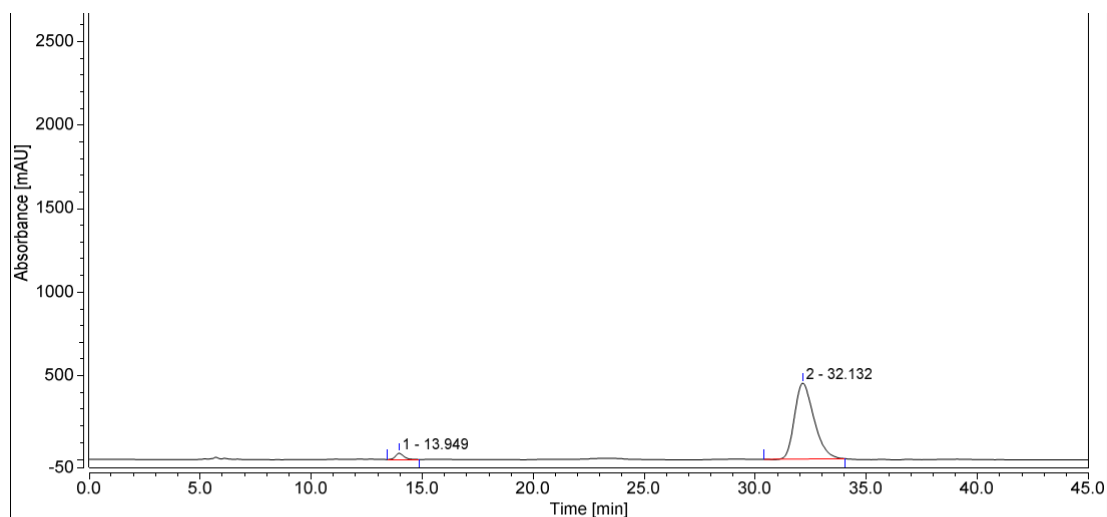
(aR)-1-(3-Benzamido-1-(4-(tert-butyl)phenyl)-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5e)



Following the general procedure, the compound was isolated as a white solid (127 mg, 89%); mp 99-100 °C; $[\alpha]_D^{21} = -4.6$ (c 1.0, CHCl₃, 94% ee); IR (KBr): 3373, 2925, 1701, 1262, 936, 817, 705 cm⁻¹; ¹H NMR (600 MHz, Chloroform-*d*) δ 9.34 (s, 1H), 7.99 – 7.94 (m, 2H), 7.89 (d, *J* = 9.3 Hz, 1H), 7.81 – 7.73 (m, 3H), 7.56 (d, *J* = 8.8 Hz, 1H), 7.50 – 7.38 (m, 7H), 7.33 – 7.27 (m, 3H), 7.25 (s, 1H), 7.11 (d, *J* = 13.3 Hz, 4H), 6.90 (d, *J* = 8.0 Hz, 1H), 6.76 – 6.70 (m, 2H), 2.06 (s, 3H), 1.23 (s, 9H); ¹³C NMR (150 MHz, DMSO-*D*₆) δ 167.8, 149.8, 147.9, 145.4, 134.7, 134.4, 133.2, 132.8, 132.1, 130.9, 130.3, 129.9, 129.5, 129.2, 128.9, 128.5, 128.3, 128.1, 127.6, 127.3, 126.9, 126.5, 125.6, 125.0, 124.2, 123.6, 121.7, 120.8, 119.7, 118.5, 112.0, 35.1, 32.0, 21.3; HRMS (ESI) calcd for C₄₆H₃₉N₂O₄S *m/z* [M + H]⁺: 715.2625, found: 715.2632; HPLC (Daicel Chiralpak ID, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 13.9 min, *t*₂ (major) = 32.1 min.

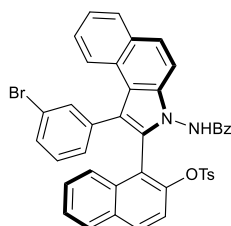


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		14.099	540.019	1266.744	48.99	71.01	n.a.
2		32.249	562.343	517.141	51.01	28.99	n.a.
Total:			1102.362	1783.885	100.00	100.00	



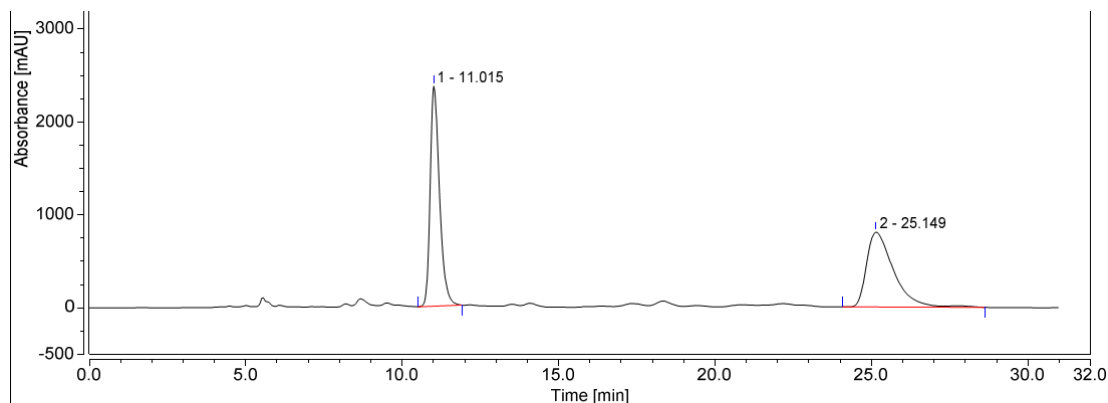
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		13.949	15.575	37.133	3.27	7.56	n.a.
2		32.132	460.229	454.281	96.73	92.44	n.a.
Total:			475.804	491.414	100.00	100.00	

(aR)-1-(3-Benzamido-1-(3-bromophenyl)-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5f)

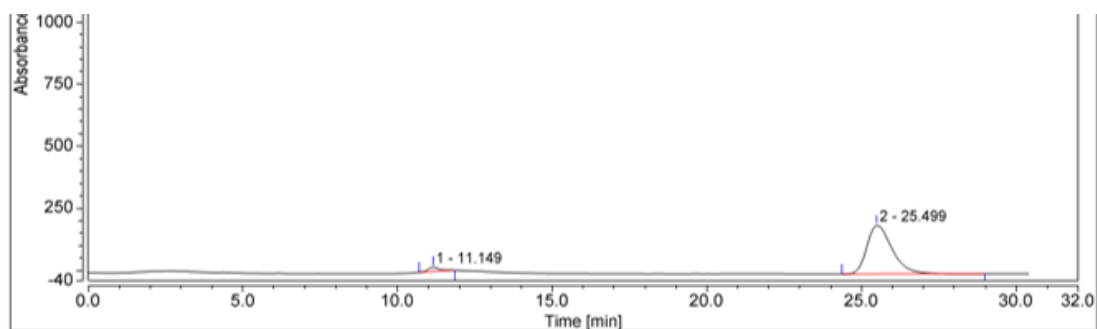


Following the general procedure, the compound was isolated as a white solid (134 mg, 91%); mp 106-107 °C; $[\alpha]_D^{21} = +14.4$ (c 1.0, CHCl₃, 92% ee); IR (KBr): 3383, 2924, 1597, 1352, 1173, 804, 683 cm⁻¹; ¹H NMR (400 MHz, Chloroform-d) δ 9.33 (s, 1H), 8.07 – 7.89 (m, 3H), 7.89 – 7.72 (m, 3H), 7.63 (m, , 1H), 7.58-7.40 (m, 7H), 7.40-7.29 (m, 4H), 7.25 (s, 1H), 7.13 – 6.86 (m, 3H), 6.85 - 6.73 (m, 2H), 2.11 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 145.6, 137.5, 134.4, 134.2, 132.9, 132.2, 131.7,

131.5, 130.5, 129.8, 129.6, 129.5, 129.0, 128.6, 128.3, 127.7, 127.6, 127.4, 127.3, 127.0, 127.0, 126.8, 125.8, 125.2, 123.6, 123.1, 121.6, 121.3, 120.7, 118.6, 110.9, 21.2; HRMS (ESI) calcd for $C_{42}H_{30}N_2O_4SBr$ m/z $[M + H]^+$: 737.1104, found: 737.1116; HPLC (Daicel Chiralpak ID, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 11.1 min, t_2 (major) = 25.5 min.

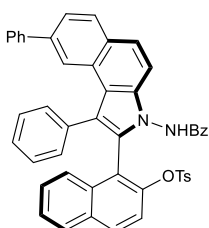


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.015	821.889	2369.156	50.57	74.63	n.a.
2		25.149	803.417	805.253	49.43	25.37	n.a.
Total:			1625.306	3174.409	100.00	100.00	



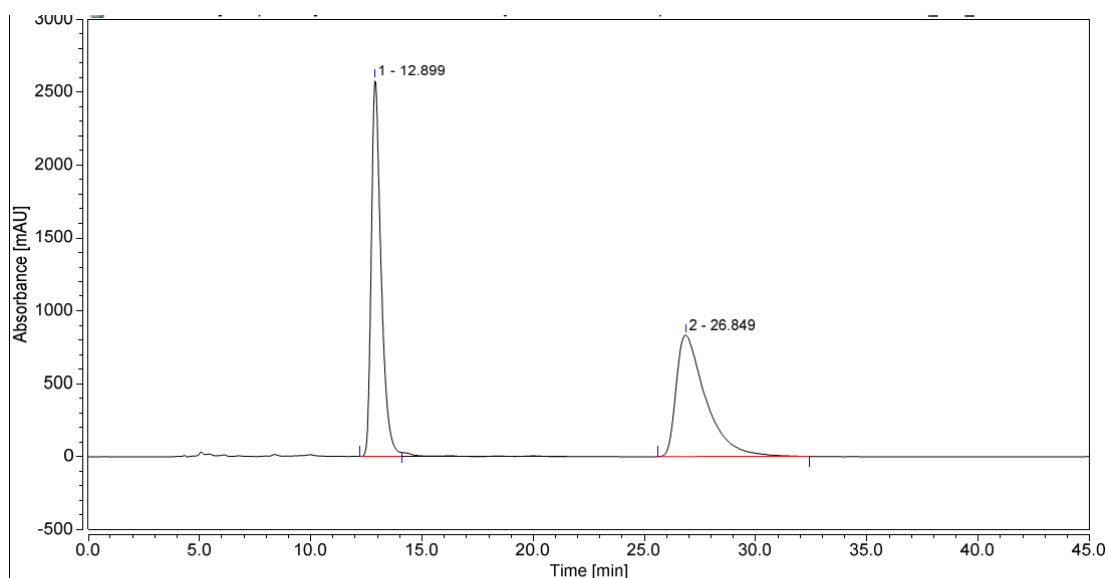
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.149	7.385	17.995	3.85	8.42	n.a.
2		25.499	184.430	195.786	96.15	91.58	n.a.
Total:			191.815	213.782	100.00	100.00	

(*aR*)-1-(3-Benzamido-1,8-diphenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5g)

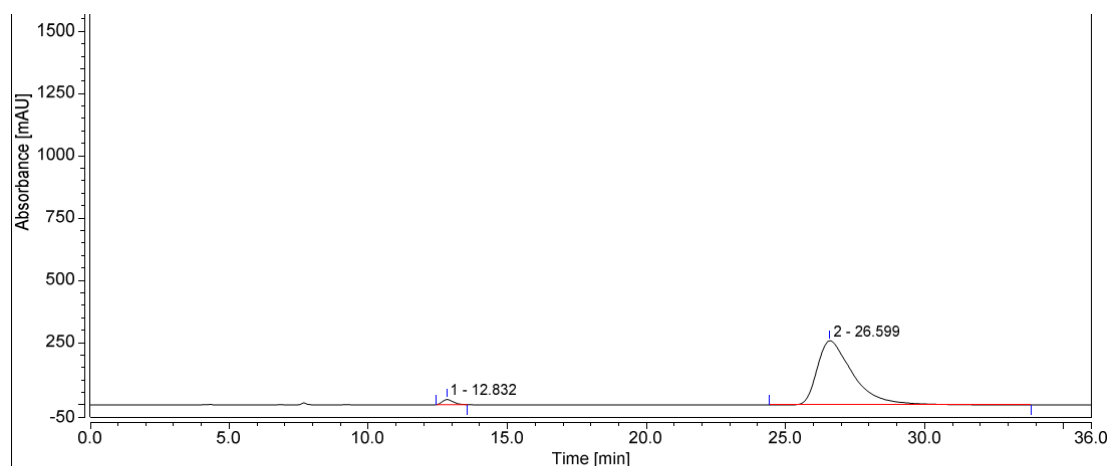


Following the general procedure, the compound was isolated as a white solid (134 mg, 91%); mp 109-110 °C; $[\alpha]_D^{21} = +5.4$ (c 1.0, $CHCl_3$, 95% ee); IR (KBr): 3373, 2924, 1701, 1261, 1173, 750 cm^{-1} ; 1H NMR (600 MHz, Chloroform-*d*) δ 9.47 (s, 1H), 8.13 (d, J = 1.8 Hz, 1H), 8.06 (dd, J = 8.5, 2.8 Hz, 2H), 7.89 – 7.81

(m, 2H), 7.78 – 7.71 (m, 2H), 7.63 (dd, $J = 8.8, 2.0$ Hz, 1H), 7.55 (dq, $J = 8.7, 1.8$ Hz, 2H), 7.51 – 7.46 (m, 3H), 7.46 – 7.26 (m, 11H), 7.24 – 7.08 (m, 4H), 6.79 (d, $J = 8.1$ Hz, 2H), 2.06 (s, 3H); 13 NMR (600 MHz, CDCl_3) δ 165.4, 145.7, 145.6, 140.9, 137.4, 135.4, 134.4, 134.1, 132.3, 132.1, 131.6, 131.5, 130.3, 129.9, 129.6, 129.4, 129.3, 128.8, 128.6, 128.1, 127.9, 127.6, 127.4, 127.4, 127.1, 127.0, 126.9, 126.9, 126.8, 126.7, 124.4, 122.3, 121.6, 121.4, 120.5, 120.2, 119.2, 111.0, 21.2; HRMS (ESI) calcd for $\text{C}_{48}\text{H}_{35}\text{N}_2\text{O}_4\text{S}$ m/z $[\text{M} + \text{H}]^+$: 735.2312, found: 735.2298; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 250$ nm): t_1 (minor) = 12.8 min, t_2 (major) = 26.6 min.

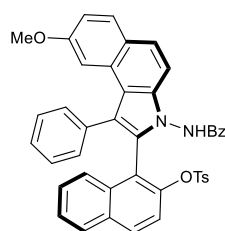


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		12.899	1319.353	2583.253	50.78	75.60	n.a.
2		26.849	1278.768	833.761	49.22	24.40	n.a.
Total:			2598.121	3417.014	100.00	100.00	

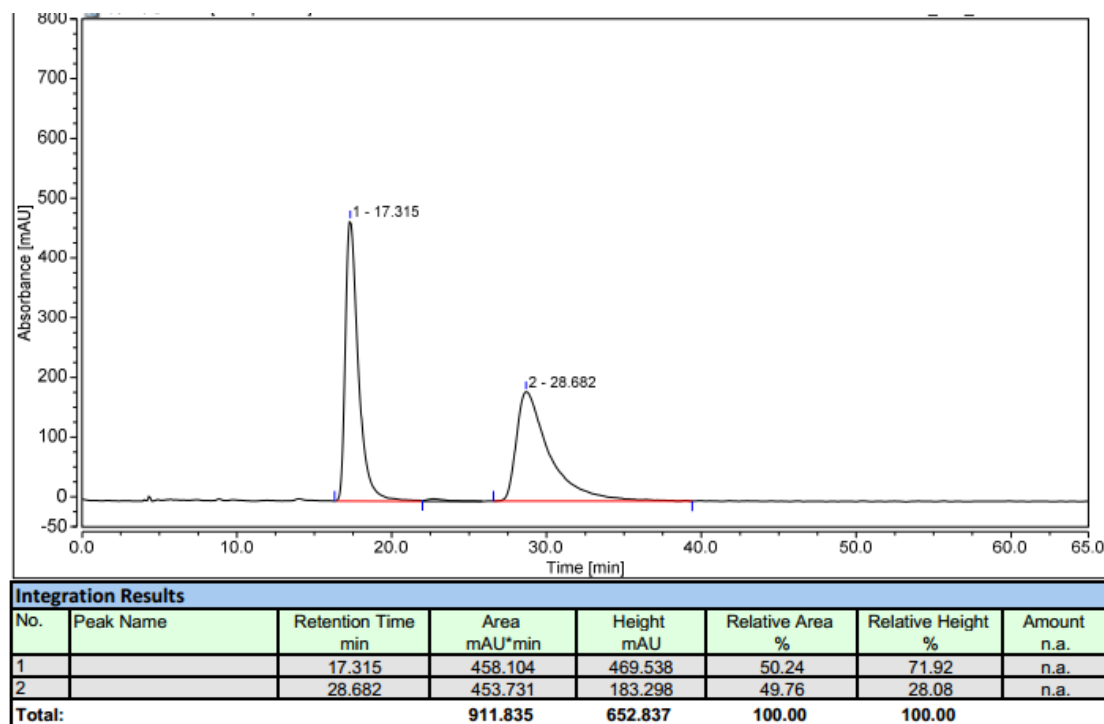


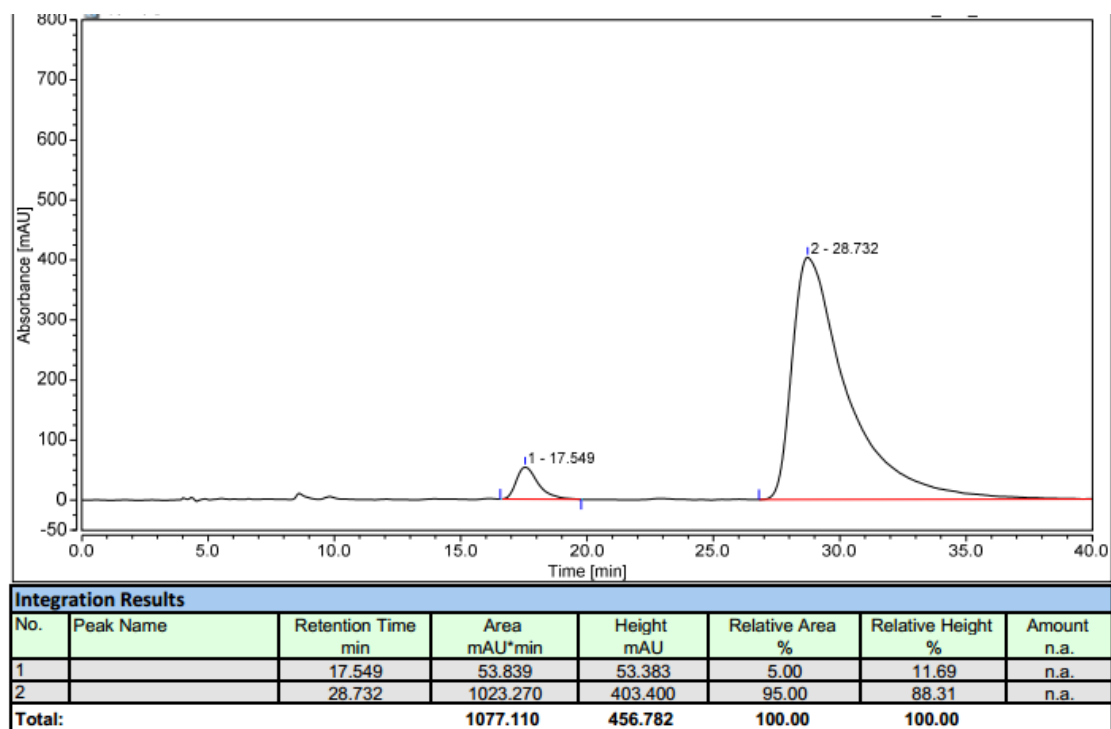
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		12.832	9.440	20.695	2.38	7.41	n.a.
2		26.599	386.460	258.682	97.62	92.59	n.a.
Total:			395.900	279.378	100.00	100.00	

(*aR*)-1-(3-Benzamido-8-methoxy-1-phenyl-3H-benzo[*e*]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5h)

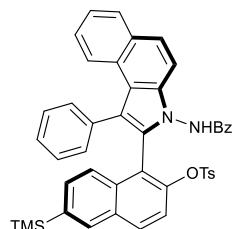


Following the general procedure, the compound was isolated as a white solid (124 mg, 90%); mp 108-109 °C; $[\alpha]_D^{21} = +3.8$ (c 1.0, CHCl₃, 90% ee); IR (KBr): 3373, 2925, 1624, 1228, 819, 748, 700 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.35 (s, 1H), 8.03 (d, *J* = 8.0 Hz, 1H), 7.89 (dd, *J* = 8.9, 5.2 Hz, 3H), 7.76 (dd, *J* = 12.8, 8.5 Hz, 3H), 7.52 (d, *J* = 7.3 Hz, 3H), 7.49 – 7.38 (m, 5H), 7.33 (t, *J* = 8.9 Hz, 5H), 7.21 – 7.10 (m, 5H), 7.06 (dd, *J* = 8.8, 2.5 Hz, 3H), 6.83 (d, *J* = 8.1 Hz, 3H), 3.46 (s, 3H), 2.16 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 157.5, 145.8, 145.5, 135.5, 134.5, 134.4, 132.5, 132.1, 131.7, 130.8, 130.6, 130.2, 130.1, 129.7, 129.5, 128.6, 127.9, 127.7, 127.5, 127.4, 127.2, 127.2, 127.1, 126.8, 126.7, 125.3, 124.6, 121.7, 120.5, 120.0, 118.4, 115.1, 108.5, 103.1, 54.6, 21.3; HRMS (ESI) calcd for C₄₃H₃₃N₂O₅S *m/z* [M + H]⁺: 689.2105, found: 689.2110; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 17.5 min, *t*₂ (major) = 28.7 min.

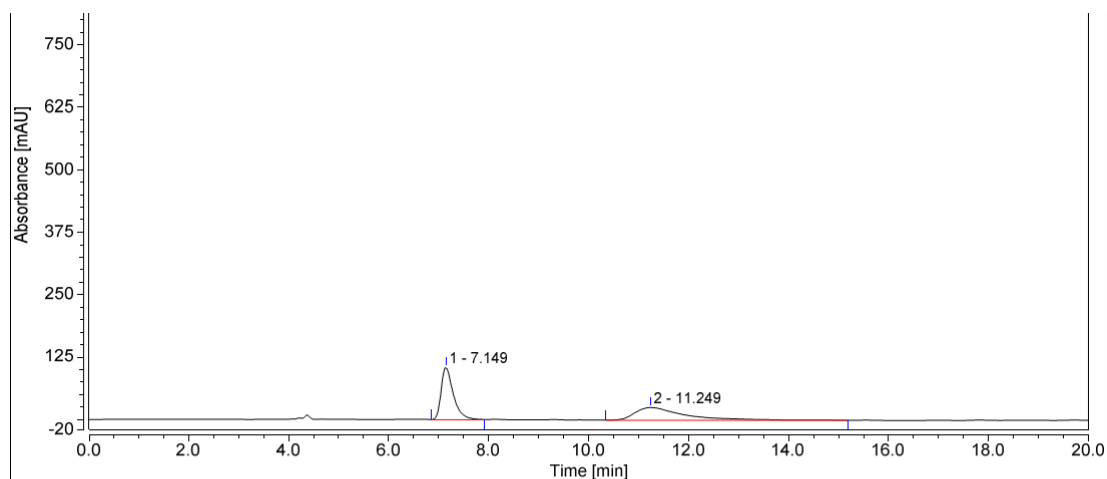




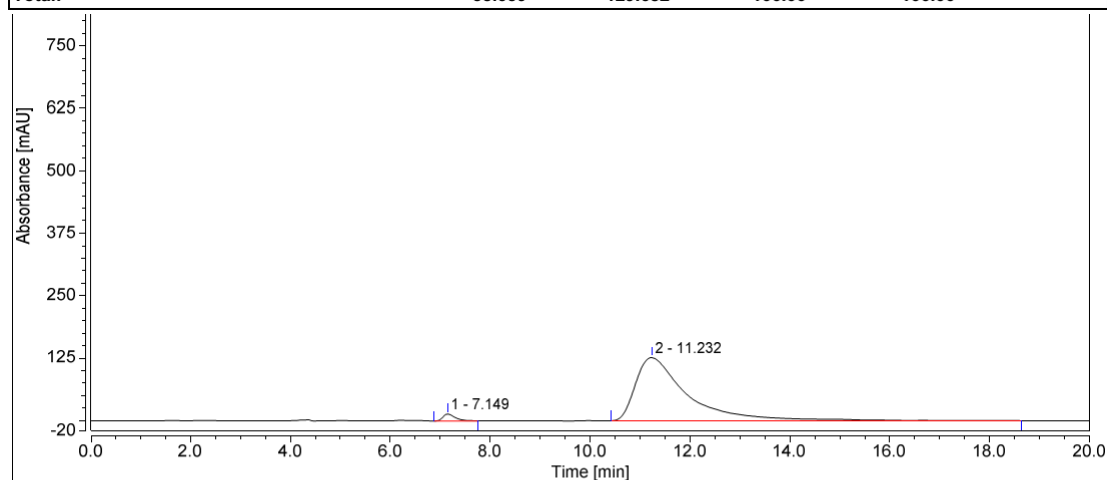
(aR)-1-(3-Benzamido-1-phenyl-3H-benzo[e]indol-2-yl)-6-(trimethylsilyl)naphthalen-2-yl-4-methyl benzenesulfonate (5i)



Following the general procedure, the compound was isolated as a white solid (138 mg, 95%); mp 116-117 °C; $[\alpha]_D^{21} = -22.2$ (c 1.0, CHCl₃, 95% ee); IR (KBr): 3365, 2954, 1699, 1348, 1265, 835, 703 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.37 (s, 1H), 7.99 (m, 2H), 7.94 – 7.85 (m, 2H), 7.82 (m, 2H), 7.65 – 7.56 (m, 2H), 7.53 (d, *J* = 7.5 Hz, 2H), 7.44 (dt, *J* = 17.9, 8.3 Hz, 3H), 7.37 – 7.31 (m, 3H), 7.23 (s, 1H), 7.15 (d, *J* = 12.9 Hz, 3H), 7.03 (s, 1H), 6.79 (d, *J* = 8.0 Hz, 2H), 2.12 (s, 3H), 0.29 (s, 9H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 145.9, 145.5, 139.1, 135.4, 134.7, 133.8, 133.3, 132.4, 132.1, 131.7, 131.6, 131.1, 130.4, 130.3, 129.9, 129.4, 128.8, 128.6, 128.5, 128.0, 127.8, 127.6, 127.5, 127.0, 126.7, 126.0, 125.5, 124.8, 123.3, 121.5, 120.4, 120.2, 118.8, 111.0, 21.3, -1.25; HRMS (ESI) calcd for C₄₅H₃₉N₂O₄SSi *m/z* [M + H]⁺: 731.2394, found: 731.2384; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 7.1 min, *t*₂ (major) = 11.2 min.

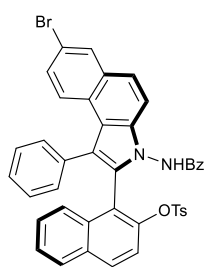


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		7.149	29.433	104.324	50.18	80.45	n.a.
2		11.249	29.226	25.358	49.82	19.55	n.a.
Total:			58.659	129.682	100.00	100.00	



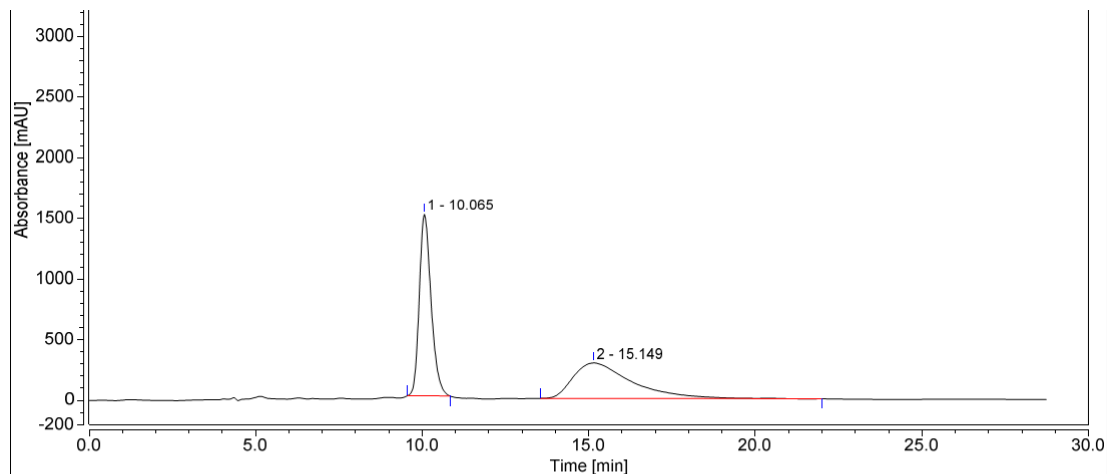
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		7.149	3.951	13.960	2.50	9.93	n.a.
2		11.232	153.827	126.662	97.50	90.07	n.a.
Total:			157.778	140.623	100.00	100.00	

(aR)-1-(3-Benzamido-7-bromo-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzene sulfonate (5j)

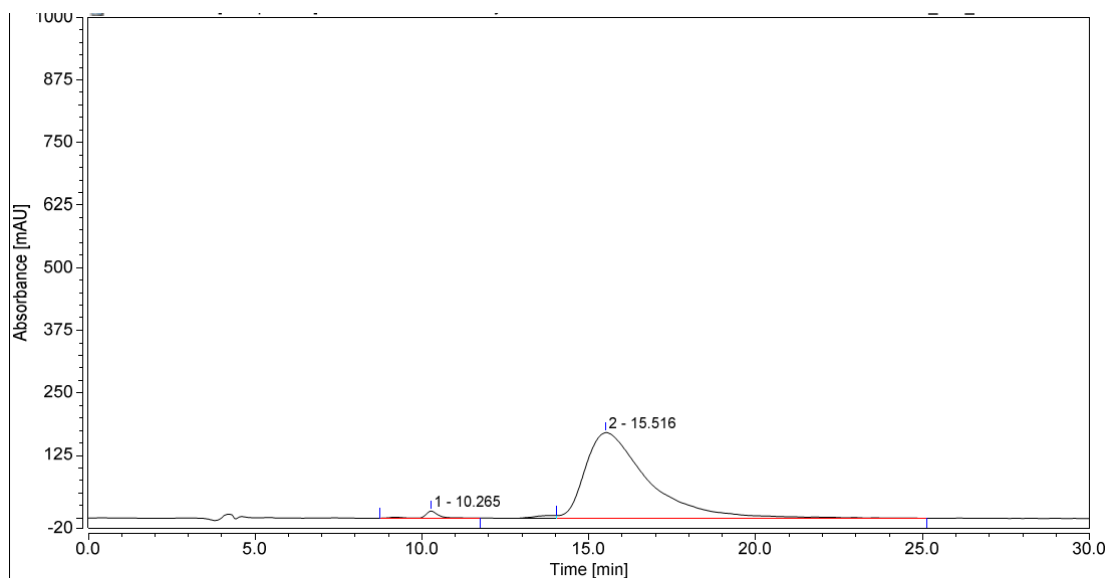


Following the general procedure, the compound was isolated as a white solid (128 mg, 88%); mp 121-122 °C; $[\alpha]_D^{21} = -13.8$ (c 1.0, CHCl₃, 96% ee); IR (KBr): 3381, 2922, 1699, 1350, 1172, 966, 819 cm⁻¹; ¹H NMR (600 MHz, Chloroform-*d*) δ 9.40 (s, 1H), 8.12 (d, *J* = 1.8 Hz, 1H), 7.95 (d, *J* = 8.3 Hz, 1H), 7.86 (d, *J* = 9.0 Hz, 1H), 7.74 (d, *J* = 8.0 Hz, 1H), 7.69 (d, *J* = 8.8 Hz, 1H), 7.65 (d, *J* = 8.9 Hz, 1H), 7.61 (d, *J* = 8.8 Hz, 1H), 7.49 (d, *J* = 7.5 Hz, 2H), 7.43 (dq, *J* = 15.3, 7.2 Hz, 3H), 7.39 – 7.26 (m, 6H), 7.21 – 7.04 (m, 4H), 6.99 (s, 1H), 6.82 (d, *J* = 8.1 Hz, 2H), 2.15 (s, 3H); ¹³C NMR

(100 MHz, CDCl₃) δ 155.0, 144.5, 141.0, 133.5, 131.6, 130.2, 130.2, 130.1, 128.8, 128.7, 128.6, 128.2, 127.1, 126.6, 125.8, 123.9, 122.7, 121.5, 120.2, 113.7, 112.8, 69.7, 54.0, 53.6, 21.9; HRMS (ESI) calcd for C₄₂H₃₀N₂O₄SBr m/z [M + H]⁺: 737.1104, found: 737.1121; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 10.3 min, t_2 (major) = 15.5 min.

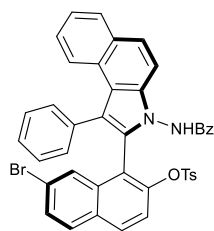


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		10.065	614.320	1495.303	50.67	83.66	n.a.
2		15.149	598.185	292.089	49.33	16.34	n.a.
Total:			1212.506	1787.392	100.00	100.00	

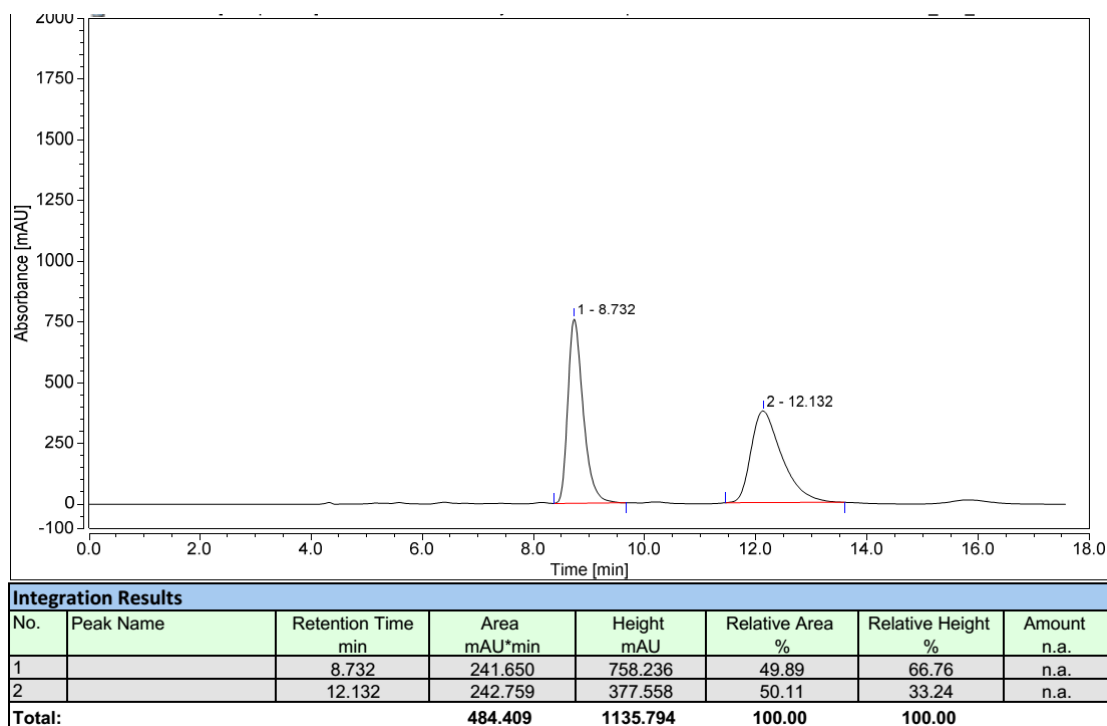


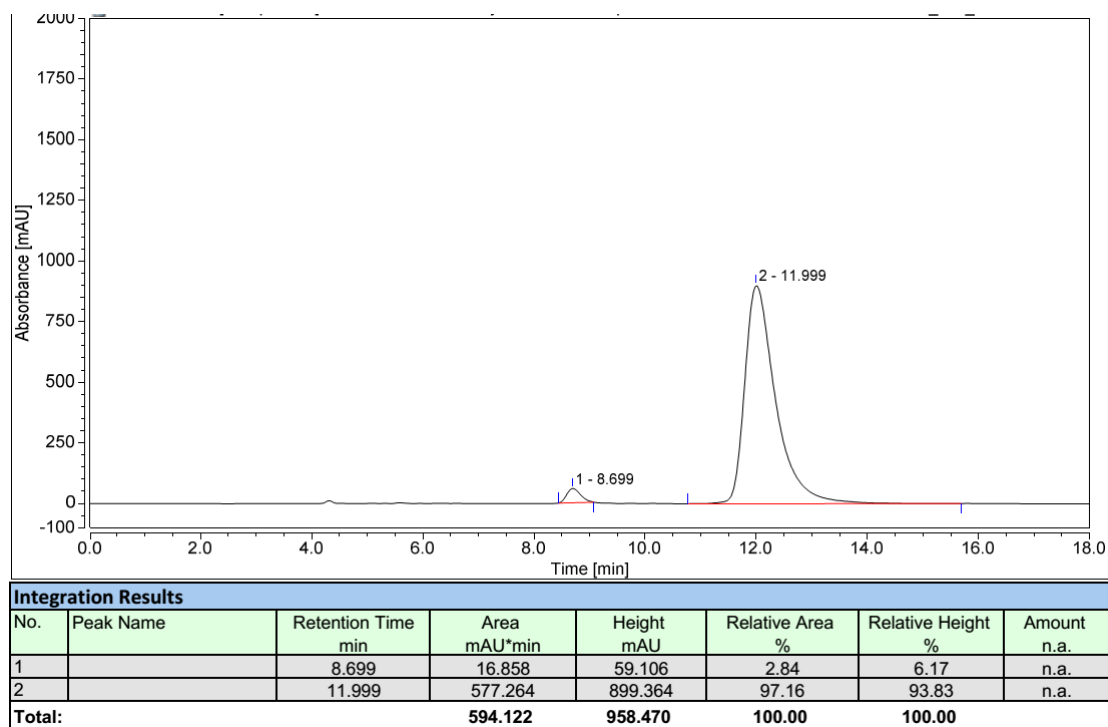
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		10.265	7.209	14.290	1.88	7.69	n.a.
2		15.516	375.764	171.545	98.12	92.31	n.a.
Total:			382.972	185.835	100.00	100.00	

(*aR*)-1-(3-Benzamido-1-phenyl-3H-benzo[*e*]indol-2-yl)-7-bromonaphthalen-2-yl-4-methylbenzene sulfonate (5k)

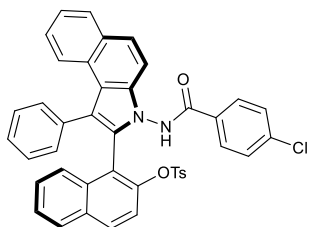


Following the general procedure, the compound was isolated as a white solid (131 mg, 89%); mp 123-124 °C; $[\alpha]_{\text{D}}^{21} = -77.0$ (c 1.0, CHCl₃, 94% ee); IR (KBr): 3375, 2923, 1697, 1350, 1170, 808, 541 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.22 (s, 1H), 8.14 (d, *J* = 2.0 Hz, 1H), 7.98 (d, *J* = 8.0 Hz, 1H), 7.85 – 7.75 (m, 3H), 7.63 – 7.53 (m, 4H), 7.50 – 7.26 (m, 10H), 7.20 – 7.05 (m, 3H), 6.90 (d, *J* = 7.3 Hz, 1H), 6.75 (d, *J* = 8.1 Hz, 2H), 2.07 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 146.5, 145.7, 135.2, 135.1, 134.0, 132.2, 131.4, 131.3, 130.5, 130.2, 130.1, 129.7, 129.5, 128.9, 128.8, 128.6, 128.5, 128.0, 127.8, 127.4, 127.1, 126.9, 125.6, 125.1, 123.5, 123.3, 122.2, 121.0, 120.5, 118.7, 110.8, 21.2; HRMS (ESI) calcd for C₄₂H₃₀N₂O₄SBr *m/z* [M + H]⁺: 737.1104, found: 737.1122; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 25/75, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 8.7 min, *t*₂ (major) = 11.9 min.

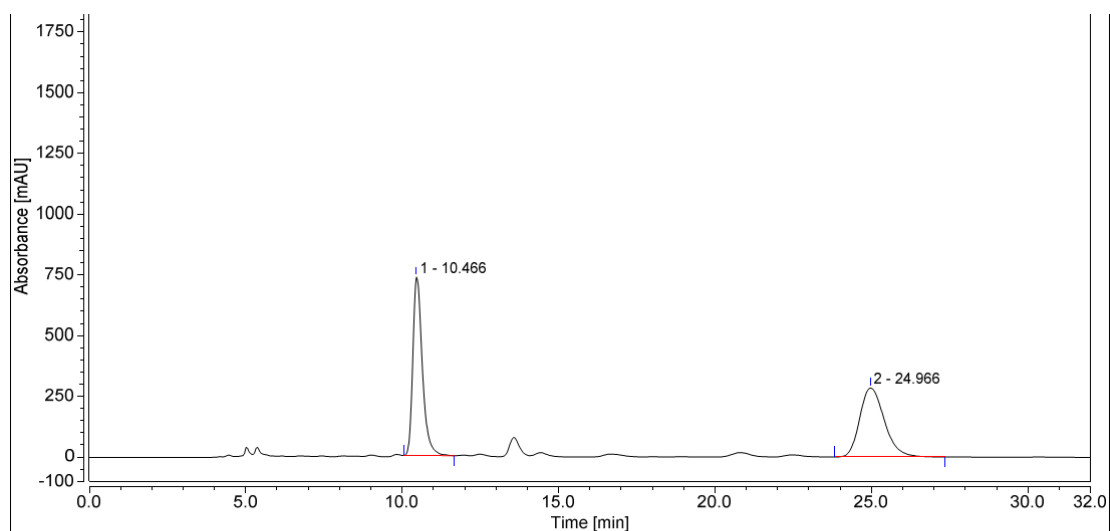




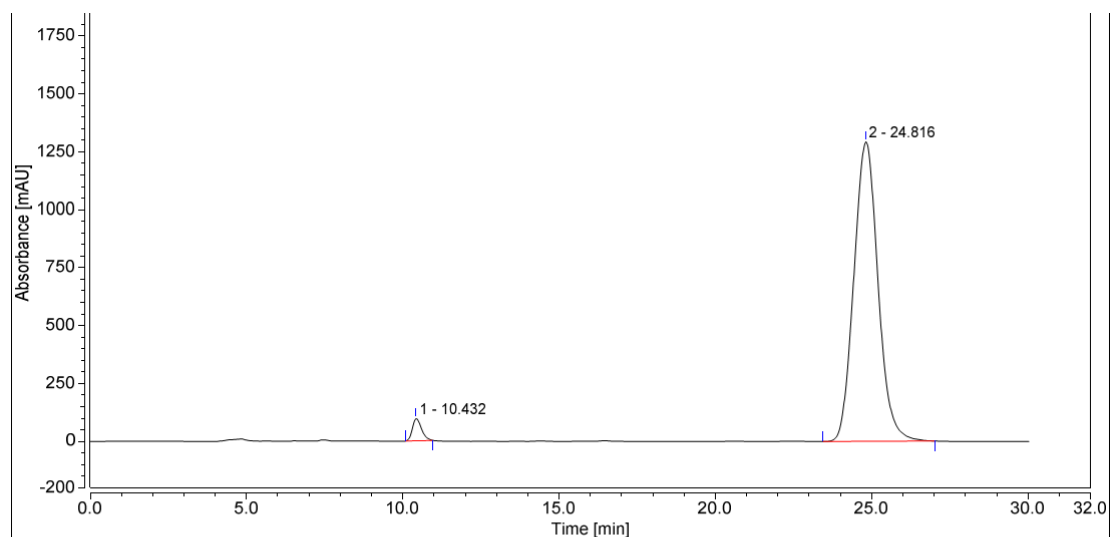
(aR)-1-(3-(4-Chlorobenzamido)-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5l)



Following the general procedure, the compound was isolated as a white solid (129 mg, 93%); mp 127-128 °C; $[\alpha]_D^{21} = -2.6$ (c 1.0, CHCl₃, 95% ee); IR (KBr): 3373, 2924, 1701, 1261, 1170, 943, 750, 692 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.51 (s, 1H), 8.03 (t, *J* = 7.4 Hz, 2H), 7.92 (d, *J* = 9.0 Hz, 1H), 7.85 (d, *J* = 8.7 Hz, 2H), 7.80 (d, *J* = 7.8 Hz, 1H), 7.64 (d, *J* = 8.8 Hz, 1H), 7.55 – 7.41 (m, 6H), 7.40 – 7.02 (m, 10H), 6.85 (d, *J* = 8.0 Hz, 2H), 2.15 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 164.4, 145.8, 145.6, 138.5, 135.3, 134.5, 133.9, 132.4, 131.7, 131.5, 130.5, 130.2, 129.9, 129.5, 128.9, 128.8, 128.6, 128.5, 128.0, 127.8, 127.6, 127.5, 127.1, 126.8, 126.7, 125.6, 125.0, 123.4, 123.3, 121.6, 120.5, 120.3, 118.9, 110.8, 21.3; HRMS (ESI) calcd for C₄₂H₃₀N₂O₄SCl *m/z* [M + H]⁺: 693.1609, found: 693.1617; HPLC (Daicel Chiralpak ID, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 10.4 min, *t*₂ (major) = 24.8 min.

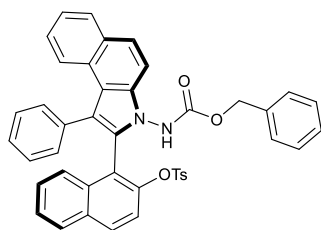


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		10.466	259.807	734.294	49.99	72.11	n.a.
2		24.966	259.934	283.943	50.01	27.89	n.a.
Total:			519.741	1018.237	100.00	100.00	



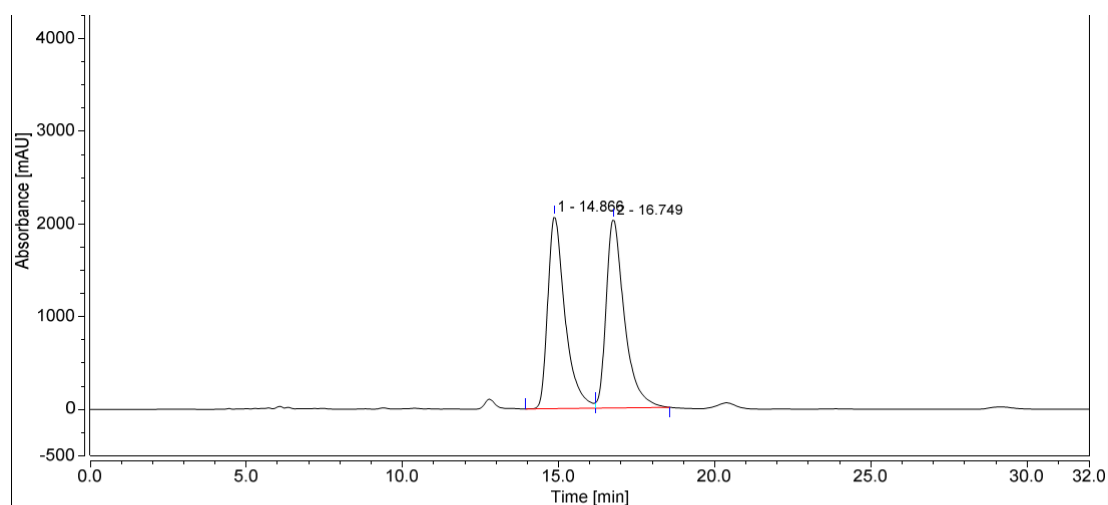
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		10.432	32.470	96.176	2.73	6.92	n.a.
2		24.816	1155.775	1293.501	97.27	93.08	n.a.
Total:			1188.245	1389.677	100.00	100.00	

(aR)-1-(3-(((Benzyloxy)carbonyl)amino)-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5m)

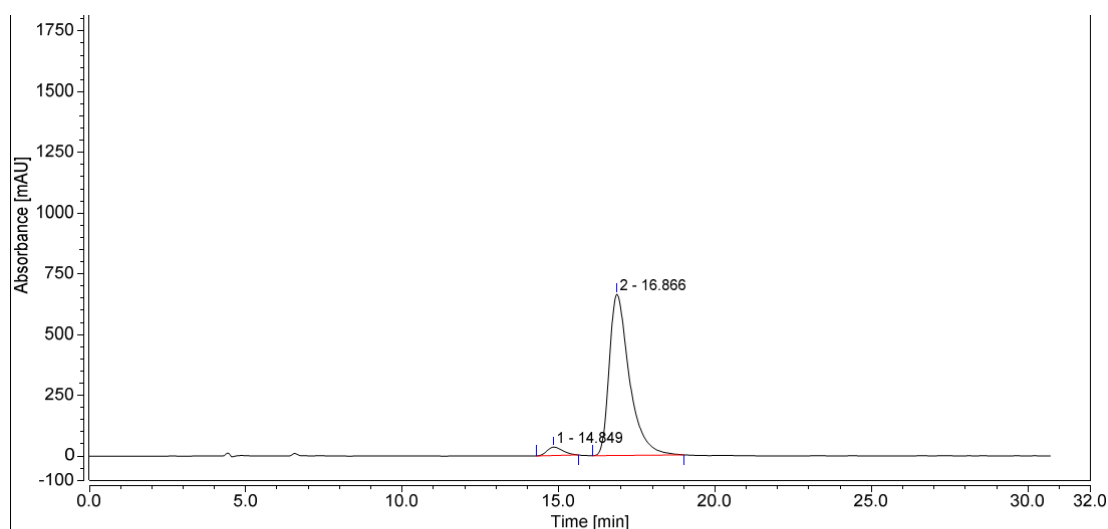


Following the general procedure, the compound was isolated as a white solid (125 mg, 91%); mp 101-102 °C; $[\alpha]_D^{21} = -25.0$ (c 1.0, CHCl_3 , 92% ee); IR (KBr): 3373, 2924, 1701, 1261, 1170, 943, 750 cm^{-1} ; ^1H NMR (600 MHz, Chloroform-*d*) δ 7.97 (d, $J = 7.3$ Hz, 1H), 7.93 – 7.75 (m, 5H), 7.62 (s, 1H), 7.54 (d, $J = 8.6$ Hz, 1H), 7.45 –

7.35(m, 3H), 7.31 (s, 2H), 7.21 (s, 3H), 7.06 – 6.89 (m, 3H), 7.01 (d, $J = 32.2$ Hz, 3H), 6.84 – 6.64 (m, 2H), 5.11 – 4.75 (m, 2H), 2.05 (s, 3H); ^{13}C NMR (150 MHz, CDCl_3) δ 154.5, 145.9, 145.2, 135.3, 134.0, 133.8, 132.4, 131.6, 131.3, 130.3, 130.2, 129.9, 129.3, 128.8, 128.4, 128.3, 128.0, 127.8, 127.7, 127.5, 127.3, 127.2, 127.1, 126.7, 126.5, 125.5, 124.8, 123.3, 123.3, 121.2, 120.6, 120.0, 118.4, 110.4, 67.3, 21.1; HRMS (ESI) calcd for $\text{C}_{43}\text{H}_{33}\text{N}_2\text{O}_5\text{S}$ m/z $[\text{M} + \text{H}]^+$: 689.2105; found: 689.2111; HPLC (Daicel Chiralpak IE, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, $\lambda = 250$ nm): t_1 (minor) = 14.8 min, t_2 (major) = 16.9 min.

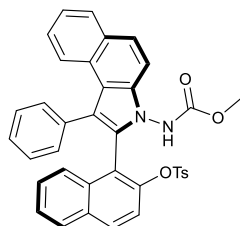


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		14.866	1330.343	2074.343	49.15	50.47	n.a.
2		16.749	1376.457	2035.617	50.85	49.53	n.a.
Total:			2706.799	4109.960	100.00	100.00	

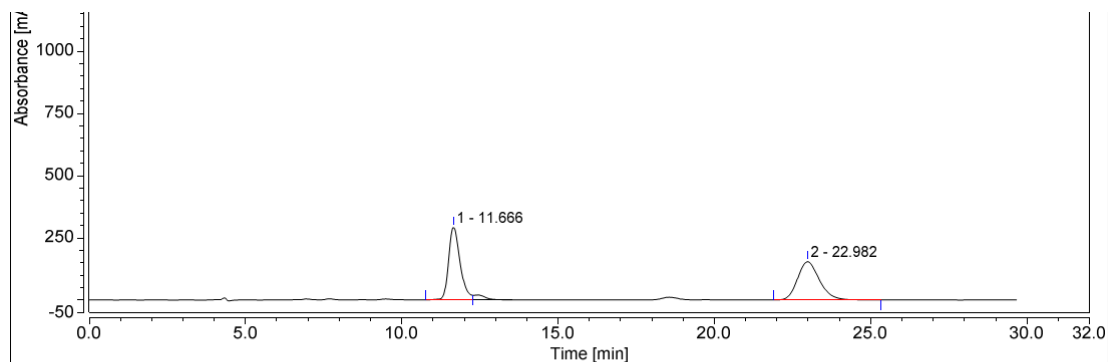


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		14.849	20.182	34.420	3.93	4.93	n.a.
2		16.866	493.737	663.852	96.07	95.07	n.a.
Total:			513.919	698.271	100.00	100.00	

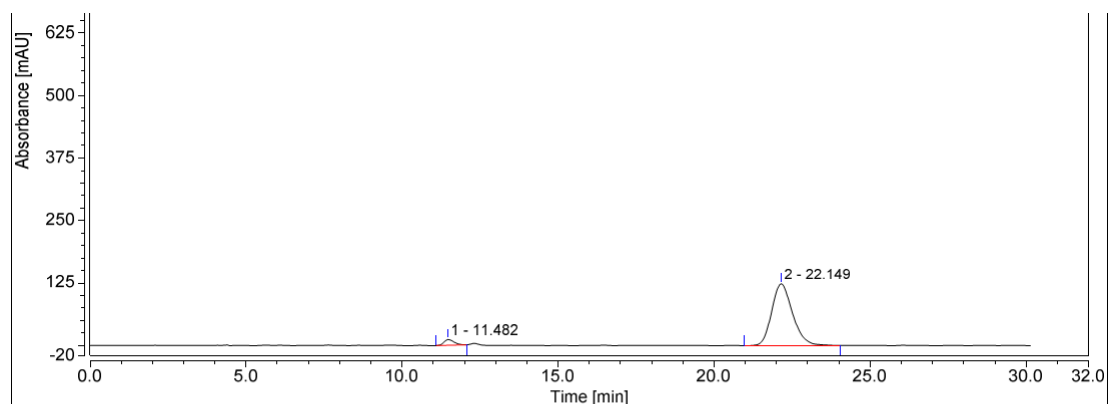
(*aR*)-1-(3-((Methoxycarbonyl)amino)-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5n)



Following the general procedure, the compound was isolated as a white solid (110 mg, 90%); mp 105-106 °C; $[\alpha]_D^{21} = -10.4$ (c 1.0, CHCl₃, 91% ee); IR (KBr): 3378, 2925, 1725, 1156, 954, 753 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 8.00 (d, *J* = 8.0 Hz, 1H), 7.96 – 7.76 (m, 5H), 7.60 (d, *J* = 8.8 Hz, 1H), 7.53 – 7.40 (m, 3H), 7.31 (d, *J* = 7.2 Hz, 4H), 7.14 (s, 5H), 6.79 (s, 2H), 3.52 (s, 3H), 2.11 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 155.0, 146.0, 145.3, 135.3, 133.9, 132.6, 131.7, 131.4, 130.8, 130.4, 130.2, 130.0, 129.3, 128.8, 128.4, 127.9, 127.9, 127.4, 127.1, 126.7, 126.4, 125.6, 123.4, 123.3, 121.2, 120.7, 120.0, 118.4, 110.4, 52.8, 21.2; HRMS (ESI) calcd for C₃₇H₂₉N₂O₅S *m/z* [M + H]⁺: 613.1792; found: 613.1809; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 11.5 min, *t*₂ (major) = 22.1 min.

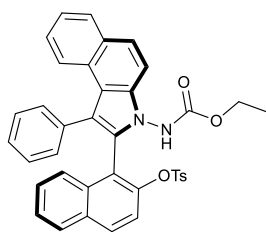


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		11.666	125.623	293.408	49.92	65.52	n.a.
2		22.982	126.017	154.375	50.08	34.48	n.a.
Total:			251.639	447.783	100.00	100.00	

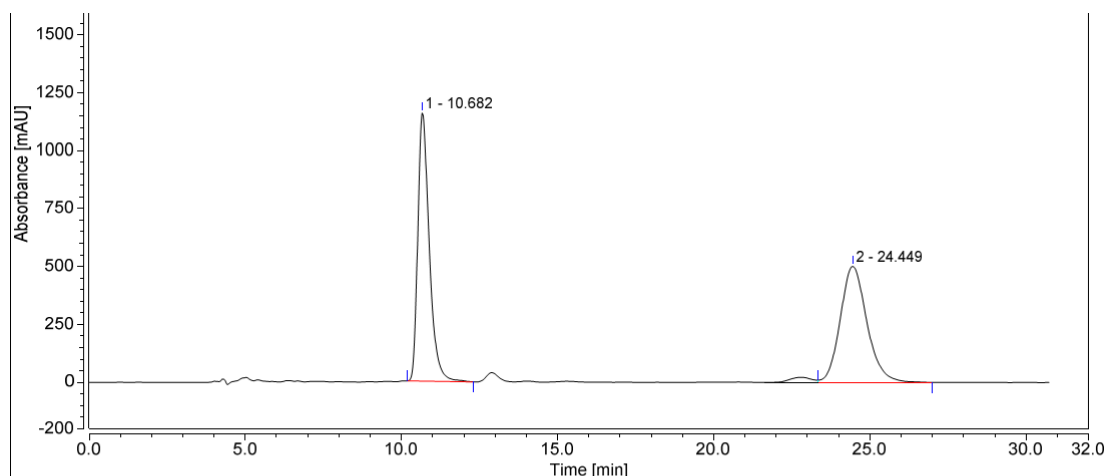


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		11.482	4.425	11.717	4.41	8.64	n.a.
2		22.149	95.951	123.843	95.59	91.36	n.a.
Total:			100.376	135.560	100.00	100.00	

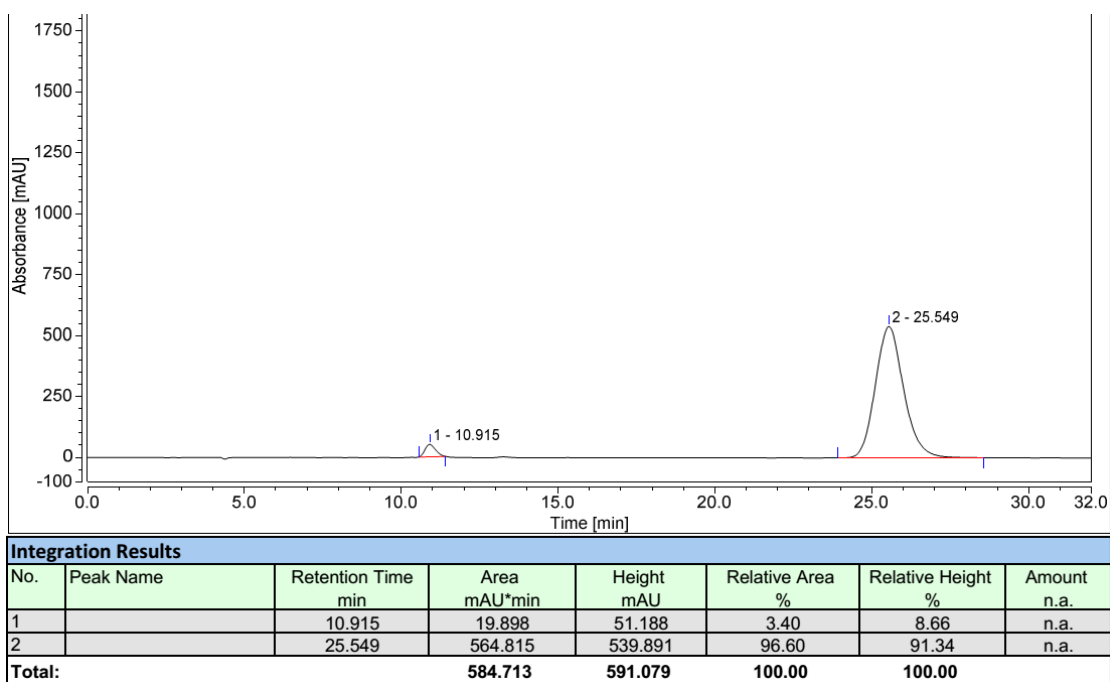
(aR)-1-(3-((Ethoxycarbonyl)amino)-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5o)



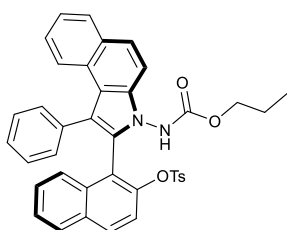
Following the general procedure, the compound was isolated as a white solid (114 mg, 91%); mp 101-102 °C; $[\alpha]_D^{21} = -11.8$ (c 1.0, CHCl₃, 93% ee); IR (KBr): 3365, 2924, 1723, 1163, 938, 731 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 8.00 (d, *J* = 8.0 Hz, 1H), 7.96 – 7.68 (m, 5H), 7.60 (d, *J* = 8.8 Hz, 1H), 7.45 (m, 3H), 7.38 – 7.29 (m, 2H), 7.27 – 7.19 (m, 1H), 7.19 – 7.07 (m, 3H), 6.99 (s, 1H), 6.88 – 6.64 (m, 2H), 4.15 – 3.75 (m, 2H), 2.09 (s, 3H), 1.23 – 0.73 (m, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 154.7, 146.0, 145.3, 135.3, 134.0, 132.6, 131.8, 131.3, 130.4, 130.2, 130.0, 129.3, 128.8, 128.5, 128.0, 127.8, 127.4, 127.2, 126.7, 126.4, 125.5, 124.7, 123.3, 121.3, 120.8, 120.0, 118.4, 110.5, 62.0, 21.2, 14.0; HRMS (ESI) calcd for C₃₈H₃₁N₂O₅S *m/z* [M + H]⁺: 627.1948; found: 627.1955; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): t₁ (minor) = 10.9 min, t₂ (major) = 25.5 min.



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		10.682	491.583	1158.615	49.82	69.81	n.a.
2		24.449	495.148	500.979	50.18	30.19	n.a.
Total:			986.731	1659.593	100.00	100.00	

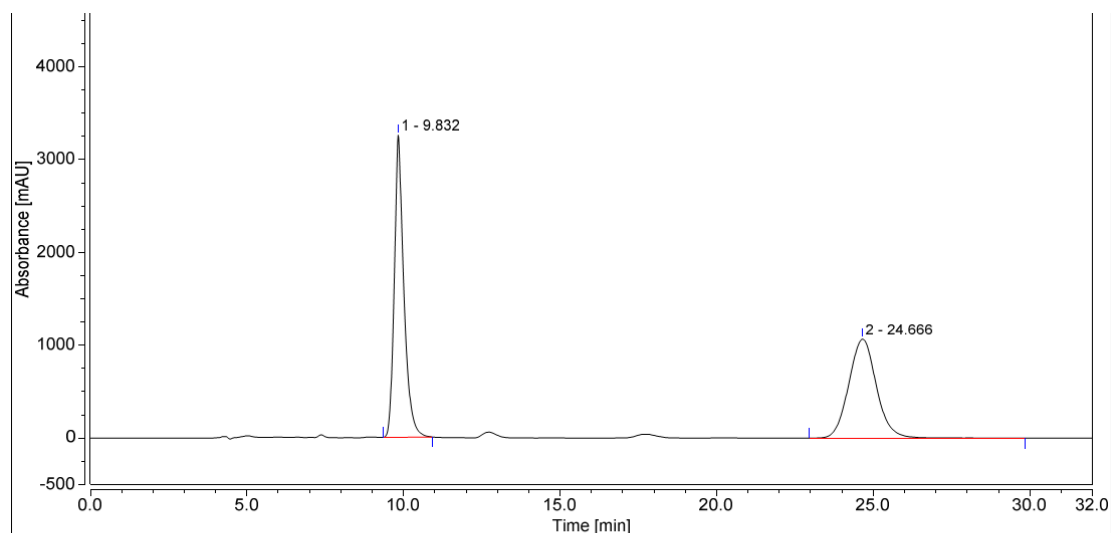


(*aR*)-1-(1-Phenyl-3-((propoxycarbonyl)amino)-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5p)

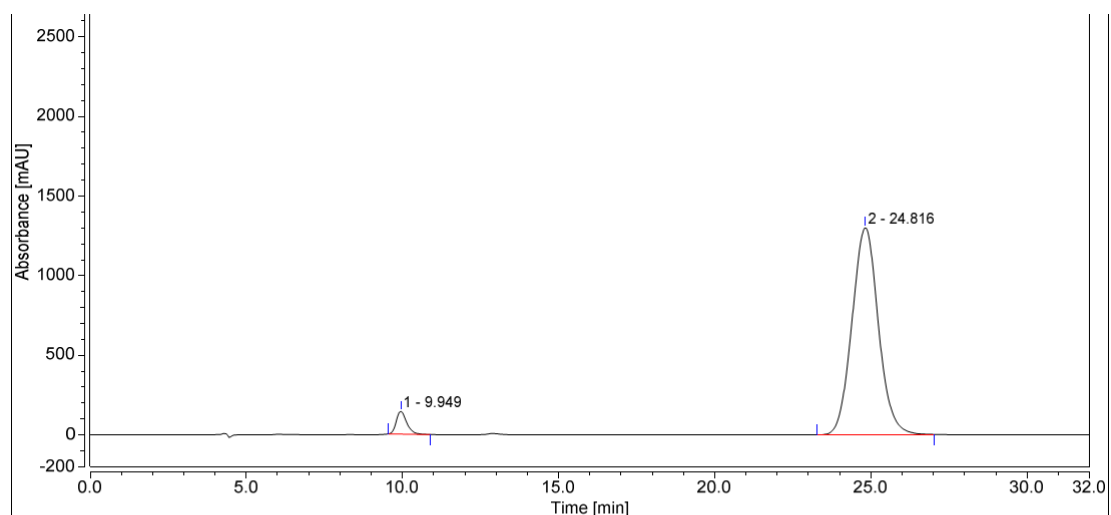


Following the general procedure, the compound was isolated as a white solid (120 mg, 94%); mp 109-110 °C; $[\alpha]_D^{21} = -18.4$ (c 1.0, CHCl₃, 92% ee); IR (KBr): 3377, 2966, 1749, 1371, 1228, 804, 748 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 8.00 (d, *J* = 8.0 Hz, 1H), 7.91 (d, *J* = 8.8 Hz, 1H), 7.86 – 7.75 (m, 3H), 7.60 (d, *J* = 8.7 Hz, 1H), 7.51 – 7.38 (m, 3H),

7.31 (s, 2H), 7.23(s, 1H), 7.18 – 6.92 (m, 3H), 6.77 (s, 2H), 4.11 – 3.61(m, 2H), 2.08 (s, 3H), 1.54 – 1.14(m, 2H), 0.97 – 0.28(m, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 154.8, 146.1, 145.3, 135.4, 134.0, 132.6, 131.8, 131.3, 130.4, 130.2, 130.0, 129.3, 128.8, 128.5, 128.0, 127.8, 127.4, 126.7, 126.4, 125.5, 124.7, 123.3, 121.3, 120.7, 120.0, 118.4, 110.5, 67.5, 21.8, 21.2, 9.7; HRMS (ESI) calcd for C₃₉H₃₃N₂O₅S *m/z* [M + H]⁺: 641.2105, found: 641.2126; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 9.9 min, *t*₂ (major) = 24.8 min.

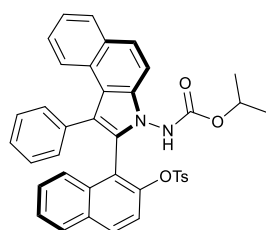


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.832	1149.250	3258.513	51.36	75.35	n.a.
2		24.666	1088.539	1065.927	48.64	24.65	n.a.
Total:			2237.789	4324.440	100.00	100.00	



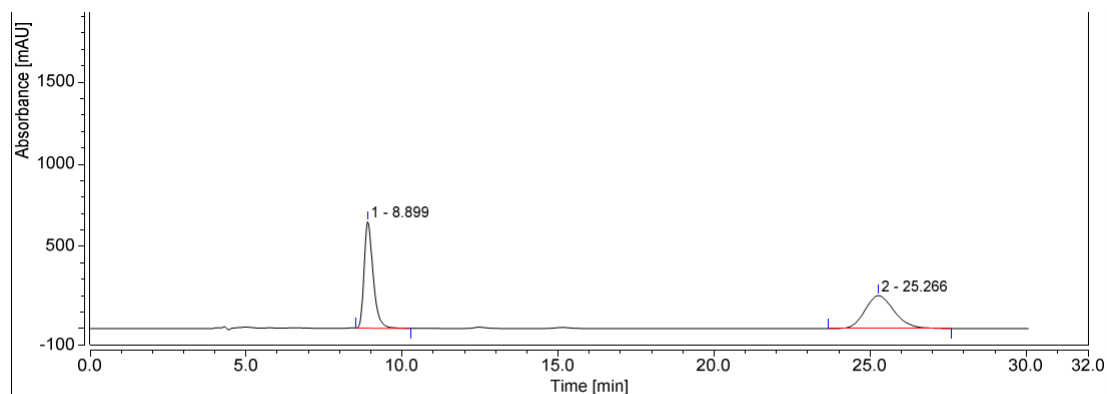
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.949	55.582	143.329	4.18	9.92	n.a.
2		24.816	1273.752	1301.294	95.82	90.08	n.a.
Total:			1329.333	1444.623	100.00	100.00	

(*aR*)-1-(3-((Isopropoxycarbonyl)amino)-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl-4-methylbenzenesulfonate (5q)

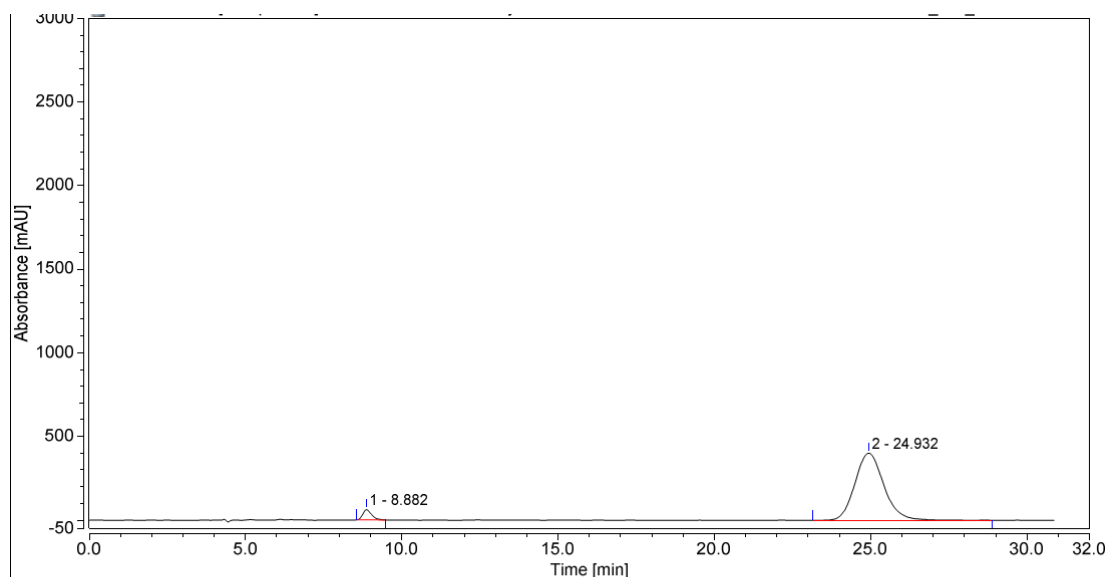


Following the general procedure, the compound was isolated as a white solid (121 mg, 94%); mp 102-103 °C; $[\alpha]_D^{21} = -17.2$ (c 1.0, CHCl₃, 91% ee); IR (KBr): 3381, 2923, 1747, 1174, 804, 748 cm⁻¹; ¹H NMR (600 MHz, Chloroform-*d*) δ 7.97 (d, *J* = 7.8 Hz, 1H), 7.89 (m, 2H), 7.82 – 7.73 (m, 3H),

7.71 – 7.51 (m, 2H), 7.49 – 7.35 (m, 4H), 7.31 (s, 3H), 7.19 (s, 1H), 7.10 (m, 3H), 6.95 (s, 1H), 6.71 (s, 2H), 4.75 (d, $J = 49.5$ Hz, 2H), 2.03 (s, 3H), 1.21 – 1.04 (m, 3H), 0.89 (d, $J = 6.6$ Hz, 1H), 0.62 (s, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ 154.3, 145.9, 145.2, 135.4, 134.0, 132.5, 131.8, 131.3, 130.4, 130.3, 130.0, 129.3, 128.8, 128.5, 128.0, 127.8, 127.4, 127.2, 126.7, 126.4, 125.5, 124.7, 123.3, 121.4, 120.8, 119.9, 118.3, 110.6, 69.8, 21.5, 21.2; HRMS (ESI) calcd for $\text{C}_{39}\text{H}_{33}\text{N}_2\text{O}_5\text{S}$ m/z $[\text{M} + \text{H}]^+$: 641.2105, found: 641.2120; HPLC (Daicel Chiralpak IC, i -PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 250$ nm): t_1 (minor) = 8.9 min, t_2 (major) = 24.9 min.

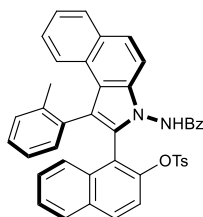


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		8.899	218.495	648.737	49.83	76.28	n.a.
2		25.266	219.958	201.740	50.17	23.72	n.a.
Total:			438.453	850.476	100.00	100.00	

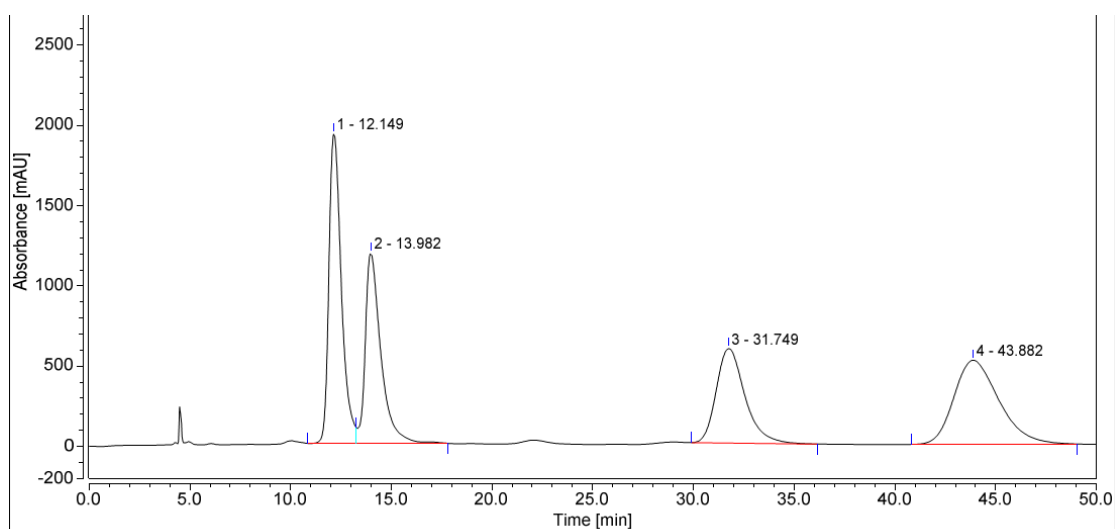


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		8.882	19.618	60.875	4.39	13.19	n.a.
2		24.932	427.280	400.686	95.61	86.81	n.a.
Total:			446.898	461.560	100.00	100.00	

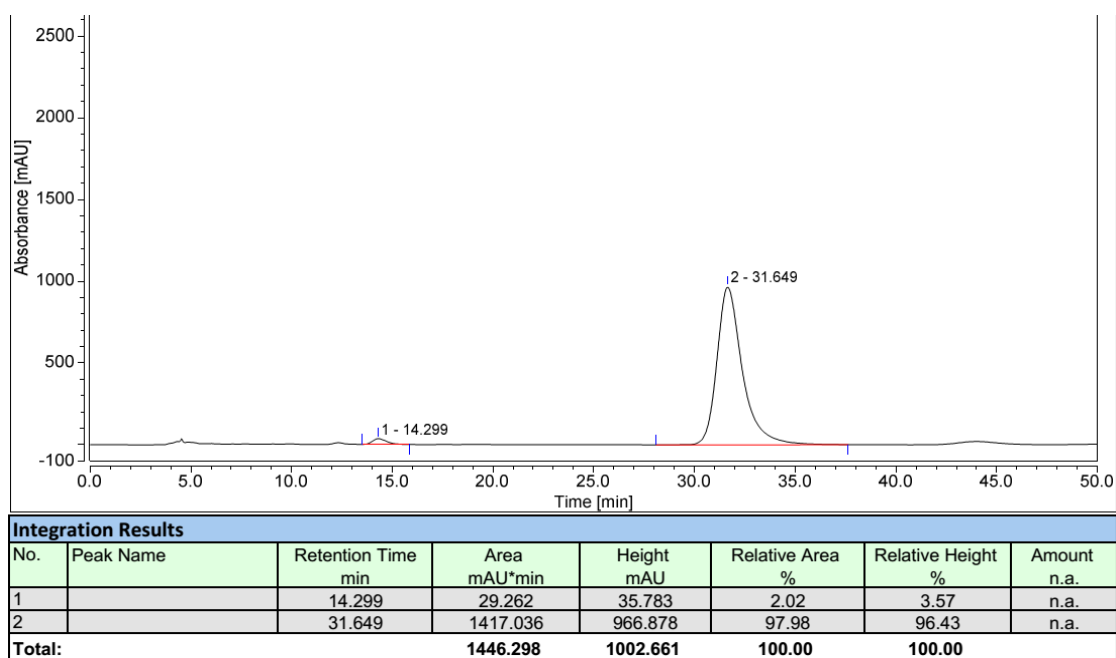
**(2a*R*, 3a*S*)-1-(3-Benzamido-1-(*o*-tolyl)-3H-benzo[*e*]indol-2-yl)naphthalen-2-yl
4-methylbenzenesulfonate (5r)**



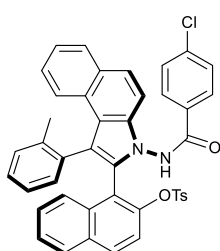
Following the general procedure, the compound was isolated as a white solid (5.8 mg, 83%); mp 134.0-135.0 °C; $[\alpha]_D^{19}$ +4.4 (c 1.0, CHCl₃, 96% ee); IR (KBr): 3375, 22923, 1701, 1263, 1177, 748 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.77 (s, 1H), 8.15 (d, *J* = 8.5 Hz, 1H), 8.01 (d, *J* = 8.1 Hz, 1H), 7.90 – 7.68 (m, 4H), 7.69 – 7.50 (m, 6H), 7.50 – 7.39 (m, 3H), 7.39 – 7.20 (m, 4H), 7.21 – 7.01 (m, 5H), 6.83 (t, *J* = 7.4 Hz, 1H), 2.31 (s, 3H), 1.87 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 146.0, 145.7, 138.6, 135.3, 134.9, 133.5, 132.2, 131.7, 131.6, 131.4, 130.9, 130.5, 130.3, 129.8, 129.6, 129.0, 128.8, 128.7, 128.6, 128.2, 127.6, 127.5, 127.3, 127.2, 127.0, 126.8, 126.0, 125.4, 124.8, 123.4, 122.6, 122.0, 120.2, 119.4, 119.1, 111.0, 21.6, 19.3; HRMS (ESI) calcd for C₄₃H₃₂N₂O₄SNa *m/z* [M + Na]⁺: 695.1975; found: 695.1982; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 14.2 min, *t*₂ (major) = 31.6 min.



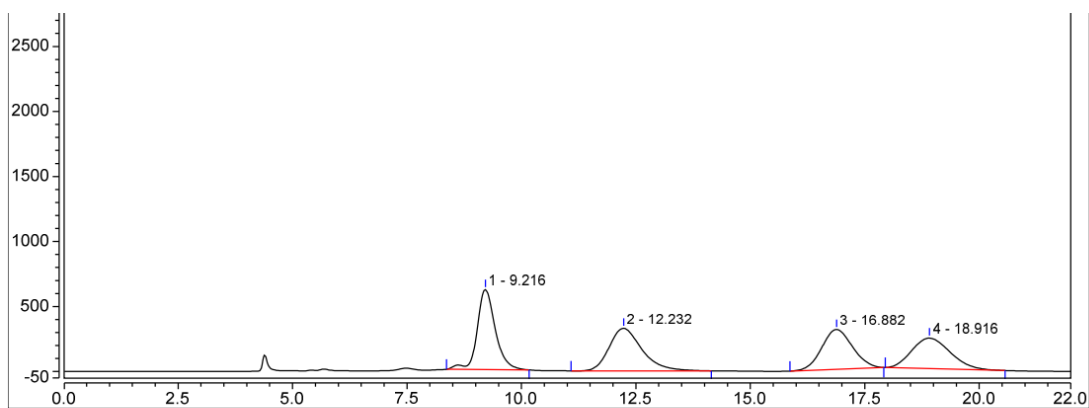
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		12.149	1382.209	1931.877	28.92	45.65	n.a.
2		13.982	1068.291	1186.985	22.35	28.05	n.a.
3		31.749	973.642	589.107	20.37	13.92	n.a.
4		43.882	1355.116	524.221	28.35	12.39	n.a.
Total:			4779.259	4232.190	100.00	100.00	



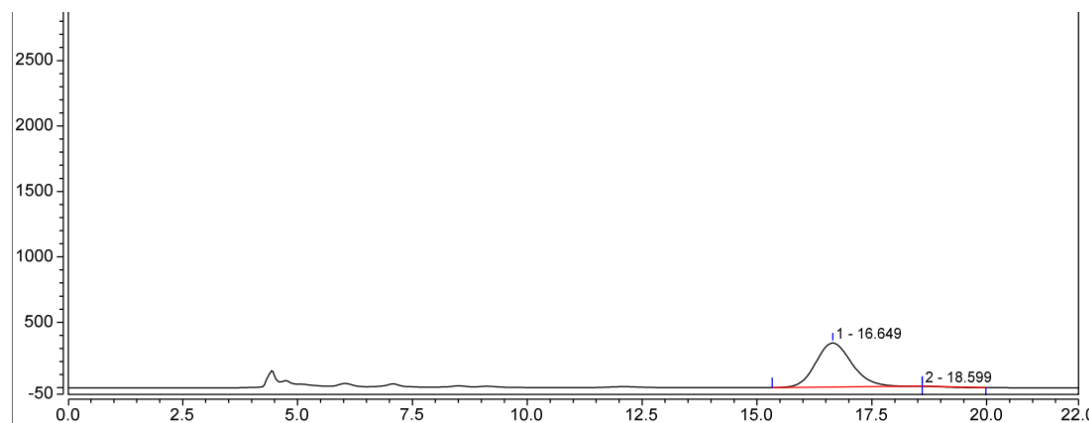
(2*aR*,3*aS*)-1-(3-(4-Chlorobenzamido)-1-(*o*-tolyl)-3H-benzo[*e*]indol-2-yl)naphthalen-2-yl 4-methylbenzenesulfonate (5s)



Following the general procedure, the compound was isolated as a white solid (7 mg, 81%); mp 148.0-149.0 °C; $[\alpha]_D^{19} +8.4$ (c 1.0, CHCl₃, 99% ee); IR (KBr): 3420, 3022, 2924, 1740, 1633, 1275, 764 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.66 (s, 1H), 7.97 (d, *J* = 7.7 Hz, 1H), 7.86 (d, *J* = 7.8 Hz, 1H), 7.75 – 7.59 (m, 3H), 7.54 (d, *J* = 8.6 Hz, 1H), 7.48 – 7.25 (m, 8H), 7.20 – 7.09 (m, 4H), 7.06 – 6.84 (m, 5H), 6.70 (d, *J* = 6.3 Hz, 1H), 2.17 (s, 3H), 1.71 (s, 3H). ¹³C NMR (100 MHz, Chloroform-*d*) δ 164.4, 146.0, 145.7, 138.5, 138.4, 135.1, 134.7, 133.4, 132.0, 131.5, 131.4, 130.4, 130.2, 129.9, 129.7, 129.5, 128.9, 128.8, 128.6, 128.5, 128.1, 127.5, 127.4, 127.3, 127.3, 126.8, 126.8, 126.7, 126.0, 125.3, 124.8, 123.4, 122.5, 121.8, 120.1, 119.4, 119.1, 110.8, 110.8, 21.5, 19.2; HRMS (ESI) calcd for C₄₃H₃₁ClN₂NaO₄S *m/z* [M + Na]⁺: 729.1585; found: 729.1592; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 50/50, flow rate 0.8 mL/min, λ = 260 nm): *t*₁ (minor) = 16.6 min, *t*₂ (major) = 18.5 min.

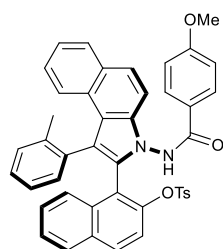


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		9.216	283.257	615.643	27.65	41.47	n.a.
2		12.232	272.434	327.463	26.59	22.06	n.a.
3		16.882	239.432	306.544	23.37	20.65	n.a.
4		18.916	229.436	234.768	22.39	15.82	n.a.
Total:			1024.559	1484.418	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		16.649	309.627	336.754	99.43	100.00	n.a.
2		18.599	1.776	0.000	0.57	0.00	n.a.
Total:			311.403	336.754	100.00	100.00	

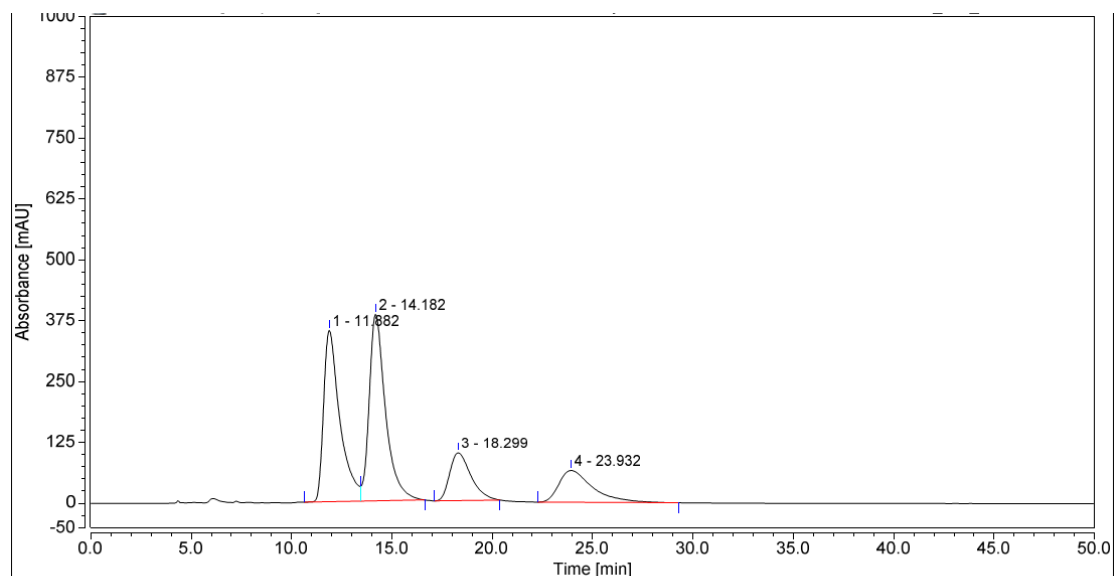
(2*aR*,3*aS*)-1-(3-(4-Methoxybenzamido)-1-(*o*-tolyl)-3*H*-benzo[*e*]indol-2-yl)naphthalen-2-yl 4-methylbenzenesulfonate (5t)



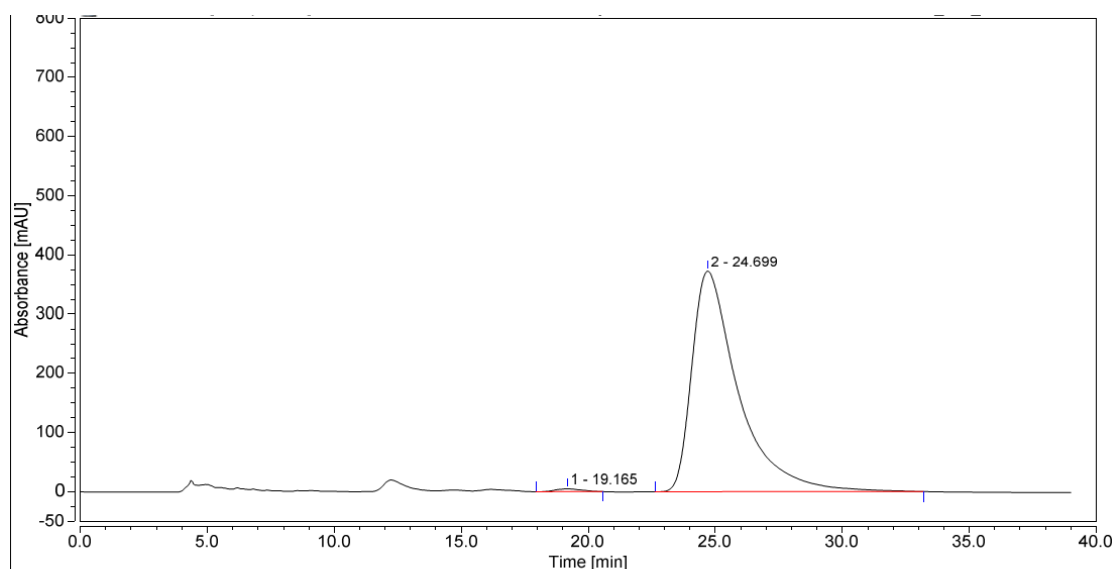
Following the general procedure, the compound was isolated as a white solid (5.8 mg, 79%); mp 143.0-144.0 °C; $[\alpha]_D^{19}$ -15.2 (*c* 1.0, CHCl₃, 99% ee); IR (KBr): 3419, 2924, 1633, 1261, 1168, 750 cm⁻¹; ¹H NMR (600 MHz, Chloroform-*d*) δ 9.54 (s, 1H), 8.00 (d, *J* = 8.5 Hz, 1H), 7.88 (d, *J* = 8.1 Hz, 1H), 7.72 (dd, *J* = 8.9, 4.5 Hz, 2H), 7.66 (d, *J* = 8.2 Hz, 1H), 7.57 (d, *J* = 8.8 Hz, 1H),

7.48 (d, *J* = 8.7 Hz, 2H), 7.46 – 7.39 (m, 4H), 7.36 (t, *J* = 7.5 Hz, 1H), 7.30 (t, *J* = 7.5 Hz, 1H), 7.19 – 7.12 (m, 3H), 7.05 – 6.88 (m, 5H), 6.71 (dd, *J* = 16.5, 8.1 Hz, 3H), 3.70 (s, 3H), 2.21 (s, 3H), 1.70 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 164.9, 162.7, 146.0, 145.7, 138.6, 135.3, 134.9, 133.6, 132.2,

131.6, 131.4, 130.5, 130.3, 129.8, 129.6, 129.6, 129.1, 129.1, 129.0, 128.7, 128.2, 127.6, 127.6, 127.5, 127.5, 127.1, 126.7, 126.0, 125.4, 124.7, 123.9, 123.3, 122.5, 122.0, 120.1, 119.3, 119.1, 113.8, 111.1, 55.3, 21.6, 19.3; HRMS (ESI) calcd for $C_{44}H_{34}N_2O_5SNa$ m/z $[M + Na]^+$: 725.2081; found: 725.2090; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 25/75, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 19.1 min, t_2 (major) = 24.6 min.

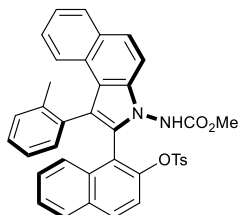


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		11.882	331.817	352.158	35.26	39.17	n.a.
2		14.182	361.098	383.322	38.38	42.63	n.a.
3		18.299	120.153	98.260	12.77	10.93	n.a.
4		23.932	127.901	65.417	13.59	7.28	n.a.
Total:			940.968	899.157	100.00	100.00	

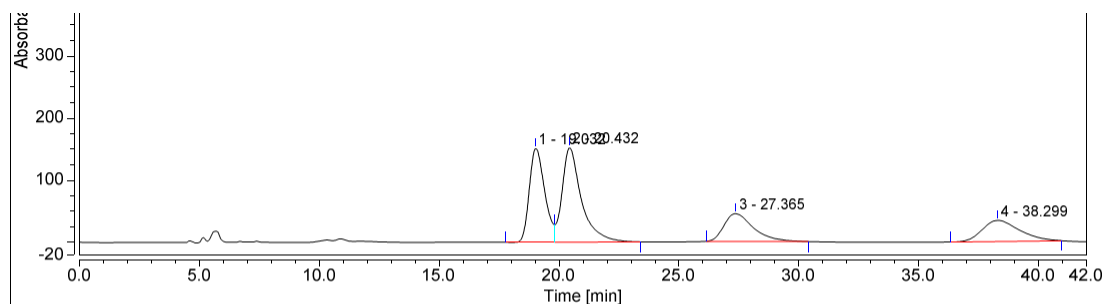


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		19.165	5.412	4.584	0.68	1.22	n.a.
2		24.699	787.639	372.655	99.32	98.78	n.a.
Total:			793.050	377.239	100.00	100.00	

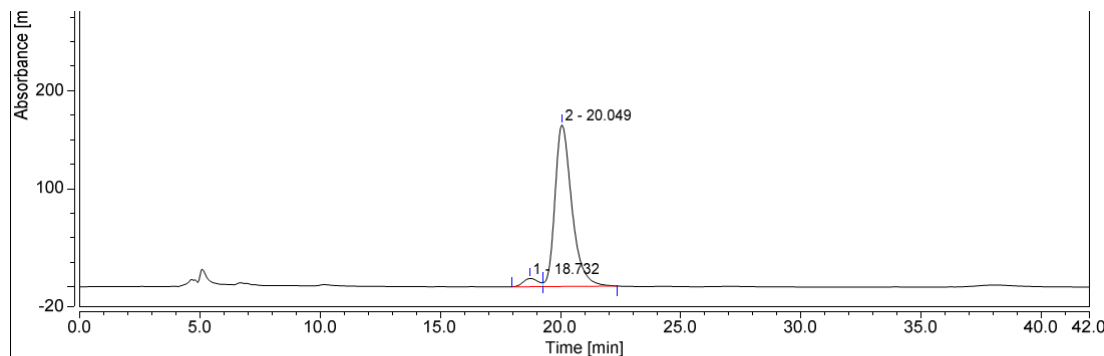
(2*aR*,3*aS*)-1-(3-((Methoxycarbonyl)amino)-1-(*o*-tolyl)-3H-benzo[*e*]indol-2-yl)naphthalen-2-yl 4-methylbenzenesulfonate (5u)



Following the general procedure, the compound was isolated as a white solid (5.3 mg, 82%); mp 122.0-123.0 °C; $[\alpha]_{\text{D}}^{19} +10.2$ (c 1.0, CHCl₃, 92% ee); IR (KBr): 3379, 2925, 2853, 1730, 1236, 1122, 806 cm⁻¹; ¹H NMR (600 MHz, Chloroform-*d*) δ 8.21-7.98 (s, 1H), 7.94 (d, *J* = 27.1 Hz, 2H), 7.86 – 7.72 (m, 3H), 7.65 (d, *J* = 8.7 Hz, 1H), 7.58 – 7.44 (m, 5H), 7.37 (s, 2H), 7.09 (d, *J* = 35.3 Hz, 5H), 6.94 (d, *J* = 7.4 Hz, 1H), 6.76 (s, 1H), 3.54 (d, *J* = 24.7 Hz, 3H), 2.33 (d, *J* = 21.8 Hz, 3H), 1.89 (d, *J* = 58.1 Hz, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 155.5, 155.1, 145.8, 138.9, 138.7, 135.2, 135.1, 134.8, 133.6, 132.3, 131.6, 131.4, 130.4, 130.4, 130.2, 129.8, 129.6, 128.7, 128.4, 128.3, 128.1, 127.6, 127.3, 126.9, 126.6, 126.0, 124.8, 123.6, 123.4, 122.6, 120.3, 119.3, 118.9, 110.7, 52.9, 21.6, 21.4, 20.3, 19.4; HRMS (ESI) calcd for C₃₈H₃₀N₂O₅SNa *m/z* [M + Na]⁺: 649.1768; found: 649.1785; HPLC (Daicel Chiralpak ID, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 18.7 min, *t*₂ (major) = 20.0 min.



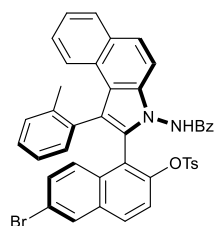
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		19.032	112.727	151.570	29.66	39.60	n.a.
2		20.432	142.237	152.422	37.43	39.83	n.a.
3		27.365	63.724	44.679	16.77	11.67	n.a.
4		38.299	61.339	34.041	16.14	8.89	n.a.
Total:			380.026	382.712	100.00	100.00	



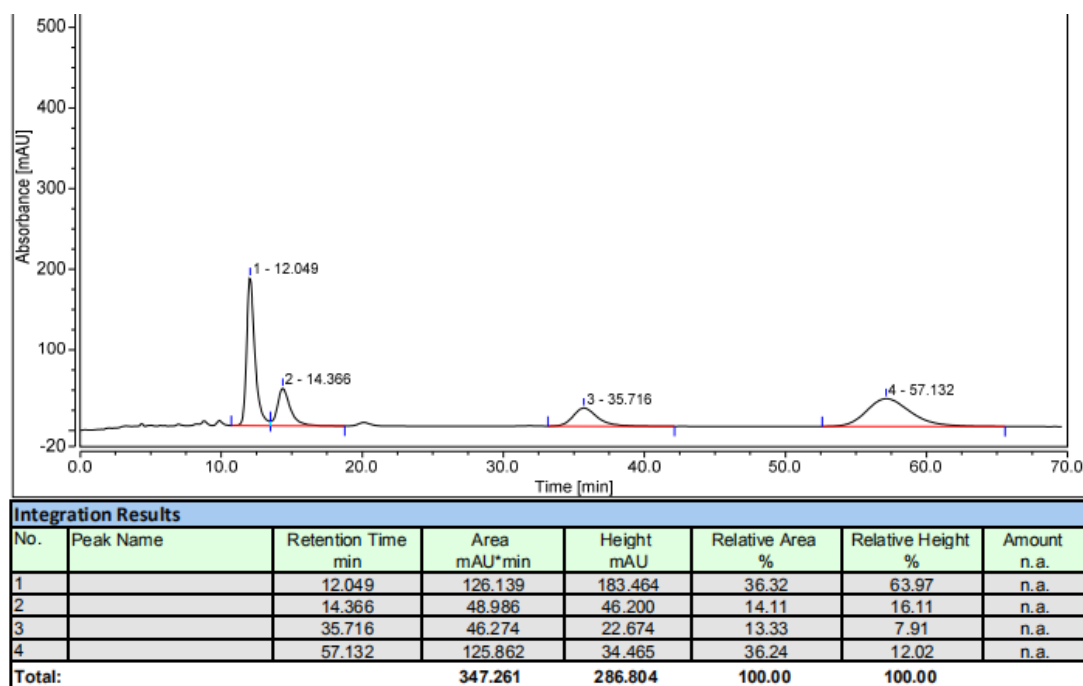
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		18.732	5.910	8.421	4.23	4.87	n.a.
2		20.049	133.969	164.608	95.77	95.13	n.a.
Total:			139.879	173.030	100.00	100.00	

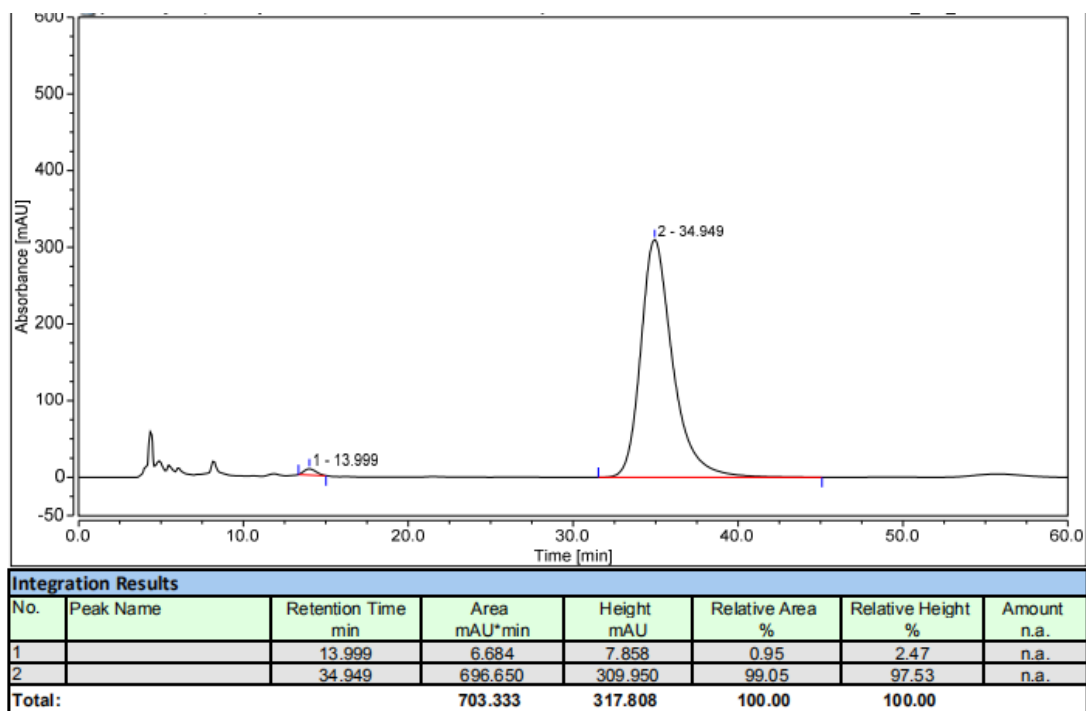
(2a*R*,3a*S*)-1-(3-Benzamido-1-(*o*-tolyl)-3*H*-benzo[*e*]indol-2-yl)-6-bromonaphthalen-2-yl

4-methylbenzenesulfonate (5v)



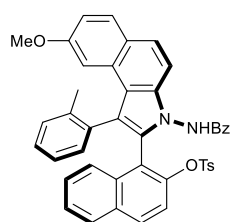
Following the general procedure, the compound was isolated as a white solid (6.4 mg, 82%); mp 220.0-221.0 °C; $[\alpha]_D^{19}$ -8.2 (c 1.0, CHCl₃, 98% ee); IR (KBr): 3417, 2922, 1635, 1261, 763 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.70 (s, 1H), 7.97 (t, *J* = 9.6 Hz, 2H), 7.90 (s, 1H), 7.81 (d, *J* = 8.7 Hz, 1H), 7.69 (d, *J* = 8.8 Hz, 1H), 7.59 (d, *J* = 11.4 Hz, 4H), 7.47 (s, 4H), 7.36 (d, *J* = 6.8 Hz, 3H), 7.25 (s, 2H), 7.07 (dd, *J* = 16.5, 7.3 Hz, 4H), 6.97 (d, *J* = 7.2 Hz, 1H), 6.82 (t, *J* = 6.1 Hz, 1H), 2.29 (s, 3H), 1.78 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 146.1, 145.9, 138.6, 134.6, 133.8, 133.6, 132.6, 132.3, 132.0, 131.4, 130.9, 130.4, 130.3, 130.3, 129.8, 129.7, 129.6, 129.4, 128.9, 128.7, 128.2, 127.4, 127.2, 126.4, 126.1, 125.4, 125.0, 123.4, 122.5, 122.4, 121.4, 121.2, 119.6, 119.1, 110.8, 21.6, 19.2; HRMS (ESI) calcd for C₄₃H₃₁BrN₂O₄SNa *m/z* [M + Na]⁺: 773.1080; found: 773.1095; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 30/70, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 14.0 min, *t*₂ (major) = 34.9 min.



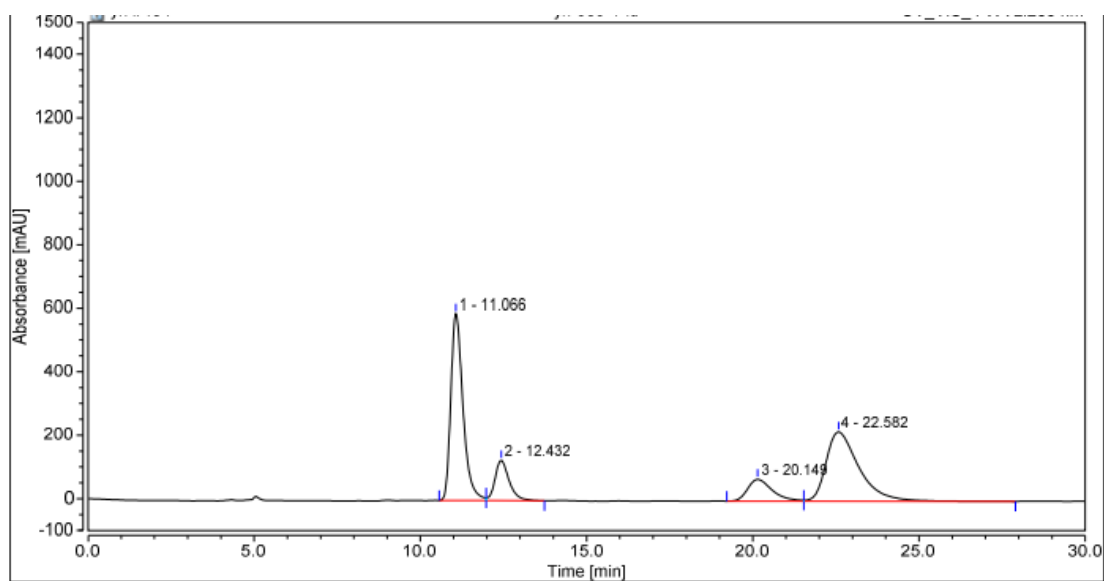


(2*a*R,3*a*S)-1-(3-Benzamido-8-methoxy-1-(*o*-tolyl)-3H-benzo[*e*]indol-2-yl)naphthalen-2-yl

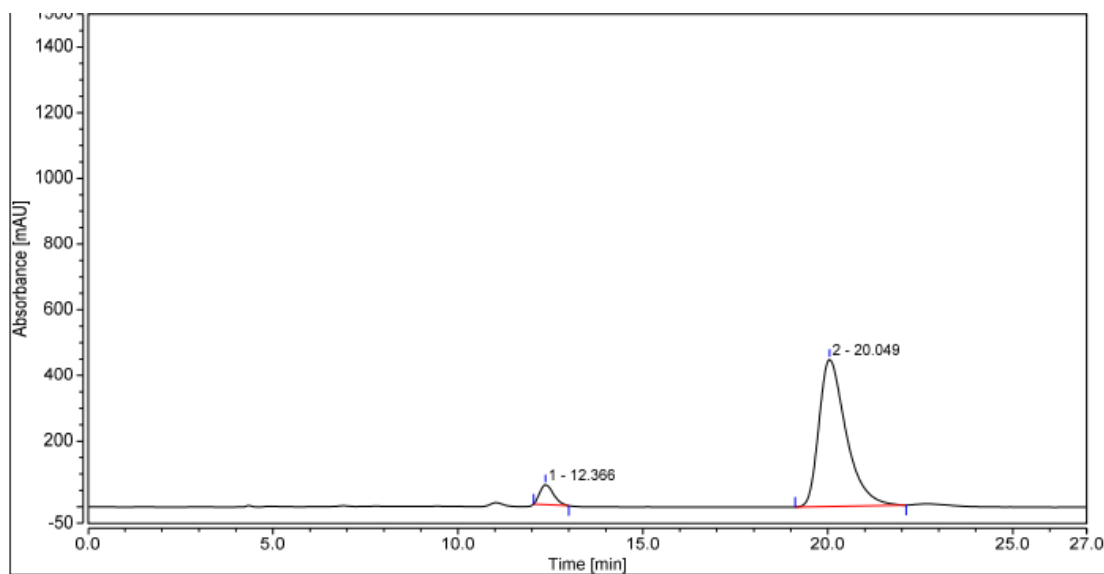
4-methylbenzenesulfonate (5w)



Following the general procedure, the compound was isolated as a white solid (5.7 mg, 79%); mp 258.0-259.0 °C; $[\alpha]_D^{19} +7.2$ (c 0.5, CHCl₃, 87% ee); IR (KBr): 3417, 2924, 1622, 1348, 1089, 740 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.68 (s, 1H), 8.10 (d, *J* = 8.4 Hz, 1H), 7.82 (dd, *J* = 13.6, 9.0 Hz, 2H), 7.77 – 7.69 (m, 2H), 7.60 – 7.39 (m, 8H), 7.32 (t, *J* = 7.4 Hz, 3H), 7.14 – 6.96 (m, 6H), 6.90 – 6.70 (m, 2H), 3.35 (s, 3H), 2.29 (s, 3H), 1.81 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 157.8, 146.0, 145.8, 138.8, 135.3, 134.9, 134.0, 132.1, 131.7, 131.6, 131.4, 130.8, 130.0, 130.0, 129.7, 129.4, 128.6, 128.2, 127.7, 127.5, 127.5, 127.5, 127.4, 127.2, 126.8, 126.3, 125.5, 125.0, 124.5, 121.9, 120.2, 119.2, 118.6, 115.2, 108.5, 101.7, 54.5, 21.6, 19.4; HRMS (ESI) calcd for C₄₄H₃₄N₂O₅Na *m/z* [M + Na]⁺: 725.2081; found: 725.2091; HPLC (Daicel Chiralpak ID, *i*-PrOH/hexane = 35/65, flow rate 0.8 mL/min, λ = 230 nm): t₁ (minor) = 12.3 min, t₂ (major) = 20.0 min.

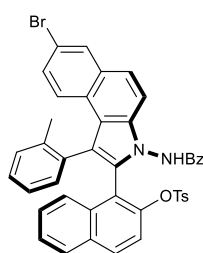


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.066	249.856	587.633	40.17	58.69	n.a.
2		12.432	62.453	126.734	10.04	12.66	n.a.
3		20.149	58.960	68.681	9.48	6.86	n.a.
4		22.582	250.797	218.127	40.32	21.79	n.a.
Total:			622.065	1001.174	100.00	100.00	

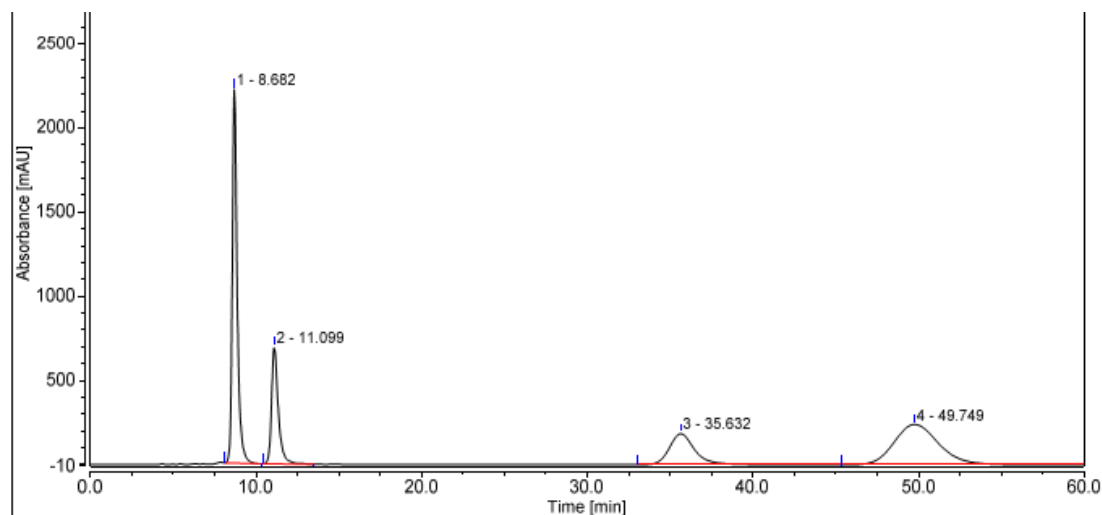


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		12.366	25.805	60.323	6.35	11.88	n.a.
2		20.049	380.843	447.565	93.65	88.12	n.a.
Total:			406.649	507.888	100.00	100.00	

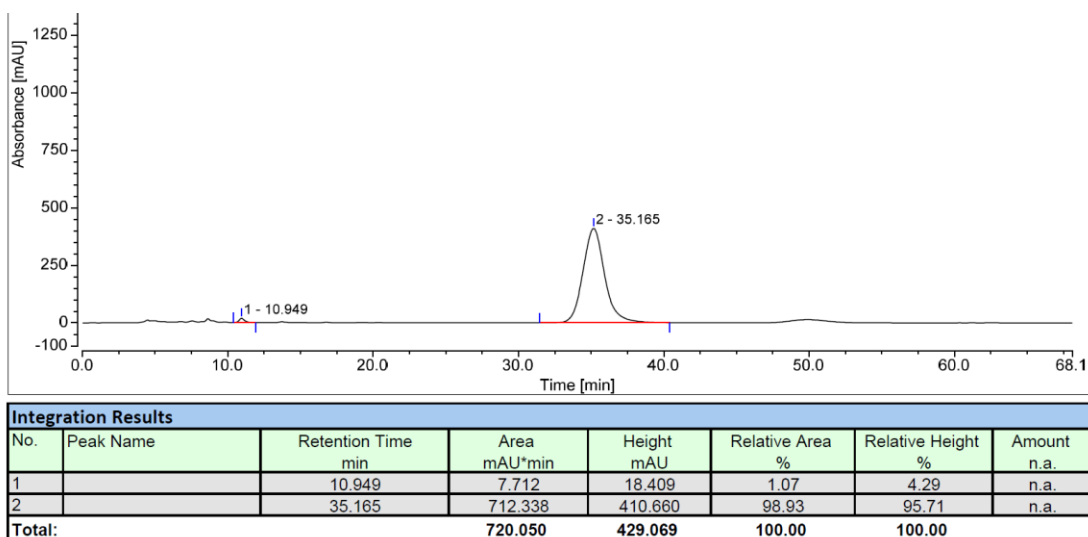
**(2a*R*,3a*S*)-1-(3-Benzamido-7-bromo-1-(*o*-tolyl)-3*H*-benzo[*e*]indol-2-yl)naphthalen-2-yl
4-methylbenzenesulfonate (5x)**



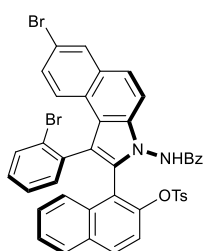
Following the general procedure, the compound was isolated as a white solid (6.4 mg, 82%); mp 145.0-146.0 °C; $[\alpha]_D^{19}$ -25.2 (*c* 1.0, CHCl₃, 97% ee); IR (KBr): 3425, 2922, 2869, 1632, 1373, 1088, 816 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.76 (s, 1H), 8.14 (d, *J* = 1.9 Hz, 1H), 8.08 (d, *J* = 8.5 Hz, 1H), 7.83 (d, *J* = 9.0 Hz, 1H), 7.80 – 7.73 (m, 1H), 7.71 (t, *J* = 8.5 Hz, 2H), 7.62 – 7.53 (m, 3H), 7.52 – 7.43 (m, 4H), 7.40 – 7.33 (m, 4H), 7.21 (d, *J* = 9.0 Hz, 1H), 7.15 – 7.05 (m, 4H), 7.04 – 6.97 (m, 1H), 6.86 – 6.78 (m, 1H), 2.34 (s, 3H), 1.78 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 146.2, 145.8, 135.2, 134.4, 133.5, 132.3, 132.1, 131.7, 131.6, 131.5, 130.7, 130.4, 129.8, 129.8, 129.7, 129.1, 128.7, 128.2, 127.7, 127.7, 127.6, 127.6, 127.5, 127.4, 127.2, 127.1, 126.9, 125.6, 124.3, 123.7, 121.7, 120.1, 119.3, 119.0, 117.0, 112.2, 21.7, 19.3; HRMS (ESI) calcd for C₄₃H₃₁BrN₂O₄SNa *m/z* [*M* + Na]⁺: 773.1080; found: 773.1091; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 35/65, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 13.4 min, *t*₂ (major) = 50.6 min.



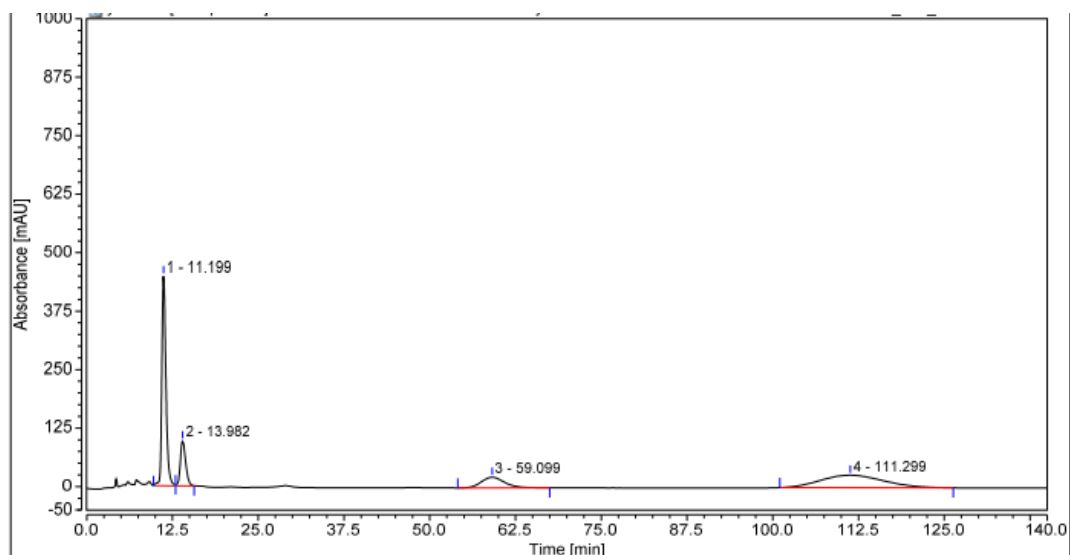
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		8.682	758.435	2220.470	34.77	66.48	n.a.
2		11.099	330.708	694.055	15.16	20.78	n.a.
3		35.632	336.782	184.763	15.44	5.53	n.a.
4		49.749	755.488	240.759	34.63	7.21	n.a.
Total:			2181.413	3340.047	100.00	100.00	



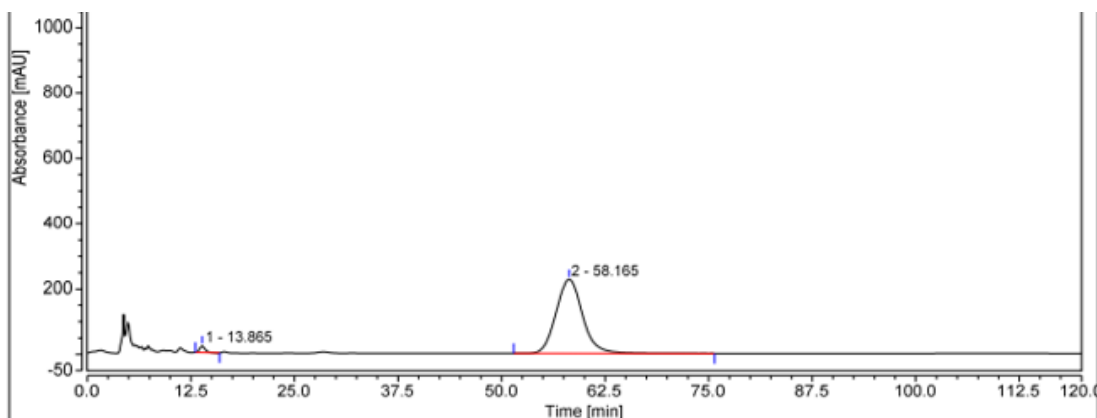
**(2a*R*,3a*S*)-1-(3-Benzamido-7-bromo-1-(2-bromophenyl)-3*H*-benzo[*e*]indol-2-yl)naphthalen-2-yl
4-methylbenzenesulfonate (5y)**



Following the general procedure, the compound was isolated as a white solid (6.8 mg, 81%); mp 149.0-150.0 °C; $[\alpha]_D^{19}$ -8.0 (*c* 1.0, CHCl₃, 96% ee); IR (KBr): 3419, 2924, 1633, 1261, 1168, 750 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 9.84 (s, 1H), 8.11 (s, 1H), 8.01 (d, *J* = 8.4 Hz, 1H), 7.85 (d, *J* = 9.0 Hz, 1H), 7.71 (dt, *J* = 20.2, 8.5 Hz, 3H), 7.62 – 7.55 (m, 2H), 7.55 – 7.39 (m, 7H), 7.36 (s, 2H), 7.31 (t, *J* = 7.7 Hz, 2H), 7.12 (dd, *J* = 7.6, 1.6 Hz, 1H), 7.00 (dd, *J* = 10.4, 4.9 Hz, 3H), 6.90 (td, *J* = 7.5, 1.2 Hz, 1H), 2.26 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 145.9, 145.7, 136.1, 135.0, 133.4, 132.6, 132.3, 132.1, 132.0, 131.7, 131.7, 131.6, 131.3, 130.6, 129.6, 129.0, 128.7, 128.5, 128.2, 127.7, 127.6, 127.3, 127.2, 127.2, 127.0, 126.8, 125.8, 124.8, 123.8, 120.9, 120.7, 118.9, 117.1, 112.0, 21.6; HRMS (ESI) calcd for C₄₂H₂₈Br₂N₂O₄SNa *m/z* [M + Na]⁺: 837.0029; found: 837.0046; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 40/60, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 13.9 min, *t*₂ (major) = 58.2 min.

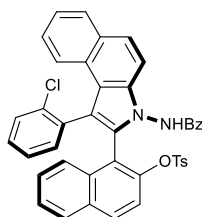


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.199	310.696	448.507	40.11	75.48	n.a.
2		13.982	86.360	96.109	11.15	16.17	n.a.
3		59.099	90.284	22.736	11.65	3.83	n.a.
4		111.299	287.364	26.860	37.09	4.52	n.a.
Total:			774.705	594.212	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		13.865	15.376	20.091	1.79	8.14	n.a.
2		58.165	844.461	226.638	98.21	91.86	n.a.
Total:			859.837	246.729	100.00	100.00	

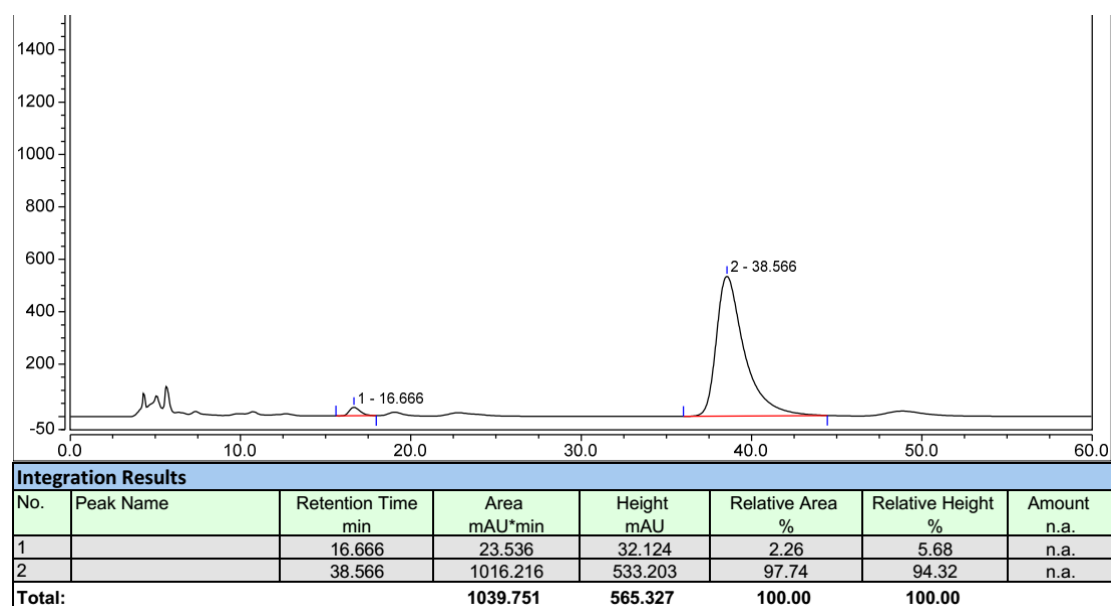
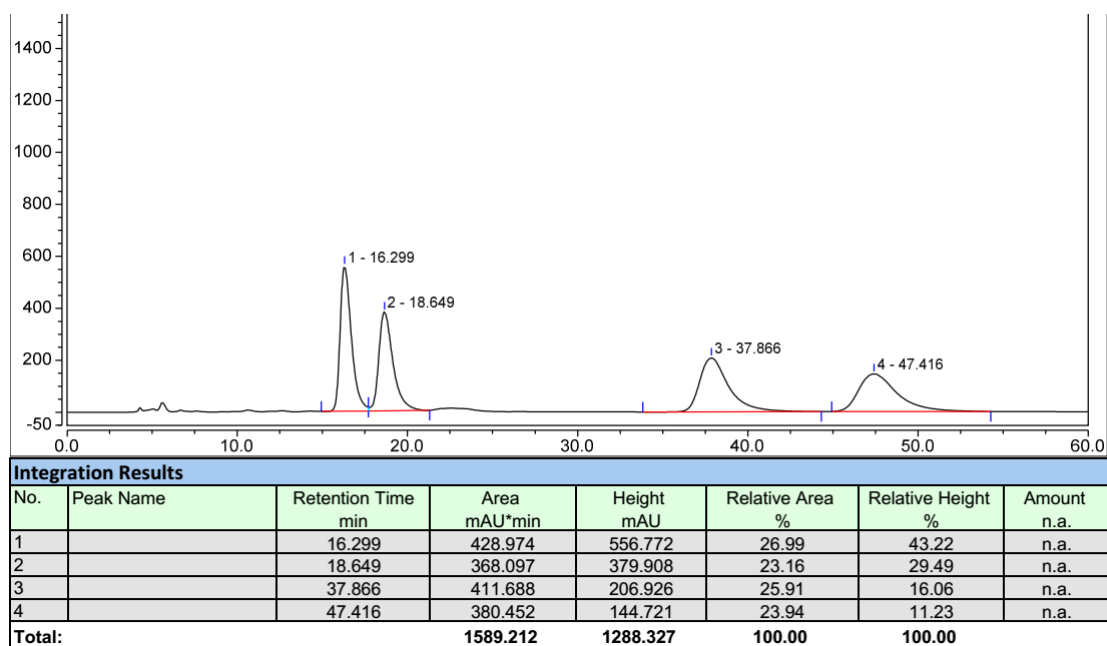
(2aR,3aS)-1-(3-Benzamido-1-(2-chlorophenyl)-3H-benzo[e]indol-2-yl)naphthalen-2-yl 4-methylbenzenesulfonate (5z)



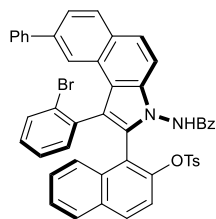
Following the general procedure, the compound was isolated as a white solid (5.8 mg, 80%); mp 139.0-140.0 °C; $[\alpha]_D^{19}$ -9.2 (c 1.0, CHCl₃, 95% ee); IR (KBr): 3375, 2924, 1701, 1348, 1263, 943, 818 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.77 (s, 1H), 8.11 (d, *J* = 8.4 Hz, 1H), 8.00 (d, *J* = 8.0 Hz, 1H), 7.85 (d, *J* = 9.0 Hz, 2H),

7.76 (d, *J* = 8.1 Hz, 1H), 7.68 (d, *J* = 8.8 Hz, 1H), 7.65 – 7.51 (m, 4H), 7.51 – 7.37 (m, 6H), 7.33 (dt, *J*

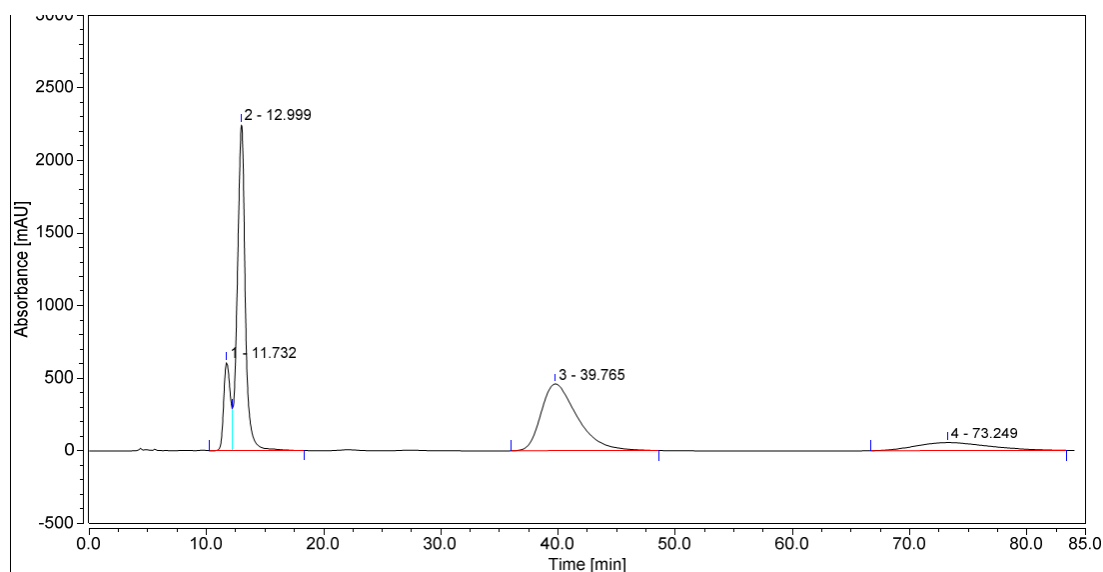
= 7.4, 3.9 Hz, 4H), 7.16 (d, J = 7.4 Hz, 1H), 7.10 (dd, J = 10.9, 4.5 Hz, 1H), 6.96 (d, J = 8.2 Hz, 2H), 6.87 (t, J = 7.2 Hz, 1H), 2.23 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 165.3, 145.7, 145.5, 135.5, 135.0, 134.4, 133.4, 132.1, 132.0, 131.9, 131.5, 131.5, 131.4, 130.2, 129.4, 129.2, 128.8, 128.6, 128.5, 128.2, 127.7, 127.5, 127.1, 127.1, 126.6, 126.2, 125.8, 124.9, 123.4, 122.8, 121.2, 120.6, 119.1, 117.2, 110.8, 21.4; HRMS (ESI) calcd for $\text{C}_{42}\text{H}_{29}\text{ClN}_2\text{NaO}_4\text{S}$ m/z $[\text{M} + \text{Na}]^+$: 715.1429; found: 715.1435; HPLC (Daicel Chiralpak IF, i -PrOH/hexane = 25/75, flow rate 0.8 mL/min, λ = 250 nm): t_1 (minor) = 16.6 min, t_2 (major) = 38.5 min.



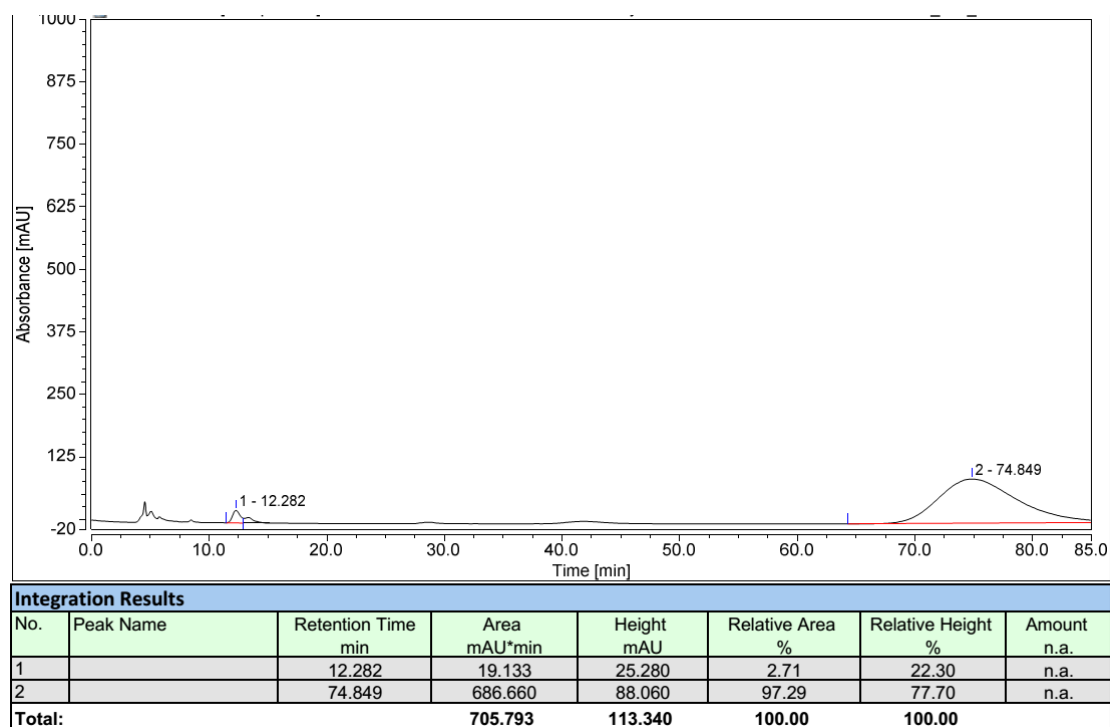
(2a*R*,3a*S*)-1-(3-Benzamido-1-(2-bromophenyl)-8-phenyl-3*H*-benzo[*e*]indol-2-yl)naphthalen-2-yl 4-methylbenzenesulfonate (5aa)



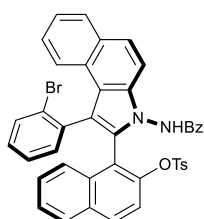
Following the general procedure, the compound was isolated as a white solid (6.9 mg, 82%); mp 169.0–170.0 °C; $[\alpha]_D^{19}$ -60.8 (*c* 1.0, CHCl₃, 95% ee); IR (KBr): 3375, 2924, 1701, 1348, 1263, 943, 818 cm⁻¹; ¹H NMR (400 MHz, Chloroform-*d*) δ 9.82 (s, 1H), 8.09 – 8.01 (m, 2H), 7.90 – 7.81 (m, 2H), 7.81 – 7.76 (m, 2H), 7.74 – 7.68 (m, 1H), 7.65 (d, *J* = 8.8 Hz, 1H), 7.63 – 7.58 (m, 2H), 7.58 – 7.41 (m, 10H), 7.37 – 7.30 (m, 4H), 7.19 – 7.14 (m, 1H), 7.05 – 6.98 (m, 3H), 6.95 – 6.88 (m, 1H), 2.26 (s, 3H); ¹³C NMR (100 MHz, CDCl₃) δ 165.5, 145.9, 145.8, 141.3, 137.8, 136.6, 135.1, 133.7, 132.4, 132.3, 132.3, 132.0, 131.7, 131.6, 131.5, 129.7, 129.5, 129.1, 129.0, 128.9, 128.7, 128.6, 128.6, 127.7, 127.6, 127.3, 127.2, 127.2, 126.9, 126.8, 126.1, 124.6, 122.7, 121.3, 121.2, 120.8, 119.3, 119.2, 111.0, 21.6; HRMS (ESI) calcd for C₄₈H₃₃BrN₂O₄SNa *m/z* [M + Na]⁺: 835.1237; found: 835.1247; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 35/65, flow rate 0.8 mL/min, λ = 250 nm): *t*₁ (minor) = 12.2 min, *t*₂ (major) = 74.8 min.



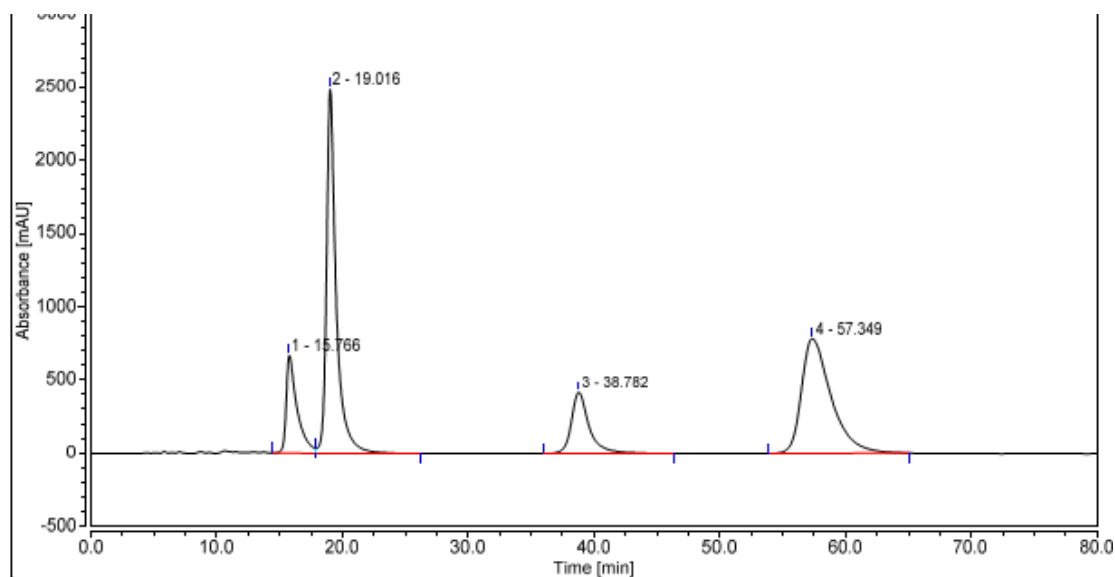
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		11.732	401.324	608.155	9.59	18.04	n.a.
2		12.999	1754.251	2248.561	41.92	66.71	n.a.
3		39.765	1638.364	459.771	39.15	13.64	n.a.
4		73.249	390.387	54.142	9.33	1.61	n.a.
Total:			4184.326	3370.629	100.00	100.00	



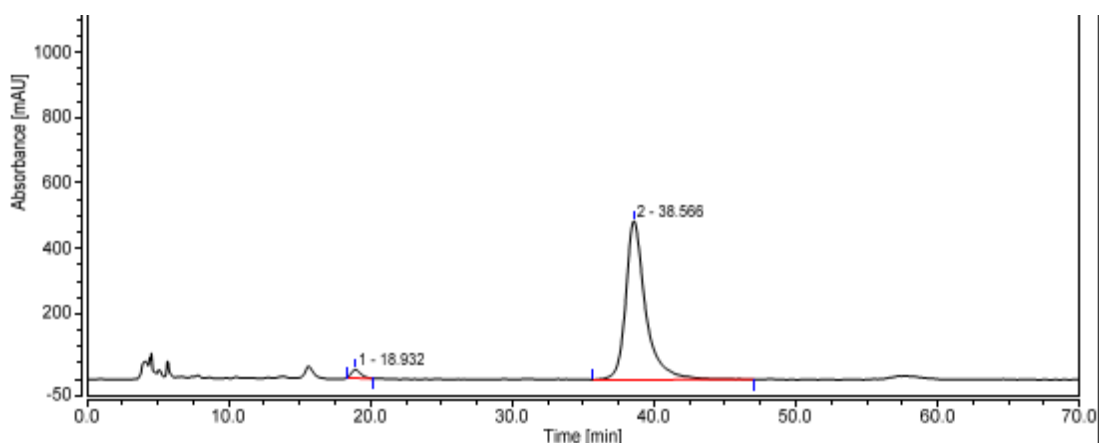
**(2*aR*,3*aS*)-1-(3-benzamido-1-(2-bromophenyl)-3*H*-benzo[*e*]indol-2-yl)naphthalen-2-yl
4-methylbenzenesulfonate(5ab)**



Following the general procedure, the compound was isolated as a white solid (6.3 mg, 83%); mp 112-113 °C; $[\alpha]_D^{19}$ -18.4 (c 0.5, CHCl₃, 95% ee); IR (KBr): 3375, 2924, 1676, 1475, 1172, 802, 728 cm⁻¹; ¹H NMR (600 MHz, CDCl₃) δ 9.81 (s, 1H), 8.03 (d, *J* = 8.5 Hz, 1H), 7.96 (d, *J* = 8.1 Hz, 1H), 7.83 (dd, *J* = 16.3, 8.9 Hz, 2H), 7.74 (d, *J* = 8.2 Hz, 1H), 7.64 (d, *J* = 8.8 Hz, 1H), 7.58 (d, *J* = 7.5 Hz, 2H), 7.55 – 7.47 (m, 4H), 7.46 (d, *J* = 3.2 Hz, 1H), 7.45 – 7.36 (m, 4H), 7.33 – 7.26 (m, 3H), 7.14 (d, *J* = 7.6 Hz, 1H), 7.02 – 6.93 (m, 3H), 6.89 (t, *J* = 7.5 Hz, 1H), 2.23 (s, 3H); ¹³C NMR (150 MHz, CDCl₃) δ 165.5, 145.8, 145.7, 136.5, 135.1, 133.4, 132.5, 132.2, 132.1, 132.1, 131.6, 131.6, 131.5, 130.3, 129.6, 128.8, 128.7, 128.6, 128.5, 127.6, 127.6, 127.3, 127.2, 126.9, 126.7, 126.0, 125.9, 124.9, 123.5, 123.0, 121.2, 120.7, 119.1, 119.1, 110.8, 21.5; HRMS (ESI) calcd for C₄₂H₂₉BrN₂O₄SNa *m/z* [M + Na]⁺: 759.0924; found: 759.0914; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 18.9 min, *t*₂ (major) = 38.5 min.

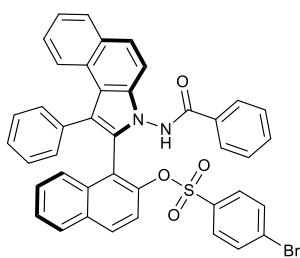


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		15.766	667.583	670.619	11.64	15.35	n.a.
2		19.016	2229.726	2493.169	38.88	57.08	n.a.
3		38.782	691.101	419.087	12.05	9.59	n.a.
4		57.349	2146.539	785.176	37.43	17.98	n.a.
Total:			5734.947	4368.050	100.00	100.00	



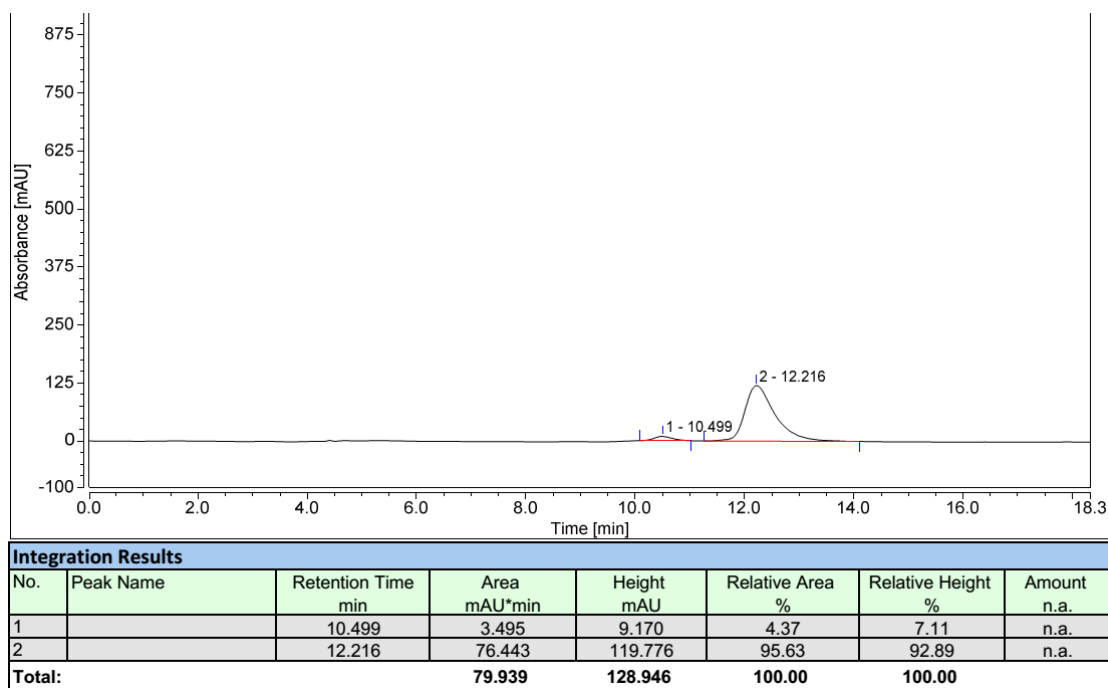
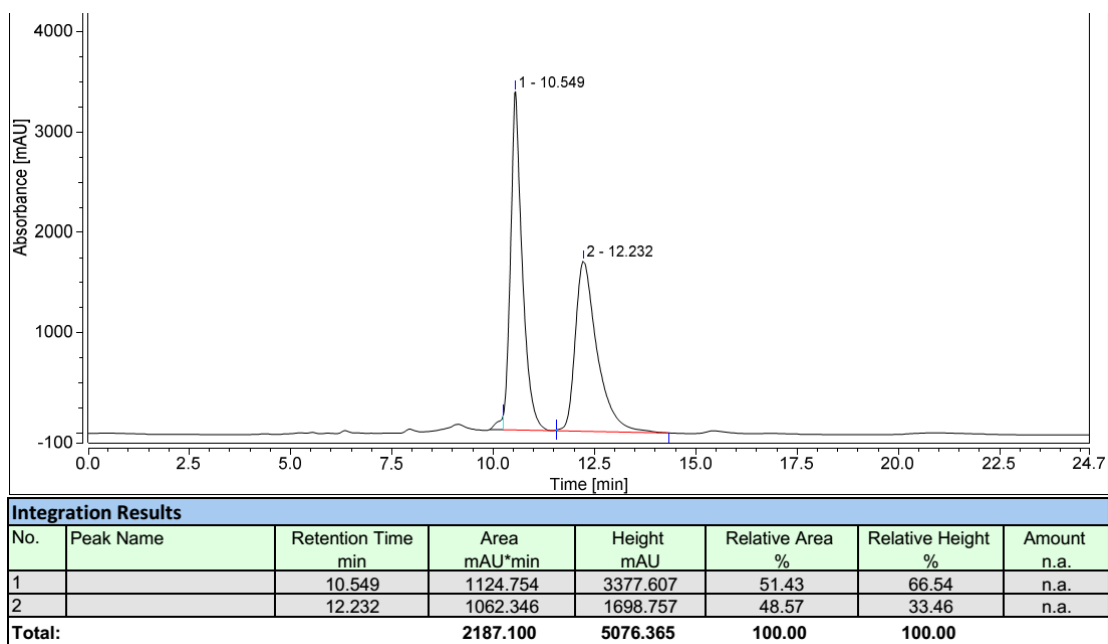
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		18.932	20.098	26.671	2.45	5.19	n.a.
2		38.566	798.861	486.785	97.55	94.81	n.a.
Total:			818.959	513.457	100.00	100.00	

(aR)- 1-(3-Benzamido-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl 4-bromobenzenesulfonate (5a2)

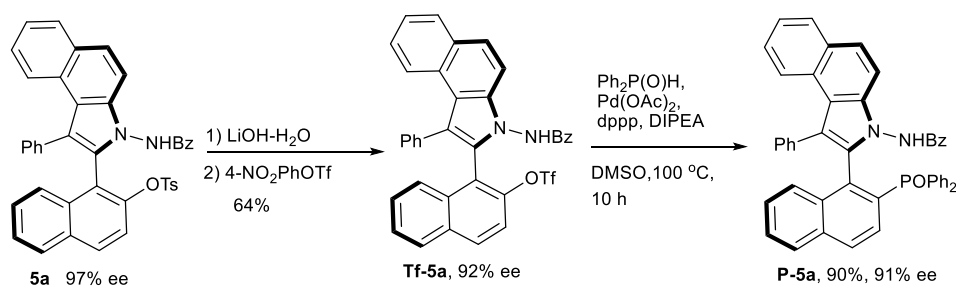


Following the general procedure, the compound was isolated as a white solid (127 mg, 88%); mp 111-112 °C; $[\alpha]_D^{21} = -23.6$ (c 1.0, CHCl₃, 91% ee); IR (KBr): 3373, 2942, 1701, 1261, 1166, 944, 750, 701 cm⁻¹; ¹H NMR (600 MHz, Chloroform-*d*) δ 9.27 (s, 1H), δ 7.99 (t, *J* = 7.4 Hz, 2H), 7.88 (d, *J* = 9.0 Hz, 1H), 7.80 (d, *J* = 8.7 Hz, 2H), 7.76 (d, *J* = 8.0

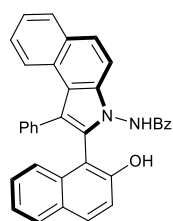
Hz, 1H), 7.57 (d, $J = 8.8$ Hz, 1H), 7.53 – 7.40 (m, 6H), 7.37 (d, $J = 9.0$ Hz, 1H), 7.30 (q, $J = 7.5$ Hz, 3H), 7.23 (s, 2H), 7.20 (d, $J = 6.4$ Hz, 1H), 7.13 (t, $J = 8.2$ Hz, 4H), 7.09 (s, 1H), 7.02 (s, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 165.4, 145.5, 135.3, 134.5, 134.4, 133.9, 132.2, 131.8, 131.6, 131.5, 130.5, 130.2, 129.7, 129.7, 128.9, 128.6, 128.5, 128.1, 127.9, 127.7, 127.5, 127.2, 127.0, 126.9, 125.8, 125.2, 123.6, 123.3, 121.8, 120.3, 118.7, 110.7; HRMS (ESI) calcd for $\text{C}_{41}\text{H}_{28}\text{N}_2\text{O}_4\text{SBr}$ m/z $[\text{M} + \text{H}]^+$: 723.0948, found: 723.0942; HPLC (Daicel Chiralpak IC, i -PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 250$ nm): t_1 (minor) = 10.5 min, t_2 (major) = 12.2 min.



8. Scheme S2. Transformation of 5a.

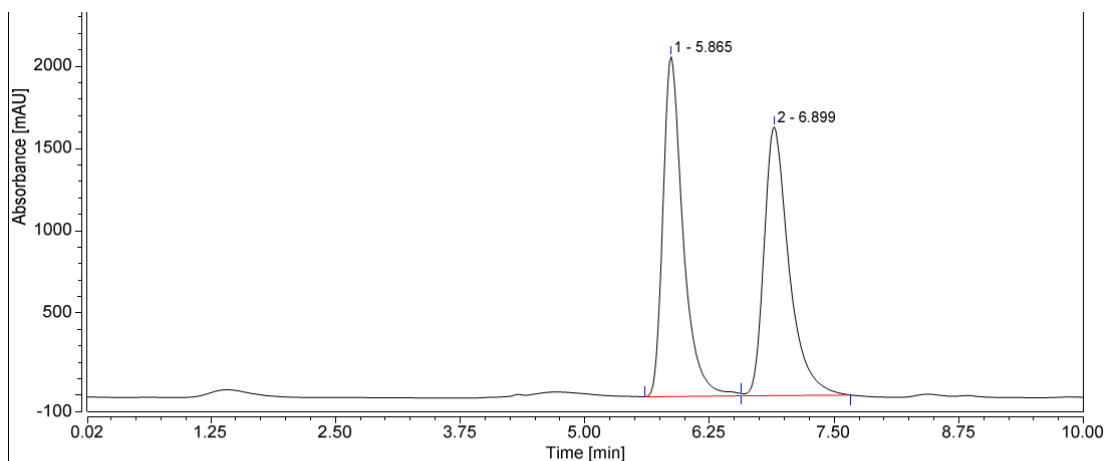


(aR)-N-(2-(2-Hydroxynaphthalen-1-yl)-1-phenyl-3H-benzo[e]indol-3-yl)benzamide (OH-5a)²

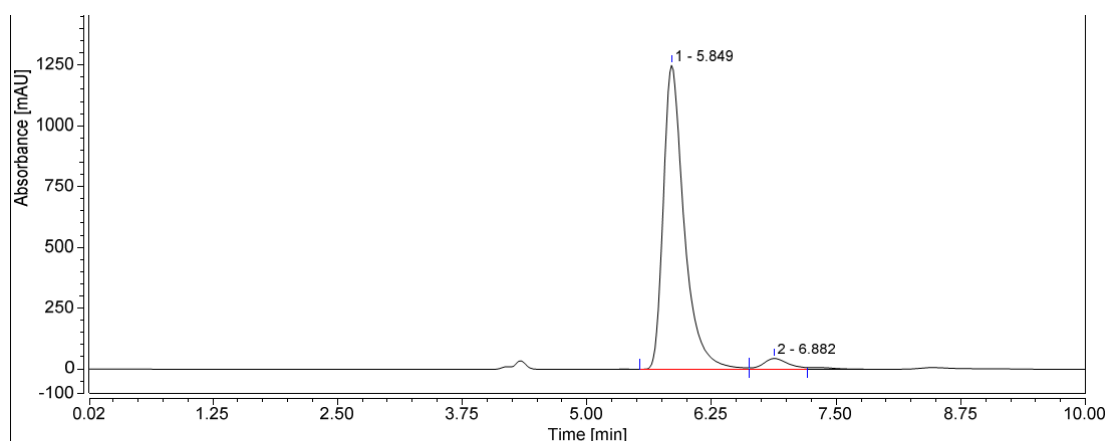


To a solution of **5a** (270 mg, 0.41 mmol) in MeOH/acetone/H₂O (6 mL, v:v:v = 1:1:1), was added LiOH H₂O (86 mg, 2.05 mmol). The reaction mixture was stirred for 24 h at 50 °C, and TLC analysis indicated that the reaction was completed. The solvent was removed under reduced pressure, and the resulting slurry was taken up in H₂O, acidified to pH 2–3 with 1 M HCl, and extracted with CH₂Cl₂ (3 ×15 mL).

The crude product was purified by flash column chromatography (20% EtOAc in hexane) gave **OH-5a** (144 mg, 70% yield, 92% *ee*). mp 295–296 °C; $[\alpha]_D^{21} = +6.8$ (c 1.0, CHCl₃); IR (KBr): 3417, 2923, 1412, 1190, 972, 750 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 8.72 (d, *J* = 12.1 Hz, 1H), 7.94 (t, *J* = 8.9 Hz, 2H), 7.78 – 7.65 (m, 3H), 7.65 – 7.50 (m, 2H), 7.50 – 7.38 (m, 5H), 7.38 – 7.23 (m, 6H), 7.21 (t, *J* = 7.1 Hz, 2H), 7.16 – 7.04 (m, 2H), 6.40 (s, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 168.3, 154.4, 135.1, 134.8, 134.5, 132.8, 131.3, 130.8, 130.6, 130.2, 130.1, 129.0, 128.8, 128.7, 128.6, 128.4, 128.3, 128.1, 127.2, 127.2, 126.0, 125.3, 123.7, 123.5, 123.4, 121.5, 119.2, 118.5, 110.0, 109.2; HRMS (ESI) calcd for C₃₅H₂₄N₂O₂Na *m/z* [M + Na]⁺: 527.1735, found: 527.1725; HPLC (Daicel Chiralpak Ic, *i*-PrOH/hexane = 25/75, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 5.8 min, *t*₂ (major) = 6.8 min.

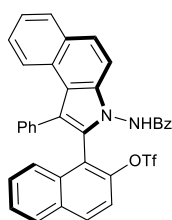


Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		5.865	483.349	2068.140	50.52	55.85	n.a.
2		6.899	473.445	1634.578	49.48	44.15	n.a.
Total:			956.794	3702.719	100.00	100.00	



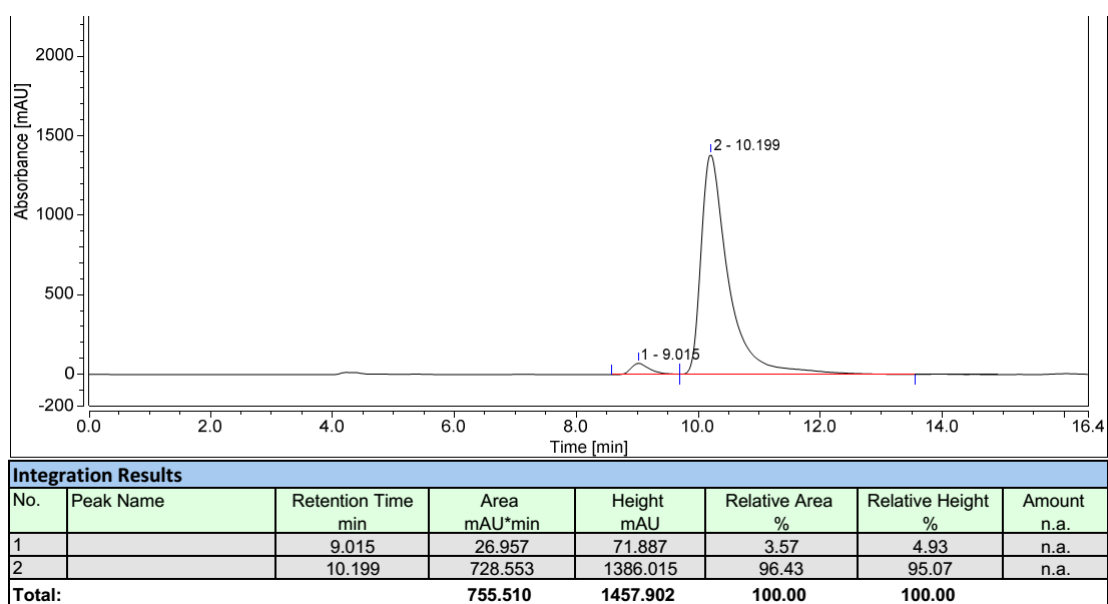
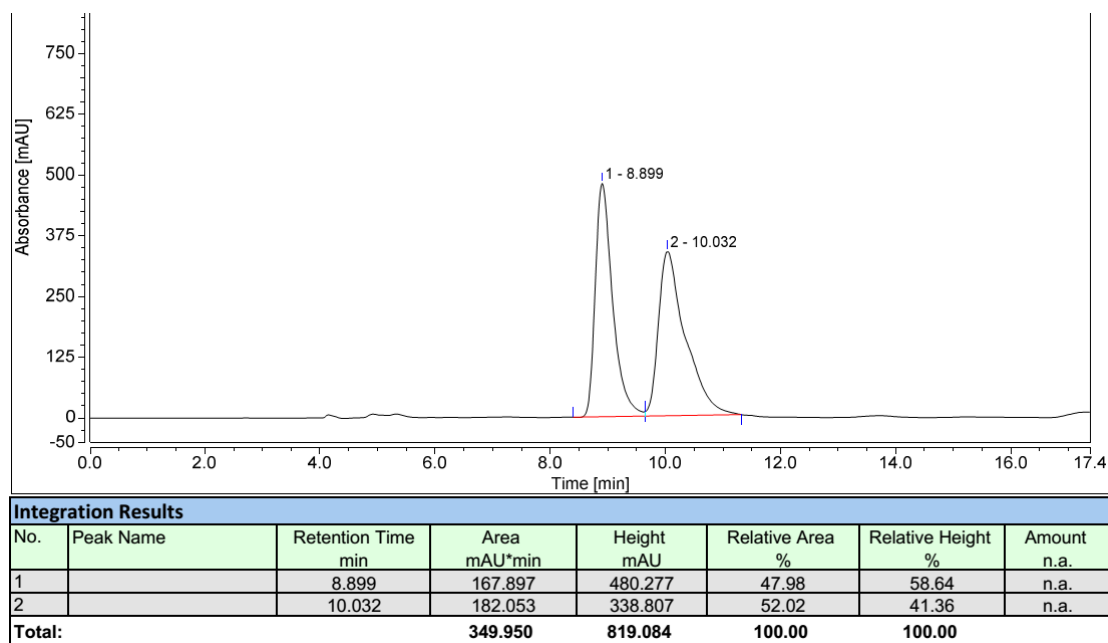
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		5.849	302.196	1250.561	95.93	96.60	n.a.
2		6.882	12.832	43.973	4.07	3.40	n.a.
Total:			315.027	1294.534	100.00	100.00	

(*aR*)-1-(3-Benzamido-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl trifluoromethanesulfonate
(Tf-5a)³

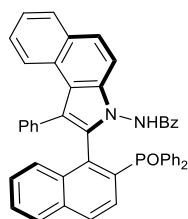


The reaction was performed using **OH-5a** (120 mg, 0.24 mmol, 92% *ee*), 4-nitrophenyl trifluoromethanesulfonate (77.4 mg, 0.28 mmol), and K₂CO₃ (65.7 mg, 0.48 mmol) in DMF (5.0 mL) at room temperature. After finished, H₂O (15 mL) was added to the reaction mixture. The solution was extracted with CH₂Cl₂ (3 ×10 mL), washed with brine (8.0 mL) and dried over anhydrous Na₂SO₄. The solvent was evaporated under reduced pressure. The crude product was purified by flash column chromatography (20% EtOAc in hexane) gave **Tf-5a** (140 mg, 92% yield, 92% *ee*); mp 225-226 °C; [α]_D²¹ = -21.8 (c 1.0,

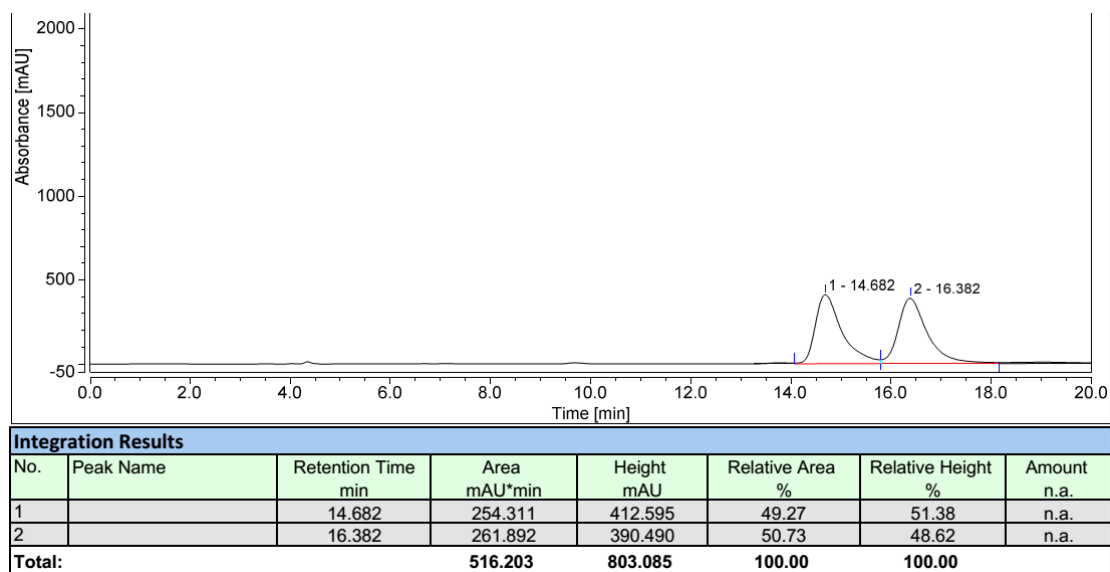
CHCl₃); IR (KBr): 3394, 2925, 1703, 1413, 1217, 748 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 8.72 (s, 1H), 7.99 (d, *J* = 8.1 Hz, 1H), 7.84 (d, *J* = 8.0 Hz, 1H), 7.79 (dd, *J* = 8.5, 4.2 Hz, 2H), 7.74 – 7.63 (m, 2H), 7.57 (d, *J* = 6.9 Hz, 1H), 7.48 – 7.25 (m, 8H), 7.25 – 7.11 (m, 5H), 7.00 (s, 2H); ¹³C NMR (100 MHz, CDCl₃) δ 165.4, 145.7, 135.2, 134.7, 134.2, 132.4, 132.2, 132.0, 131.5, 130.6, 130.6, 130.0, 128.9, 128.7, 128.7, 128.3, 128.2, 127.6, 127.6, 127.5, 127.1, 127.0, 126.0, 125.8, 125.5, 123.6, 123.4, 122.2, 121.2, 119.9, 118.8, 118.6, 116.8, 110.8; HRMS (ESI) calcd for C₃₆H₂₃F₃N₂O₄Na⁺ *m/z* [M + Na]⁺: 659.1223; found: 659.1233; HPLC (Daicel Chiralpak IC, *i*-PrOH/hexane = 10/90, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 9.0 min, *t*₂ (major) = 10.2 min.

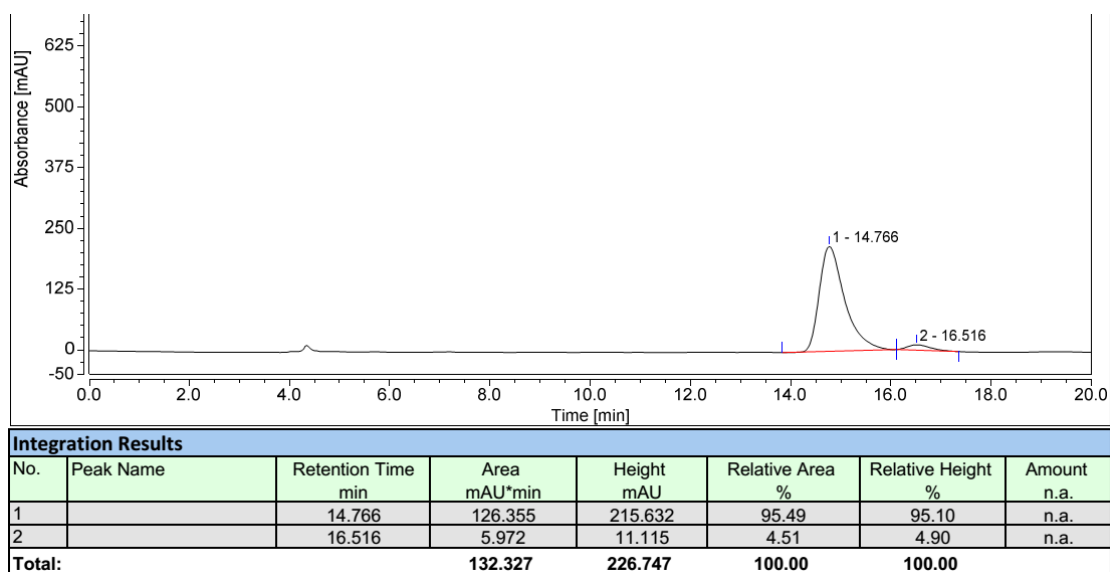


(aR)-N-(2-(2-(Diphenylphosphoryl)naphthalen-1-yl)-1-phenyl-3H-benzo[e]indol-3-yl)benzamide (P-5a)⁴

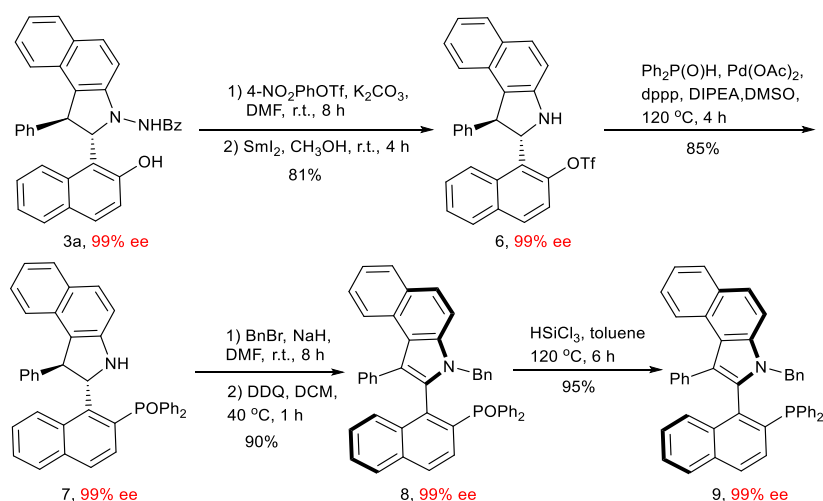


A stirred solution of Pd(OAc)₂ (3.5 mg, 0.02 mmol) and dppp (6.5 mg, 0.02 mmol) in dry DMSO (2.0 mL) was stirred at room temperature for 0.5 h under argon atmosphere. Subsequently, **Tf-5a** (100 mg, 0.16 mmol, 92% *ee*), diphenylphosphine oxide (63.5 mg, 0.3 mmol) and DIPEA (101.5 mg, 0.79 mmol) were added. The reaction was stirred at 100 °C for 10 h. The reaction was quenched with H₂O (10 mL), extracted with CH₂Cl₂ (3 × 10 mL), washed with H₂O (3 × 10 mL) and brine (8.0 mL), and dried over anhydrous Na₂SO₄. The solvent was evaporated under reduced pressure. The crude product was purified by flash column chromatography (20% EtOAc in hexane) gave **P-5a** (97 mg, 90% yield, 91% *ee*); mp 177-178 °C; [α]_D²¹ = +30.2 (c 1.0, CHCl₃); IR (KBr): 3396, 2925, 1689, 1267, 1091, 973, 700 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 12.15 (s, 1H), 7.88 (dd, *J* = 16.5, 9.1 Hz, 4H), 7.78 – 7.62 (m, 6H), 7.58 (d, *J* = 8.1 Hz, 2H), 7.51 – 7.44 (m, 4H), 7.36 (dt, *J* = 14.0, 7.5 Hz, 7H), 7.23 (s, 1H), 7.17 (t, *J* = 7.7 Hz, 2H), 7.00 (dd, *J* = 14.5, 6.7 Hz, 4H), 6.71 (s, 1H), 6.04 (s, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 165.5, 135.31 (d, *J* = 7.1 Hz), 135.2, 134.5, 134.4, 134.3, 133.4, 132.3, 131.99 (d, *J* = 6.7 Hz), 131.9, 131.52 (d, *J* = 2.0 Hz), 130.9, 130.8, 130.5, 130.4, 130.3, 130.0, 129.9, 128.9, 128.8, 128.7, 128.6, 128.5, 128.4, 128.3, 128.2, 127.7, 127.6, 127.5, 127.2, 127.0, 125.8, 125.0, 124.9, 123.3, 123.0, 120.0, 118.5, 111.4; HRMS (ESI) calcd for C₄₇H₃₃N₂O₂PNa *m/z* [M + Na]⁺: 711.2172; found: 711.2157; HPLC (Daicel Chiralpak ID, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 14.7 min, *t*₂ (major) = 16.5 min.



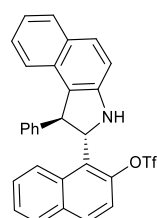


9. Synthesis of 9



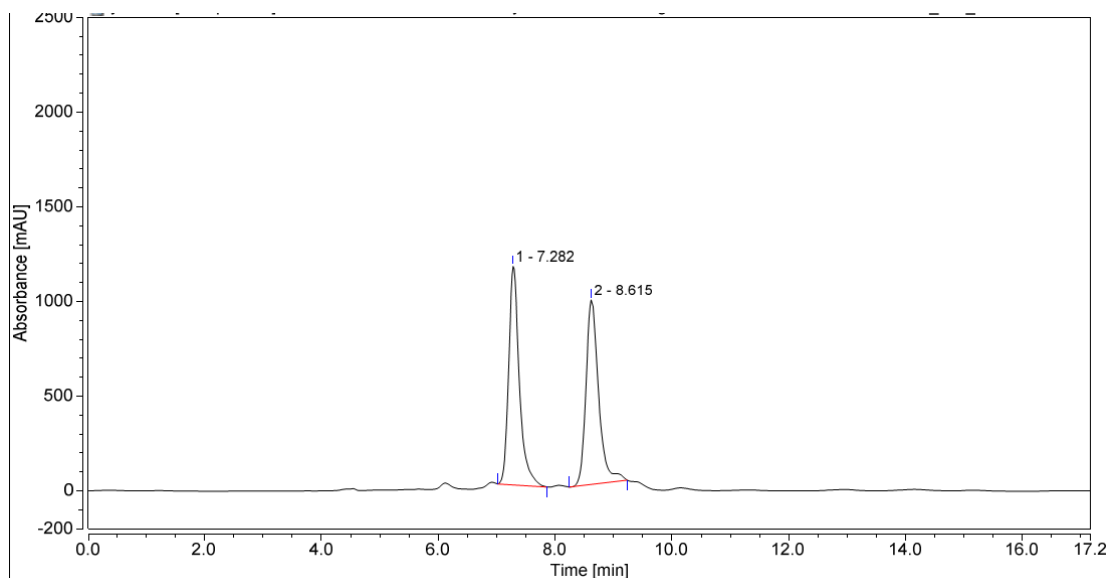
1-((1R,2R)-1-Phenyl-2,3-dihydro-1H-benzo[e]indol-2-yl)naphthalen-2-yl

trifluoromethanesulfonate (6)

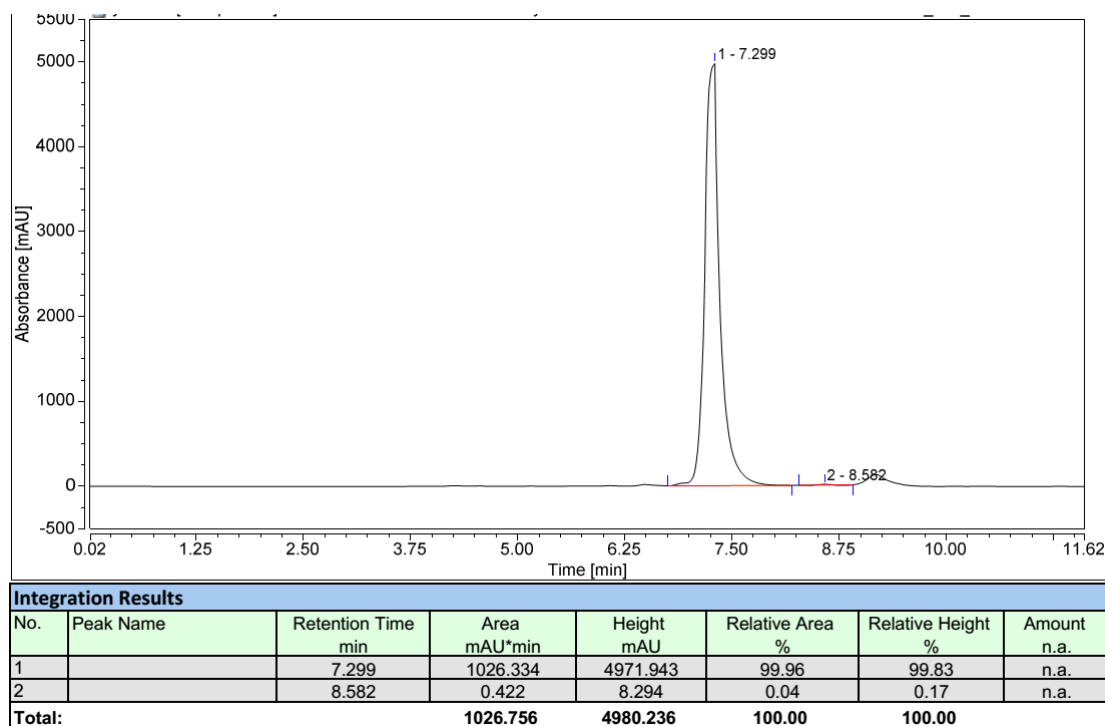


The reaction was performed using **3a** (506.2 mg, 1.0 mmol, 99% ee), 4-nitrophenyl trifluoromethanesulfonate (325.4 mg, 1.2 mmol), and K₂CO₃ (276.4 mg, 2.0 mmol) in DMF (10.0 mL) at room temperature. After finished, the reaction was quenched with H₂O (10 mL). The solution was extracted with CH₂Cl₂ (3 × 10 mL), washed with brine (8.0 mL) and dried over anhydrous Na₂SO₄. The solvent was evaporated under reduced pressure. The crude product was purified by flash column chromatography (20% EtOAc in hexane) giving **Tf-3a** (0.637 g, 1.0 mmol, 99% yield, 99% ee); subsequently, **Tf-3a** (637.0 mg, 1.0 mmol, 99% ee) was

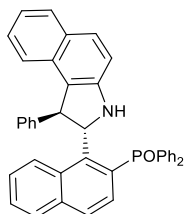
treated with SmI_2 (5 mmol, 50 mL) in THF (5.0 mL) and CH_3OH (1.0 mL) at room temperature for 4 h. The reaction was quenched with a saturated solution of NaHCO_3 (10.0 mL). The solution was extracted with CH_2Cl_2 (3×10 mL). The combined extracts were washed with brine (8.0 mL), dried (Na_2SO_4), filtered and concentrated in vacuo. The crude product was purified by flash column chromatography (20% EtOAc in hexane) gave **6** (0.425 g, 82% yield, 99% ee); mp 87-88 °C; $[\alpha]_{\text{D}}^{21} = +72$ (c 1.0, CHCl_3); IR (KBr): 3398, 2925, 1623, 1421, 1217, 811, 607 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 8.45 (s, 1H), 7.91 (d, $J = 8.1$ Hz, 1H), 7.87 (d, $J = 9.1$ Hz, 1H), 7.80 (d, $J = 9.3$ Hz, 2H), 7.53 (t, $J = 7.3$ Hz, 1H), 7.40 (t, $J = 7.3$ Hz, 1H), 7.28 (d, $J = 8.8$ Hz, 1H), 7.23 – 7.19 (m, 4H), 7.18 – 7.14 (m, 2H), 7.09 (d, $J = 7.9$ Hz, 1H), 7.02 (dd, $J = 6.3, 2.8$ Hz, 2H), 5.73 (d, $J = 10.0$ Hz, 1H), 5.30 (d, $J = 10.1$ Hz, 1H), 4.64 (s, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ 148.6, 143.4, 133.5, 132.3, 131.1, 130.9, 130.2, 129.8, 129.7, 129.1, 128.8, 128.7, 128.0, 127.3, 127.0, 126.8, 126.4, 123.0, 122.2, 119.9, 119.6, 119.1, 116.8, 113.5, 67.1, 56.7; HRMS (ESI) calcd for $\text{C}_{29}\text{H}_{20}\text{F}_3\text{NO}_3\text{SNa}$ m/z $[\text{M} + \text{Na}]^+$: 542.1008; found: 542.0998; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 15/85, flow rate 0.8 mL/min, $\lambda = 230$ nm): t_1 (minor) = 7.3 min, t_2 (major) = 8.6 min.



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		7.282	244.979	1153.943	50.13	54.23	n.a.
2		8.615	243.699	974.114	49.87	45.77	n.a.
Total:			488.678	2128.057	100.00	100.00	

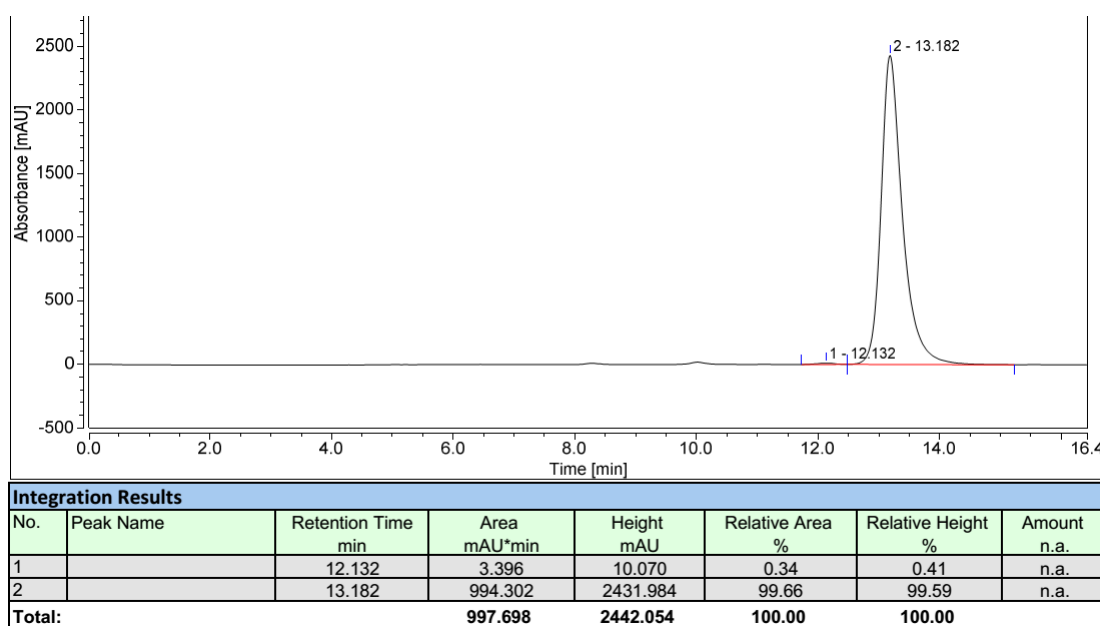
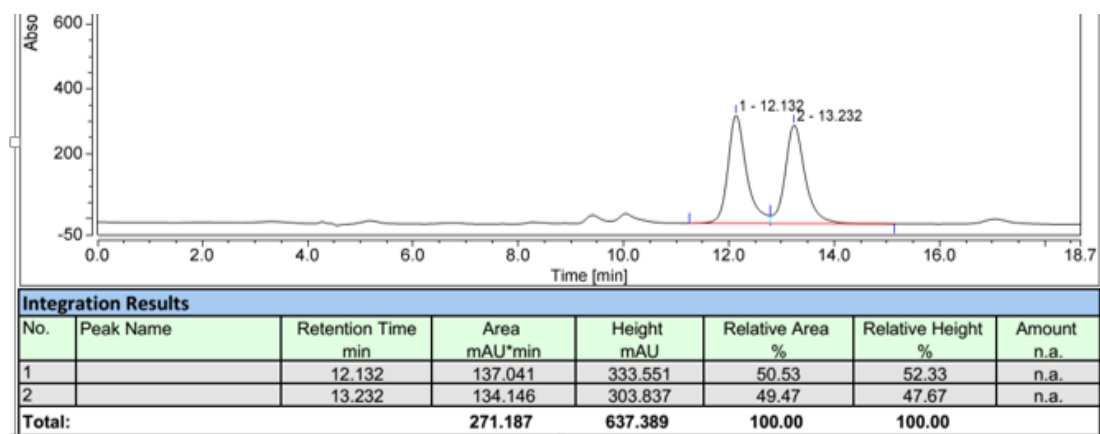


Diphenyl(1-((1*R*,2*R*)-1-phenyl-2,3-dihydro-1*H*-benzo[*e*]indol-2-yl)naphthalen-2-yl)phosphine oxide (7)⁵

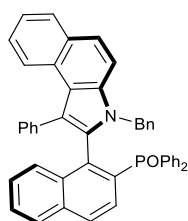


A solution of Pd(OAc)₂ (35.9 mg, 0.16 mmol) and dppp (66.0 mg, 0.16 mmol) in dry DMSO (5.0 mL) was stirred at room temperature for 0.5 h at under N₂. Subsequently, **6** (415.3 mg, 0.8 mmol, 99% *ee*), diphenylphosphine oxide (404.4 mg, 2 mmol) and DIPEA (517 mg, 4.0 mmol) were added. The reaction was stirred at 120 °C for 4 h. The reaction was quenched with H₂O (10 mL). The solution was extracted with CH₂Cl₂ (3 ×10 mL), washed with H₂O (3 ×10 mL) and brine (8.0 mL) and dried over anhydrous Na₂SO₄. The solvent was evaporated under reduced pressure. The crude product was purified by flash column chromatography (30% EtOAc in hexane) gave **7** (0.388 g, 85% yield, 99% *ee*); mp 109-110 °C; [α]_D²¹ = +66.8 (c 1.0, CHCl₃); IR (KBr): 3427, 2925, 1670, 1436, 1217, 769, 515 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 8.36 (d, *J* = 8.2 Hz, 1H), 7.86 (d, *J* = 8.0 Hz, 1H), 7.72 (t, *J* = 9.0 Hz, 2H), 7.66 (dd, *J* = 8.7, 1.9 Hz, 1H), 7.57 – 7.36 (m, 8H), 7.31 (dd, *J* = 11.4, 8.0 Hz, 3H), 7.18 – 6.93 (m, 7H), 6.90 (t, *J* = 7.1 Hz, 1H), 6.82 (t, *J* = 7.4 Hz, 2H), 6.75 (d, *J* = 7.3 Hz, 1H), 6.58 (d, *J* = 9.4 Hz, 1H), 5.48 (d, *J* = 9.5 Hz, 1H), 5.33 (s, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 148.9, 146.35 (d, *J* = 6.8 Hz), 143.9, 135.75 (d, *J* = 1.6 Hz), 135.1, 132.4, 132.3, 132.0, 131.9, 131.60 (d, *J* = 2.0 Hz), 131.45 (d, *J* = 2.5 Hz), 131.16 (d, *J* = 1.6 Hz), 131.1, 130.7, 129.9, 129.6, 129.0, 128.7, 128.4, 128.3, 128.3, 128.1, 127.7, 127.6,

127.5, 126.6, 126.5, 126.0, 122.7, 121.6, 120.7, 113.7, 70.25 (d, $J = 7.2$ Hz), 57.0; HRMS (ESI) calcd for $C_{40}H_{30}NOPNa$ m/z $[M + Na]^+$: 594.1957, found: 594.1946; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 230$ nm): t_1 (minor) = 12.1 min, t_2 (major) = 13.2 min.

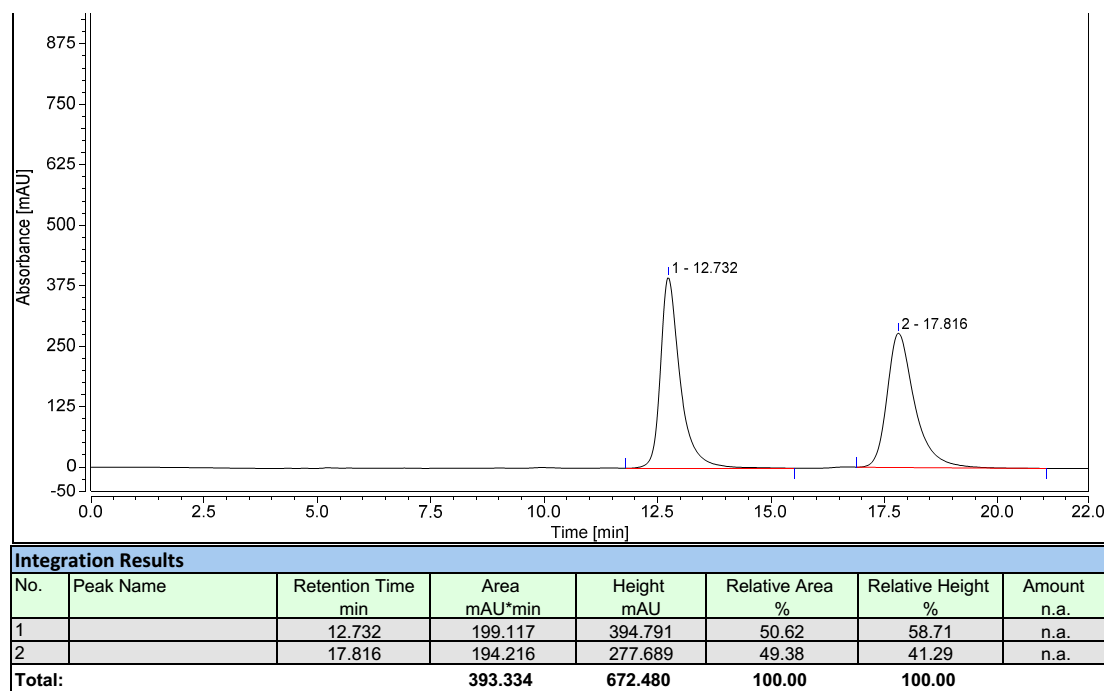


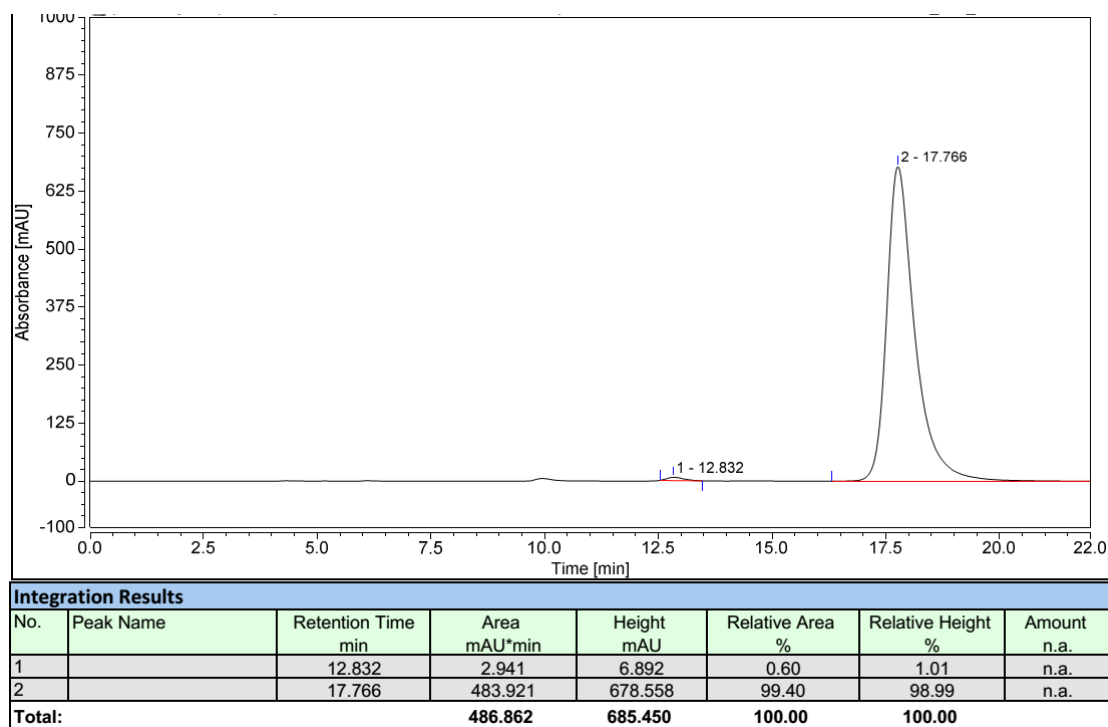
(*aR*)-(1-(3-Benzyl-1-phenyl-3H-benzo[e]indol-2-yl)naphthalen-2-yl)diphenylphosphine oxide (8)



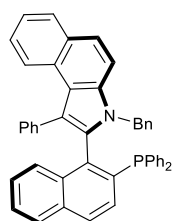
To a stirred solution of **7** (0.388 g, 0.68 mmol, 99% *ee*), NaH (82 mg, 60%, 2.04 mmol) in dry DMF (3.0 mL) at the room temperature was added BnBr (349 mg, 2.04 mmol) in one portion, the mixture was stirred until TLC revealed the absence of the starting material. The reaction was quenched with H_2O (10 mL). The solution was extracted with CH_2Cl_2 (3 $\times$ 6 mL), washed with brine (6.0 mL) and dried over anhydrous Na_2SO_4 . The solvent was evaporated under reduced pressure. The crude product was purified by flash

column chromatography (30% EtOAc in hexane) gave **Bn-7** (0.427 g, 95% yield, 99% *ee*). To a stirred solution of **Bn-7** (0.427 g, 0.64 mmol, 99% *ee*) in dry DCM (20.0 mL) at 40 °C was slowly added DDQ solution (290.56 mg, 1.28 mmol in 10 mL DCM). The mixture was stirred at this temperature for 1 h, then quenched with a saturated solution of NaHCO₃ (10.0 mL). The solution was extracted with CH₂Cl₂ (3 × 6 mL). The combined extracts were washed with brine (8.0 mL), dried (Na₂SO₄), filtered and concentrated in vacuo. The residue was purified by column chromatography (30% EtOAc in hexane) to yield the corresponding product **8** (0.400 g, 95% yield, 99% *ee*); mp 99-100 °C; [α]_D²¹ = +28.8 (c 1.0, CHCl₃); IR (KBr): 3417, 2920, 1439, 1218, 763, 515 cm⁻¹; ¹H NMR (400 MHz, CDCl₃) δ 7.86 (d, *J* = 7.1 Hz, 2H), 7.76 (dd, *J* = 12.8, 8.5 Hz, 2H), 7.71 – 7.61 (m, 1H), 7.57 (d, *J* = 8.9 Hz, 1H), 7.47 – 7.25 (m, 10H), 7.18 (q, *J* = 7.0 Hz, 3H), 7.13 – 6.98 (m, 6H), 6.93 (dt, *J* = 14.0, 6.8 Hz, 4H), 6.86 – 6.71 (m, 3H), 5.11 (d, *J* = 16.5 Hz, 1H), 4.93 (d, *J* = 16.5 Hz, 1H); ¹³C NMR (100 MHz, CDCl₃) δ 137.3, 136.1, 135.43 (d, *J* = 7.5 Hz), 135.0, 134.88 (d, *J* = 5.9 Hz), 133.90 (d, *J* = 2.2 Hz), 133.4, 131.81 (d, *J* = 2.9 Hz), 131.71 (d, *J* = 3.1 Hz), 131.35 (d, *J* = 2.4 Hz), 131.13 (d, *J* = 4.6 Hz), 131.02 (d, *J* = 2.7 Hz), 130.82 (d, *J* = 9.8 Hz), 129.9, 129.5, 128.9, 128.8, 128.6, 128.6, 128.5, 128.4, 128.3, 128.0, 128.0, 127.9, 127.8, 127.7, 127.5, 127.0, 126.9, 126.8, 125.9, 124.9, 123.4, 122.8, 120.4, 120.0, 112.3, 48.7; HRMS (ESI) calcd for C₄₇H₃₄NOPNa *m/z* [M + Na]⁺: 682.2270; found: 682.2254; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, λ = 230 nm): *t*₁ (minor) = 12.8 min, *t*₂ (major) = 17.8 min.

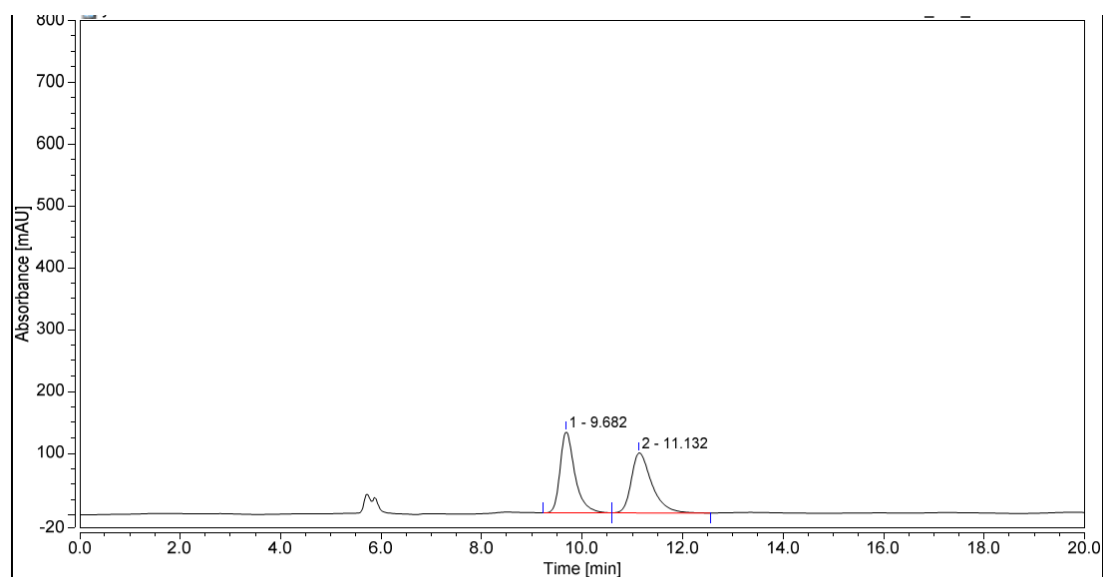




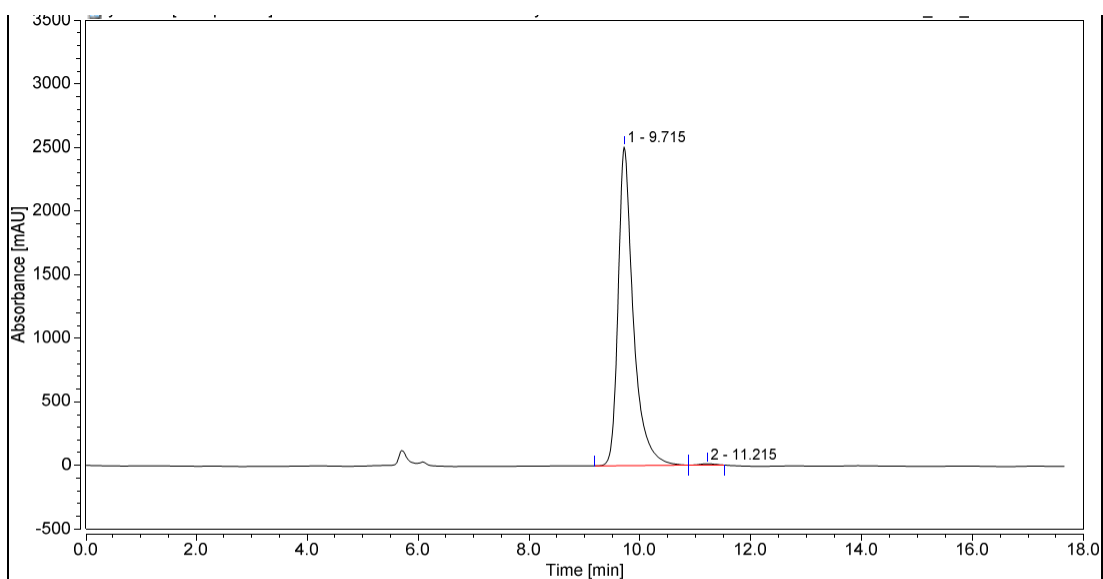
(aR)-3-Benzyl-2-(2-(diphenylphosphanyl)naphthalen-1-yl)-1-phenyl-3H-benzo[e]indole (9)



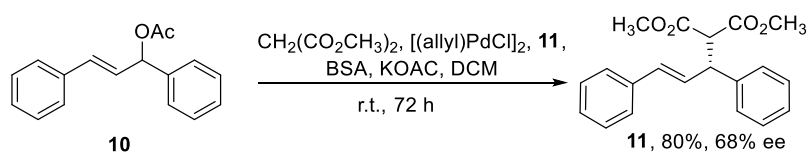
A dried pressure tube charged with **8** (65.9 mg, 0.1 mmol) and HSiCl_3 (41 mg, 0.3 mmol) in 1 mL toluene was stirred at 120 °C for 6 h under N_2 . After removal of the solvent under reduced pressure, the residue was purified by column chromatography on silica gel (2% EtOAc in hexane) gave **9** (61.1 mg, 95% yield, 99% ee); $[\alpha]_{\text{D}}^{21} = -16.1$ (c 1.0, CHCl_3); IR (KBr): 3352, 1652, 1274, 1261, 752, 701 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 7.89 (t, $J = 9.3$ Hz, 2H), 7.74 (t, $J = 8.0$ Hz, 2H), 7.58 (d, $J = 8.9$ Hz, 1H), 7.53 – 7.24 (m, 7H), 7.21 – 7.06 (m, 7H), 7.08 – 6.92 (m, 9H), 6.84 (d, $J = 7.5$ Hz, 2H), 6.74 (t, $J = 7.0$ Hz, 2H), 4.83 (s, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ 138.1, 137.95 (d, $J = 3.9$ Hz), 137.80 (d, $J = 3.4$ Hz), 137.5, 137.1, 137.1, 136.5, 134.73 (d, $J = 7.4$ Hz), 133.8, 133.7, 133.5, 133.4, 133.1, 132.8, 132.6, 132.0, 130.7 (d, $J = 2.1$ Hz), 129.9, 129.7, 129.2, 128.8, 128.7, 128.3, 128.3, 128.2, 128.1, 127.8, 127.6, 127.09 (d, $J = 2.4$ Hz), 126.90 (d, $J = 4.3$ Hz), 126.6, 126.3, 125.3, 123.5, 123.10 (d, $J = 7.5$ Hz), 120.8, 120.37 (d, $J = 2.6$ Hz), 112.4, 51.6; HRMS (ESI) calcd for $\text{C}_{47}\text{H}_{34}\text{NPNa}$ m/z $[\text{M} + \text{Na}]^+$: 666.2321; found: 666.2314; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 2/98, flow rate 0.6 mL/min, $\lambda = 230$ nm): t_1 (minor) = 9.7 min, t_2 (major) = 11.2 min.



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		9.682	44.906	131.372	49.43	57.49	n.a.
2		11.132	45.934	97.159	50.57	42.51	n.a.
Total:			90.840	228.531	100.00	100.00	



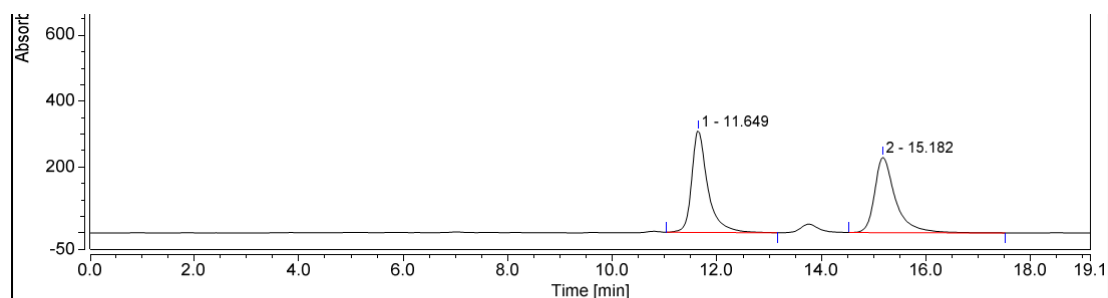
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		9.715	793.936	2507.947	99.54	99.56	n.a.
2		11.215	3.664	11.080	0.46	0.44	n.a.
Total:			797.599	2519.027	100.00	100.00	



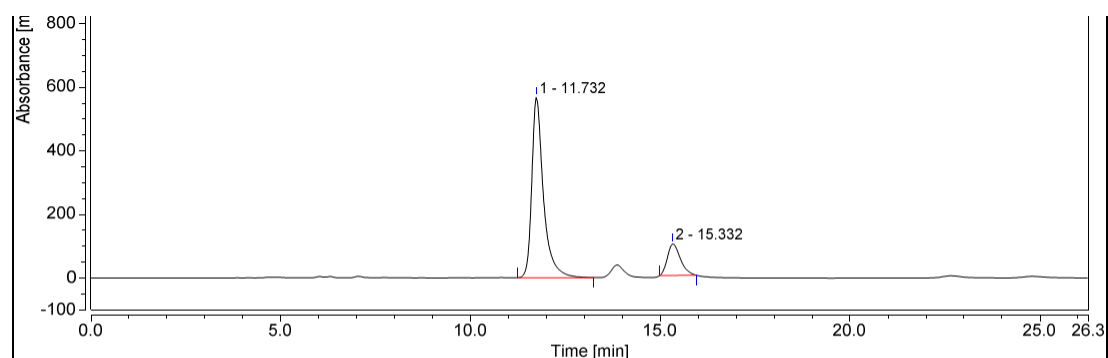
In a Schlenk tube, a solution of 1,3-diphenylprop-2-en-1-yl acetate (126.1 mg, 0.5 mmol), $[\text{Pd}(\text{C}_3\text{H}_5)\text{Cl}]_2$ (1.8 mg, 0.005 mmol), and **10** (6.43 mg, 0.01 mmol) in CH_2Cl_2 (3 mL) was stirred at

room temperature for 40 min. Dimethyl malonate (198 mg, 1.5 mmol), KOAc (1.0 mg, 0.01 mmol), and BSA (306 mg, 1.5 mmol) were then added. The reaction mixture was stirred for 60 h and then quenched with saturated aqueous NH_4Cl and extracted with CH_2Cl_2 (3×10 mL). The organic phase was washed with saturated aqueous NaHCO_3 and brine, dried over Na_2SO_4 , and concentrated under a reduced pressure. The residue was purified by flash chromatography on silica gel with hexane–EtOAc (25:1) as eluent to produce **11** (138 mg, 85%) with 68% ee.

$[\alpha]_{\text{D}}^{21} = +6.1$ (c 1.0, CHCl_3); IR (KBr): 3027, 2952, 1737, 1218, 771, 701 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 7.31 – 7.03 (m, 10H), 6.39 (d, $J = 15.8$ Hz, 1H), 6.24 (dd, $J = 15.7, 8.6$ Hz, 1H), 4.19 (dd, $J = 10.7, 8.8$ Hz, 1H), 3.88 (d, $J = 10.9$ Hz, 1H), 3.59 (s, 3H), 3.40 (s, 3H); ^{13}C NMR (100 MHz, CDCl_3) δ 168.1, 167.6, 140.0, 136.7, 131.7, 129.0, 128.6, 128.4, 127.7, 127.5, 127.0, 126.3, 57.5, 52.5, 52.3, 49.1; HRMS (ESI) calcd for $\text{C}_{20}\text{H}_{20}\text{O}_4\text{Na}$ m/z $[\text{M} + \text{Na}]^+$: 347.1254, found: 347.1249; HPLC (Daicel Chiralpak IA, *i*-PrOH/hexane = 10/90, flow rate 0.8 mL/min, $\lambda = 230$ nm): t_1 (minor) = 11.7 min, t_2 (major) = 15.3 min.



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.649	110.311	308.530	51.11	57.44	n.a.
2		15.182	105.536	228.614	48.89	42.56	n.a.
Total:			215.846	537.143	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.732	202.825	567.315	83.66	85.03	n.a.
2		15.332	39.629	99.872	16.34	14.97	n.a.
Total:			242.454	667.187	100.00	100.00	

10. Enantiomerisation barrier determination for 5a and 5x

The enantiomerisation barrier, corresponding to barrier to rotation for the following atropisomers, was obtained by kinetic of racemisation of an enantiomer. The slope of the first-order kinetic line gives the racemisation constant ($k_{\text{racemisation}} = 2 \times k_{\text{enantiomerisation}}$). Eyring equation gives the enantiomerisation barrier ($\Delta G^{\ddagger}_{\text{enantiomerisation}}$) from enantiomerisation constant ($k_{\text{enantiomerisation}}$), $R = 8.31451 \text{ J.K}^{-1} \text{ mol}^{-1}$, $h = 6.62608 \times 10^{-34} \text{ J.s}$ and $k_B = 1.38066 \times 10^{-23} \text{ J.K}^{-1}$.

About 5 mg of enantio-enriched **5a** was refluxed in 15 mL of dichlorobenzene. Samples of 10 μL of this solution were injected on Daicel Chiralpak IC (*i*-PrOH/hexane = 20/80, flow rate 0.8 mL/min, $\lambda = 250 \text{ nm}$) to monitor the percentage decrease of the second eluted enantiomer over time.

Solvent : 1,2 - dichlorobenzene

Temperature = 180 $^{\circ}\text{C}$

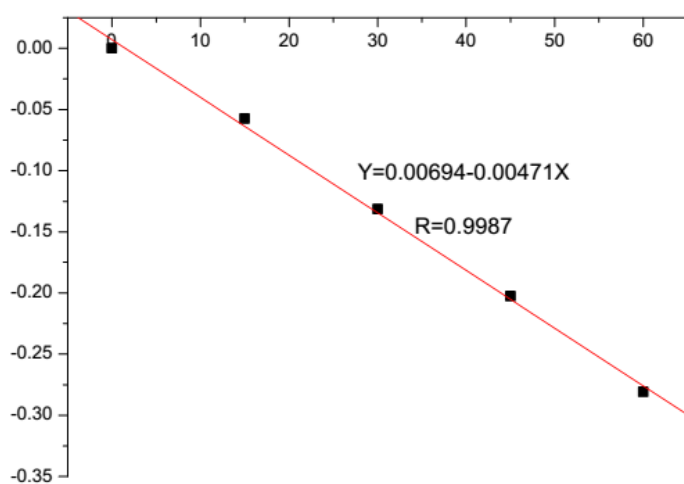
Time (min)	% second eluted enantiomer (%t)	$\ln ((\%t-50)/(\%0-50))$
0	97.02	0
15	94.40	-0.0574
30	91.22	-0.1314
45	88.40	-0.2026
60	85.50	-0.2809

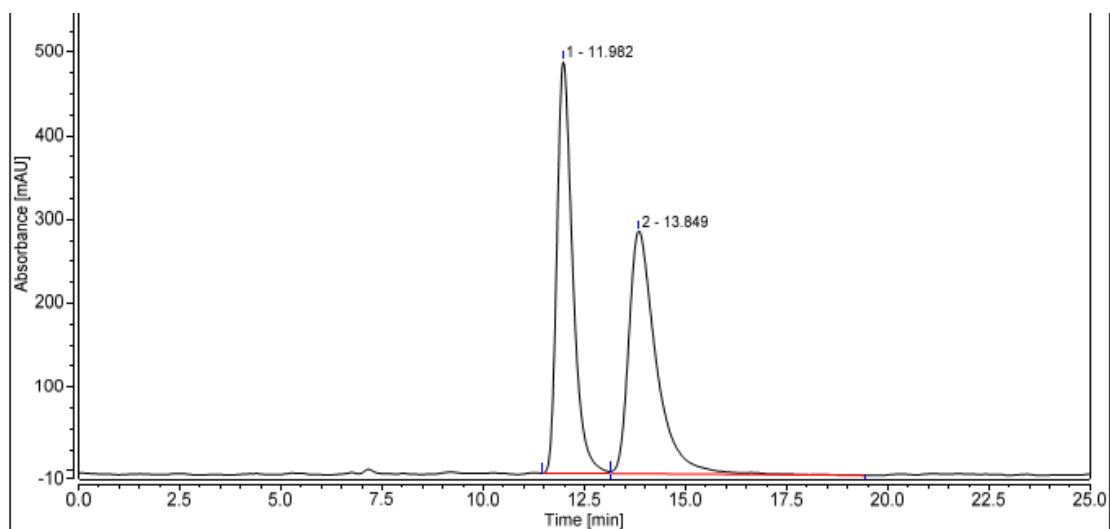
$$K_{\text{racemisation}} = 7.85\text{E-}05 \text{ s}^{-1}$$

$$k_{\text{enantiomerisation}} = 3.925\text{E-}05 \text{ s}^{-1}$$

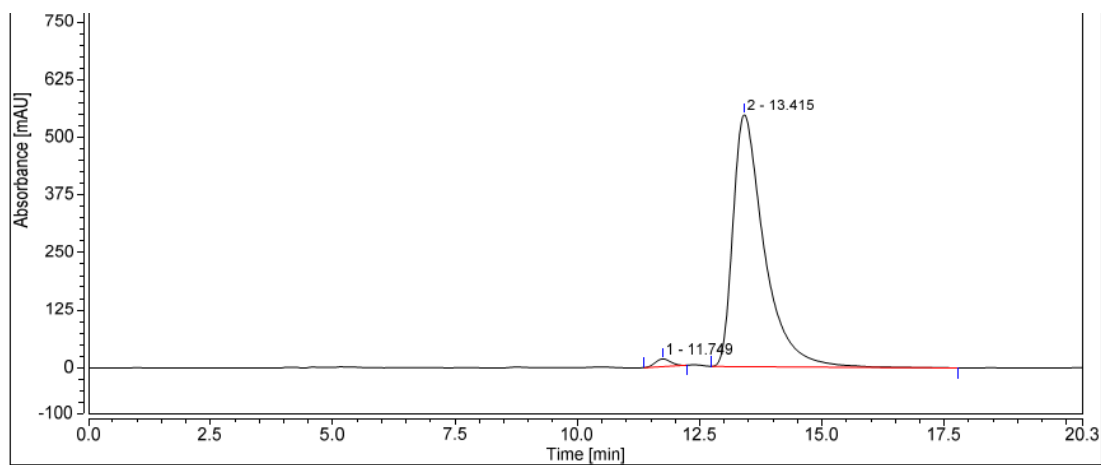
$$\Delta G^{\ddagger}_{\text{enantiomerisation}} = 151 \text{ kJ.mol}^{-1}$$

$$t_{1/2} (25^{\circ}\text{C}) = 467169 \text{ years}$$

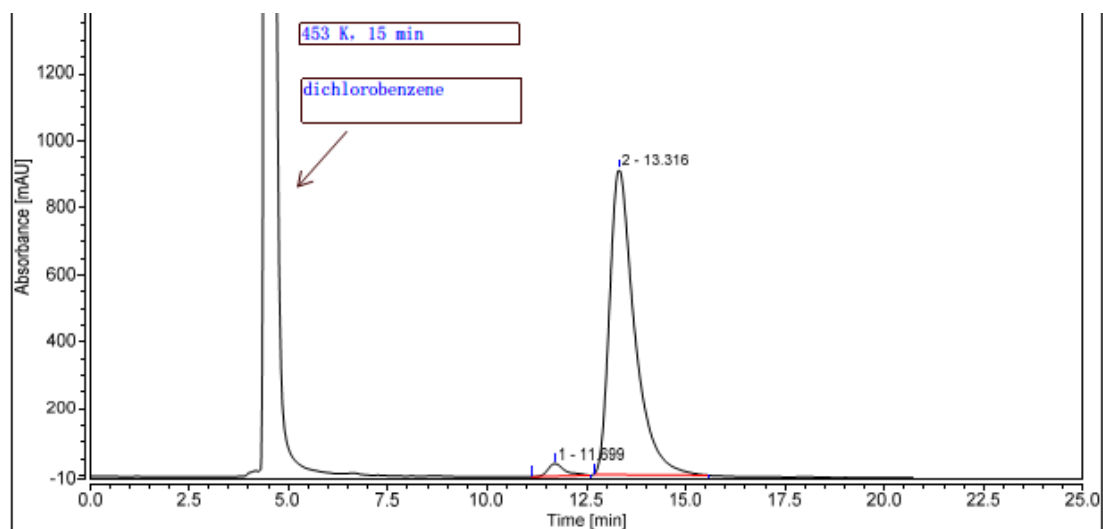




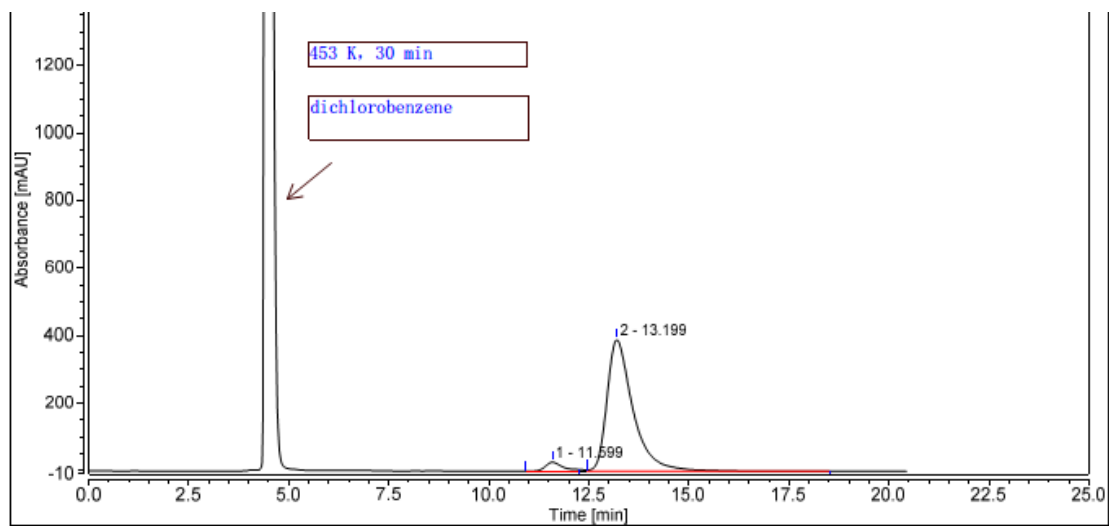
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.982	222.450	492.037	49.39	62.88	n.a.
2		13.849	227.983	290.420	50.61	37.12	n.a.
Total:			450.433	782.458	100.00	100.00	



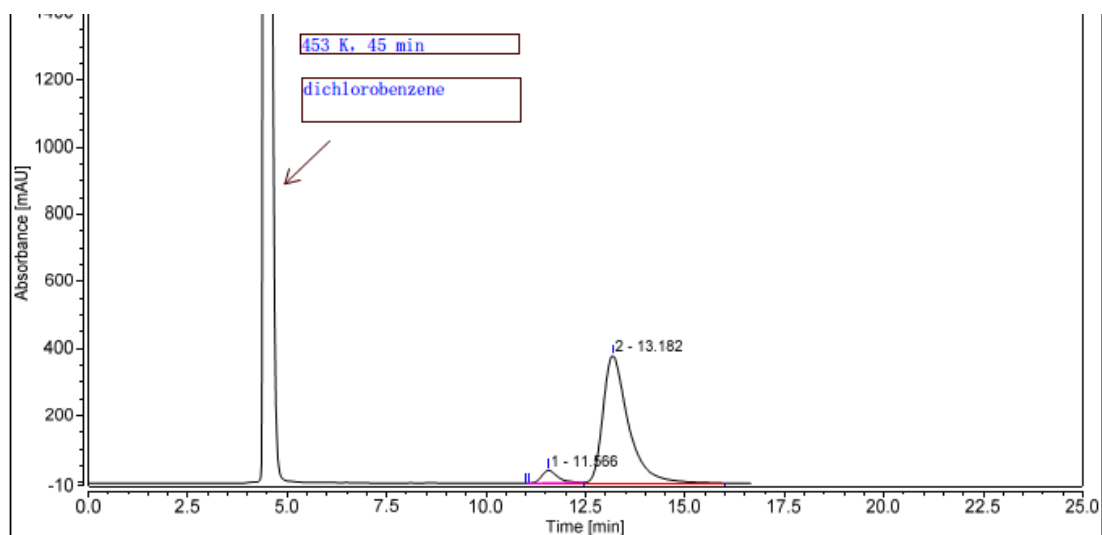
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.749	6.097	16.600	1.49	2.95	n.a.
2		13.415	403.116	546.707	98.51	97.05	n.a.
Total:			409.213	563.307	100.00	100.00	



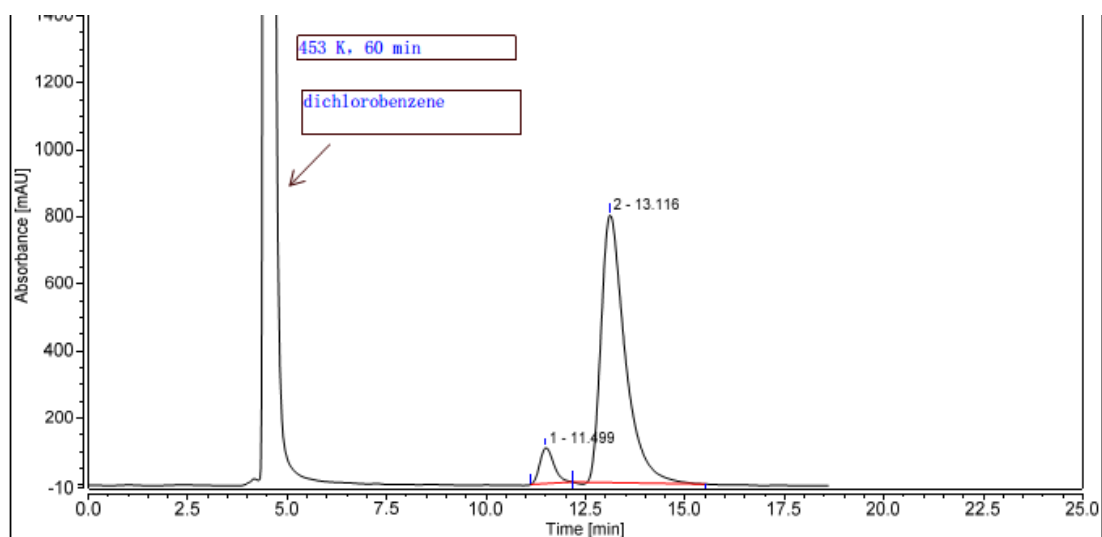
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.699	18.846	37.711	2.76	3.98	n.a.
2		13.316	663.765	910.890	97.24	96.02	n.a.
Total:			682.611	948.601	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.599	13.555	26.560	4.39	6.39	n.a.
2		13.199	295.358	389.405	95.61	93.61	n.a.
Total:			308.914	415.965	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.566	17.404	37.510	5.80	8.98	n.a.
2		13.182	282.480	380.172	94.20	91.02	n.a.
Total:			299.884	417.681	100.00	100.00	



Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount n.a.
1		11.499	43.556	106.764	7.22	11.78	n.a.
2		13.116	559.813	799.778	92.78	88.22	n.a.
Total:			603.369	906.542	100.00	100.00	

The enantiomerisation barrier for the second axis of **5x**:

About 5 mg of enantio-enriched **5x** was heated to 100 °C in 3 mL of toluene. Samples of 10 µL of this solution were injected on Daicel Chiralpak IA (*i*-PrOH/hexane = 35/65, flow rate 0.8 mL/min, λ = 230 nm) to monitor the percentage decrease of the main eluted enantiomer over time.

Solvent : toluene

Temperature = 100 °C

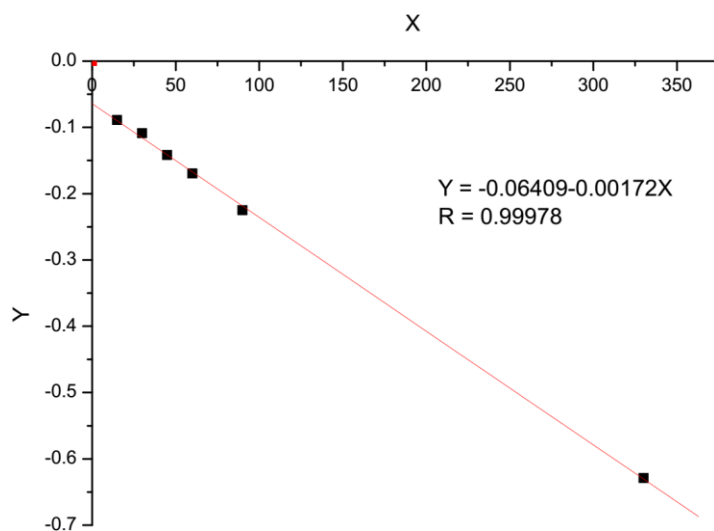
Time(min)	ee	ln ((%t-50)/(%0-50))
0	90.59	0
15	87.14	-0.088827
30	86.4	-0.108953
45	85.22	-0.141908
60	84.26	-0.169543
90	82.42	-0.224746
330	71.64	-0.628978

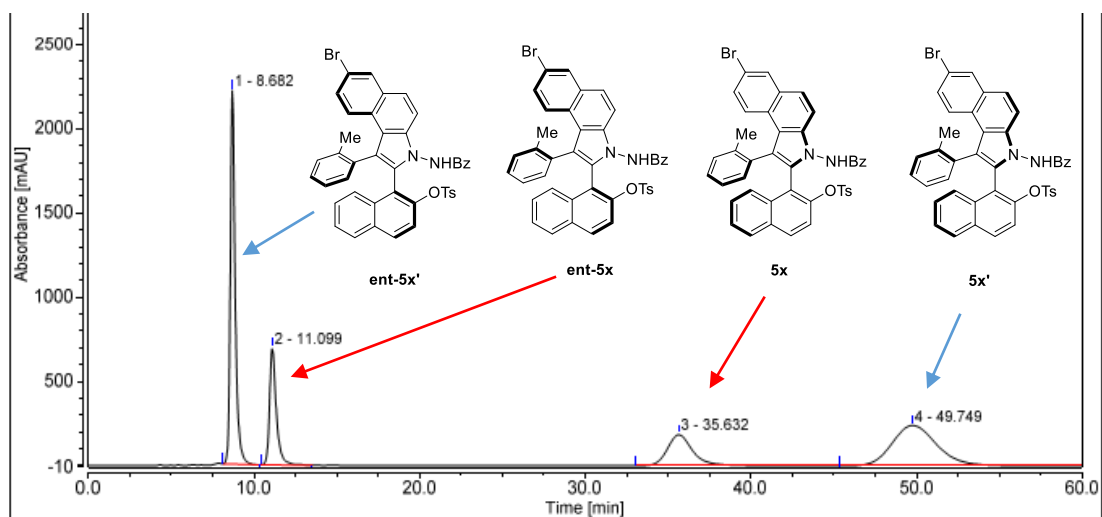
$k_{\text{racemisation}}(100\text{ °C}) = 2.866\text{E-}05\text{ s}^{-1}$

$k_{\text{enantiomerisation}}(100\text{ °C}) = 1.433\text{E-}05\text{ s}^{-1}$

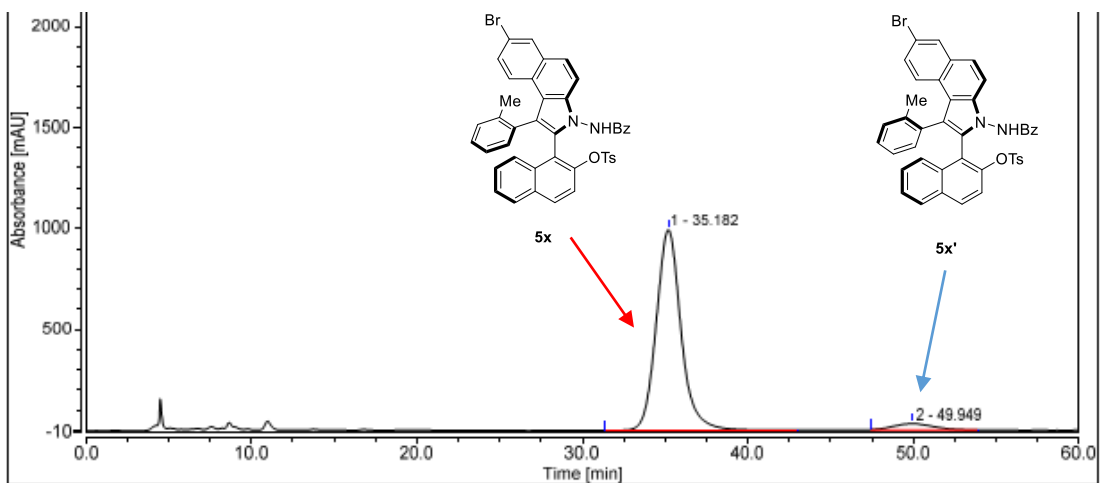
$\Delta G^{\ddagger}_{\text{enantiomerisation}} = 126.64\text{ kJ.mol}^{-1}$

$t_{1/2}(25\text{ °C}) = 28\text{ years}$

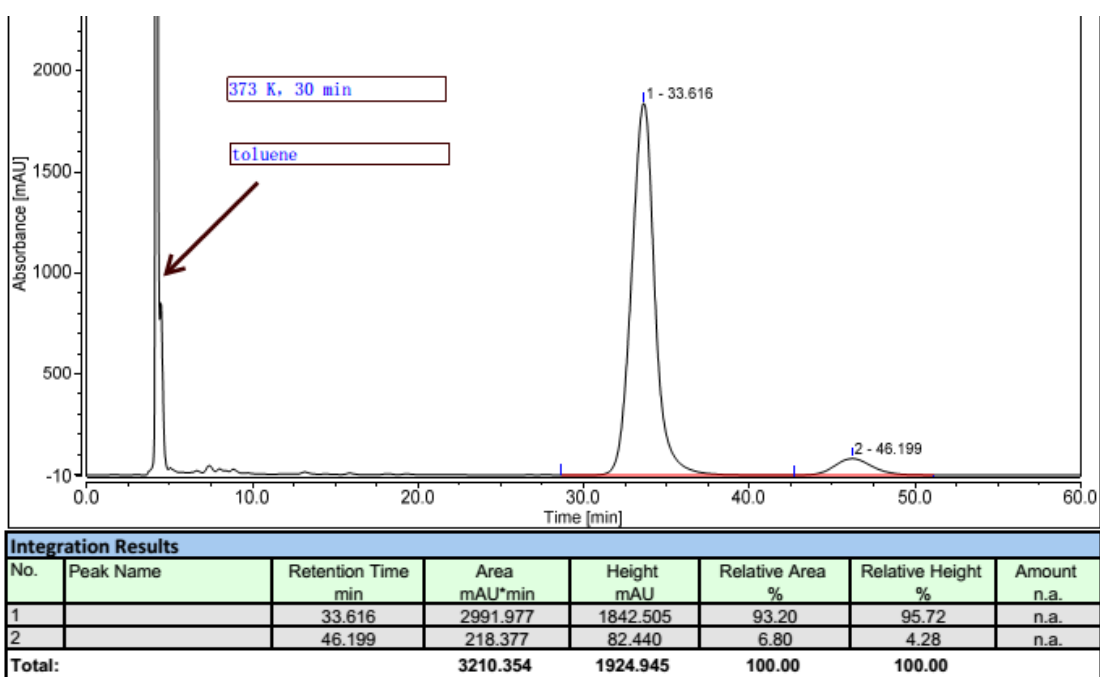
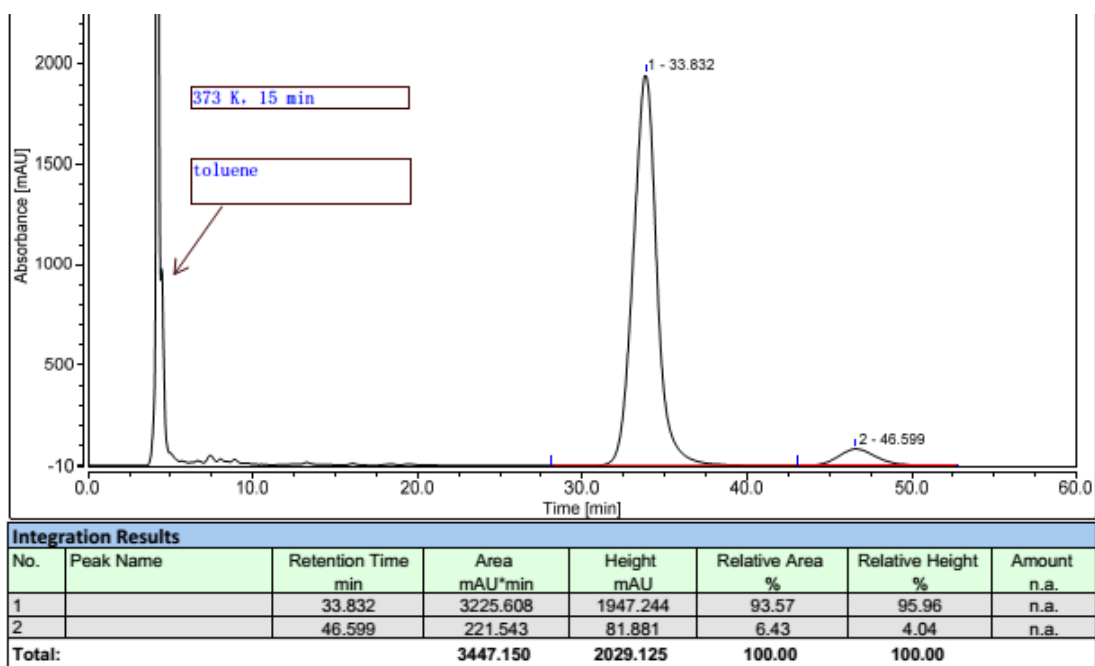


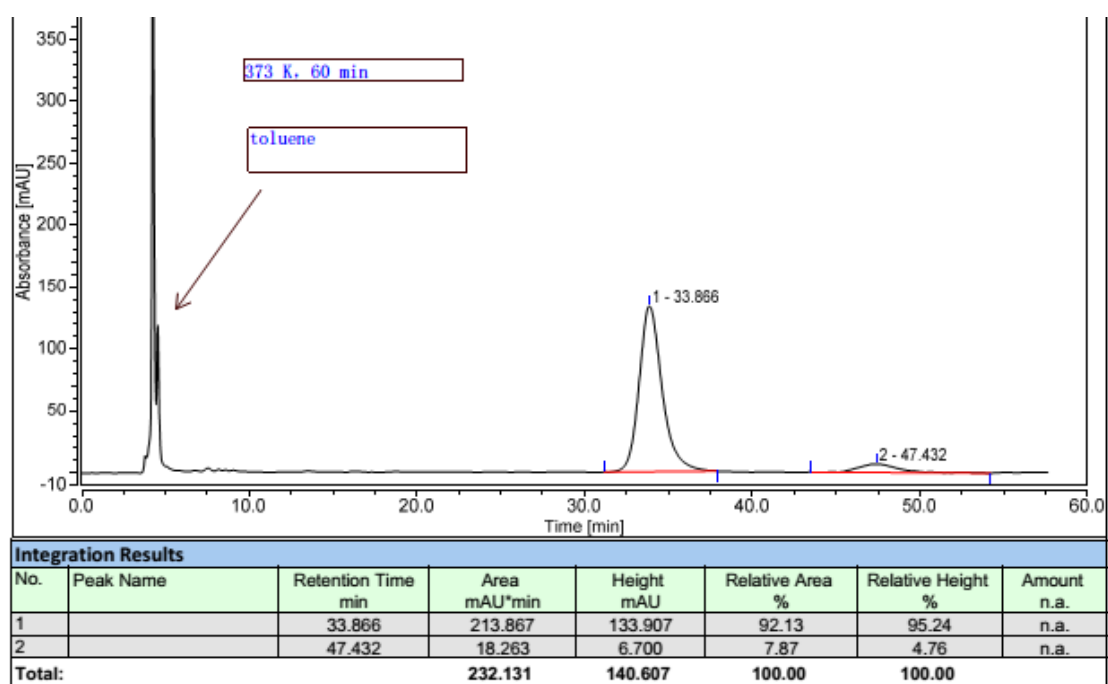
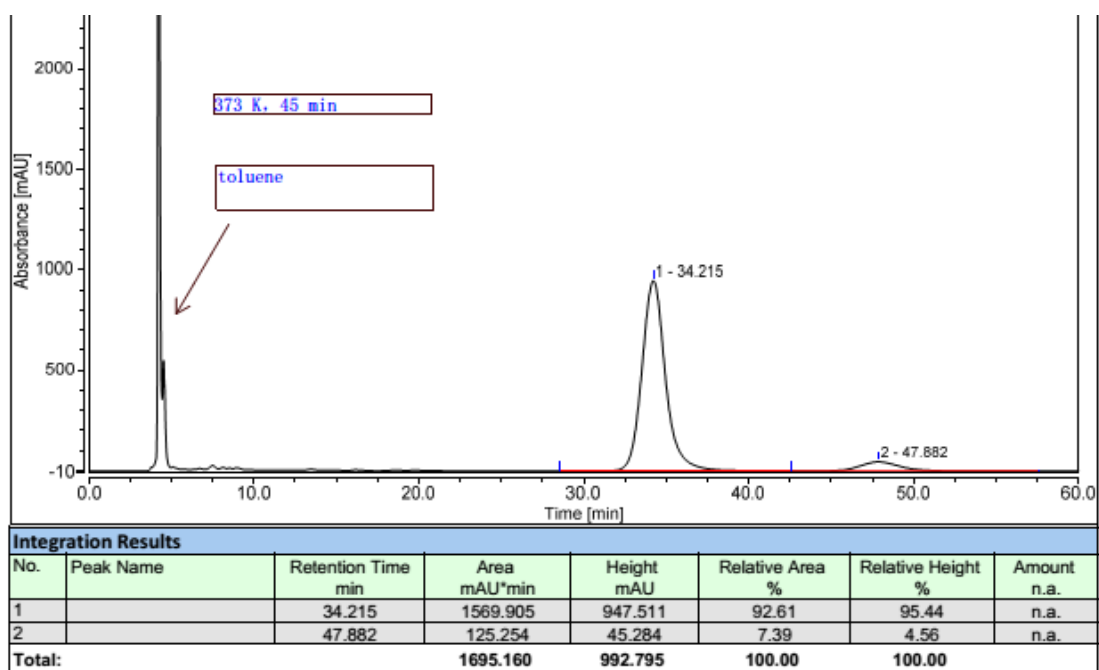


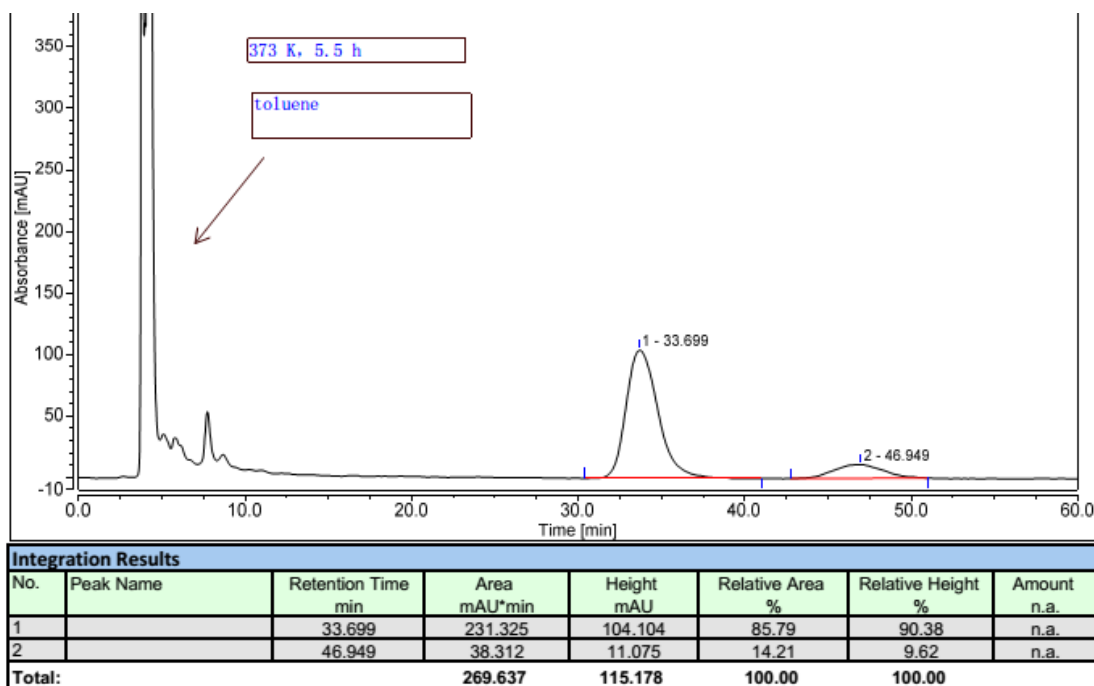
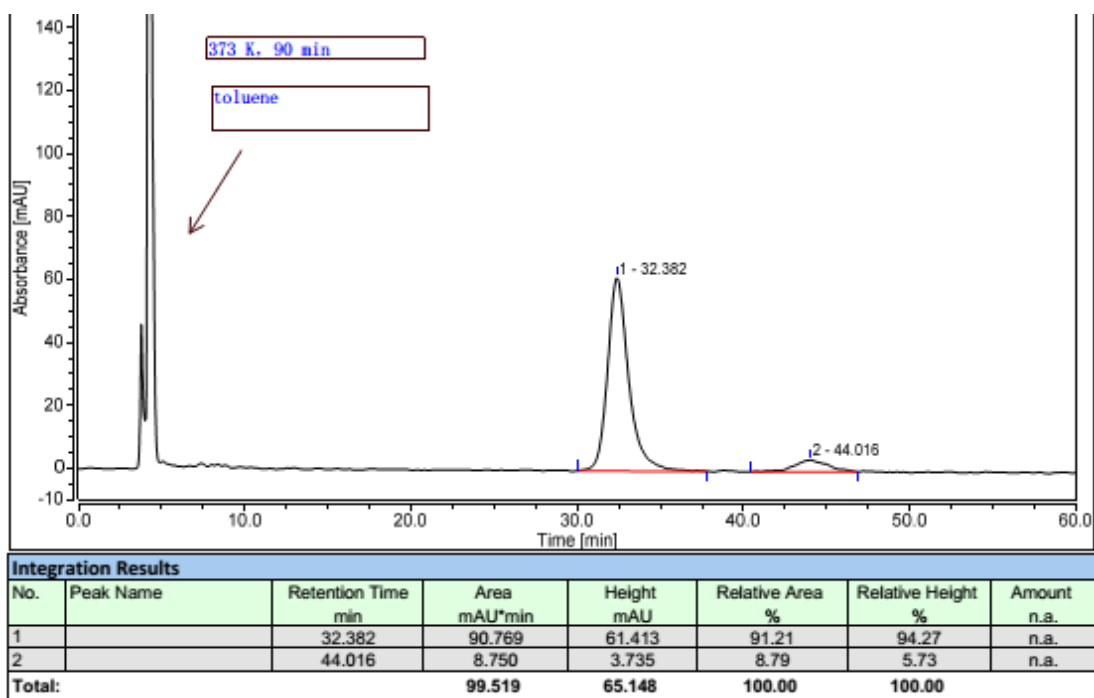
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		8.682	758.435	2220.470	34.77	66.48	n.a.
2		11.099	330.708	694.055	15.16	20.78	n.a.
3		35.632	336.782	184.763	15.44	5.53	n.a.
4		49.749	755.488	240.759	34.63	7.21	n.a.
Total:			2181.413	3340.047	100.00	100.00	



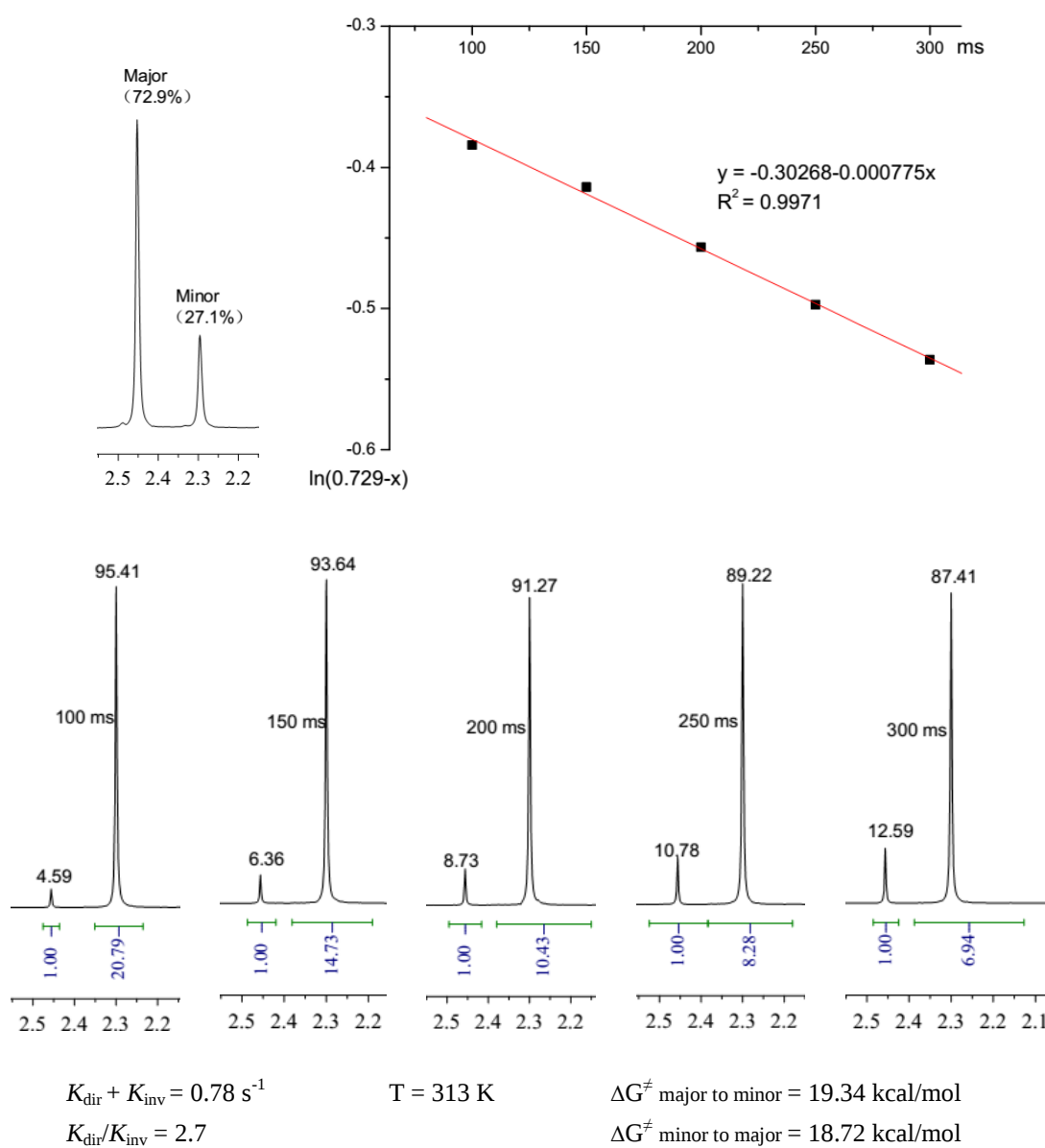
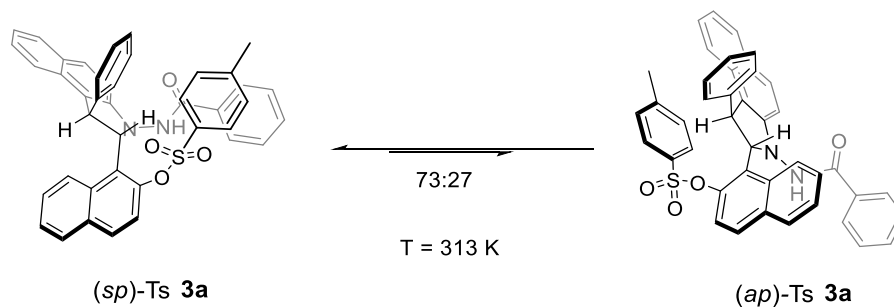
Integration Results							
No.	Peak Name	Retention Time min	Area mAU*min	Height mAU	Relative Area %	Relative Height %	Amount
1		35.182	1731.734	994.960	95.32	97.02	n.a.
2		49.949	85.081	30.585	4.68	2.98	n.a.
Total:			1816.816	1025.545	100.00	100.00	



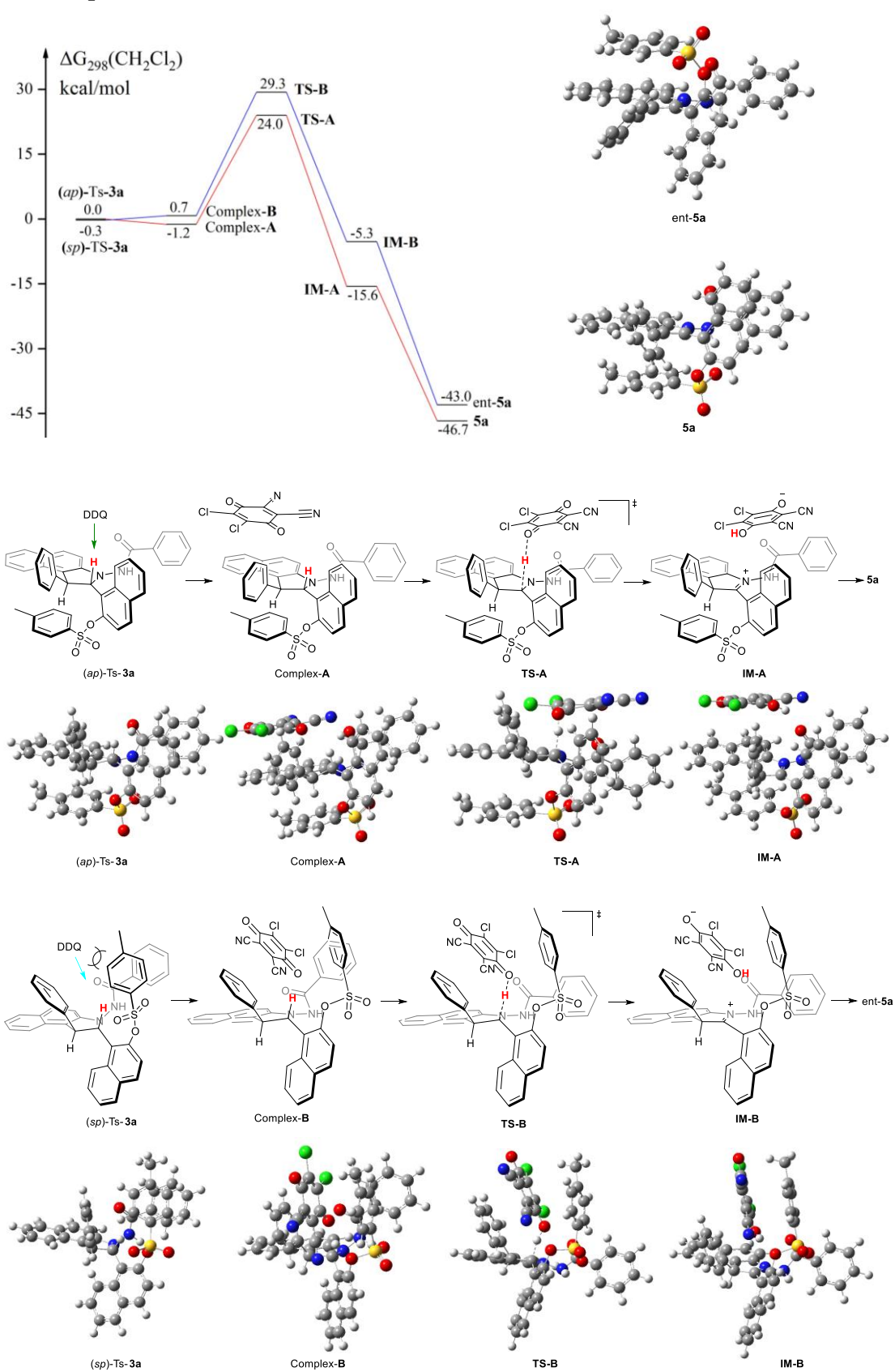




11. 1D-EXSY experiment on compound Ts-3a (the minor conformation was saturated using selnoggps.2 sequence)



12. Computational Studies⁶



Cartesian coordinates of all optimized structures

Compound : (ap)-Ts-3a

C	0.278729	-5.218208	-1.214707
C	0.631345	-3.873491	-1.316459
C	1.840500	-3.423754	-0.767913
C	2.679084	-4.326516	-0.103394
C	2.330588	-5.670578	-0.015685
C	1.129466	-6.118459	-0.572529
H	-0.665737	-5.558770	-1.628686
H	-0.058025	-3.176703	-1.782867
H	3.593666	-3.950489	0.343010
H	2.988955	-6.369458	0.492337
H	0.853306	-7.166499	-0.496636
C	2.225605	-1.980810	-0.771753
O	2.902846	-1.472245	0.114852
N	1.744079	-1.239666	-1.834446
H	1.124236	-1.664136	-2.515529
N	1.473304	0.109282	-1.675634
C	0.680812	0.522862	-0.489434
C	0.688417	2.078531	-0.621692
H	1.287411	0.304606	0.390243
C	0.498451	2.726985	0.729574
C	1.534197	2.747514	1.672253
C	-0.743813	3.264487	1.079035
C	1.330673	3.299130	2.935256
H	2.504176	2.338399	1.404111
C	-0.951023	3.817069	2.343826
H	-1.553817	3.243569	0.353824
C	0.086755	3.835939	3.275510
H	2.145034	3.313379	3.654404
H	-1.922572	4.230596	2.600151
H	-0.070915	4.267256	4.260078
C	2.457149	1.084888	-1.859160
C	3.685486	0.948186	-2.533485
C	2.033533	2.285143	-1.313168
C	4.466699	2.072228	-2.682584
H	3.996842	-0.022986	-2.902465
C	2.789929	3.460899	-1.509606
C	4.047158	3.343055	-2.203975
H	-0.117428	2.399251	-1.289059
C	-0.616259	-0.243281	-0.400604
C	-0.843111	-1.198978	0.649248
C	-1.565495	-0.154170	-1.400558
C	0.053986	-1.394011	1.736974

C	-2.009817	-2.037588	0.594688
C	-2.729142	-0.948650	-1.448444
C	-0.174191	-2.364085	2.685664
H	0.947733	-0.792272	1.822211
C	-2.216988	-3.022937	1.594363
C	-2.935820	-1.884934	-0.467910
H	-3.425656	-0.805253	-2.267314
C	-1.317054	-3.191530	2.618639
H	0.538373	-2.494773	3.494529
H	-3.104680	-3.646653	1.527396
H	-3.816551	-2.520642	-0.492868
H	-1.480408	-3.954510	3.374008
O	-1.388329	0.802826	-2.400417
S	-1.067387	0.281486	-3.956486
O	-0.316582	-0.976794	-3.902523
O	-2.330250	0.332184	-4.686292
C	-0.021063	1.636346	-4.401800
C	1.280911	1.392770	-4.821674
C	-0.519121	2.936554	-4.269577
C	2.104937	2.479714	-5.107048
H	1.647955	0.375929	-4.893561
C	0.327450	4.002866	-4.536090
H	-1.540579	3.102662	-3.945644
C	1.653180	3.792623	-4.950413
H	3.129681	2.300950	-5.414610
H	-0.037901	5.018731	-4.413194
C	2.565304	4.966666	-5.187812
H	2.104084	5.697107	-5.862629
H	3.517943	4.651512	-5.622143
H	2.784460	5.476735	-4.243412
C	4.836607	4.506013	-2.395599
C	2.375528	4.748147	-1.068662
C	3.162825	5.855444	-1.290029
C	4.410437	5.737330	-1.951334
H	5.024767	6.619248	-2.108072
H	5.789227	4.406500	-2.910933
H	2.828642	6.830949	-0.947204
H	1.428431	4.845884	-0.549675
H	5.429256	2.000231	-3.183034

Compound: Complex-A

C	5.942214	2.340861	-2.161522
C	4.741535	1.735900	-1.793747

C	3.563712	2.494293	-1.746482
C	3.600527	3.859824	-2.052981
C	4.798398	4.456175	-2.434034
C	5.970650	3.697043	-2.488750
H	6.855730	1.754075	-2.183629
H	4.738515	0.689061	-1.505106
H	2.680972	4.431413	-1.983649
H	4.822161	5.513106	-2.683012
H	6.907187	4.165285	-2.778465
C	2.270335	1.919705	-1.278469
O	1.427906	2.568191	-0.674138
N	2.083255	0.572501	-1.556054
H	2.829183	0.012451	-1.954479
N	1.262109	-0.171977	-0.732534
C	1.484252	-0.136812	0.734416
C	0.343270	-1.066490	1.242906
H	1.221181	0.868025	1.063372
C	0.041821	-0.831731	2.703792
C	-0.335936	0.428731	3.180308
C	0.211049	-1.878556	3.616799
C	-0.542402	0.631614	4.543950
H	-0.498779	1.241295	2.481069
C	-0.002607	-1.678594	4.980856
H	0.519777	-2.855901	3.253180
C	-0.378317	-0.419164	5.448398
H	-0.837162	1.615144	4.899542
H	0.132212	-2.502659	5.675846
H	-0.540911	-0.256981	6.510161
C	-0.093561	-0.279105	-0.953989
C	-0.779100	0.021381	-2.144163
C	-0.725554	-0.800955	0.181081
C	-2.124728	-0.249973	-2.191769
H	-0.253589	0.479333	-2.973258
C	-2.098970	-1.107441	0.135173
C	-2.814885	-0.821024	-1.084179
H	0.655291	-2.108428	1.124213
C	2.925309	-0.415101	1.080721
C	3.772268	0.623866	1.600526
C	3.508558	-1.632313	0.787861
C	3.304810	1.928400	1.926467
C	5.175717	0.360548	1.771605
C	4.876783	-1.911207	0.977183
C	4.167118	2.904052	2.371306
H	2.262343	2.184804	1.801569

C	6.033596	1.388252	2.241487
C	5.695514	-0.919597	1.453691
H	5.248599	-2.900055	0.732070
C	5.545101	2.638729	2.532702
H	3.779439	3.893052	2.595923
H	7.090388	1.163771	2.360076
H	6.756605	-1.105118	1.594801
H	6.211279	3.421225	2.883478
O	2.692567	-2.663162	0.315011
S	2.883199	-3.167192	-1.266488
O	3.317713	-2.031244	-2.085335
O	3.691015	-4.380760	-1.232196
C	1.176083	-3.538985	-1.561606
C	0.548991	-3.011645	-2.684266
C	0.486340	-4.335828	-0.641899
C	-0.804266	-3.282276	-2.882626
H	1.101467	-2.381120	-3.371248
C	-0.866267	-4.568184	-0.845995
H	0.996775	-4.742204	0.224118
C	-1.533481	-4.043774	-1.965520
H	-1.307110	-2.863815	-3.748553
H	-1.421511	-5.159944	-0.123545
C	-3.005763	-4.298834	-2.155407
H	-3.202286	-5.365435	-2.319281
H	-3.399410	-3.746495	-3.012657
H	-3.570722	-3.989895	-1.269887
C	-4.200552	-1.089667	-1.152703
C	-2.825871	-1.658666	1.228499
C	-4.177698	-1.904214	1.127149
C	-4.877198	-1.611116	-0.066999
H	-5.946667	-1.785992	-0.126071
H	-4.731933	-0.873013	-2.075768
H	-4.717856	-2.305318	1.979035
H	-2.300992	-1.861967	2.154928
H	-2.690502	-0.022595	-3.091562
C	-5.579748	1.670156	-0.675060
C	-4.515844	2.178588	-1.582527
C	-3.231068	2.357905	-1.155606
C	-2.822145	2.028774	0.239854
C	-3.912435	1.646674	1.173271
C	-5.186094	1.462481	0.745419
O	-1.647927	2.092929	0.575340
O	-6.715084	1.478963	-1.078828
Cl	-3.462198	1.464131	2.826137

Cl	-6.466094	1.005786	1.805861
C	-2.219618	2.888498	-2.010903
N	-1.415908	3.342432	-2.717056
C	-4.890240	2.404864	-2.938105
N	-5.173318	2.557854	-4.055624

Compound : TS-A

C	3.719253	-0.770789	-4.581316
C	2.810566	-0.717531	-3.526844
C	3.256971	-0.370263	-2.243267
C	4.615154	-0.098061	-2.025051
C	5.512614	-0.135379	-3.086657
C	5.066021	-0.471301	-4.366212
H	3.373784	-1.050211	-5.572190
H	1.775587	-0.983374	-3.713140
H	4.949133	0.156903	-1.027119
H	6.556401	0.105250	-2.912269
H	5.766846	-0.502897	-5.195545
C	2.371457	-0.261092	-1.057126
O	2.775464	-0.328529	0.094128
N	1.033332	0.003868	-1.318236
H	0.622984	-0.222886	-2.222682
N	0.103974	0.021987	-0.305036
C	0.060419	-0.809811	0.812417
C	-1.410292	-0.727282	1.310234
H	0.745748	0.170347	1.806077
C	-1.569689	-0.802367	2.814801
C	-1.635729	0.334445	3.624523
C	-1.601484	-2.069100	3.409920
C	-1.734399	0.203275	5.008734
H	-1.595378	1.316655	3.173643
C	-1.690624	-2.200244	4.794790
H	-1.543892	-2.955811	2.783647
C	-1.759557	-1.061502	5.598071
H	-1.781785	1.094490	5.627679
H	-1.708137	-3.189226	5.243449
H	-1.830896	-1.159246	6.677510
C	-1.042076	0.810873	-0.438239
C	-1.248953	1.848090	-1.368692
C	-1.969706	0.430792	0.519204
C	-2.459965	2.495724	-1.316532
H	-0.468197	2.142818	-2.059636
C	-3.233899	1.060023	0.553760
C	-3.471556	2.123689	-0.385600

H	-1.882846	-1.631338	0.898841
C	0.673461	-2.165937	0.661875
C	1.694335	-2.708181	1.503590
C	0.169124	-2.963722	-0.357388
C	2.234953	-2.009044	2.612004
C	2.209506	-4.014711	1.204723
C	0.657395	-4.249127	-0.656972
C	3.236257	-2.563478	3.374389
H	1.881849	-1.017859	2.854408
C	3.239834	-4.558018	2.015575
C	1.684155	-4.745486	0.109537
H	0.212421	-4.819194	-1.462982
C	3.746042	-3.848389	3.078034
H	3.653743	-1.991407	4.195893
H	3.621899	-5.546424	1.774198
H	2.090435	-5.730095	-0.104346
H	4.541411	-4.267274	3.687137
O	-1.001688	-2.479082	-0.972108
S	-1.321940	-2.470893	-2.592731
O	-0.438472	-1.497608	-3.253298
O	-1.362013	-3.842191	-3.084150
C	-2.939061	-1.771845	-2.413050
C	-3.211375	-0.531930	-2.983022
C	-3.898007	-2.467577	-1.670623
C	-4.476182	0.022868	-2.797816
H	-2.446628	-0.007320	-3.541895
C	-5.145610	-1.887163	-1.487812
H	-3.663089	-3.433551	-1.237237
C	-5.454652	-0.636304	-2.047554
H	-4.697847	0.994215	-3.228113
H	-5.895971	-2.409264	-0.900770
C	-6.818565	-0.031564	-1.842297
H	-7.586644	-0.612202	-2.367819
H	-6.857902	0.997005	-2.208783
H	-7.080874	-0.019158	-0.779742
C	-4.728415	2.777307	-0.367903
C	-4.270903	0.681811	1.446407
C	-5.482151	1.336529	1.426113
C	-5.712262	2.397506	0.518443
H	-6.669143	2.910916	0.522555
H	-4.902124	3.590612	-1.067790
H	-6.266059	1.043191	2.118347
H	-4.091103	-0.122041	2.151155
H	-2.656989	3.321899	-1.993052

C	2.662603	3.744261	-0.473374
C	3.504029	2.826612	0.311120
C	2.969234	2.001754	1.288983
C	1.566531	2.005015	1.576399
C	0.780003	3.069401	1.012028
C	1.274960	3.873197	0.018587
O	1.034522	1.098188	2.364691
O	3.095334	4.393638	-1.423577
Cl	-0.803284	3.334300	1.678885
Cl	0.332791	5.134732	-0.702519
C	3.808508	1.160803	2.086191
N	4.489177	0.528414	2.783610
C	4.886874	2.769957	-0.015961
N	6.014462	2.684514	-0.292667

Compound: **IM-A**

C	5.030500	3.027679	-2.379199
C	4.024499	2.248277	-1.814881
C	2.739252	2.787320	-1.650668
C	2.462172	4.103945	-2.043919
C	3.471848	4.867601	-2.623324
C	4.752356	4.333786	-2.788463
H	6.029380	2.618614	-2.496005
H	4.255599	1.244332	-1.469639
H	1.455435	4.492275	-1.922646
H	3.257834	5.881094	-2.948167
H	5.536956	4.937448	-3.235598
C	1.656259	2.010801	-1.011527
O	0.783081	2.472114	-0.294720
N	1.672446	0.643001	-1.288685
H	2.446200	0.157832	-1.737529
N	0.936547	-0.179346	-0.457570
C	1.454612	-0.857804	0.546758
C	0.349788	-1.655031	1.194445
H	-0.697644	3.209208	0.665666
C	0.256413	-1.163824	2.640420
C	-0.400452	0.036111	2.930419
C	0.924799	-1.860303	3.651008
C	-0.393556	0.530437	4.233629
H	-0.915550	0.590676	2.153367
C	0.922885	-1.365408	4.954208
H	1.446510	-2.784826	3.417073
C	0.266491	-0.167497	5.245576
H	-0.910189	1.460660	4.444456

H	1.432802	-1.914872	5.740067
H	0.267301	0.217954	6.260853
C	-0.450326	-0.439383	-0.655533
C	-1.289184	0.065298	-1.659813
C	-0.834365	-1.347050	0.312150
C	-2.590019	-0.390642	-1.643870
H	-0.939646	0.781399	-2.393508
C	-2.164463	-1.807520	0.356073
C	-3.060373	-1.296531	-0.647818
H	0.615669	-2.718284	1.180722
C	2.865107	-0.779072	0.935240
C	3.431437	0.386851	1.543919
C	3.676690	-1.860220	0.640235
C	2.654544	1.504536	1.937192
C	4.847505	0.410451	1.770575
C	5.063193	-1.847703	0.880273
C	3.257912	2.616014	2.480763
H	1.581112	1.489422	1.808086
C	5.432631	1.571074	2.338287
C	5.631900	-0.722698	1.428651
H	5.647992	-2.719390	0.608891
C	4.657132	2.656049	2.676728
H	2.647734	3.467876	2.763282
H	6.506522	1.584160	2.502425
H	6.702650	-0.688503	1.608063
H	5.115803	3.541986	3.104613
O	3.101191	-2.988308	0.065431
S	3.021988	-3.033429	-1.629229
O	3.217221	-1.660780	-2.115155
O	3.922071	-4.095436	-2.046286
C	1.320078	-3.486504	-1.791789
C	0.516156	-2.769120	-2.674923
C	0.816166	-4.556763	-1.042898
C	-0.824350	-3.127915	-2.801614
H	0.924680	-1.940887	-3.242298
C	-0.528029	-4.877600	-1.168885
H	1.461029	-5.110657	-0.369317
C	-1.369822	-4.169803	-2.045798
H	-1.460280	-2.566108	-3.476828
H	-0.939848	-5.690523	-0.577588
C	-2.826290	-4.531212	-2.151231
H	-2.947918	-5.572715	-2.471543
H	-3.348417	-3.889104	-2.864046
H	-3.321049	-4.422869	-1.180565

C	-4.421903	-1.691903	-0.610941
C	-2.645956	-2.720476	1.327666
C	-3.969817	-3.098459	1.318291
C	-4.862626	-2.571111	0.353363
H	-5.912449	-2.843937	0.390999
H	-5.115548	-1.220612	-1.301071
H	-4.340855	-3.786303	2.072513
H	-1.967229	-3.093528	2.088789
H	-3.296358	-0.043347	-2.388557
C	-4.808534	1.637659	-0.970798
C	-3.779929	2.449606	-1.578512
C	-2.685556	2.969761	-0.836813
C	-2.543693	2.713454	0.531101
C	-3.596681	2.033352	1.184976
C	-4.692848	1.555466	0.486954
O	-1.459423	3.101259	1.265085
O	-5.680663	1.021867	-1.620611
Cl	-3.463889	1.811558	2.918200
Cl	-5.981429	0.728264	1.307295
C	-1.688428	3.745671	-1.496522
N	-0.867481	4.390087	-2.013380
C	-3.771001	2.546387	-2.993417
N	-3.708966	2.575898	-4.158239

Compound: **5a**

C	5.496418	-1.517298	0.861744
C	4.156705	-1.396768	0.496484
C	3.695742	-2.006596	-0.678812
C	4.589291	-2.720294	-1.487297
C	5.922998	-2.847910	-1.113044
C	6.378344	-2.246476	0.063558
H	5.850352	-1.033901	1.767504
H	3.493703	-0.800515	1.114152
H	4.216799	-3.157991	-2.407397
H	6.610435	-3.409484	-1.739054
H	7.421381	-2.340413	0.352797
C	2.295545	-1.843849	-1.168725
O	1.984863	-1.914652	-2.347028
N	1.348069	-1.616492	-0.176958
H	1.612545	-1.532545	0.800568
N	0.214322	-0.898914	-0.490043
C	0.097578	0.480825	-0.317756
C	-1.186395	0.853421	-0.675293
C	-1.653392	2.253028	-0.743414

C	-2.145939	2.770401	-1.953129
C	-1.572286	3.106034	0.366216
C	-2.559038	4.097094	-2.045397
H	-2.200368	2.119951	-2.821099
C	-1.979707	4.436858	0.270972
H	-1.191471	2.719138	1.303462
C	-2.477694	4.936679	-0.931975
H	-2.936822	4.478779	-2.989995
H	-1.910080	5.082666	1.142221
H	-2.797245	5.972511	-1.004199
C	-0.969619	-1.419099	-0.953480
C	-1.271418	-2.757817	-1.271615
C	-1.883565	-0.352252	-1.068916
C	-2.545288	-3.031023	-1.695984
H	-0.507149	-3.522890	-1.193393
C	-3.233121	-0.647828	-1.456613
C	-3.544832	-2.009807	-1.789005
C	1.279825	1.244300	0.122988
C	2.350599	1.512074	-0.791012
C	1.441478	1.610598	1.444660
C	2.256223	1.184204	-2.167762
C	3.559103	2.109200	-0.304880
C	2.616599	2.220552	1.931010
C	3.317506	1.407137	-3.014805
H	1.345526	0.731311	-2.540201
C	4.631207	2.329177	-1.206700
C	3.659037	2.453856	1.068252
H	2.669433	2.479392	2.982801
C	4.516870	1.980200	-2.532464
H	3.234195	1.133331	-4.061929
H	5.546905	2.775090	-0.827467
H	4.577237	2.908034	1.430387
H	5.347057	2.144792	-3.213041
O	0.400743	1.423613	2.359383
S	0.277085	-0.034689	3.166784
O	1.315145	-0.937042	2.649196
O	0.247689	0.310169	4.580315
C	-1.315136	-0.581124	2.617421
C	-1.459506	-1.894476	2.181194
C	-2.403856	0.294424	2.675586
C	-2.724425	-2.338902	1.800590
H	-0.599270	-2.551201	2.127963
C	-3.648540	-0.164403	2.270568
H	-2.273079	1.315598	3.014504

C	-3.830917	-1.486915	1.831804
H	-2.842237	-3.355184	1.440158
H	-4.496711	0.514181	2.285695
C	-5.192425	-1.959781	1.398716
H	-5.572967	-1.342906	0.578808
H	-5.910674	-1.895999	2.225384
H	-5.162694	-2.995211	1.050477
C	-4.863199	-2.332719	-2.193786
C	-4.277654	0.307837	-1.491319
C	-5.555572	-0.044900	-1.879286
C	-5.852716	-1.373937	-2.247301
H	-6.858347	-1.640973	-2.559205
H	-5.084796	-3.364426	-2.456783
H	-6.337625	0.709233	-1.899680
H	-4.067552	1.329383	-1.202311
H	-2.823080	-4.045902	-1.967542

Compound: (sp)-Ts-3a

C	0.897197	-5.669103	-0.519383
C	0.890888	-4.278267	-0.622222
C	2.086174	-3.561799	-0.486207
C	3.278922	-4.244512	-0.222863
C	3.285322	-5.633490	-0.136903
C	2.093661	-6.348230	-0.288029
H	-0.034654	-6.219770	-0.608894
H	-0.050765	-3.751832	-0.743198
H	4.188431	-3.668785	-0.086659
H	4.216311	-6.160130	0.052488
H	2.097442	-7.432228	-0.215366
C	2.122536	-2.068434	-0.531489
O	2.858306	-1.402089	0.184887
N	1.287132	-1.487012	-1.467540
H	0.643883	-2.065452	-1.989466
N	0.906800	-0.152912	-1.361185
C	0.110156	0.165802	-0.137341
C	0.618381	1.574156	0.342292
H	0.383459	-0.561332	0.623201
C	1.070302	1.525079	1.791463
C	2.390018	1.203464	2.130905
C	0.138023	1.737499	2.812778
C	2.771009	1.116212	3.469573
H	3.107253	1.005470	1.343072
C	0.513964	1.632088	4.152186
H	-0.894345	1.959214	2.556798

C	1.834631	1.326709	4.484550
H	3.801436	0.877481	3.719740
H	-0.226423	1.782085	4.932338
H	2.130839	1.248627	5.526893
C	1.891374	0.837992	-1.533210
C	2.894582	0.847650	-2.525747
C	1.716527	1.884986	-0.653074
C	3.707747	1.953507	-2.614064
H	3.013588	-0.003184	-3.188028
C	2.526913	3.041741	-0.738913
C	3.548911	3.072292	-1.748237
H	-0.198129	2.300007	0.268600
C	-1.372555	0.034492	-0.401173
C	-2.104058	0.946800	-1.233124
C	-2.065876	-1.023192	0.156079
C	-1.478533	1.986920	-1.974446
C	-3.527512	0.805824	-1.347240
C	-3.464347	-1.185267	0.036389
C	-2.219120	2.855476	-2.745675
H	-0.401654	2.089691	-1.958953
C	-4.260226	1.723832	-2.142680
C	-4.181532	-0.265477	-0.682467
H	-3.936096	-2.033998	0.519082
C	-3.624404	2.734497	-2.825284
H	-1.713050	3.637397	-3.304577
H	-5.338745	1.604747	-2.208447
H	-5.259789	-0.361337	-0.775802
H	-4.195520	3.430056	-3.433245
O	-1.339133	-2.029158	0.799914
S	-1.582553	-2.250484	2.455161
O	-1.768980	-0.930389	3.049307
O	-2.592387	-3.294976	2.609195
C	0.026564	-2.893616	2.804056
C	1.070060	-1.995408	3.029939
C	0.236047	-4.271017	2.752939
C	2.355144	-2.499190	3.183257
H	0.883020	-0.930297	3.071528
C	1.529844	-4.752064	2.926204
H	-0.595871	-4.941461	2.570978
C	2.604570	-3.877095	3.128543
H	3.176192	-1.803844	3.321479
H	1.713006	-5.820587	2.870517
C	4.008580	-4.400388	3.287887
H	4.090962	-5.434394	2.941098

H	4.323323	-4.372474	4.338910
H	4.718430	-3.790764	2.718993
C	4.376865	4.218914	-1.848403
C	2.387607	4.155907	0.129996
C	3.211248	5.252012	0.002126
C	4.214285	5.288041	-0.995624
H	4.855958	6.159971	-1.083835
H	5.147702	4.238410	-2.615286
H	3.093155	6.097391	0.674363
H	1.628770	4.126864	0.905337
H	4.493257	1.989066	-3.364682

Compound: Complex-B

C	-0.717516	-2.997505	4.979521
C	0.196230	-2.392789	4.117469
C	0.022784	-1.056454	3.731553
C	-1.052783	-0.328350	4.257880
C	-1.963578	-0.931771	5.119638
C	-1.803135	-2.273688	5.474548
H	-0.580070	-4.036715	5.262370
H	1.030689	-2.976600	3.748165
H	-1.151096	0.710692	3.969131
H	-2.795593	-0.357458	5.517408
H	-2.515612	-2.750662	6.141461
C	0.891141	-0.342787	2.738707
O	0.755773	0.853081	2.505969
N	1.889753	-1.097922	2.149937
H	1.750833	-2.095431	2.048747
N	2.664706	-0.559943	1.122430
C	2.005261	-0.467677	-0.216601
C	2.434563	0.939043	-0.791200
H	0.929746	-0.471168	-0.061953
C	1.240849	1.799148	-1.157113
C	0.645180	2.655435	-0.217620
C	0.712754	1.738194	-2.452508
C	-0.439253	3.451099	-0.577942
H	1.030824	2.678351	0.794429
C	-0.388146	2.514502	-2.808163
H	1.160581	1.068364	-3.181486
C	-0.969590	3.375714	-1.868048
H	-0.882479	4.119409	0.153877
H	-0.785094	2.460480	-3.817954
H	-1.819422	3.992752	-2.147644
C	3.333557	0.644537	1.391923

C	4.039180	0.952904	2.575892
C	3.301515	1.502881	0.313578
C	4.715862	2.148065	2.634609
H	4.031028	0.259416	3.409682
C	4.011055	2.726236	0.340120
C	4.732328	3.056351	1.538161
H	3.020991	0.780291	-1.702734
C	2.366525	-1.635958	-1.114458
C	3.705388	-1.879364	-1.580056
C	1.376788	-2.492921	-1.558703
C	4.825195	-1.114944	-1.151128
C	3.947762	-2.946799	-2.508899
C	1.598109	-3.536076	-2.484832
C	6.092820	-1.376375	-1.622452
H	4.695134	-0.320801	-0.430716
C	5.265328	-3.187323	-2.976538
C	2.866615	-3.751418	-2.952671
H	0.757306	-4.139605	-2.801451
C	6.321308	-2.418379	-2.547735
H	6.925807	-0.774043	-1.271487
H	5.421725	-3.999337	-3.681978
H	3.059980	-4.544571	-3.669364
H	7.326061	-2.612370	-2.911614
O	0.055333	-2.299574	-1.116953
S	-0.545642	-3.433917	-0.063358
O	-0.712176	-4.700876	-0.768929
O	0.243635	-3.392452	1.171476
C	-2.122837	-2.661892	0.181123
C	-3.021178	-2.630612	-0.886482
C	-2.422725	-2.082061	1.410283
C	-4.230291	-1.964553	-0.717700
H	-2.766209	-3.094311	-1.832507
C	-3.646200	-1.434112	1.562858
H	-1.711000	-2.122989	2.223102
C	-4.559742	-1.353467	0.504790
H	-4.932322	-1.916023	-1.545848
H	-3.878196	-0.967987	2.515383
C	-5.878808	-0.645022	0.675678
H	-5.812642	0.149093	1.424957
H	-6.656058	-1.345877	1.005913
H	-6.225564	-0.202195	-0.263654
C	5.439043	4.283561	1.594999
C	4.029819	3.642386	-0.744636
C	4.727273	4.826410	-0.651473

C	5.439545	5.153043	0.526524
H	5.985511	6.090171	0.584426
H	5.984055	4.528135	2.503680
H	4.732248	5.517323	-1.490029
H	3.480920	3.401286	-1.649586
H	5.262073	2.416672	3.535193
C	-2.231899	0.787595	-0.705673
C	-2.705256	0.563901	-2.105800
C	-3.881093	1.087684	-2.546507
C	-4.732059	1.944099	-1.669185
C	-4.226298	2.211302	-0.295655
C	-3.068844	1.672649	0.154966
O	-5.795523	2.381603	-2.070760
O	-1.233930	0.236422	-0.288547
Cl	-5.227561	3.219161	0.679232
Cl	-2.478189	1.913059	1.745506
C	-4.373398	0.834554	-3.859592
N	-4.767649	0.615105	-4.930918
C	-1.909938	-0.290421	-2.925164
N	-1.284851	-0.998162	-3.602095

Compound: **TS-B**

C	-5.312684	2.850365	2.512945
C	-4.456801	1.817157	2.141990
C	-3.172023	1.740765	2.695665
C	-2.761953	2.696020	3.635622
C	-3.617209	3.731587	3.997712
C	-4.892834	3.811536	3.434318
H	-6.307811	2.905704	2.082490
H	-4.796826	1.066484	1.436513
H	-1.771092	2.606613	4.068164
H	-3.291626	4.475248	4.718792
H	-5.561290	4.619791	3.716294
C	-2.191776	0.678656	2.347266
O	-1.229585	0.398002	3.040167
N	-2.505533	-0.034022	1.172083
H	-2.888149	0.530845	0.413952
N	-1.633288	-0.985906	0.694011
C	-1.136202	-0.962589	-0.608691
C	-0.415292	-2.318343	-0.803001
H	0.040039	0.015239	-0.465870
C	0.978227	-2.179613	-1.417211
C	2.145497	-2.393883	-0.677156
C	1.083368	-1.839851	-2.771221

C	3.395467	-2.304064	-1.290437
H	2.080496	-2.636847	0.376865
C	2.333059	-1.734734	-3.379428
H	0.183627	-1.650916	-3.350551
C	3.493866	-1.975846	-2.641576
H	4.292464	-2.466334	-0.700485
H	2.399295	-1.451606	-4.424966
H	4.467754	-1.883299	-3.112083
C	-1.240366	-2.119521	1.411449
C	-1.554740	-2.468635	2.743829
C	-0.507030	-2.944877	0.567701
C	-1.092070	-3.677877	3.201290
H	-2.116970	-1.803375	3.381834
C	-0.051704	-4.204121	1.018605
C	-0.342854	-4.567014	2.378549
H	-1.010987	-2.914980	-1.507253
C	-2.079244	-0.477829	-1.681484
C	-3.162202	-1.345498	-2.083729
C	-1.954441	0.740915	-2.329496
C	-3.491984	-2.545520	-1.394095
C	-3.979458	-0.977293	-3.203306
C	-2.757299	1.102859	-3.436823
C	-4.533941	-3.345489	-1.810677
H	-2.946504	-2.834106	-0.505113
C	-5.033901	-1.831828	-3.614854
C	-3.734192	0.249173	-3.873140
H	-2.571148	2.058014	-3.912076
C	-5.307048	-2.998332	-2.939659
H	-4.764858	-4.250616	-1.256762
H	-5.631537	-1.535937	-4.472847
H	-4.348309	0.511829	-4.729765
H	-6.119728	-3.642511	-3.260854
O	-0.997250	1.646807	-1.908651
S	-1.593528	3.042966	-1.171994
O	-1.974196	3.977201	-2.225093
O	-2.592665	2.594786	-0.193046
C	-0.110451	3.557049	-0.368150
C	0.934323	4.056206	-1.146931
C	0.028496	3.339795	1.001680
C	2.158894	4.297121	-0.533583
H	0.803373	4.210404	-2.211314
C	1.258996	3.598369	1.594449
H	-0.798627	2.951369	1.580493
C	2.347634	4.047451	0.834302

H	2.991575	4.654096	-1.132624
H	1.387354	3.409455	2.656118
C	3.710223	4.200512	1.457577
H	3.642269	4.413687	2.528465
H	4.285743	4.998295	0.978542
H	4.283722	3.271411	1.344256
C	0.105902	-5.820034	2.862000
C	0.647067	-5.126928	0.193886
C	1.062554	-6.337940	0.699147
C	0.797284	-6.686939	2.044275
H	1.136255	-7.644315	2.428312
H	-0.109072	-6.088290	3.892947
H	1.599951	-7.032612	0.060569
H	0.859849	-4.861994	-0.835537
H	-1.305217	-3.979037	4.222916
C	2.023639	0.636340	-0.082418
C	2.793187	1.008526	-1.222092
C	4.181903	0.980621	-1.190175
C	4.928169	0.561373	0.005337
C	4.088967	0.163633	1.148082
C	2.719036	0.181141	1.088862
O	6.159721	0.536280	0.035529
O	0.726293	0.791499	-0.061938
Cl	4.936058	-0.355061	2.565258
Cl	1.726133	-0.334493	2.411168
C	4.943371	1.328028	-2.339197
N	5.550195	1.604213	-3.293483
C	2.117777	1.389443	-2.421517
N	1.597681	1.698057	-3.414248

Compound: **IM-B**

C	4.520699	-3.605930	3.652153
C	3.857227	-2.512583	3.099461
C	2.458492	-2.513891	3.016200
C	1.729807	-3.607835	3.501787
C	2.396293	-4.697578	4.048805
C	3.792158	-4.699442	4.122113
H	5.604128	-3.600823	3.722257
H	4.425768	-1.651004	2.763814
H	0.648456	-3.589813	3.428709
H	1.830542	-5.548663	4.414944
H	4.311201	-5.552153	4.549857
C	1.688746	-1.385231	2.443448
O	0.522343	-1.144781	2.678273

N	2.477825	-0.523528	1.630274
H	3.091283	-0.988137	0.965026
N	1.905743	0.600347	1.068075
C	2.043241	0.939423	-0.199657
C	1.543235	2.363480	-0.385050
H	-0.342628	-0.263330	-0.665861
C	0.575658	2.532536	-1.557725
C	-0.784145	2.777162	-1.352928
C	1.071163	2.438424	-2.863125
C	-1.642886	2.907691	-2.443732
H	-1.177944	2.846240	-0.347408
C	0.208032	2.556033	-3.950205
H	2.129682	2.265584	-3.032714
C	-1.151888	2.787629	-3.742897
H	-2.701502	3.072380	-2.269819
H	0.598393	2.460278	-4.958692
H	-1.827213	2.863287	-4.589268
C	1.334133	1.652550	1.853563
C	1.110254	1.683606	3.240668
C	1.082505	2.713220	1.006795
C	0.582980	2.846275	3.751623
H	1.307531	0.830613	3.872514
C	0.563499	3.923743	1.521460
C	0.293781	3.973333	2.931399
H	2.430267	2.972077	-0.620343
C	2.724544	0.138556	-1.223249
C	3.960242	0.633585	-1.769390
C	2.114530	-0.968868	-1.807660
C	4.704151	1.678813	-1.161792
C	4.489337	0.021349	-2.948462
C	2.627660	-1.550596	-2.990057
C	5.885753	2.121564	-1.715957
H	4.360595	2.114794	-0.229077
C	5.703658	0.505167	-3.497748
C	3.780602	-1.055074	-3.542823
H	2.077445	-2.359044	-3.449006
C	6.387278	1.540220	-2.901731
H	6.440846	2.918433	-1.230351
H	6.087338	0.034821	-4.398819
H	4.164507	-1.488526	-4.461777
H	7.316487	1.902139	-3.330326
O	0.930248	-1.411706	-1.268366
S	0.731469	-3.095697	-0.871585
O	1.086038	-3.868674	-2.054300

O	1.502591	-3.243660	0.362509
C	-0.995850	-3.121560	-0.592084
C	-1.829609	-3.518399	-1.647955
C	-1.510620	-2.754378	0.655990
C	-3.197591	-3.571054	-1.429492
H	-1.407406	-3.769399	-2.613100
C	-2.886843	-2.813347	0.842309
H	-0.860048	-2.411233	1.451001
C	-3.752329	-3.224767	-0.184075
H	-3.855286	-3.854148	-2.244897
H	-3.301357	-2.519464	1.801573
C	-5.238373	-3.291717	0.034471
H	-5.475998	-3.387961	1.098157
H	-5.672717	-4.142849	-0.499737
H	-5.738182	-2.383938	-0.330220
C	-0.245881	5.164370	3.478313
C	0.311998	5.071130	0.724856
C	-0.207756	6.211051	1.294474
C	-0.494357	6.257487	2.679300
H	-0.912114	7.162089	3.110534
H	-0.462233	5.198351	4.542427
H	-0.405594	7.081329	0.676191
H	0.514979	5.032778	-0.339592
H	0.374197	2.915255	4.814932
C	-2.136245	0.237336	-0.217034
C	-2.684948	-0.157117	-1.439813
C	-4.086686	-0.275670	-1.604388
C	-5.019500	0.032440	-0.540102
C	-4.377838	0.562369	0.668185
C	-3.006035	0.643900	0.816650
O	-6.245958	-0.168843	-0.620822
O	-0.795434	0.248865	0.028104
Cl	-5.446414	1.008680	1.961779
Cl	-2.265482	1.218429	2.295346
C	-4.603156	-0.830773	-2.802414
N	-4.988824	-1.333572	-3.781701
C	-1.800998	-0.458059	-2.517292
N	-1.037890	-0.683635	-3.368217

Compound: ent-5a

C	-5.765112	-1.375967	-1.173092
C	-4.380379	-1.244195	-1.085638
C	-3.570229	-2.386491	-1.019310
C	-4.160477	-3.656158	-1.019712

C	-5.542559	-3.784415	-1.117154
C	-6.346530	-2.644330	-1.197475
H	-6.389063	-0.487938	-1.210291
H	-3.944660	-0.251954	-1.018767
H	-3.518045	-4.526455	-0.938379
H	-5.995463	-4.771434	-1.125146
H	-7.425833	-2.744976	-1.267711
C	-2.085464	-2.309939	-0.882684
O	-1.416625	-3.171257	-0.333192
N	-1.509728	-1.216404	-1.508571
H	-2.098030	-0.548955	-1.988178
N	-0.283308	-0.717192	-1.126131
C	-0.134113	0.546647	-0.559848
C	1.215717	0.861210	-0.543895
C	1.731062	2.162300	-0.076334
C	1.283155	2.722684	1.130184
C	2.606791	2.912103	-0.879293
C	1.712543	3.988333	1.526505
H	0.589836	2.172553	1.756004
C	3.039267	4.174137	-0.478401
H	2.940650	2.499186	-1.826688
C	2.594496	4.717418	0.728485
H	1.354073	4.403040	2.464519
H	3.716695	4.737621	-1.114316
H	2.929117	5.702731	1.040611
C	0.948263	-1.217163	-1.492753
C	1.244924	-2.451839	-2.101889
C	1.920094	-0.268796	-1.110483
C	2.565128	-2.735082	-2.336690
H	0.450288	-3.145486	-2.349179
C	3.305198	-0.602461	-1.285363
C	3.611369	-1.841680	-1.942434
C	-1.310459	1.313051	-0.123916
C	-1.664624	2.560944	-0.734146
C	-2.106935	0.823946	0.898145
C	-0.925413	3.114097	-1.812481
C	-2.807576	3.276088	-0.247979
C	-3.242497	1.515017	1.368821
C	-1.282265	4.323199	-2.363813
H	-0.065769	2.572981	-2.188291
C	-3.147641	4.519989	-0.840783
C	-3.579409	2.721899	0.806874
H	-3.818476	1.075208	2.175267
C	-2.400073	5.037721	-1.872649

H	-0.699553	4.733788	-3.183169
H	-4.012886	5.056581	-0.460155
H	-4.445154	3.270493	1.167414
H	-2.667265	5.992763	-2.315409
O	-1.816571	-0.416394	1.452507
S	-0.942066	-0.458723	2.903060
O	-0.763040	0.923319	3.348108
O	-1.659694	-1.433930	3.710657
C	0.615564	-1.124641	2.382579
C	1.781304	-0.400083	2.637893
C	0.649125	-2.382916	1.784466
C	3.003244	-0.960193	2.283446
H	1.726084	0.579205	3.096406
C	1.884205	-2.915727	1.429285
H	-0.264613	-2.920739	1.568849
C	3.075091	-2.224654	1.681835
H	3.917601	-0.402959	2.466233
H	1.919169	-3.881803	0.935514
C	4.409277	-2.828332	1.332160
H	4.299082	-3.646295	0.615737
H	4.900114	-3.229133	2.228795
H	5.076556	-2.082528	0.892131
C	4.967531	-2.185029	-2.165116
C	4.381214	0.193425	-0.822649
C	5.692648	-0.176964	-1.047253
C	5.993470	-1.369093	-1.738621
H	7.027541	-1.649130	-1.917677
H	5.186341	-3.120009	-2.675483
H	6.498229	0.455152	-0.683690
H	4.168326	1.101670	-0.274481
H	2.843288	-3.670700	-2.814109

Compound: DDQ

C	0.119051	1.458699	0.000379
C	1.401252	0.679025	0.000092
C	1.401254	-0.679023	0.000018
C	0.119054	-1.458697	-0.000113
C	-1.153971	-0.677380	-0.000002
C	-1.153971	0.677380	0.000087
O	0.138349	-2.672131	0.000263
O	0.138346	2.672132	-0.000253
Cl	-2.592469	-1.613560	-0.000111
Cl	-2.592473	1.613556	0.000005
C	2.605394	-1.441238	-0.000055

N	3.590695	-2.057592	-0.000135
C	2.605391	1.441241	0.000033
N	3.590693	2.057594	0.000005

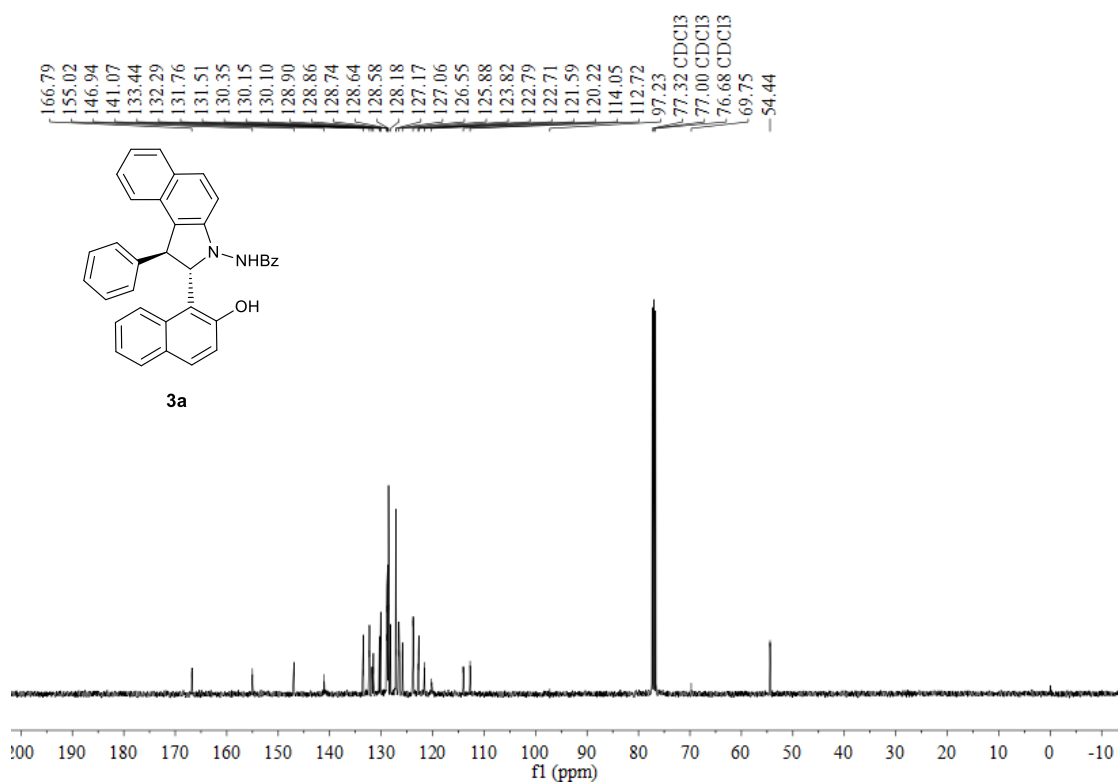
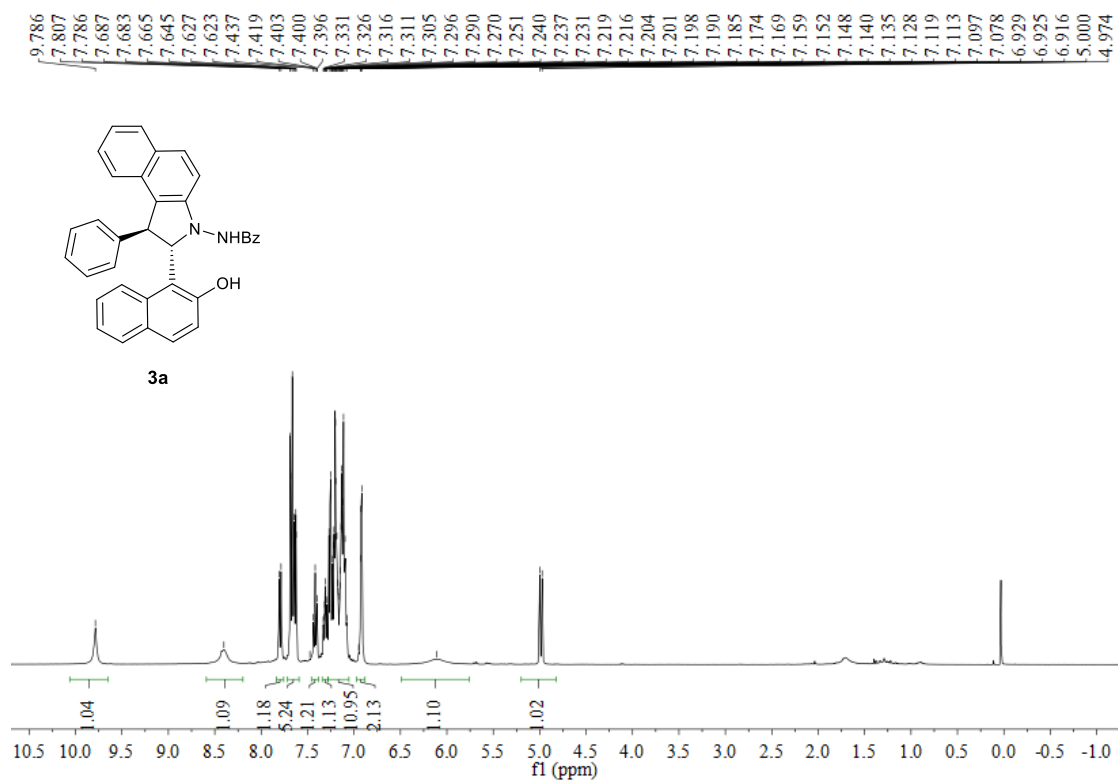
Compound: DDQH₂

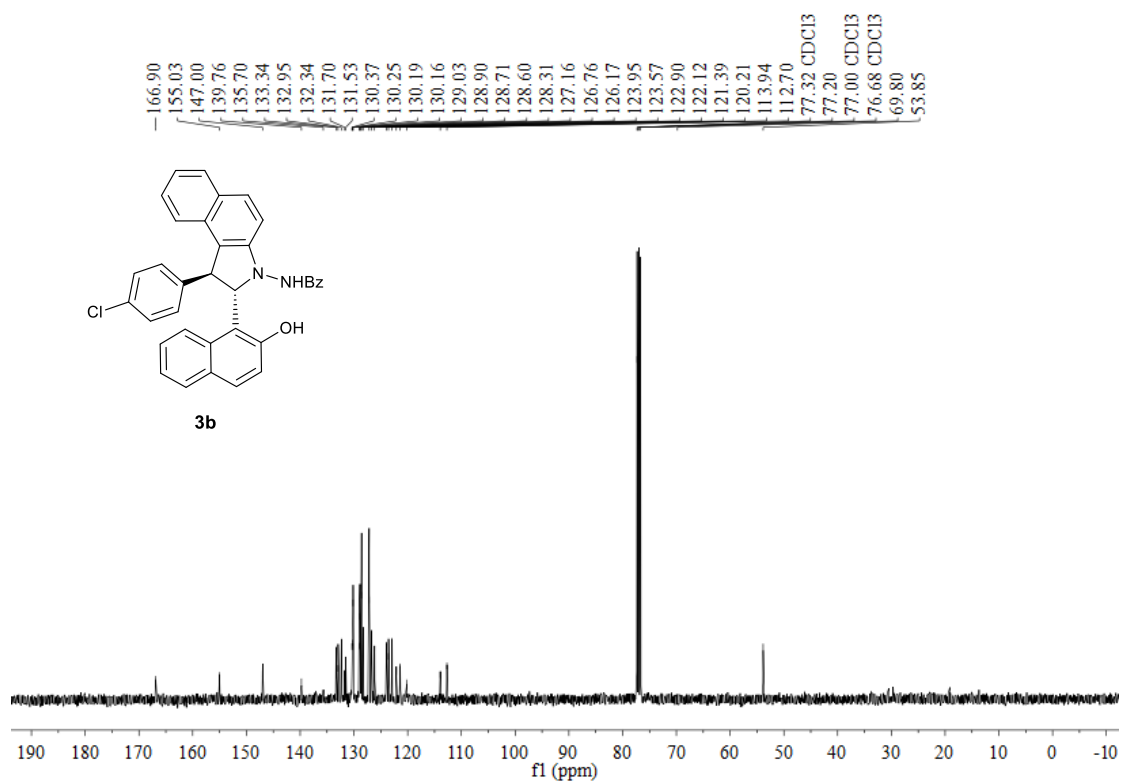
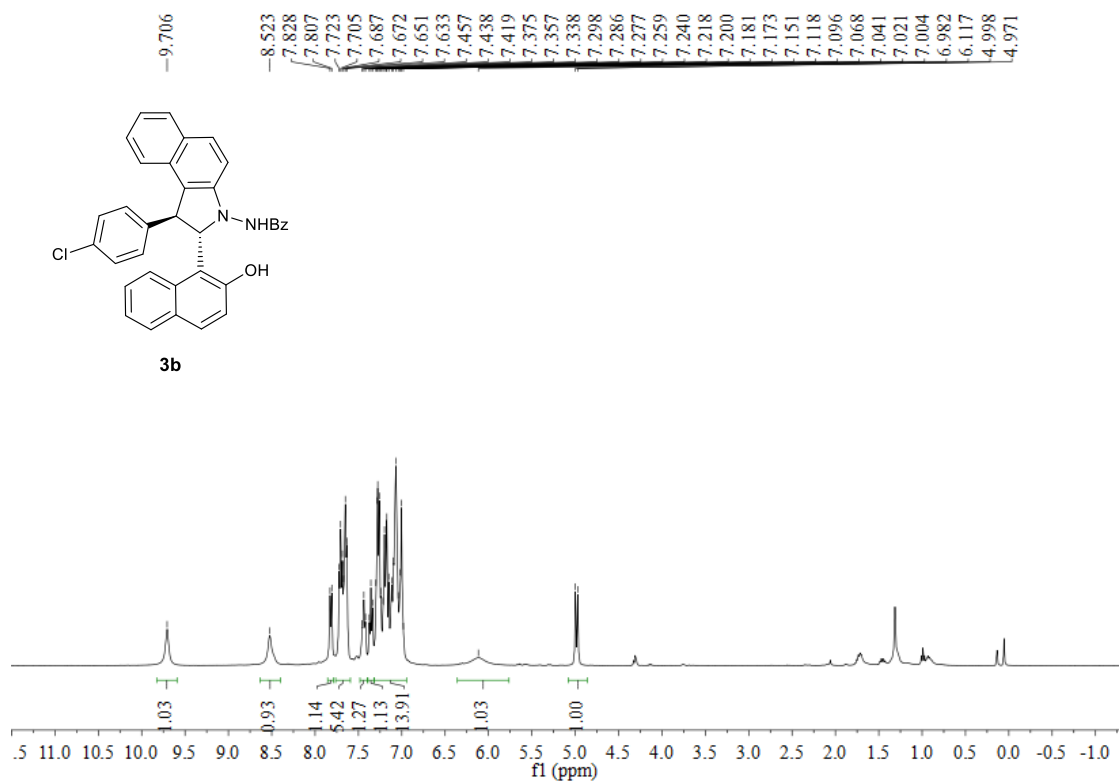
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C	0.130294	-1.418173	-0.000033
C	1.340928	-0.706006	-0.000020
C	1.340928	0.706006	0.000021
C	0.130294	1.418173	0.000027
C	-1.075467	0.698431	0.000012
O	0.192108	2.763544	0.000047
H	-0.708264	3.132783	0.000053
O	0.192108	-2.763544	-0.000073
H	-0.708263	-3.132783	0.000012
Cl	-2.566544	1.599487	0.000030
Cl	-2.566543	-1.599488	-0.000030
C	2.570468	1.430513	0.000068
N	3.572186	2.019690	-0.000074
C	2.570468	-1.430513	-0.000056
N	3.572186	-2.019690	0.000094

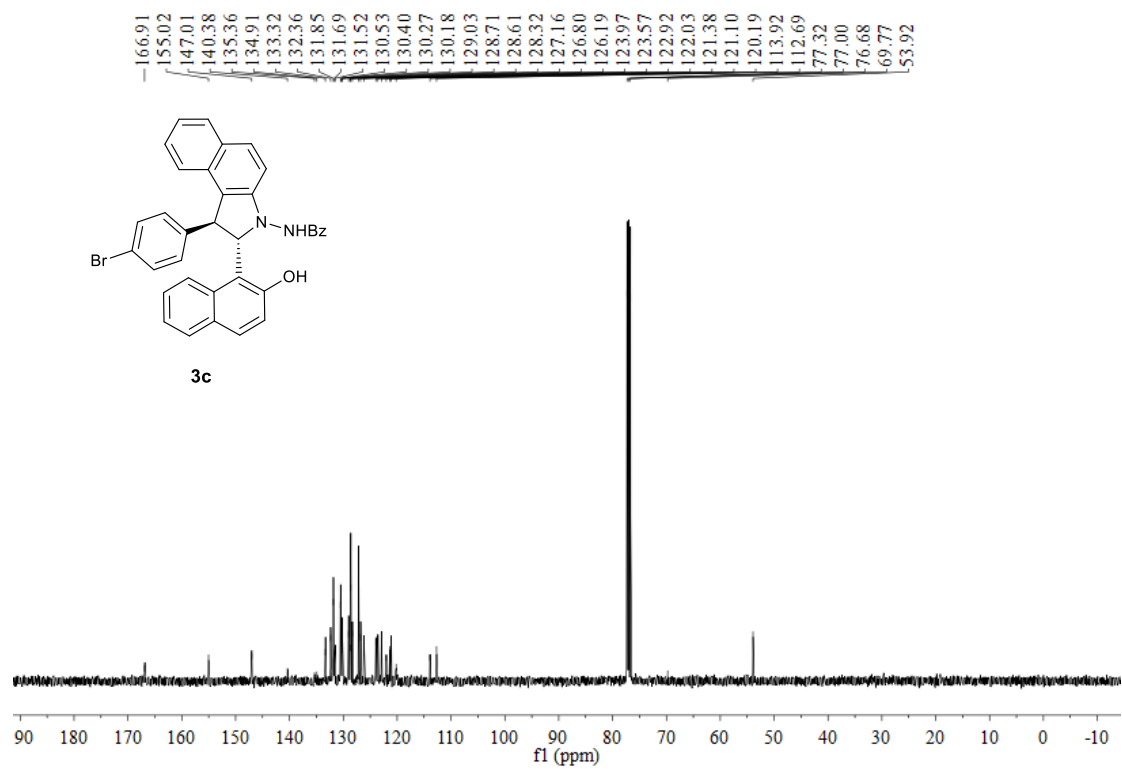
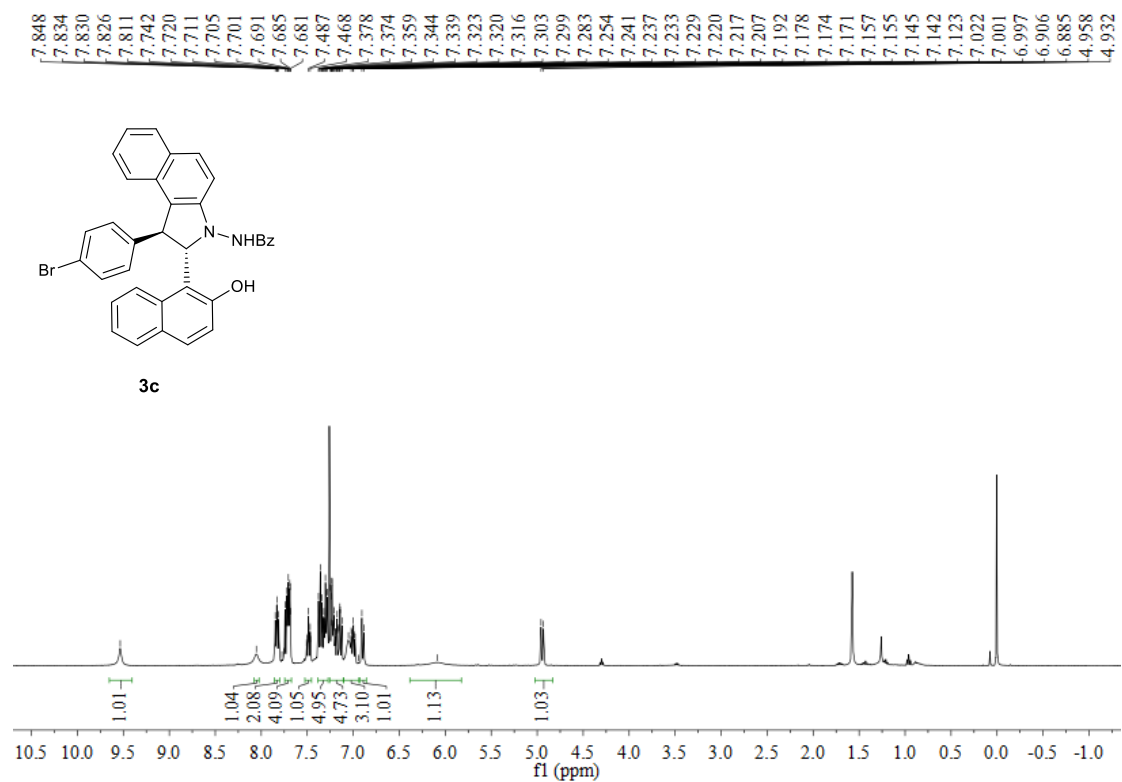
13. Reference

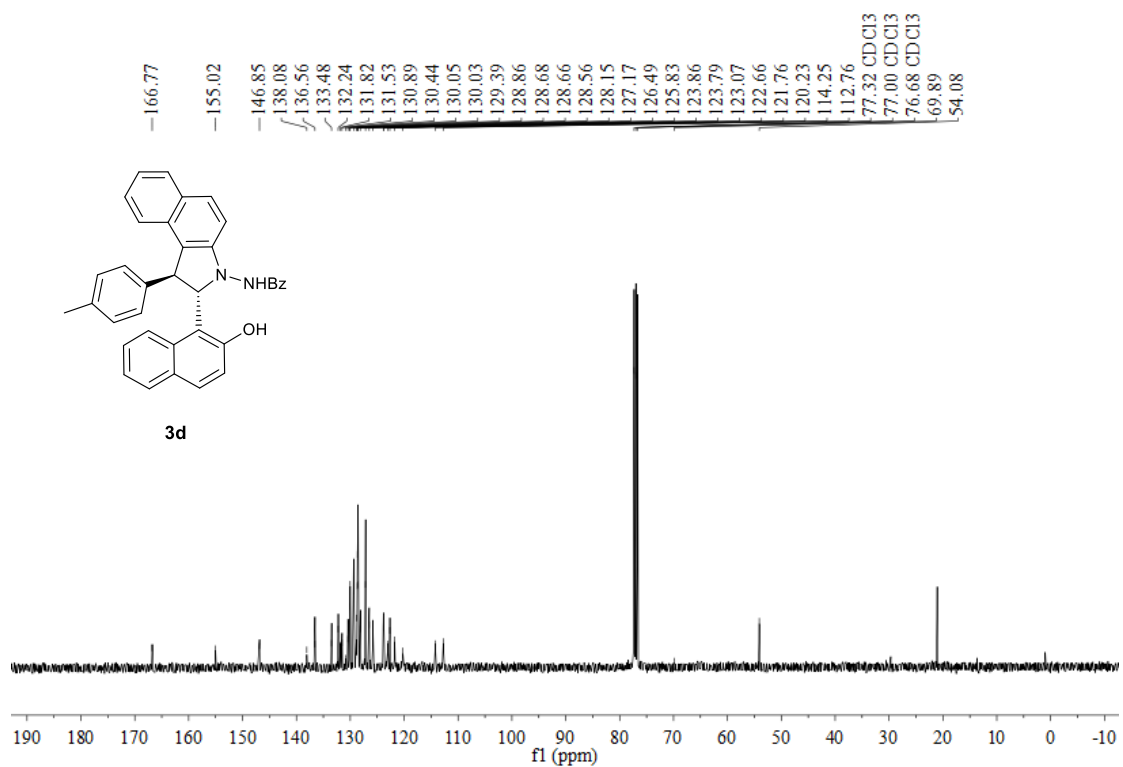
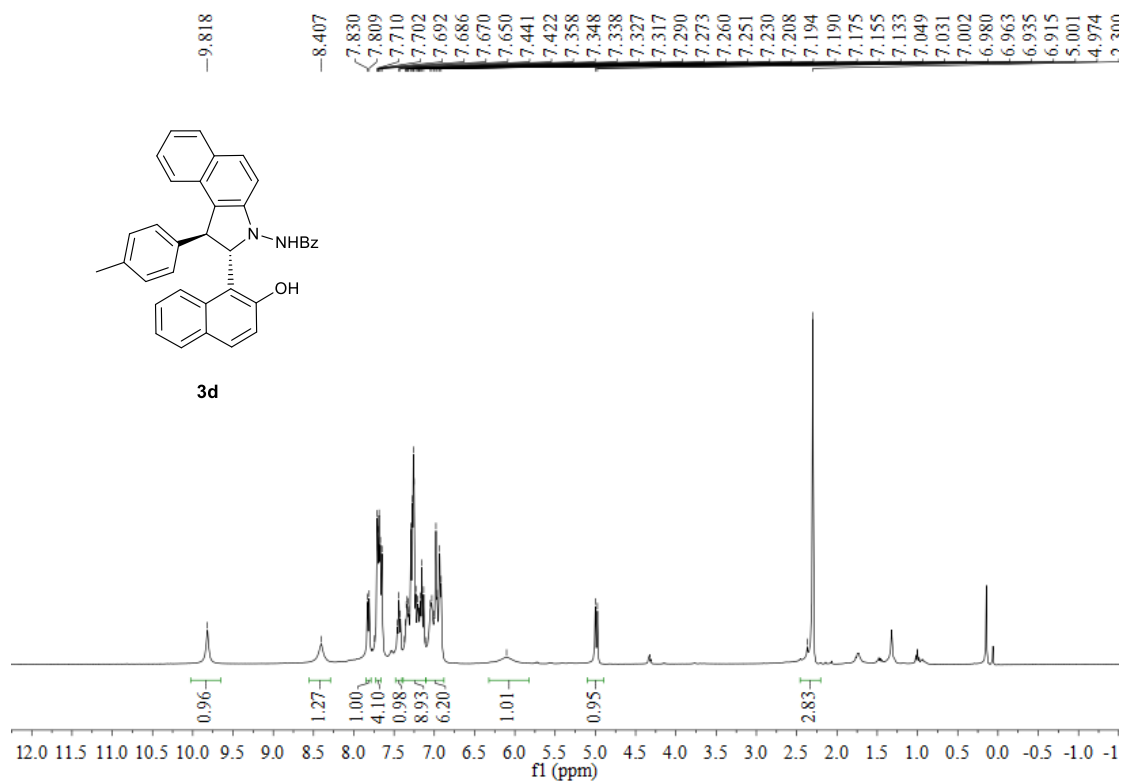
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- (2) Z. Xie, B. Oscar, L. Zhao, X. Ding, C. Cao, S. Feng, H. Li, C. Pan, Z. Bian, Y. Li, W. Wang, Y. Kong, Z. Li, *Eur. J. Med. Chem.* **2017**, *125*, 197.
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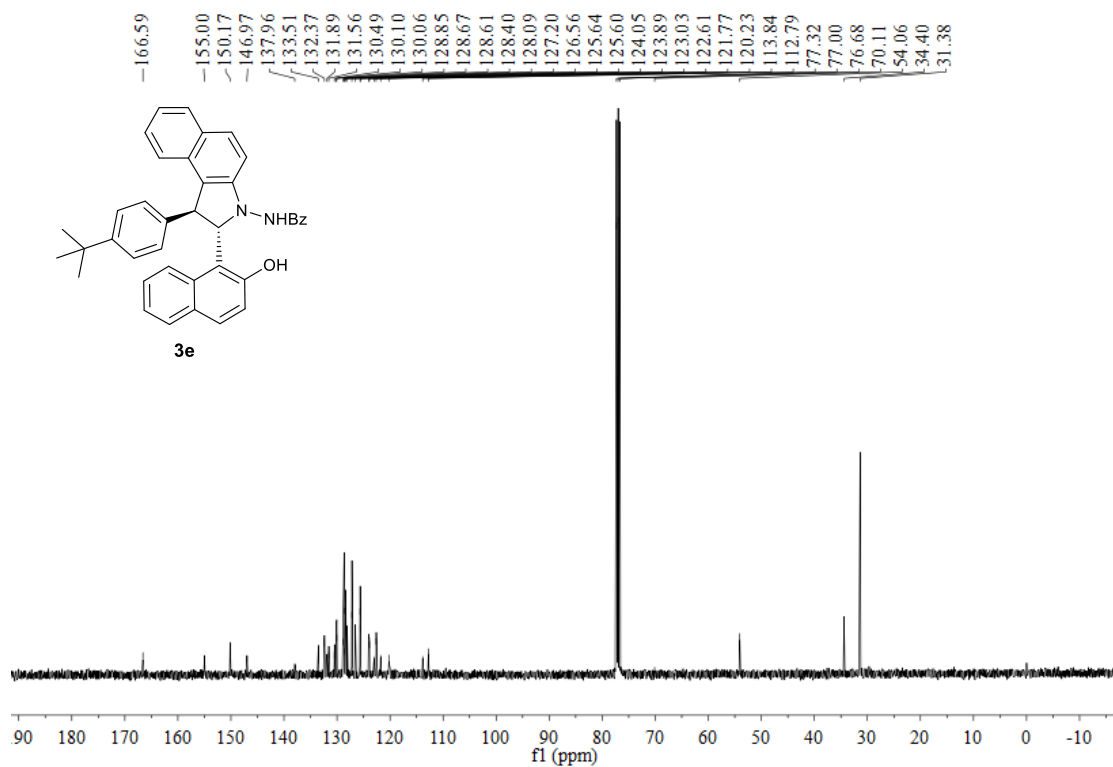
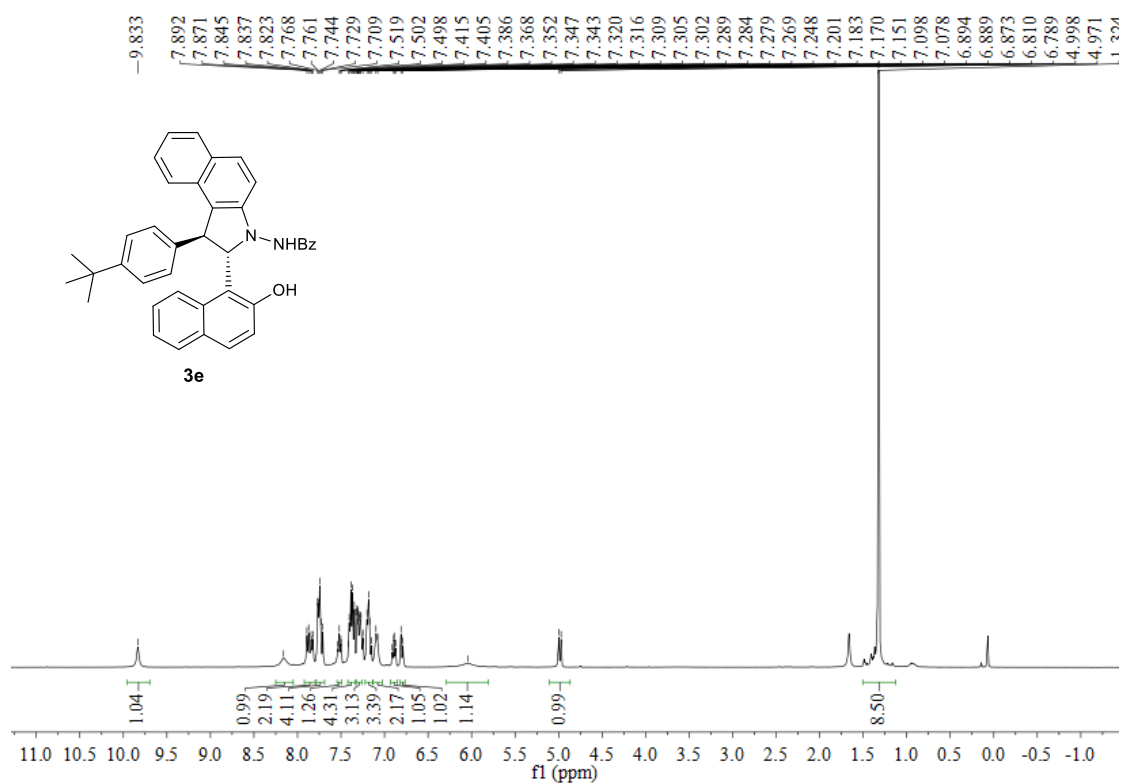
14. NMR spectra

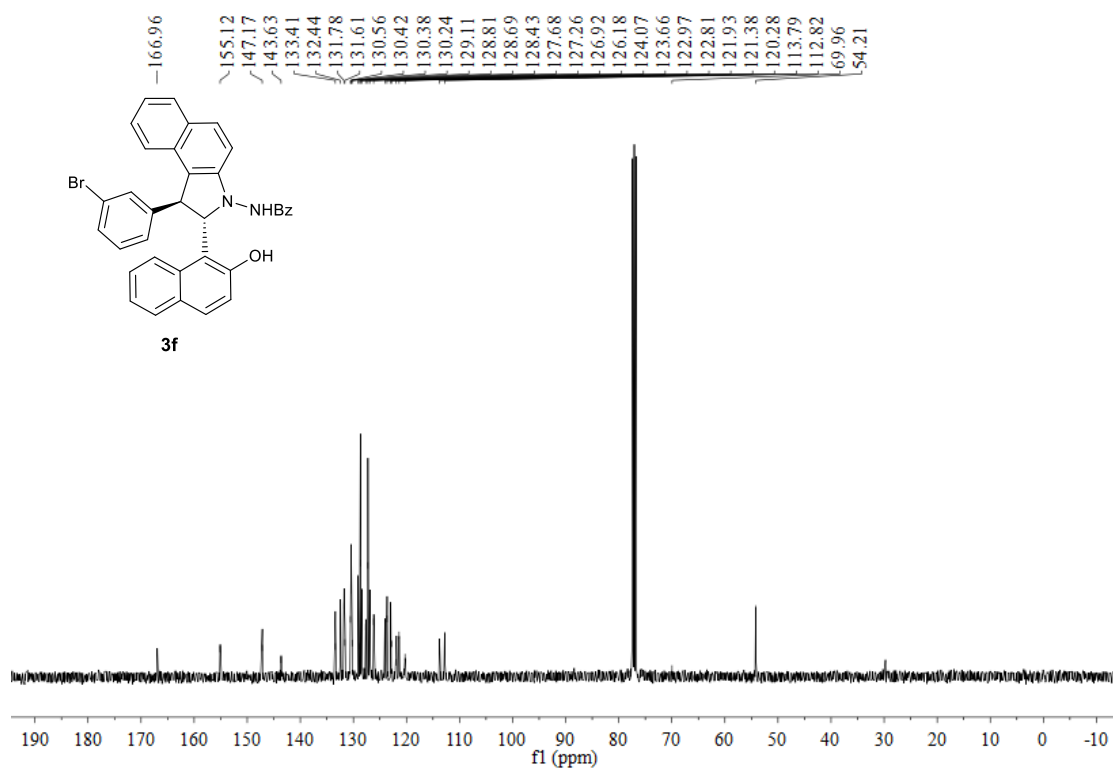
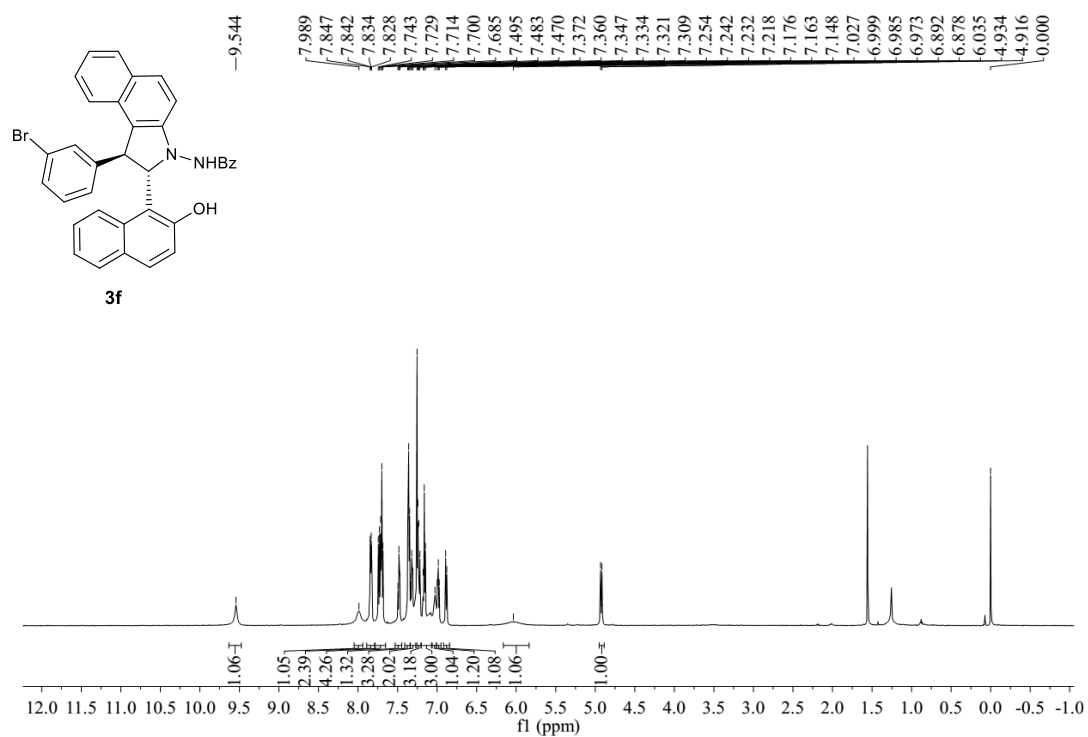


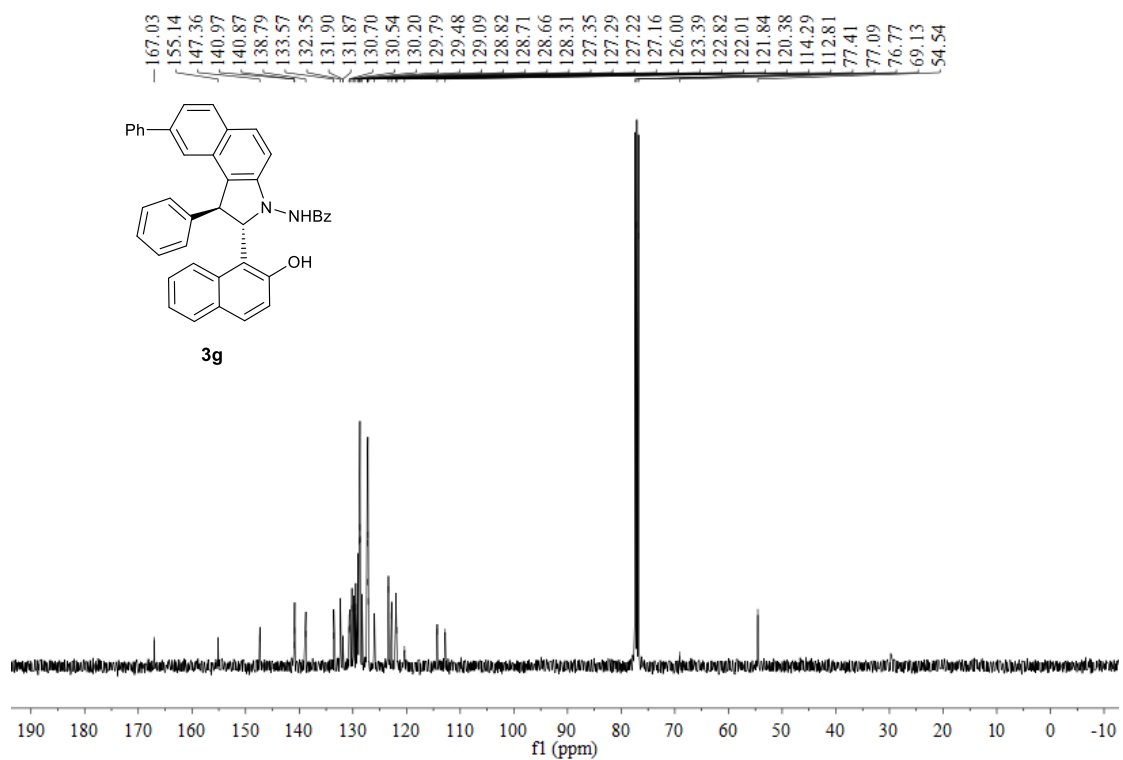
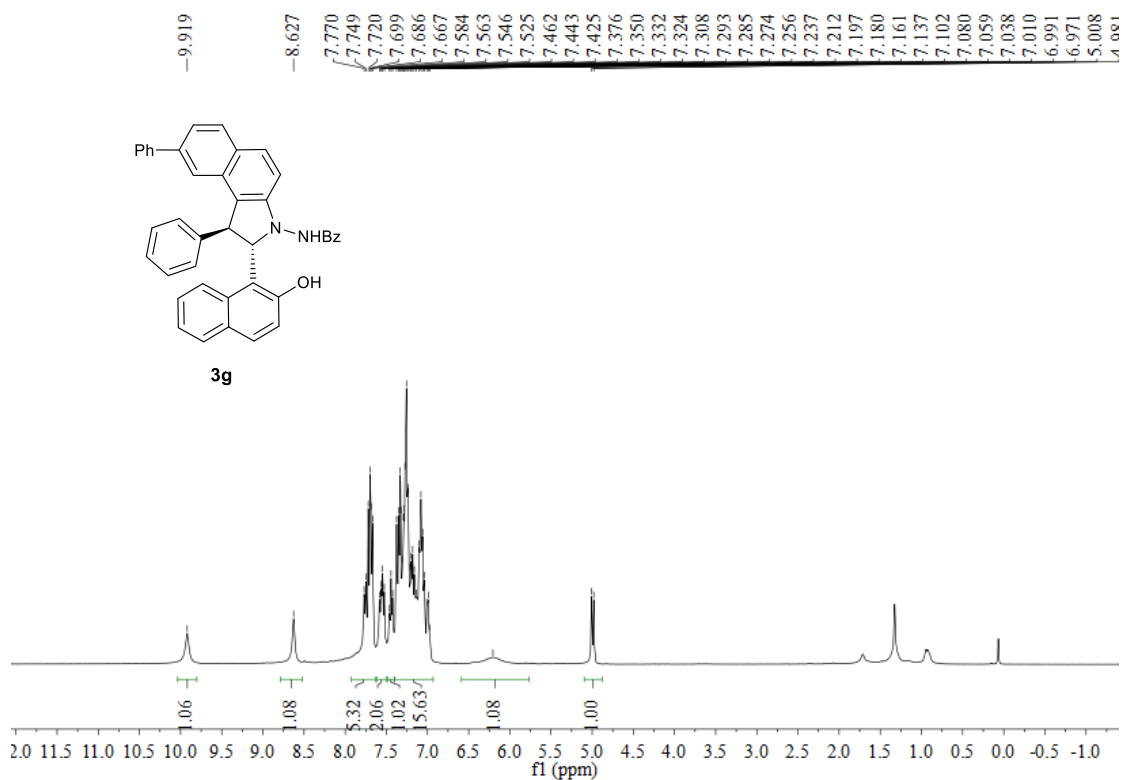


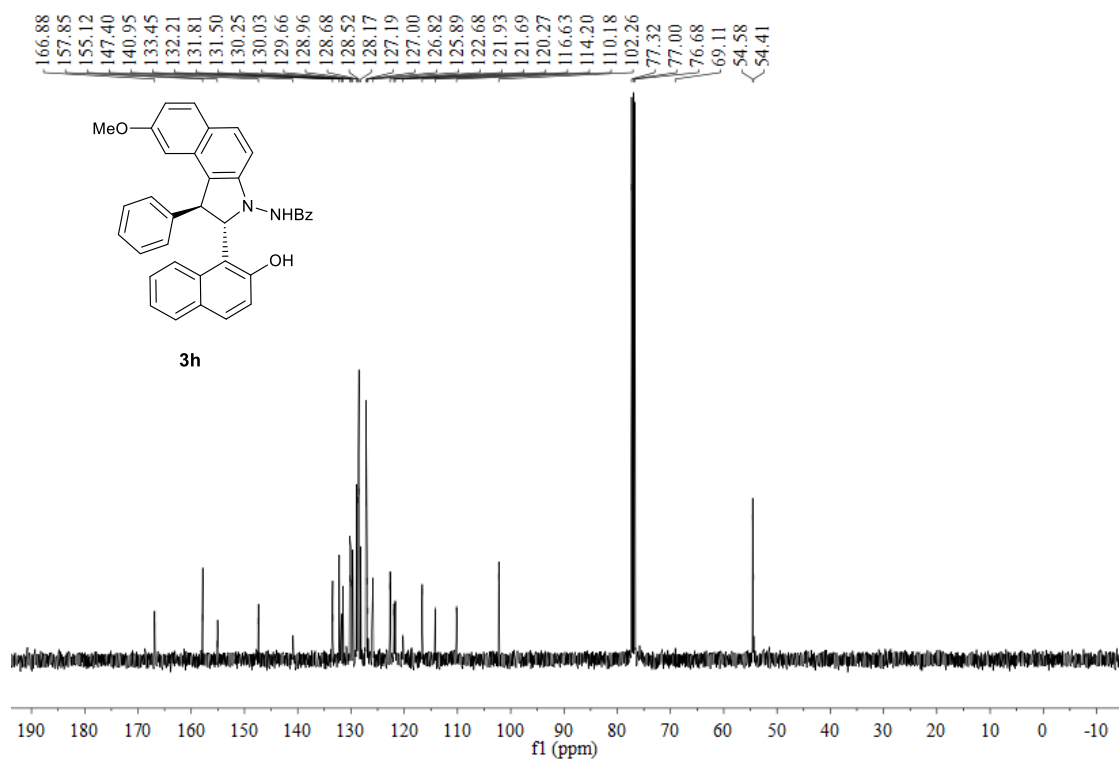
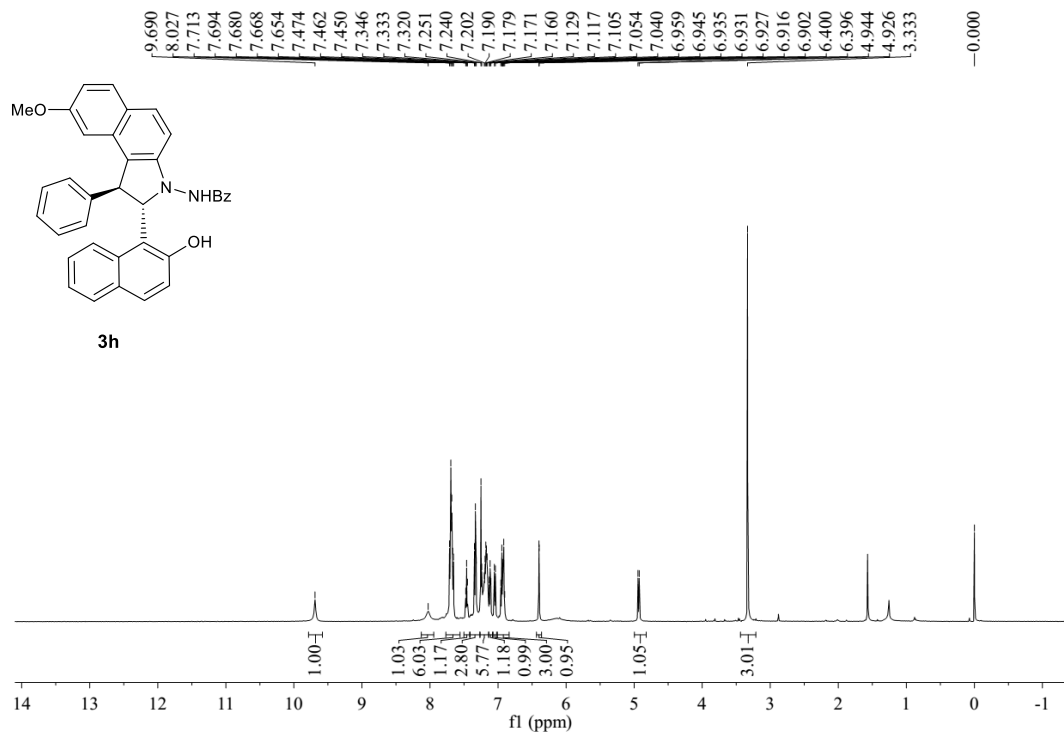


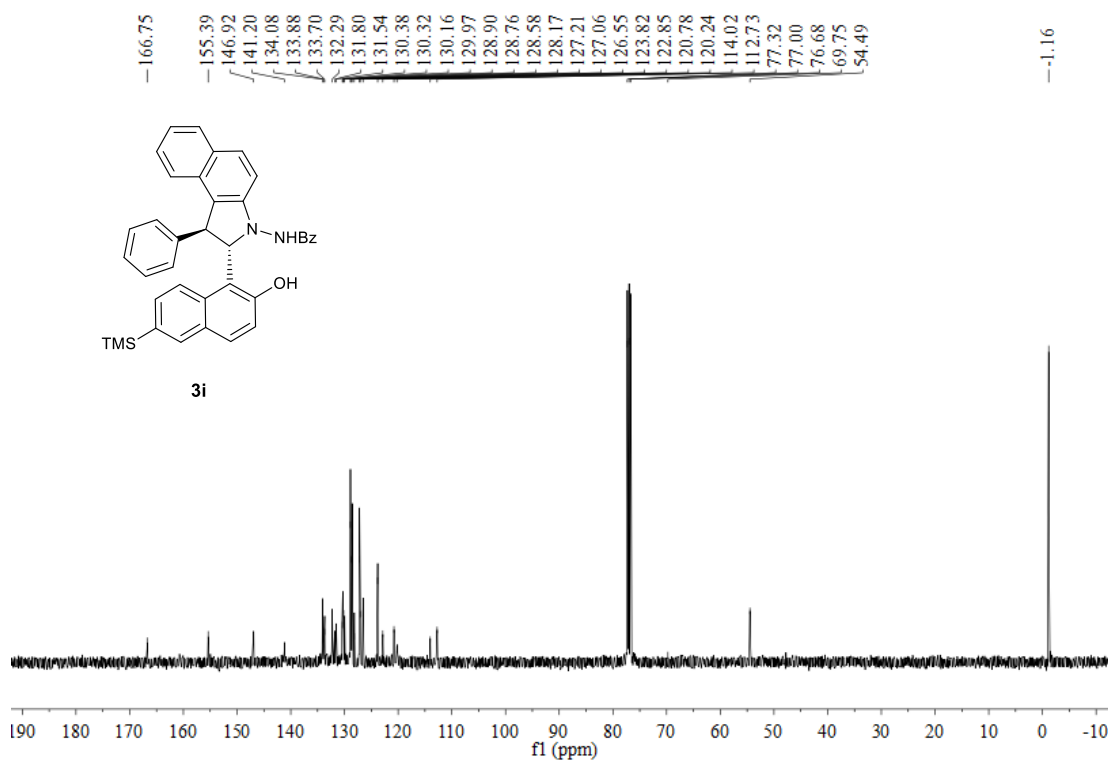
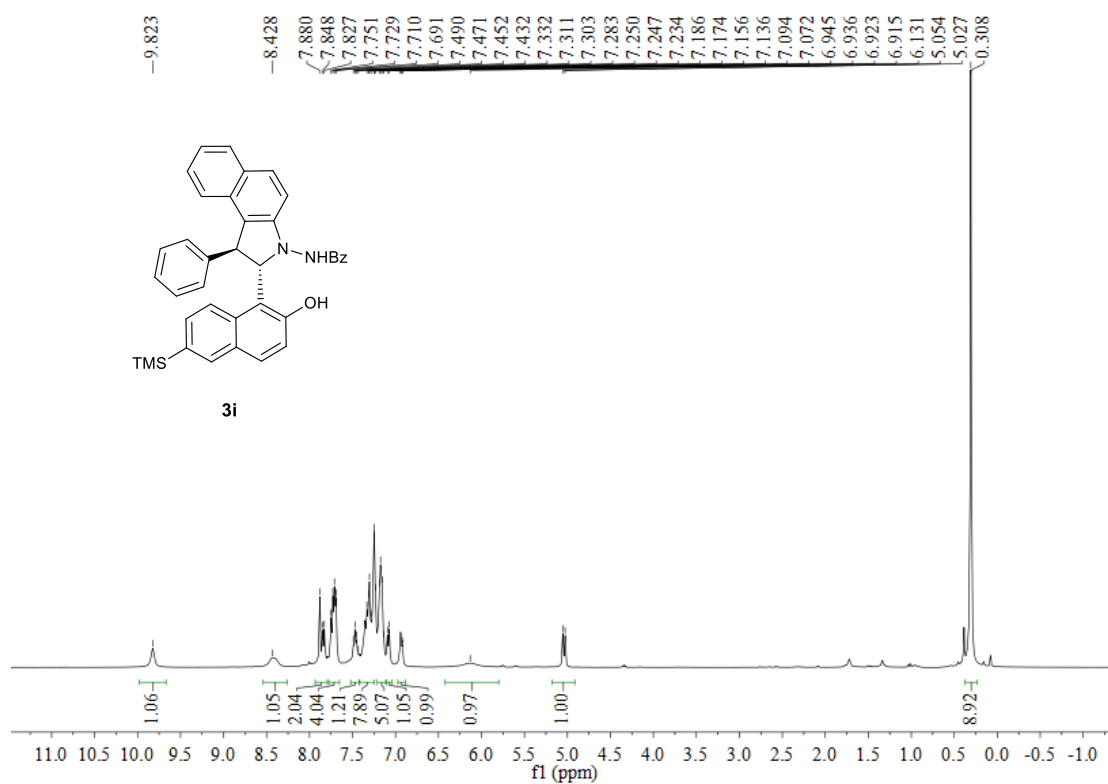


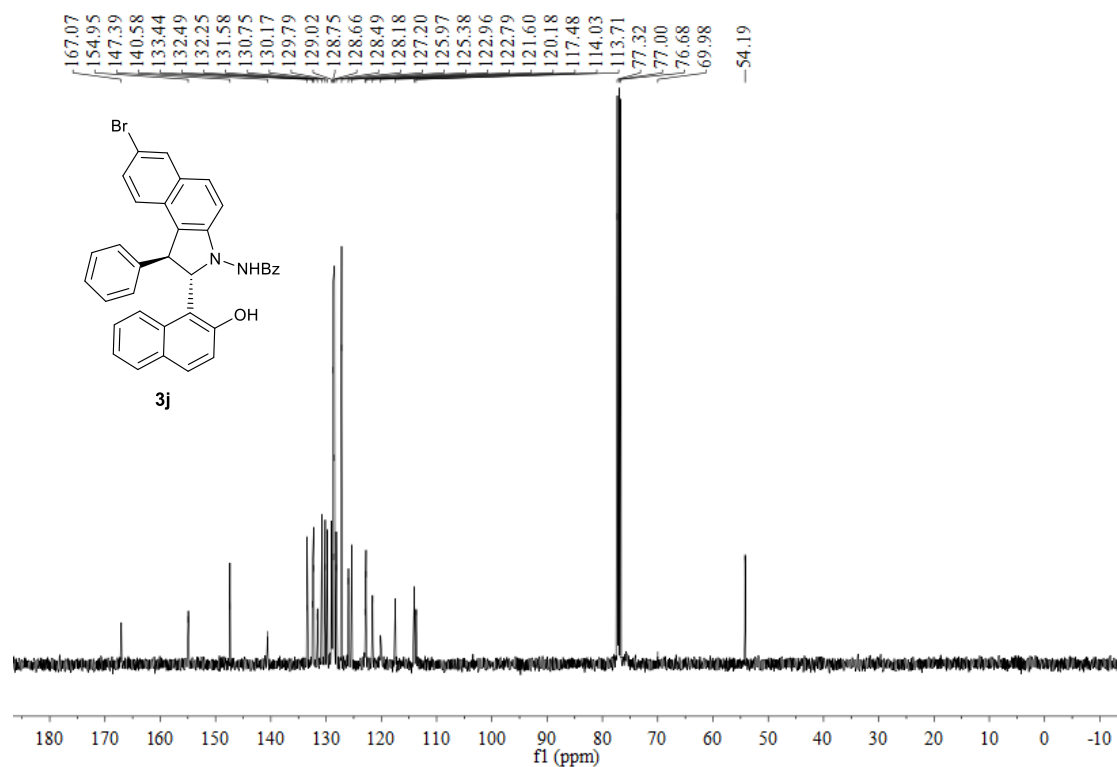
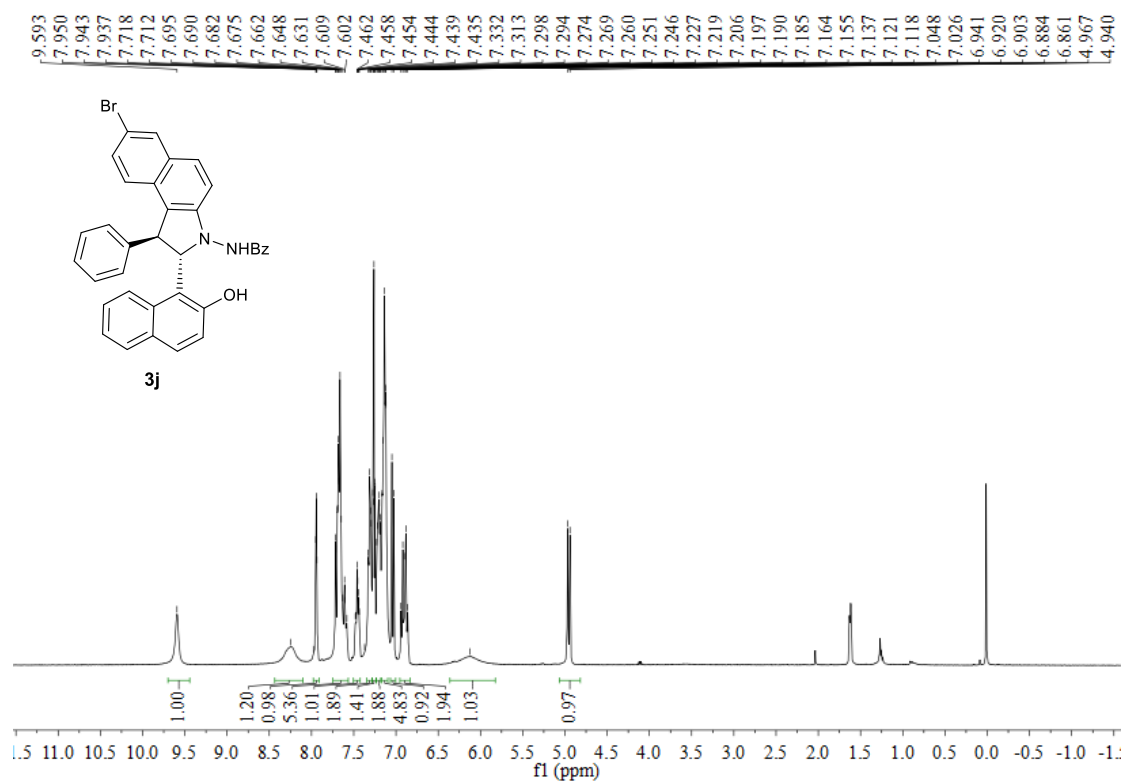


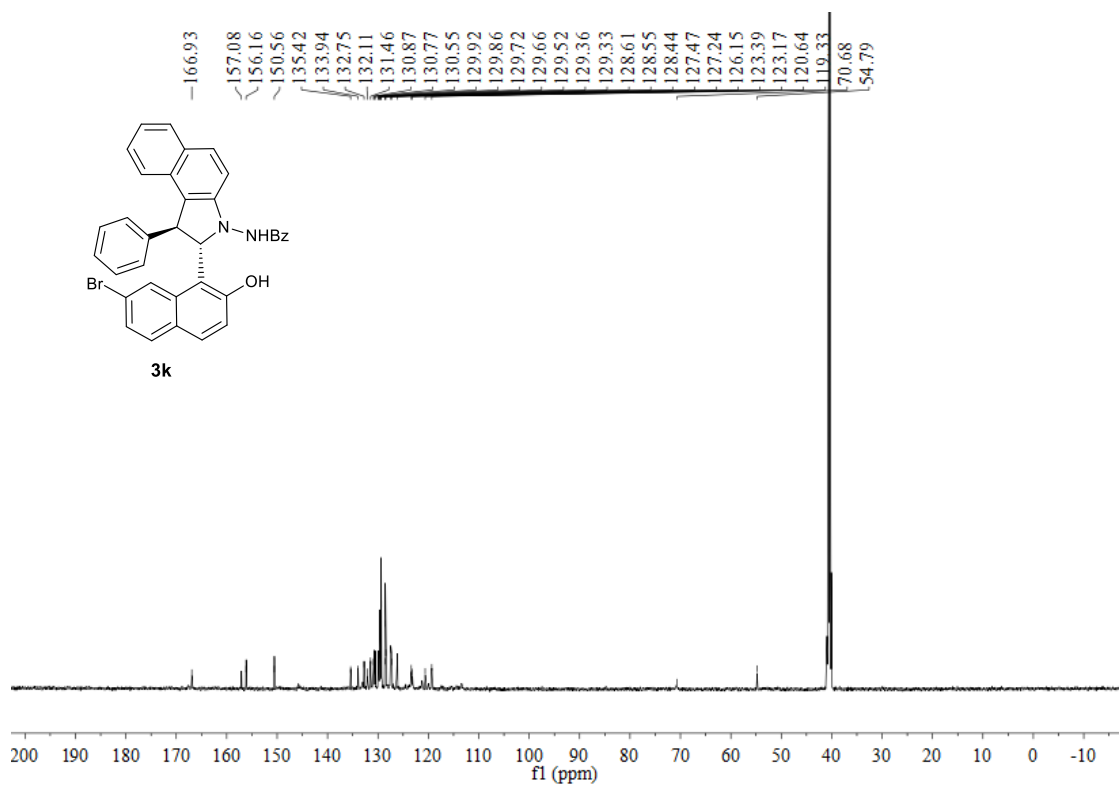
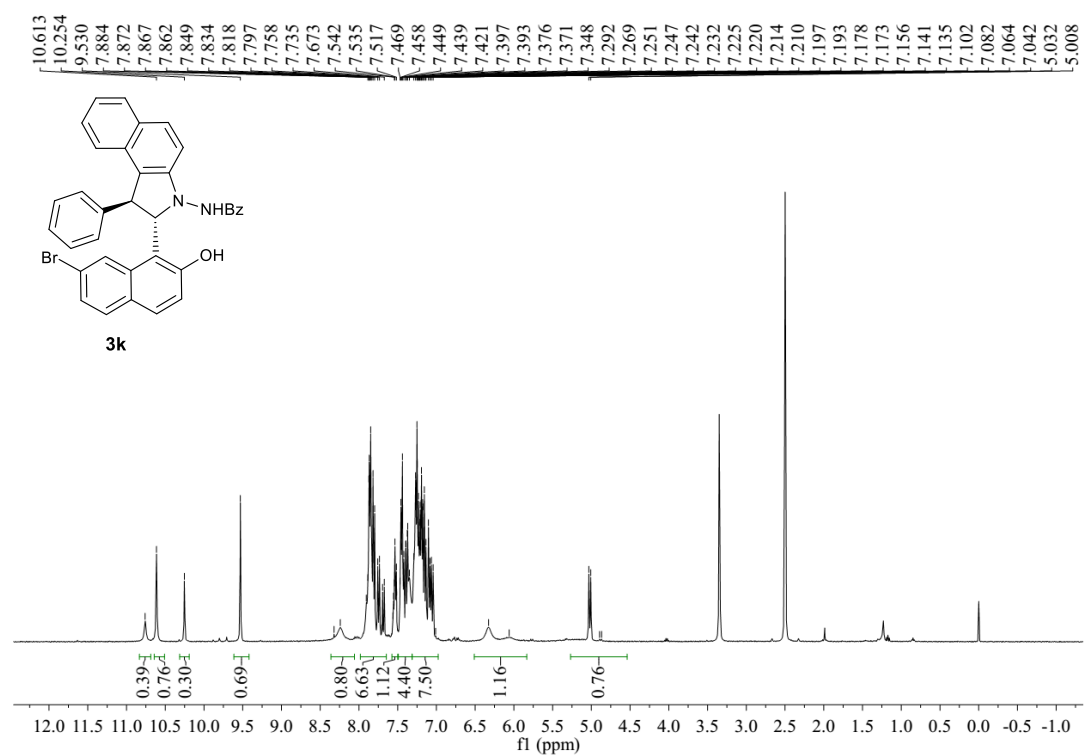


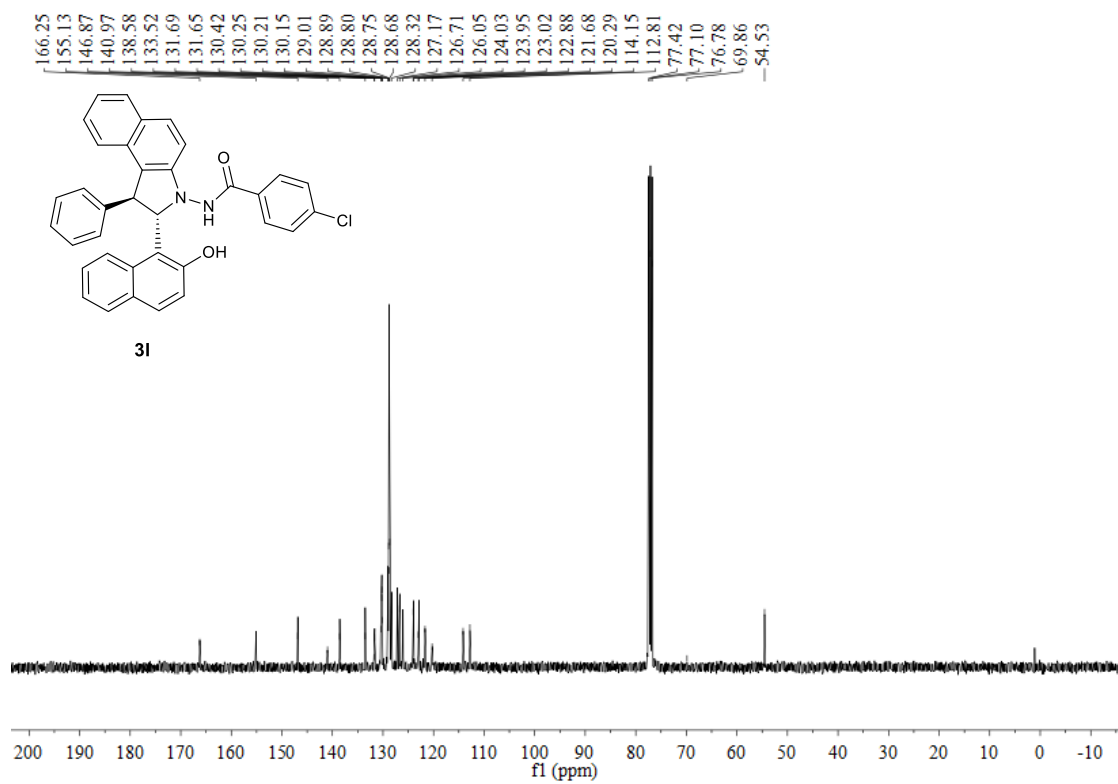
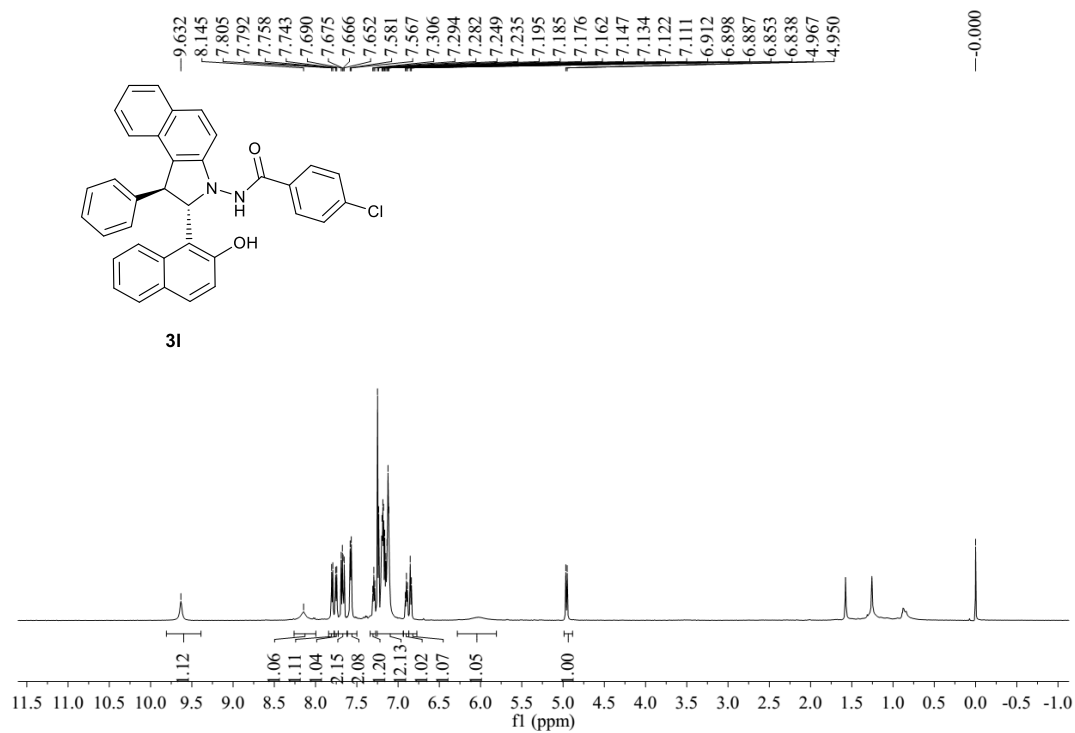


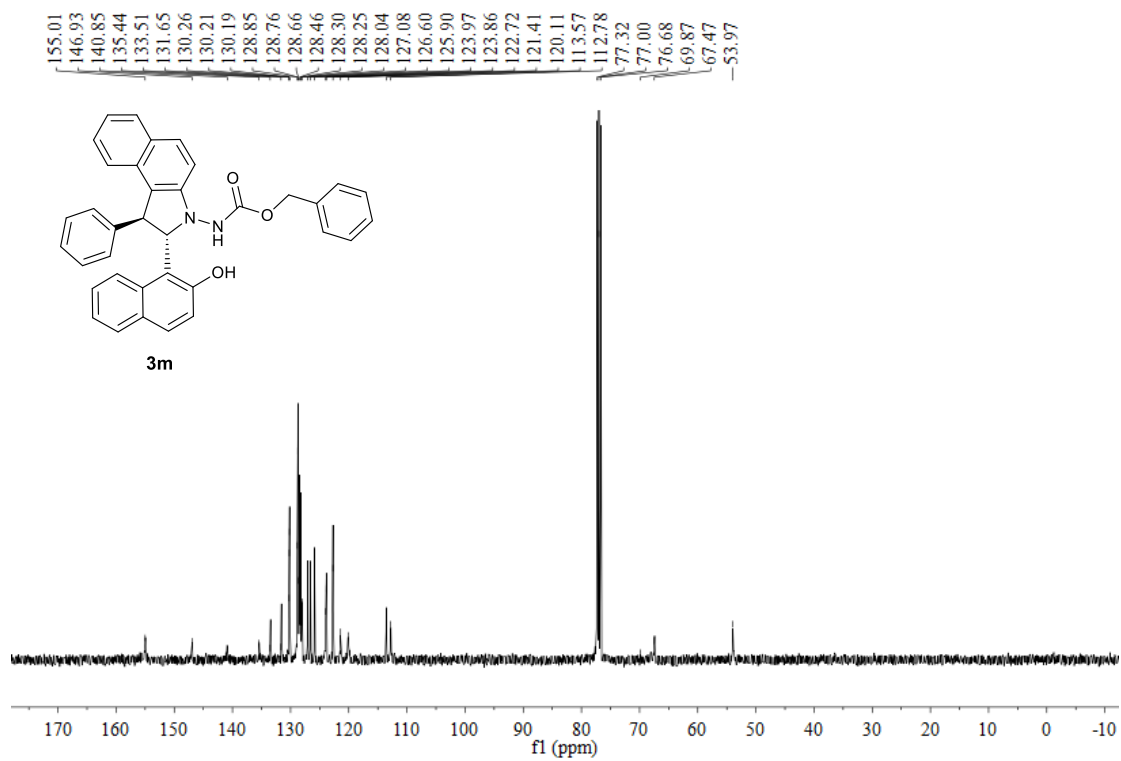
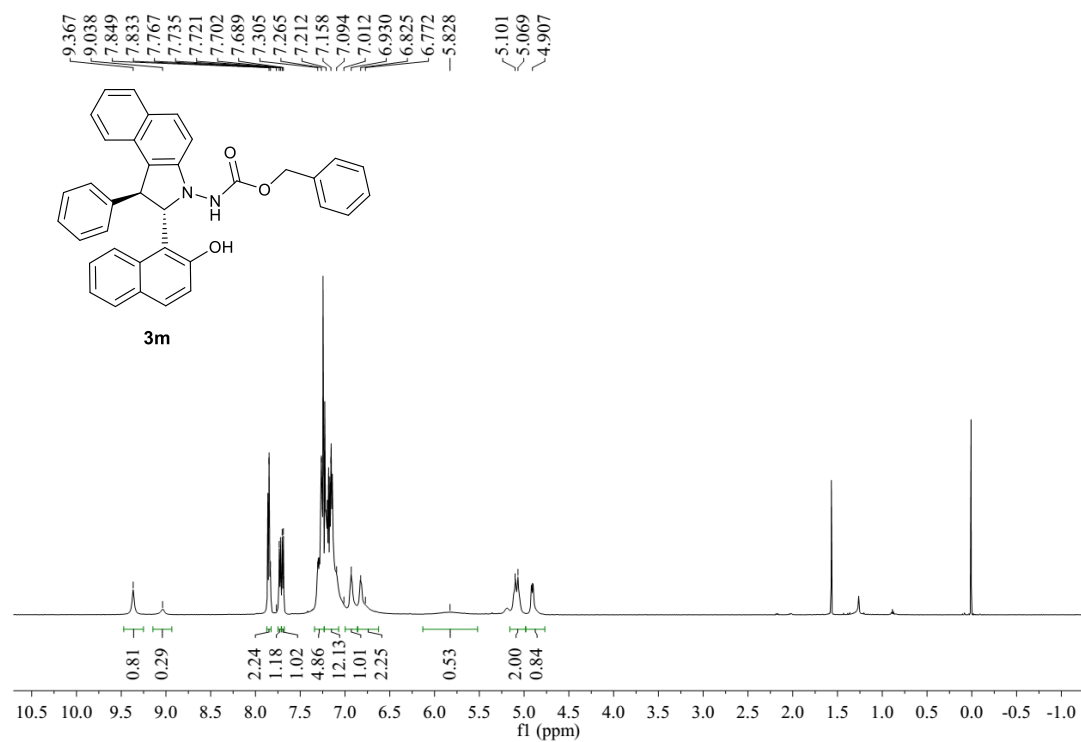


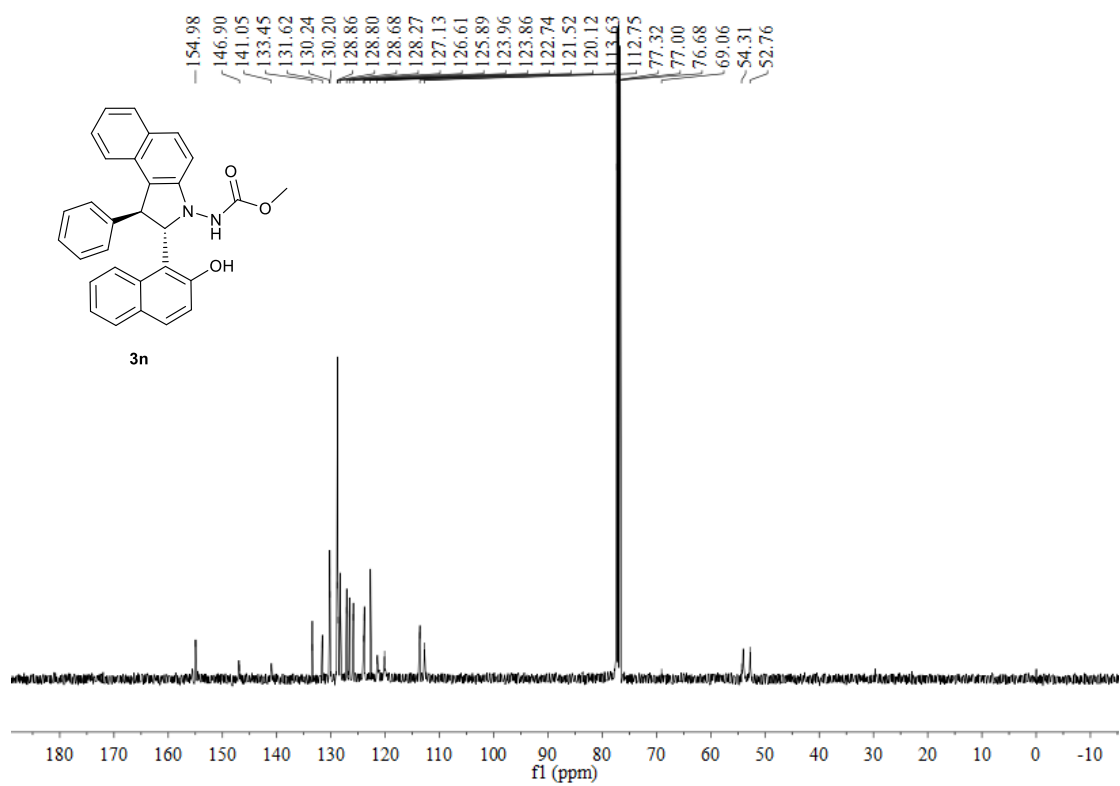
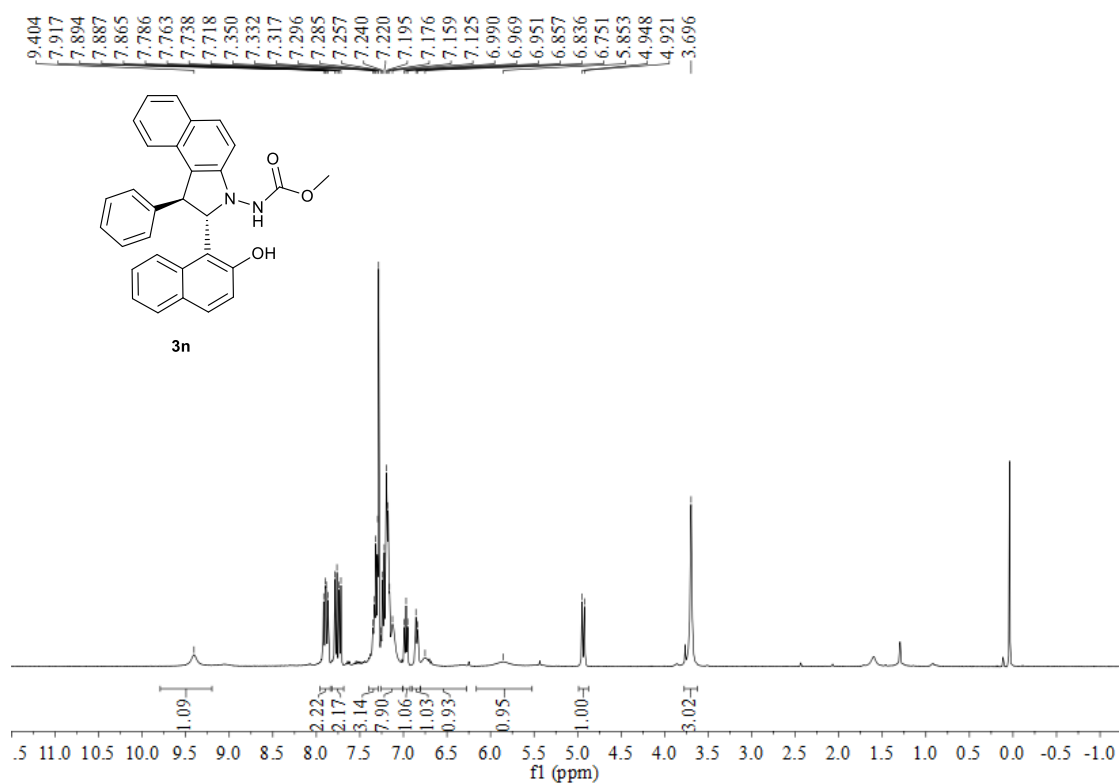


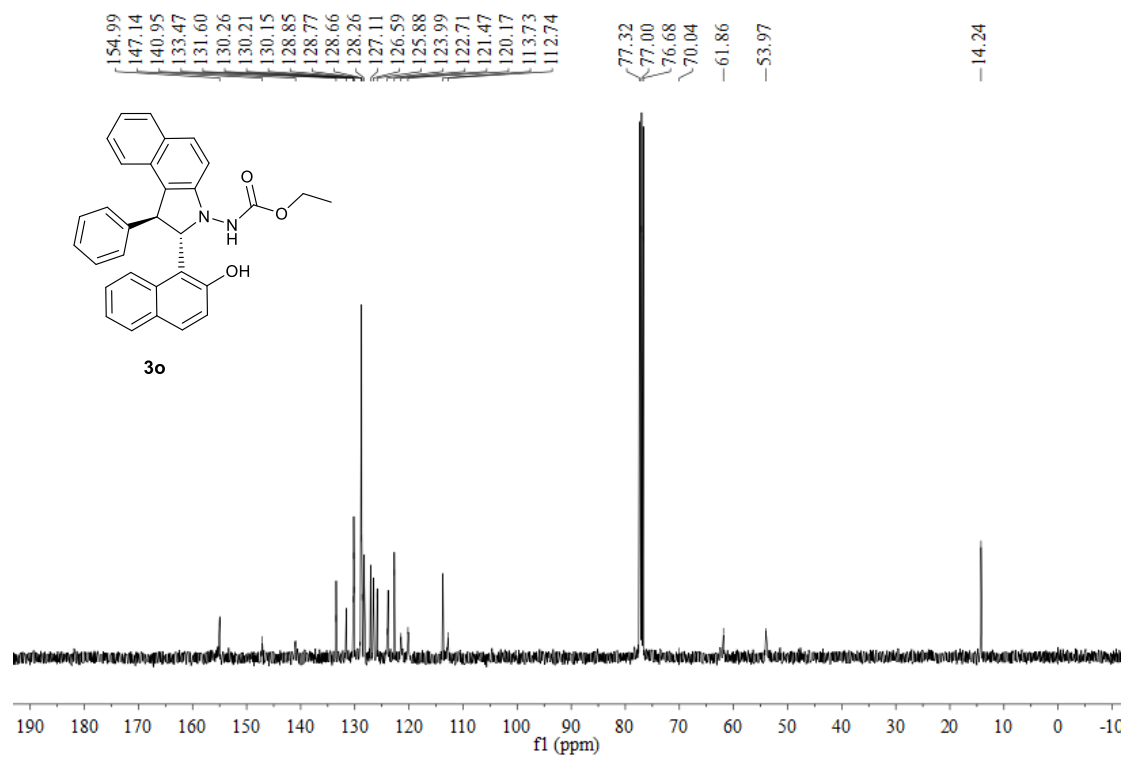
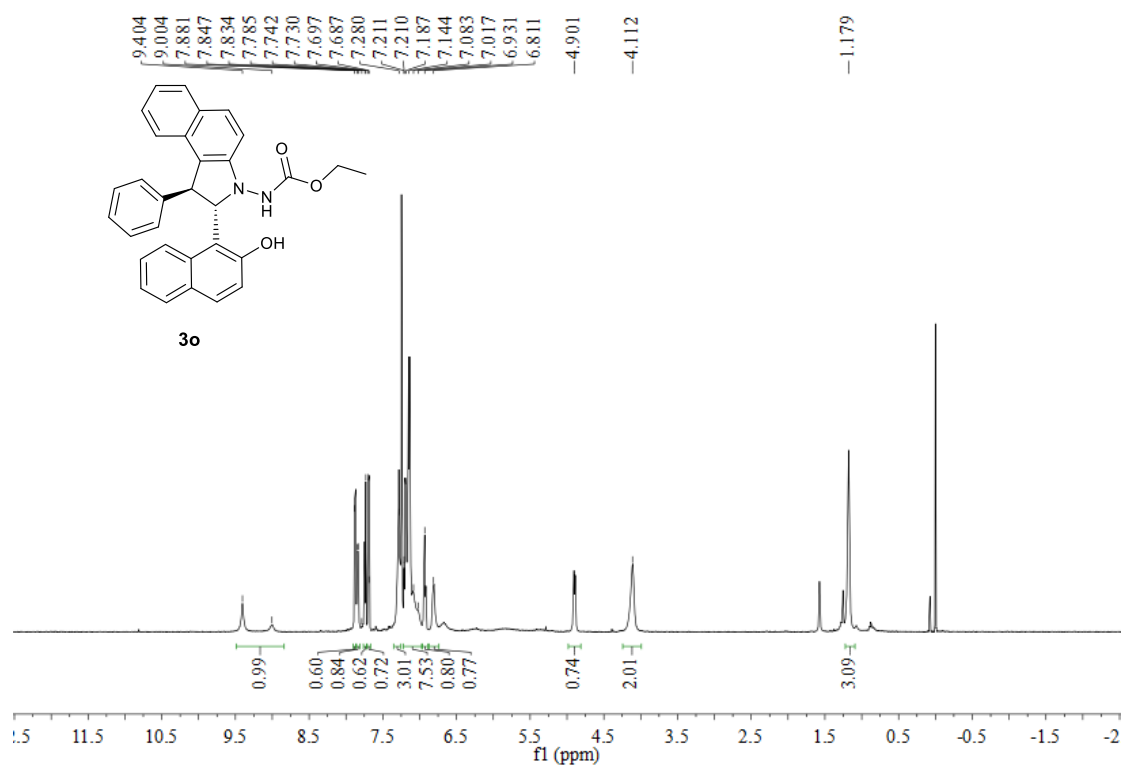


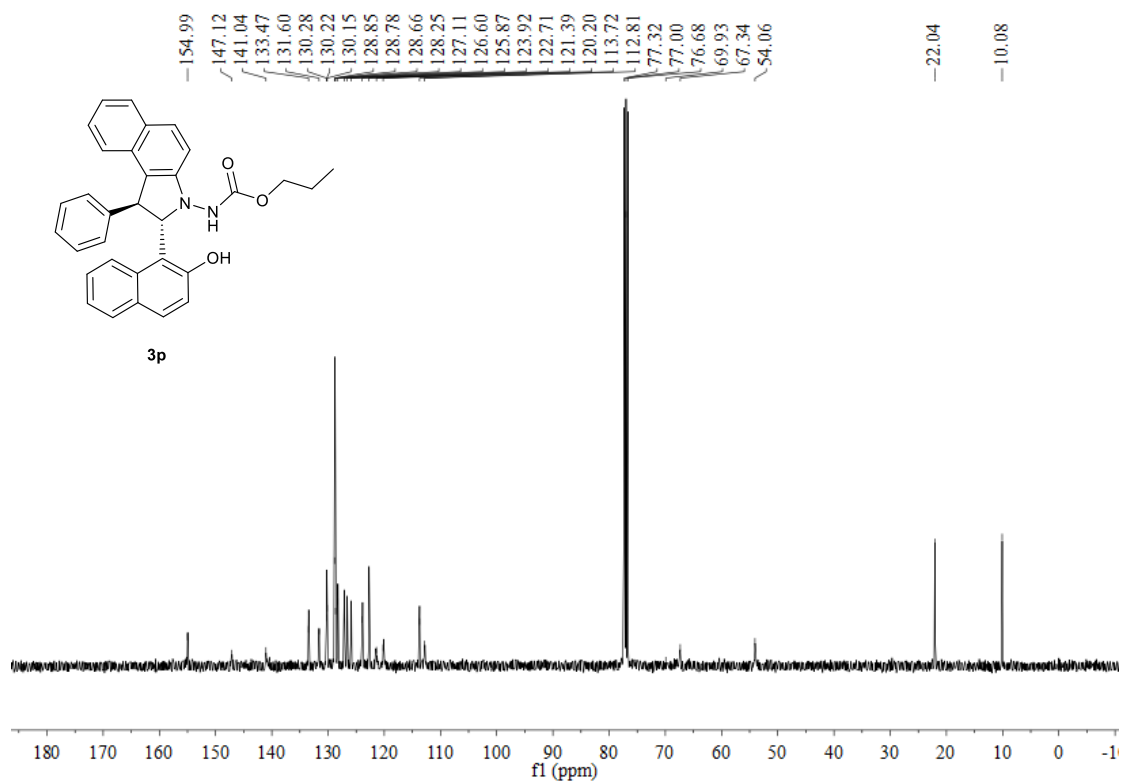
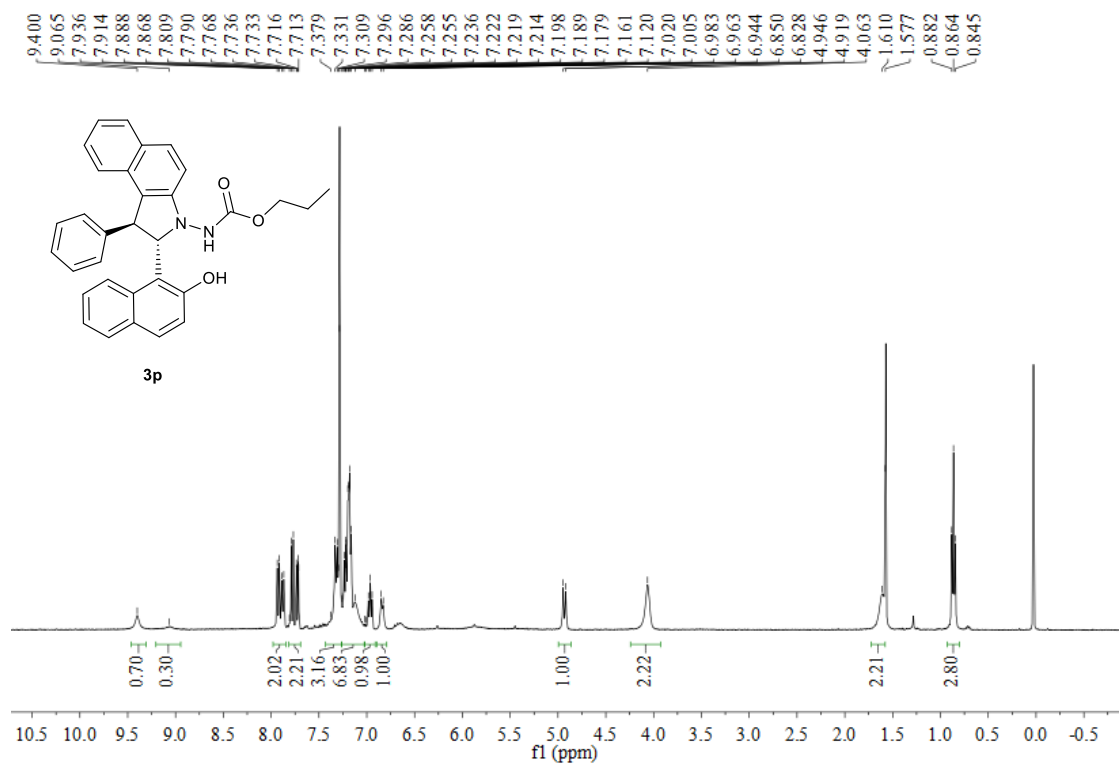


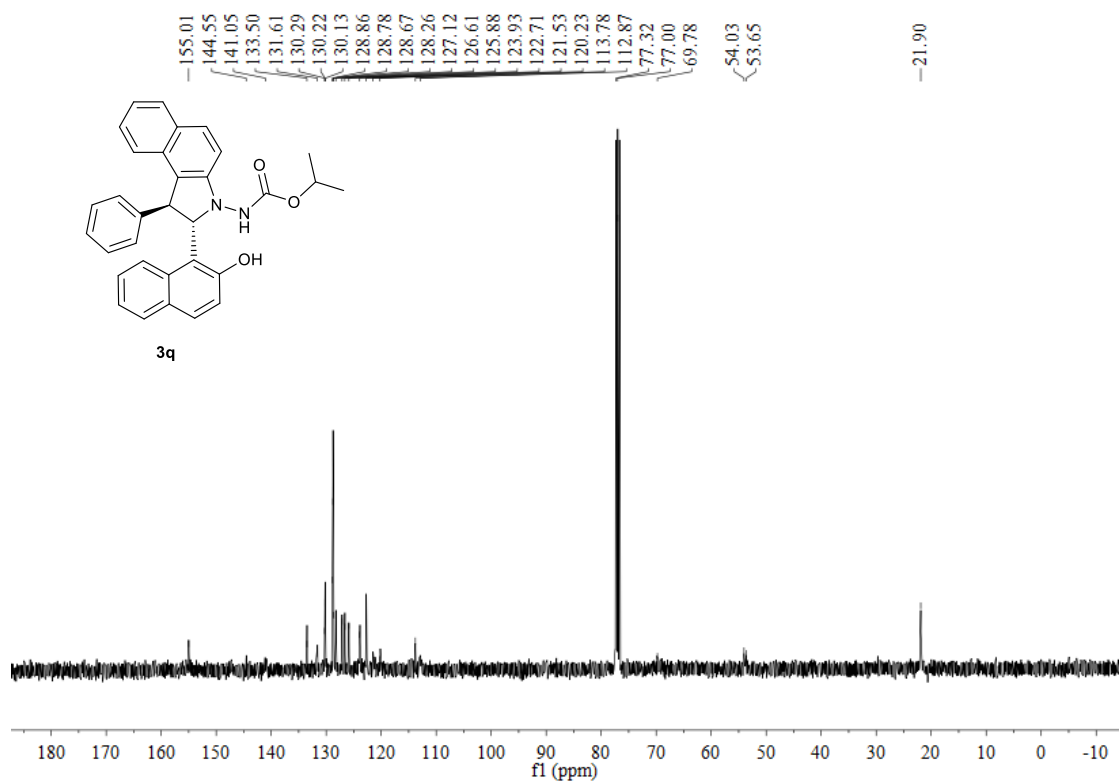
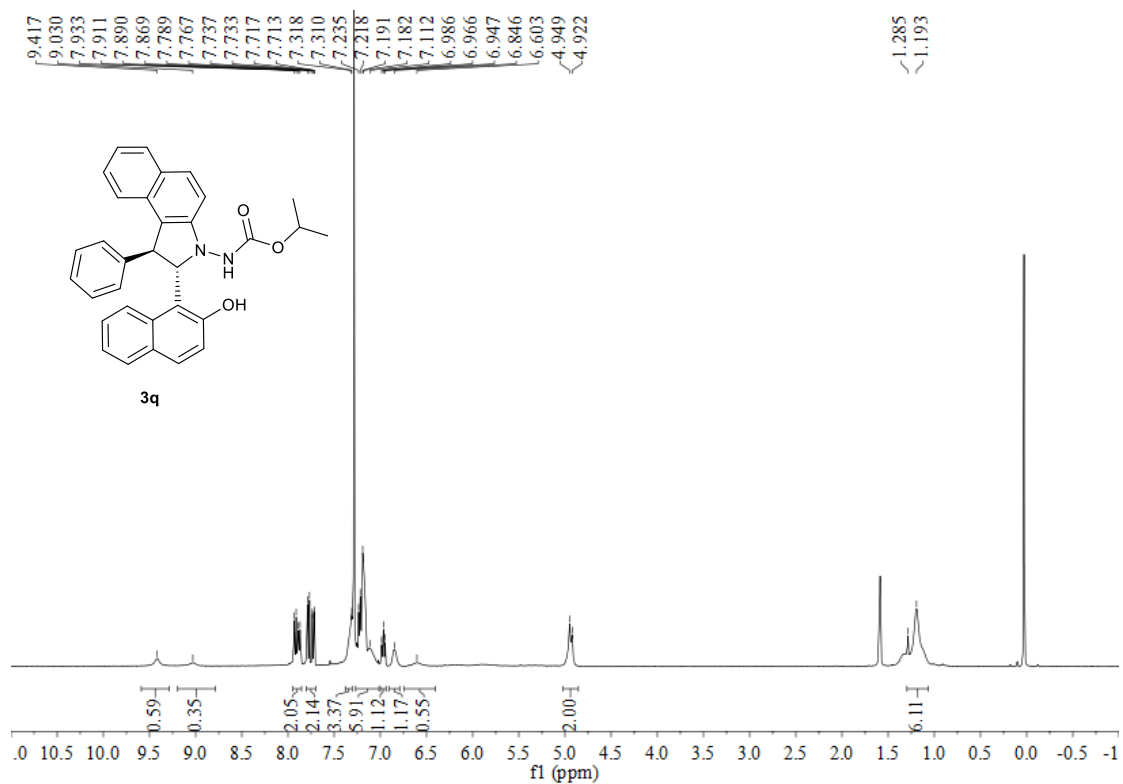


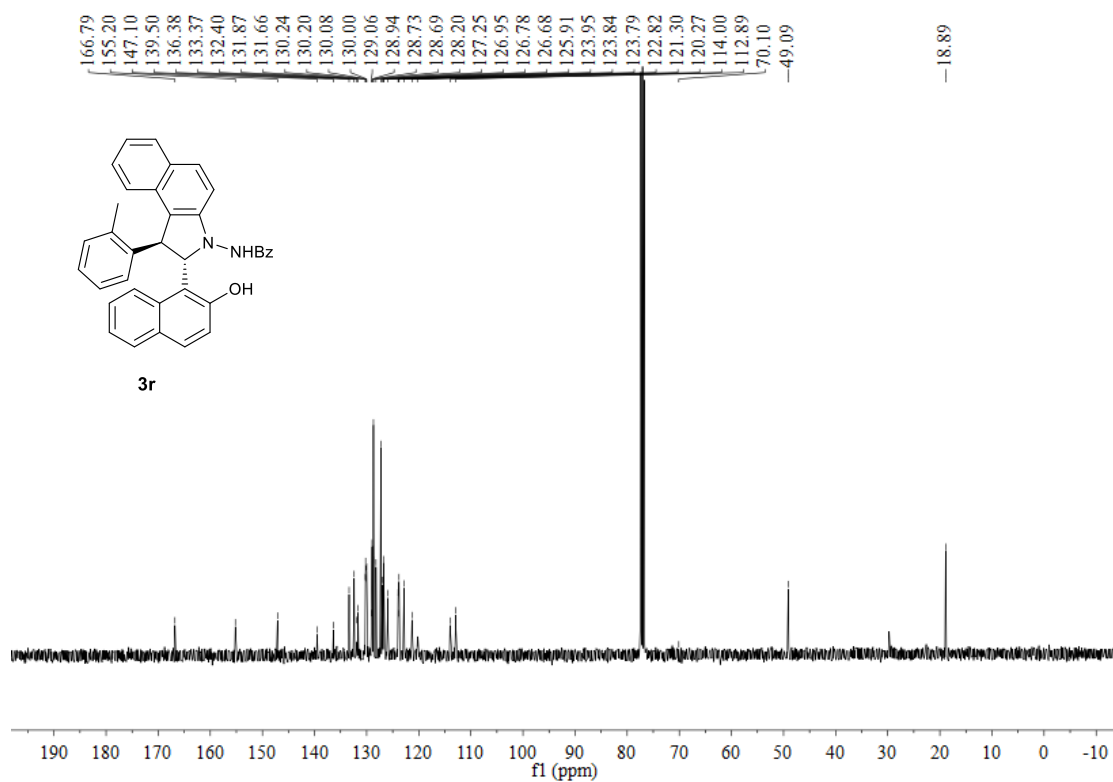
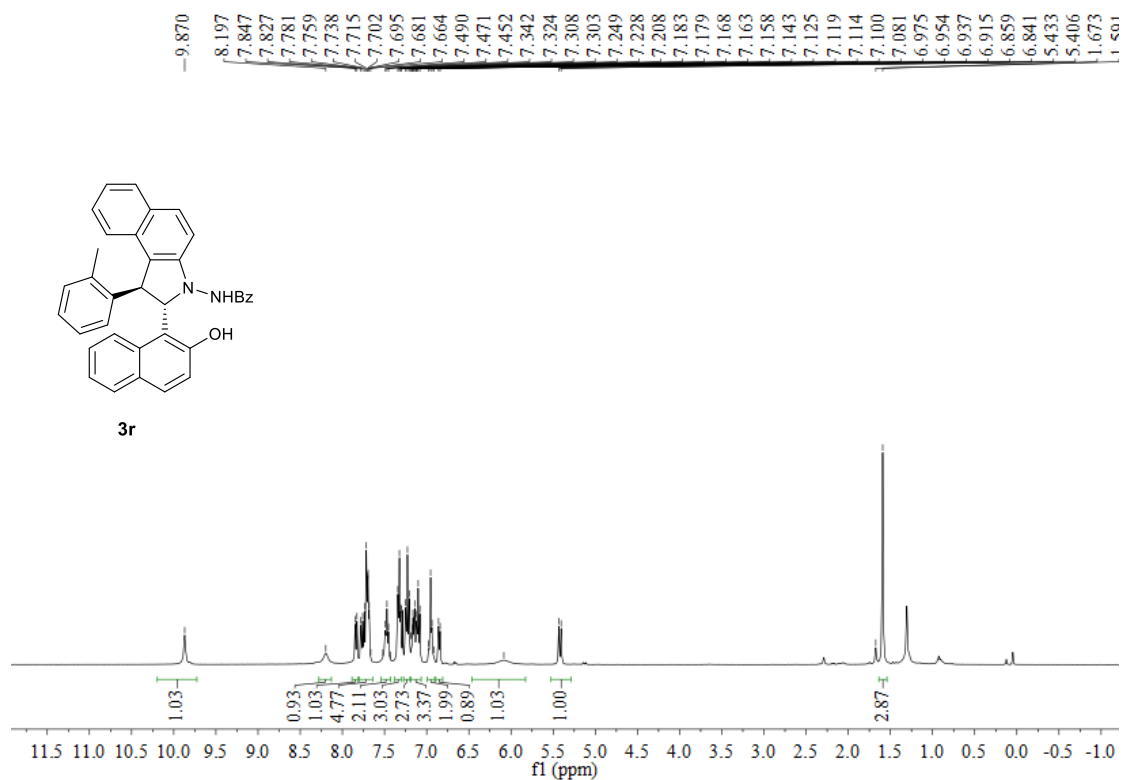


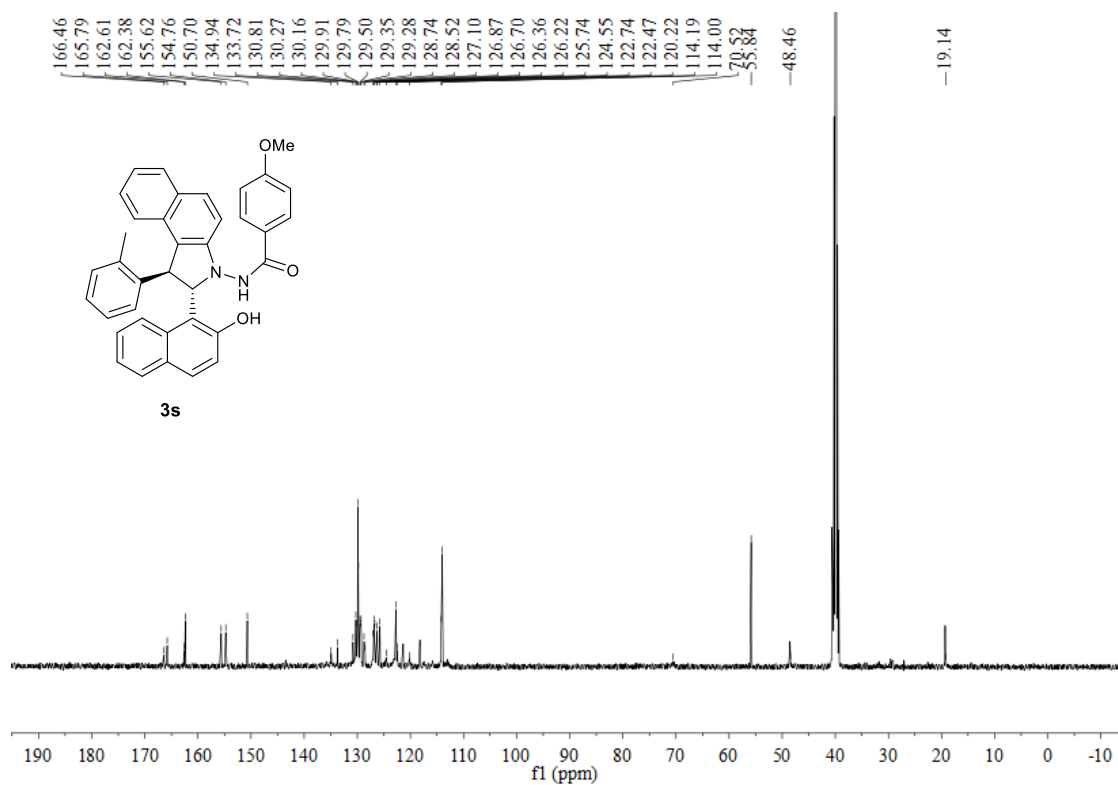
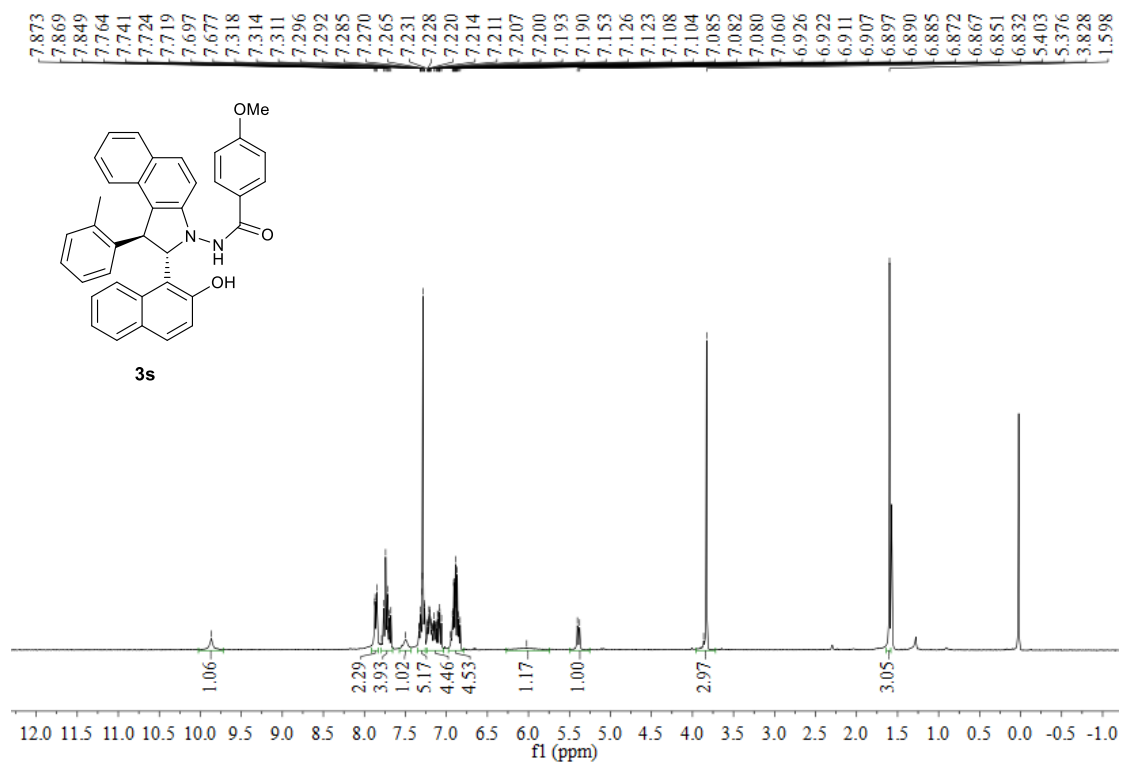


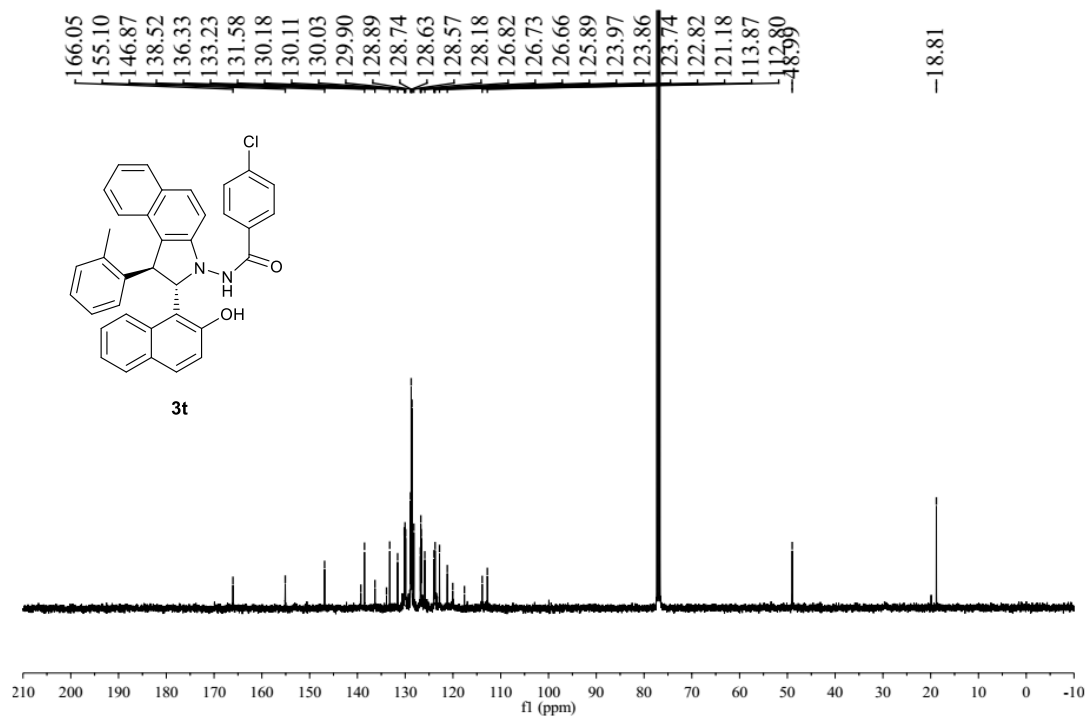
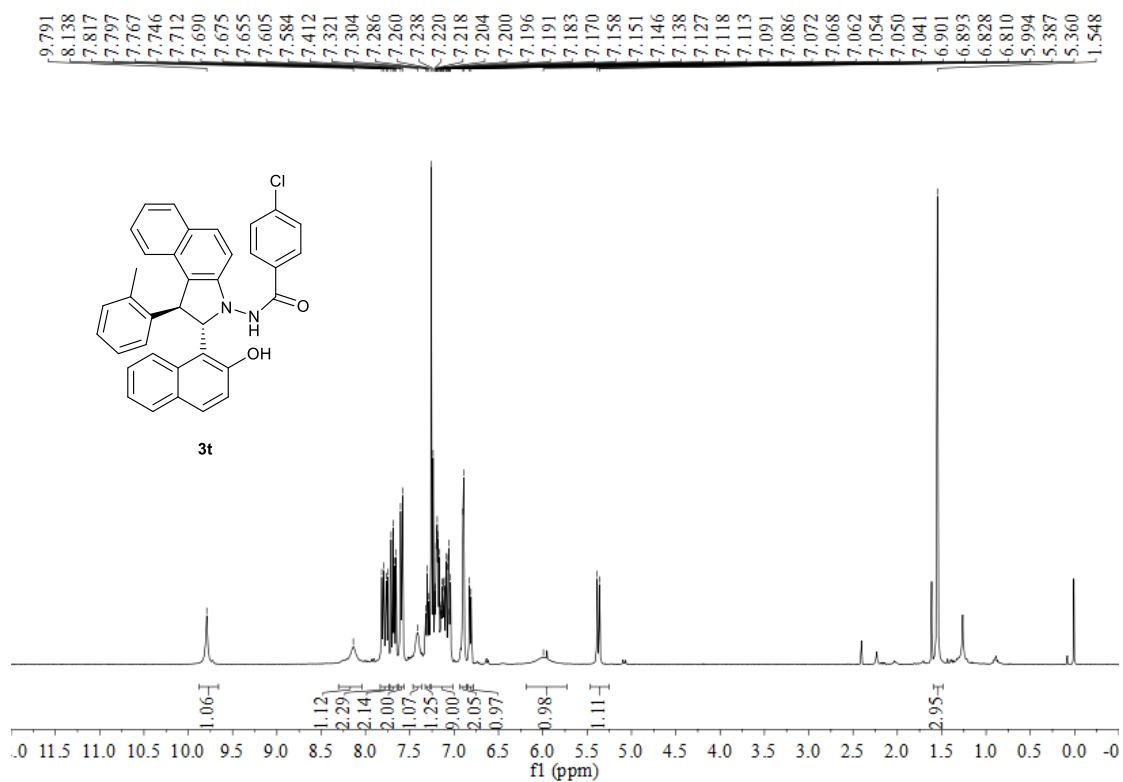


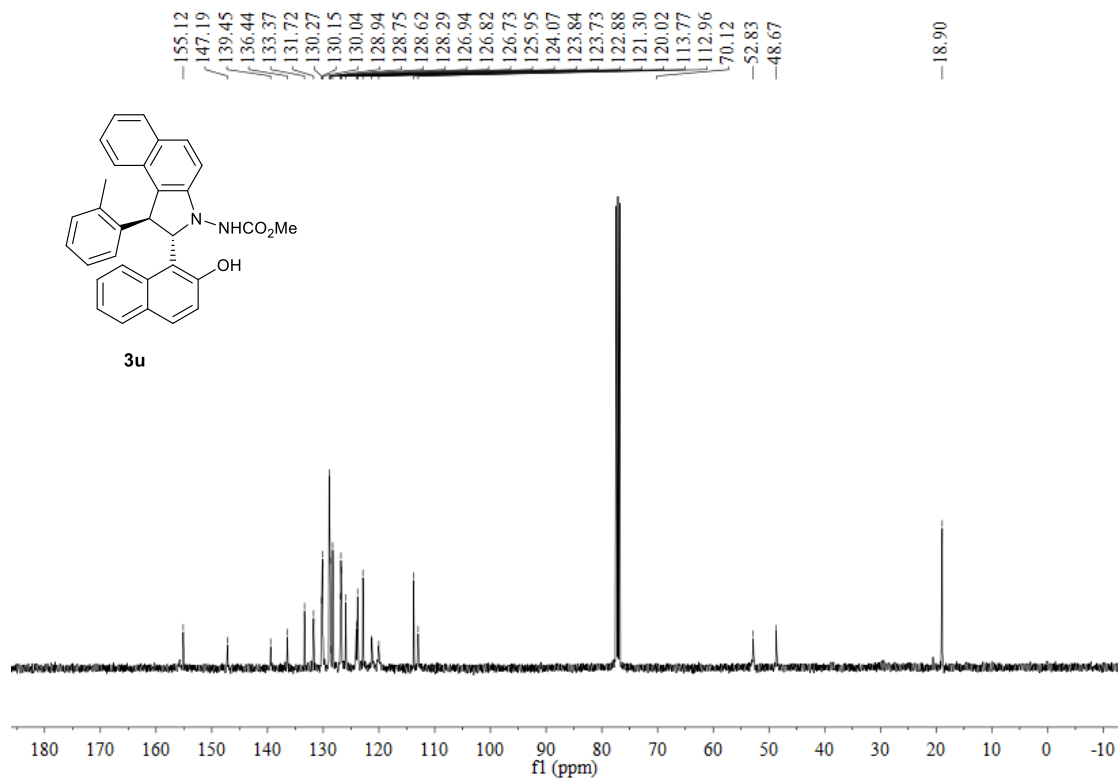
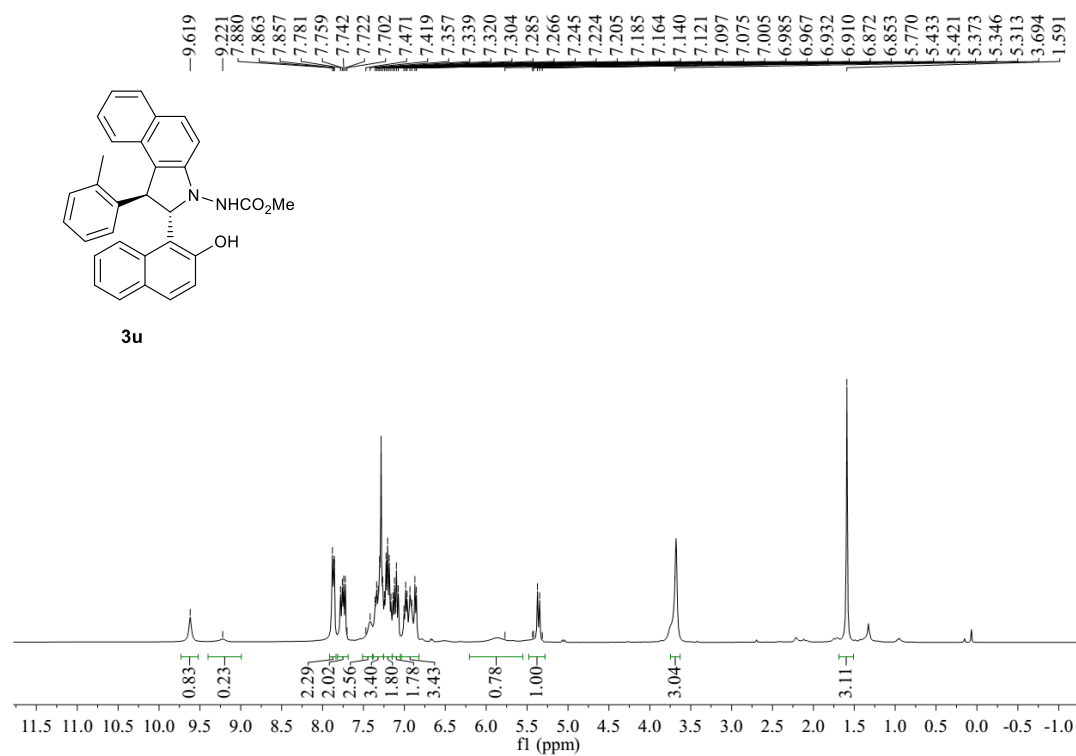


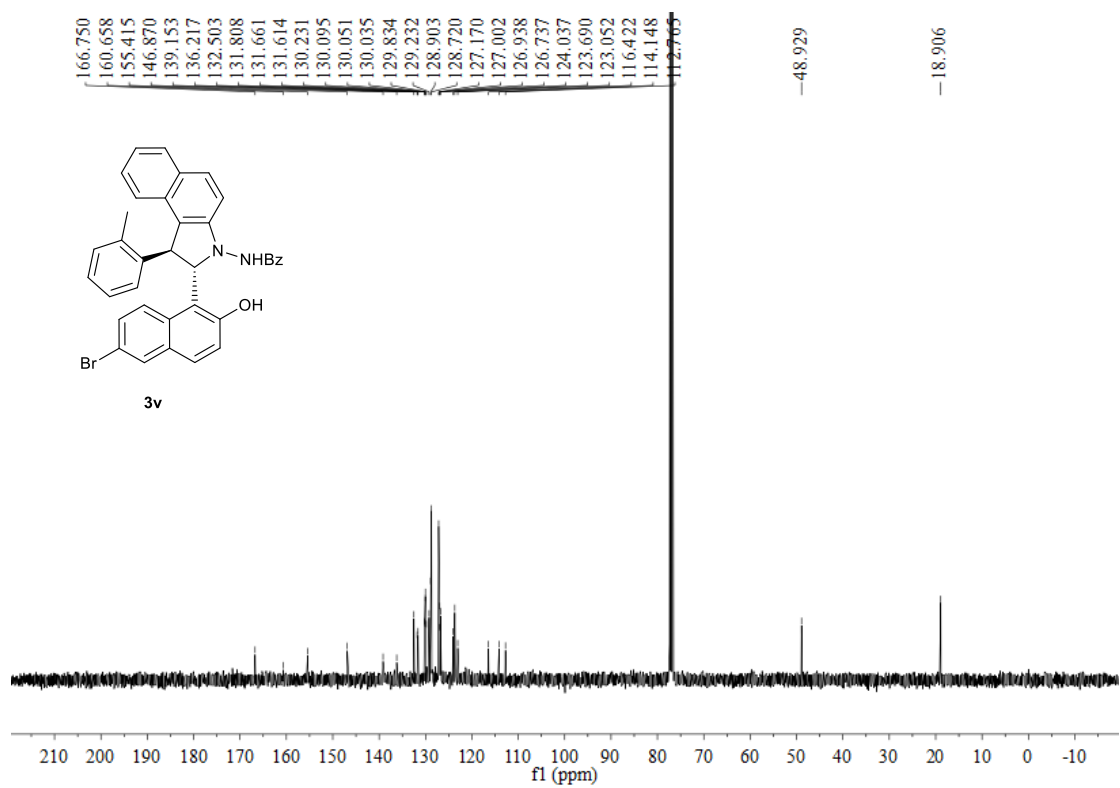
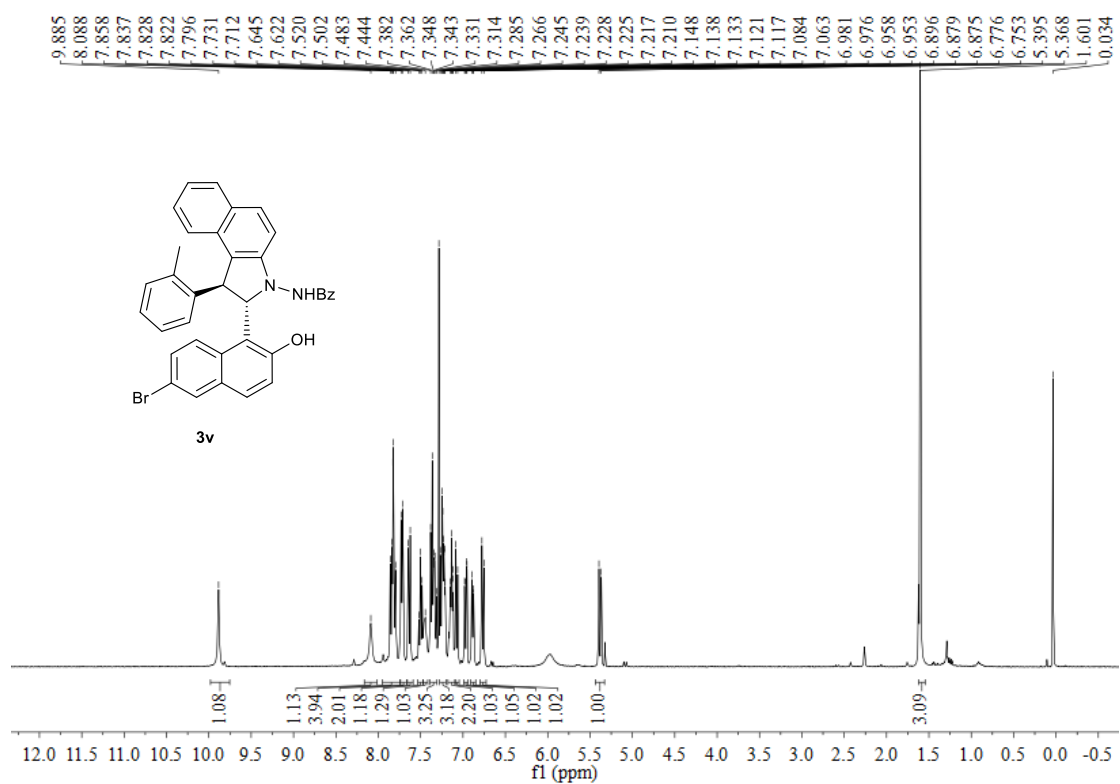


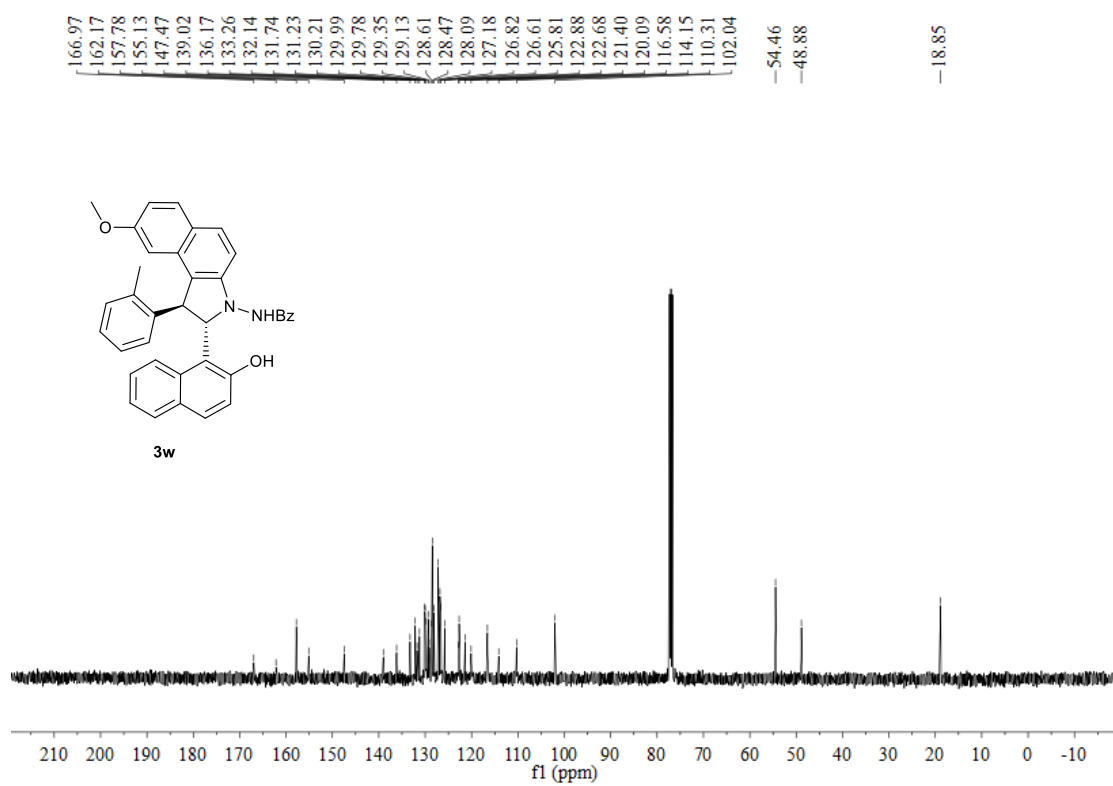
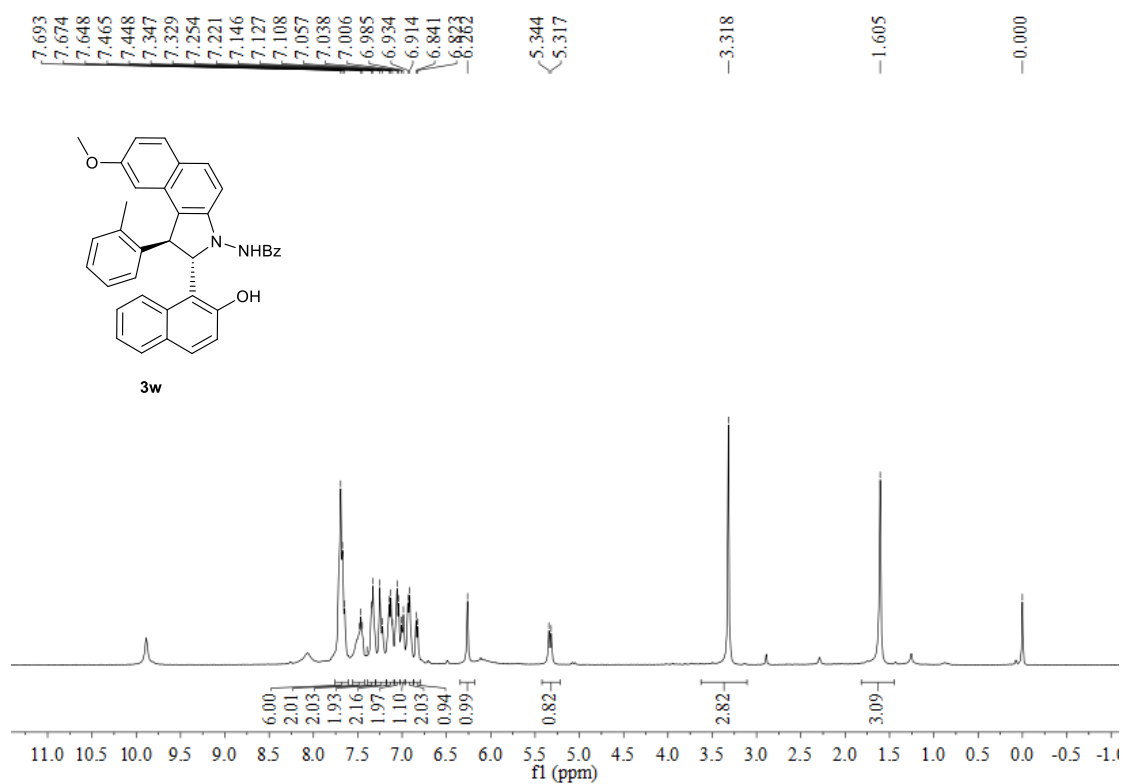


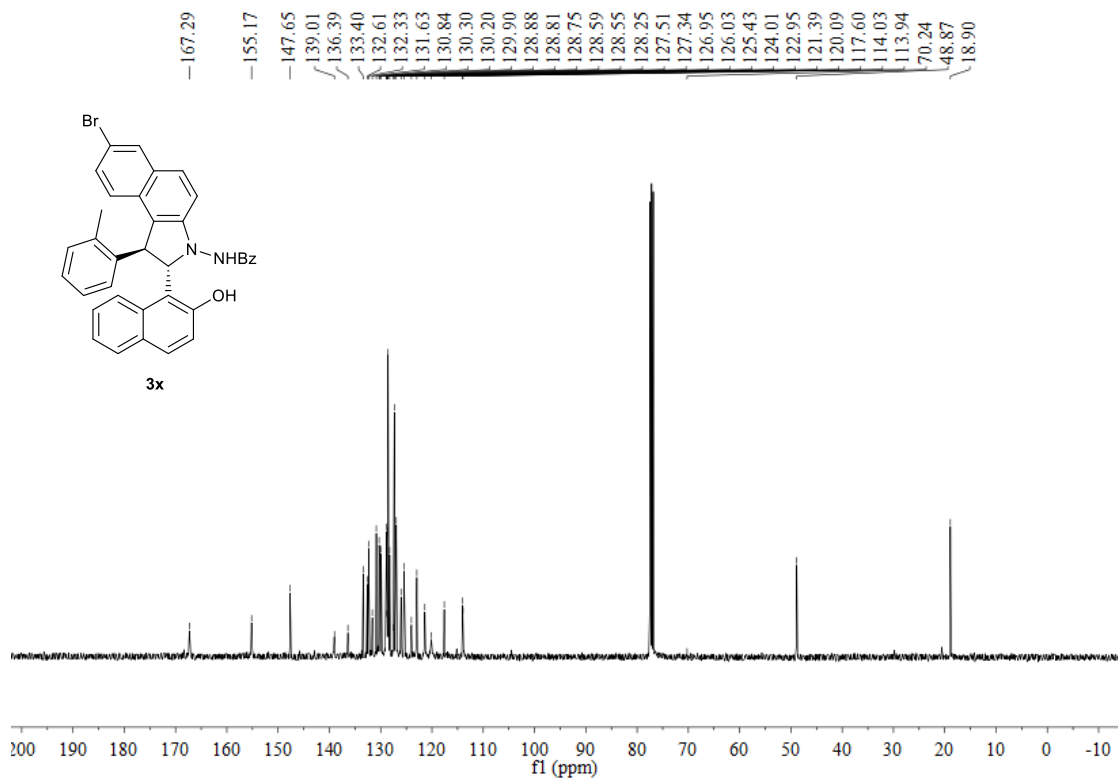
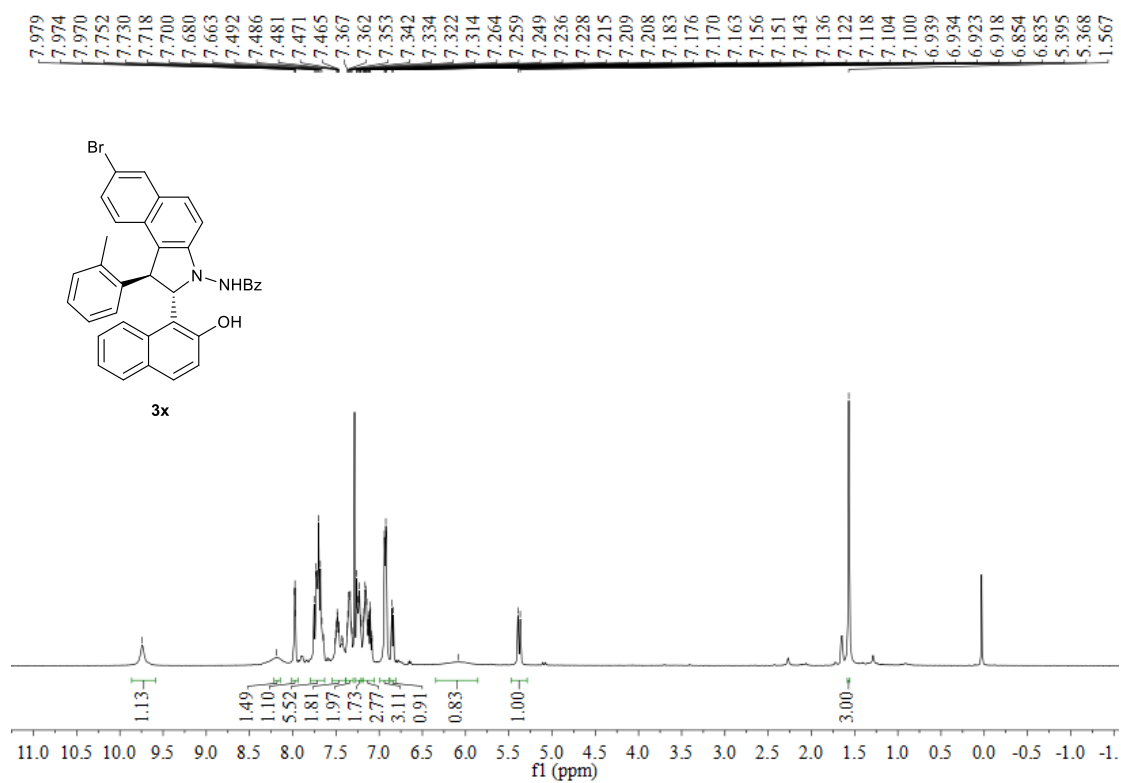


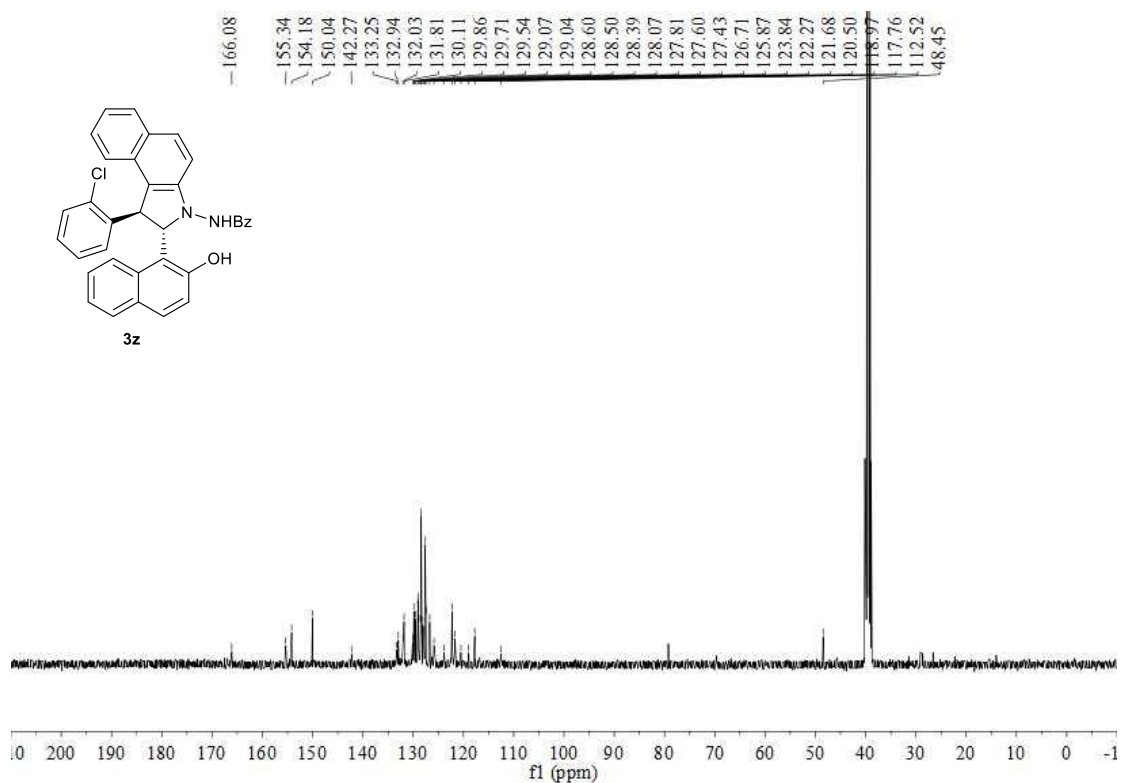
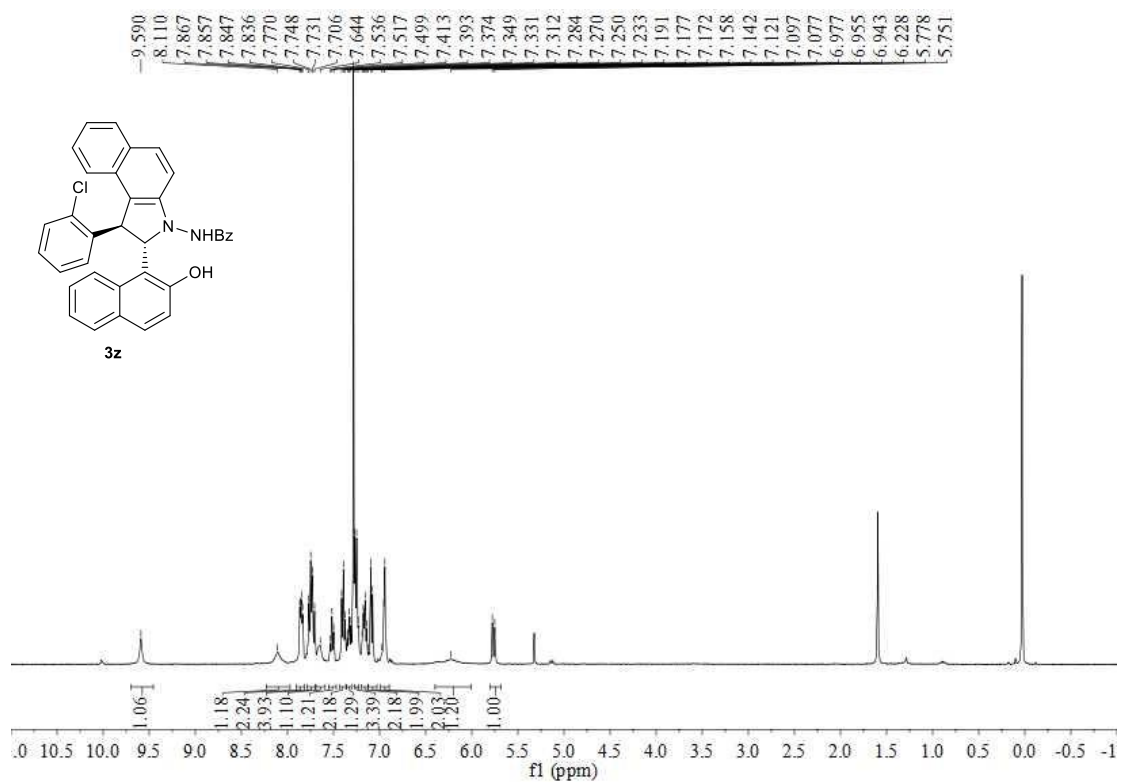


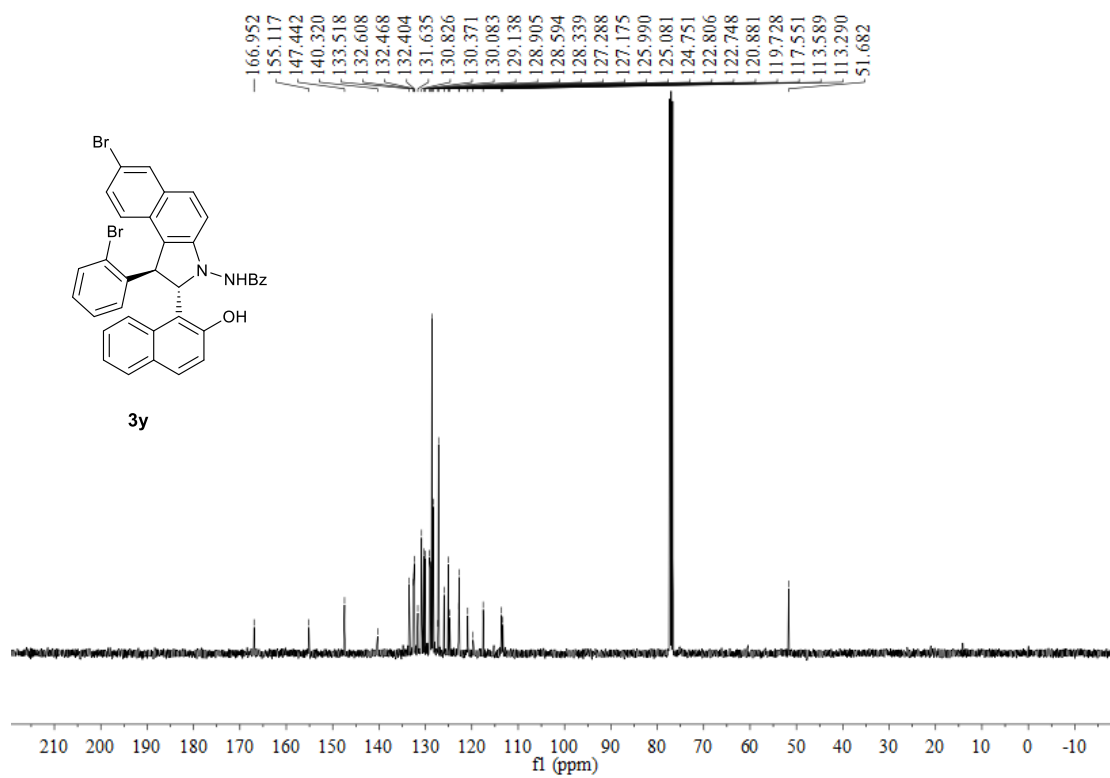
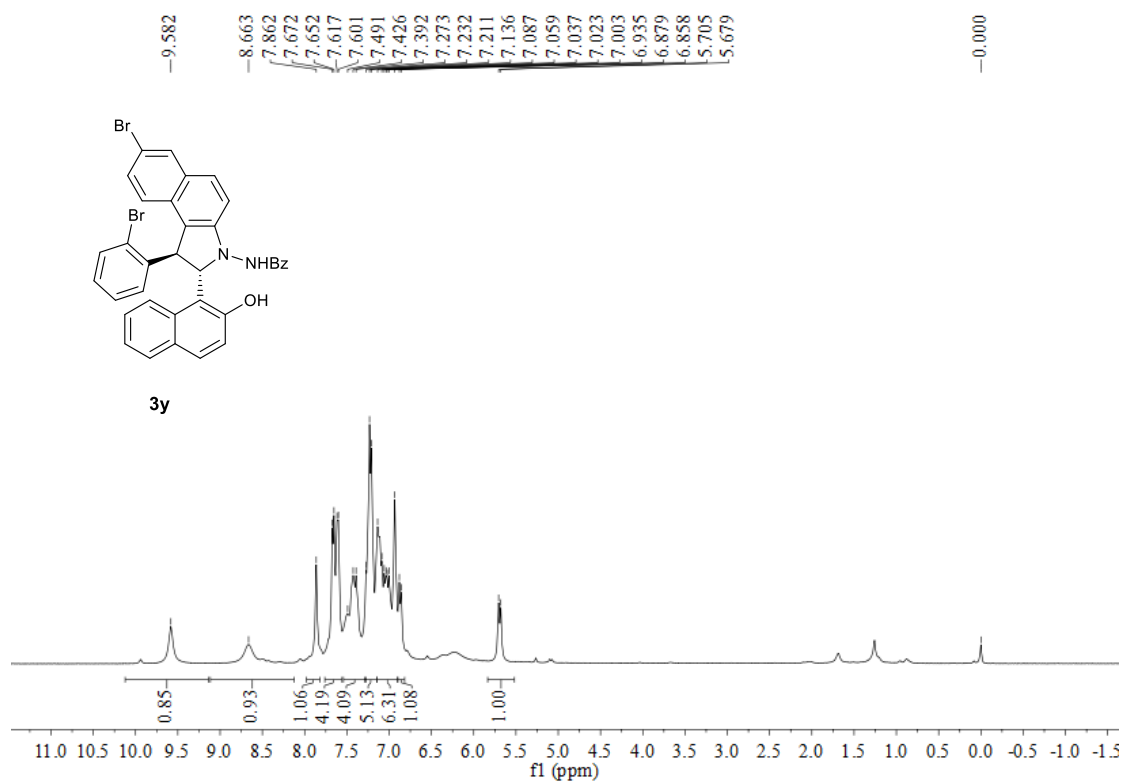


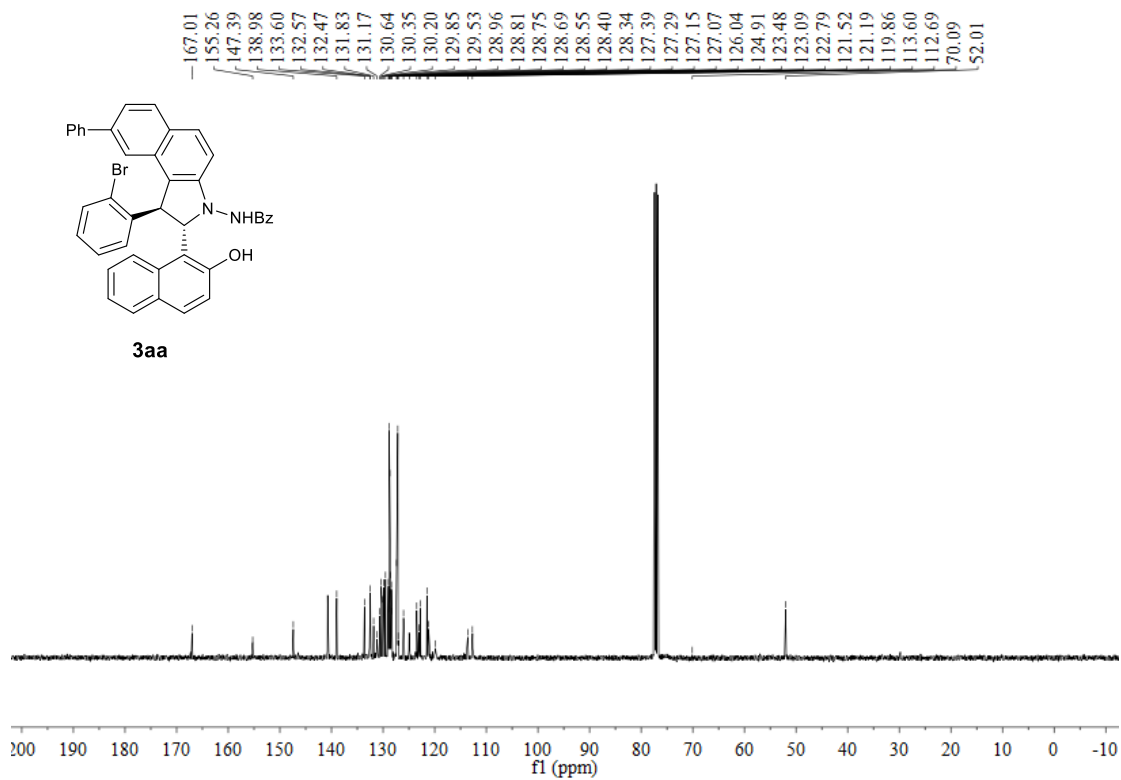
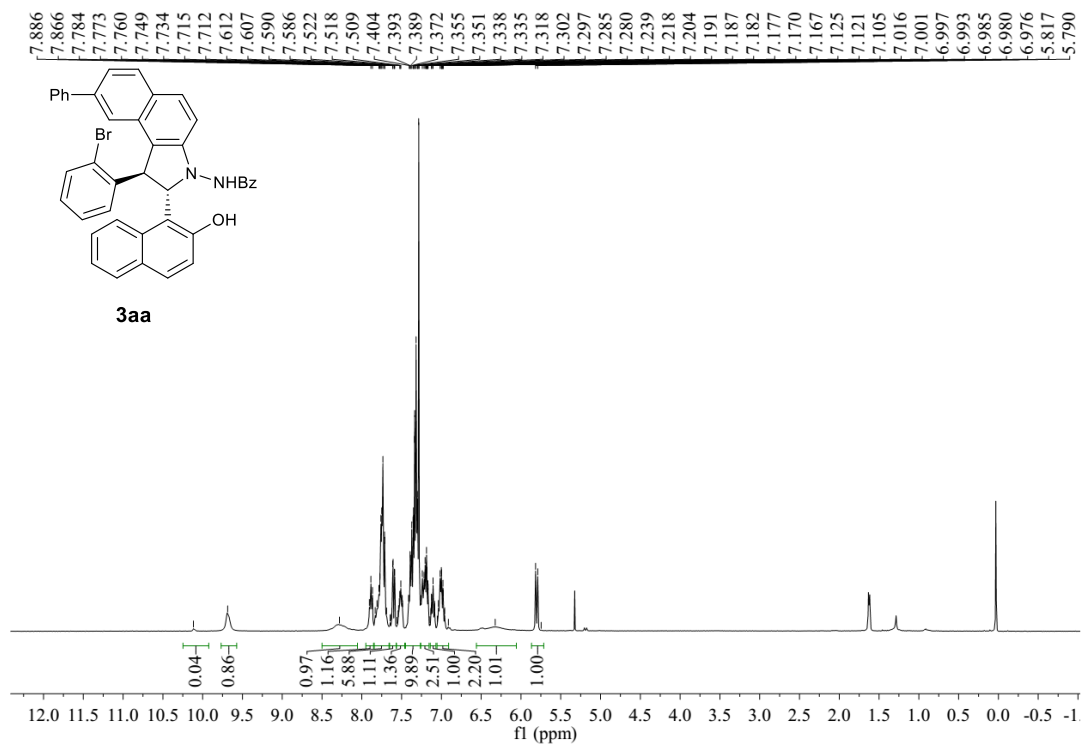


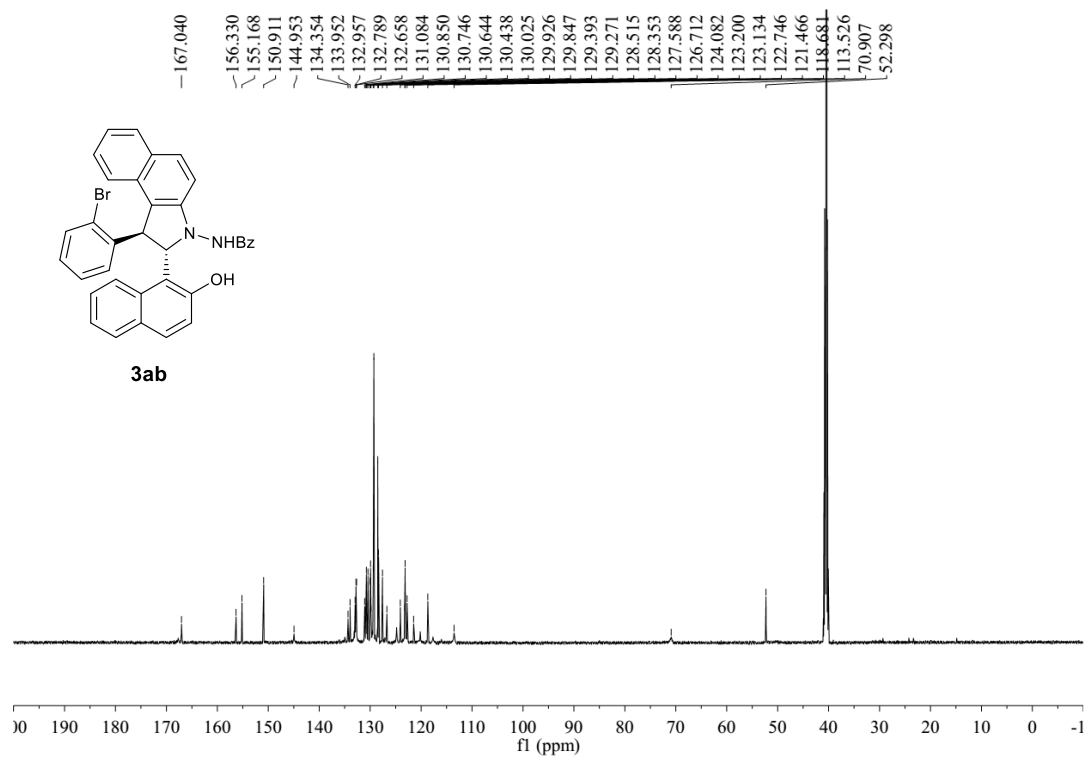
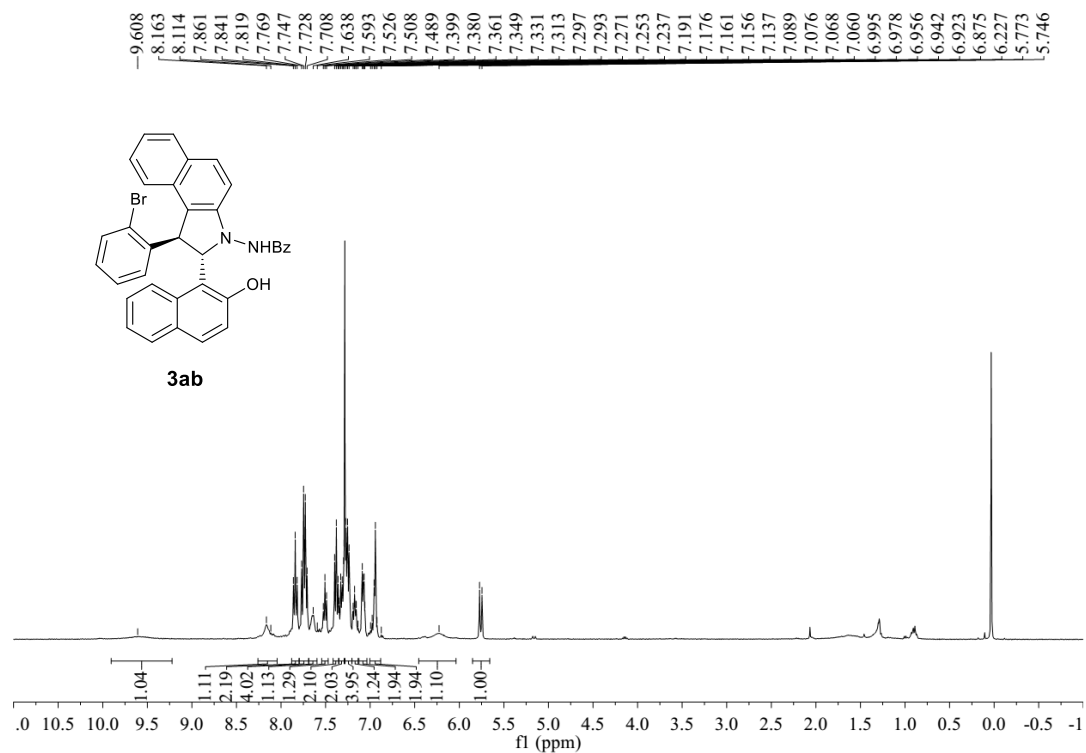




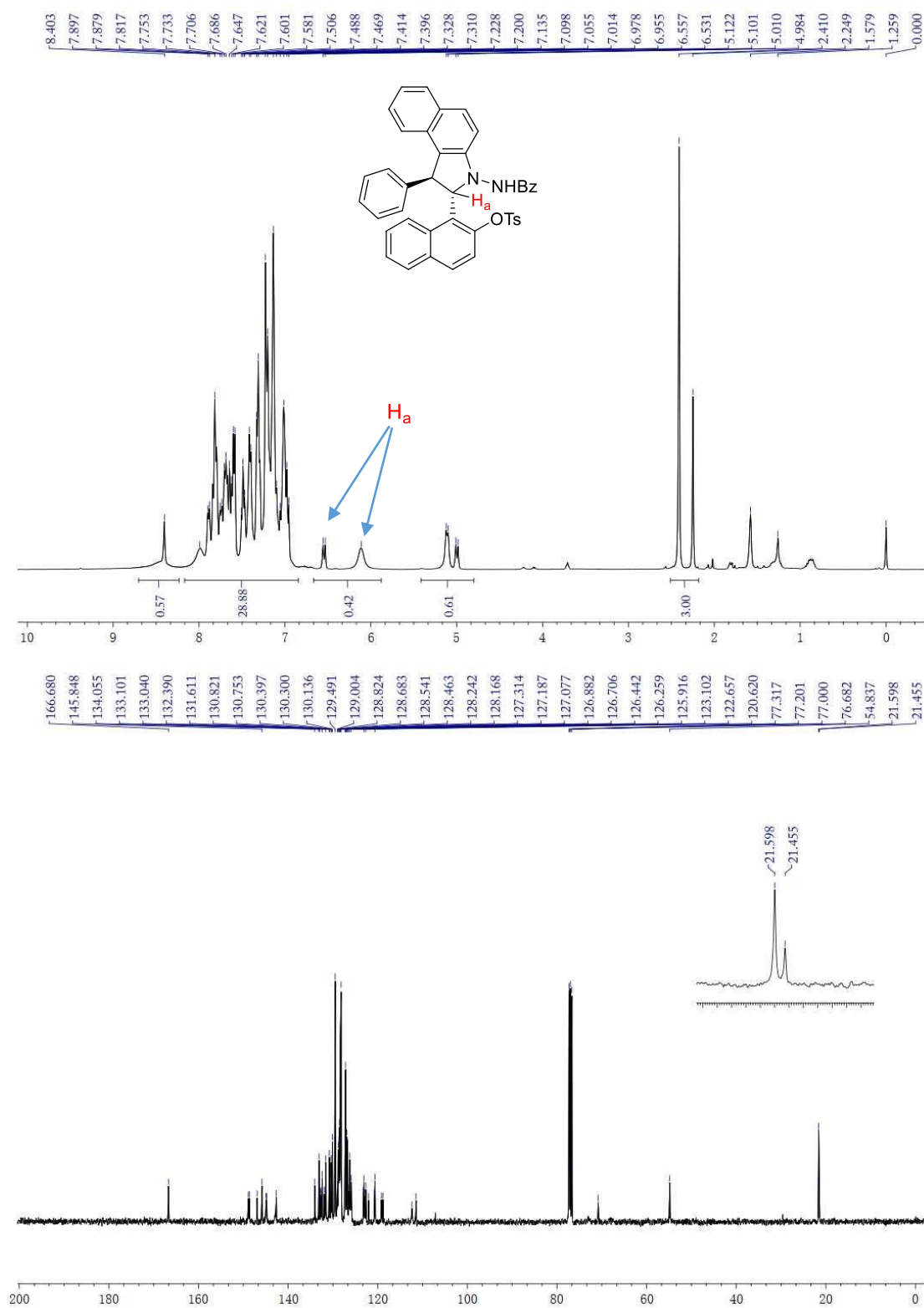




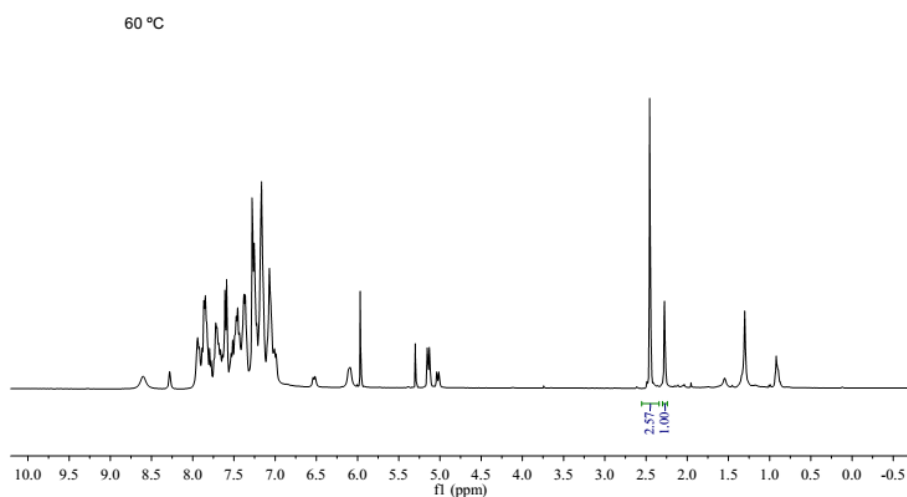
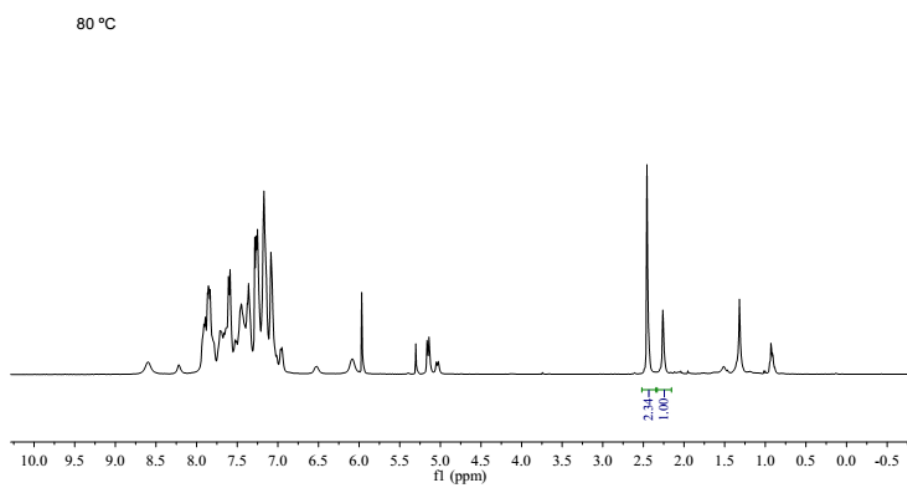
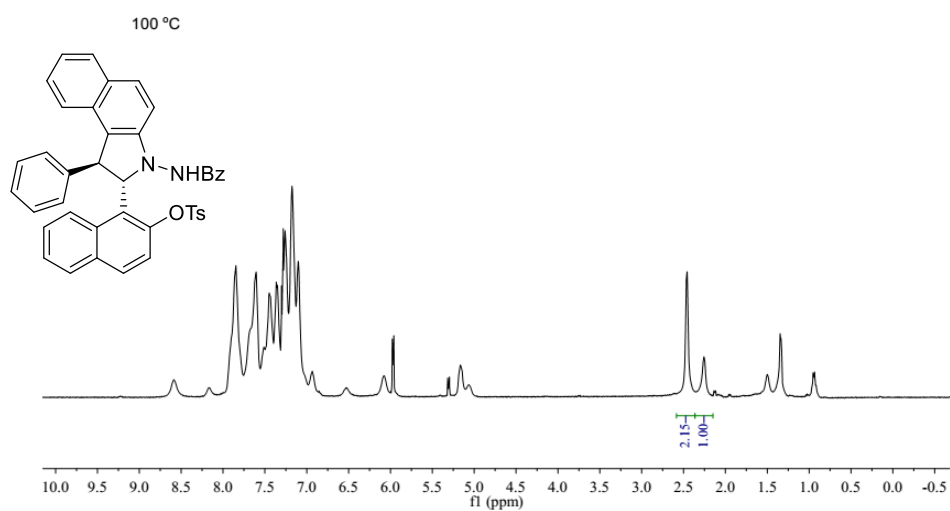


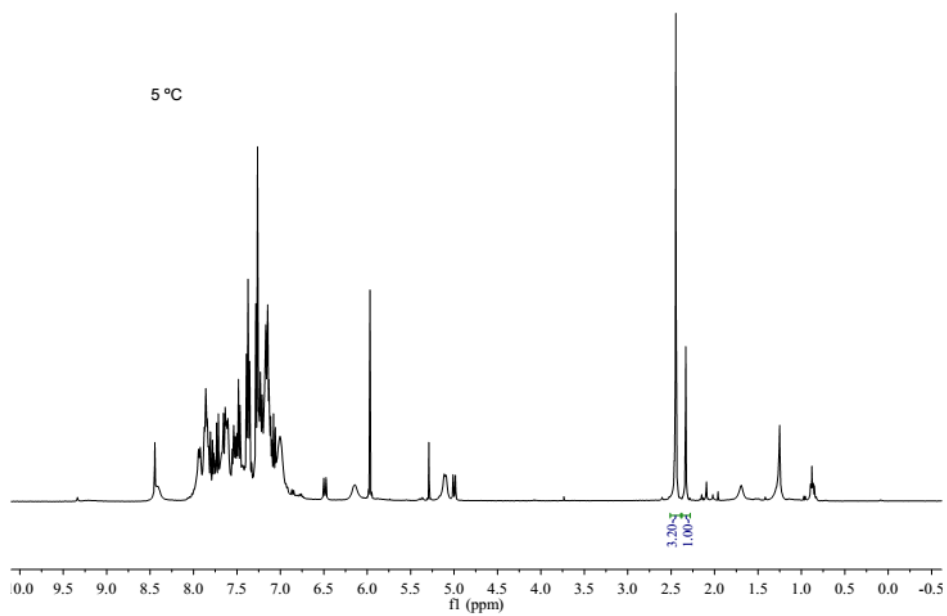
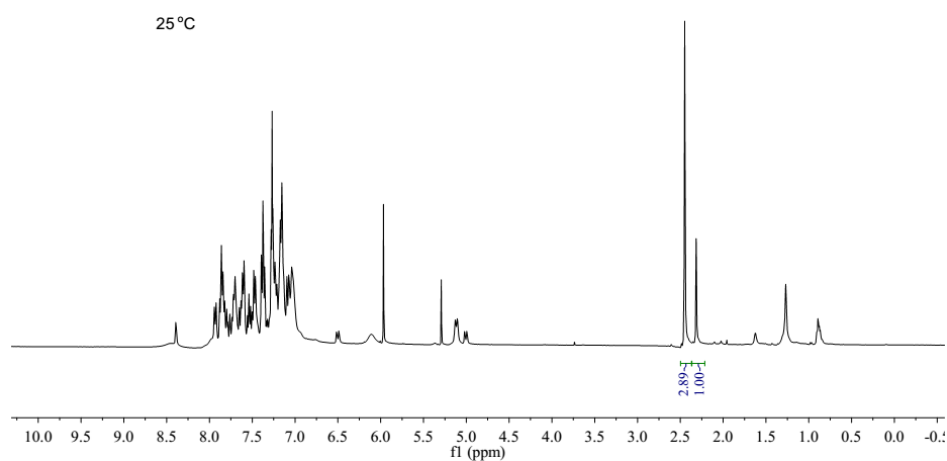
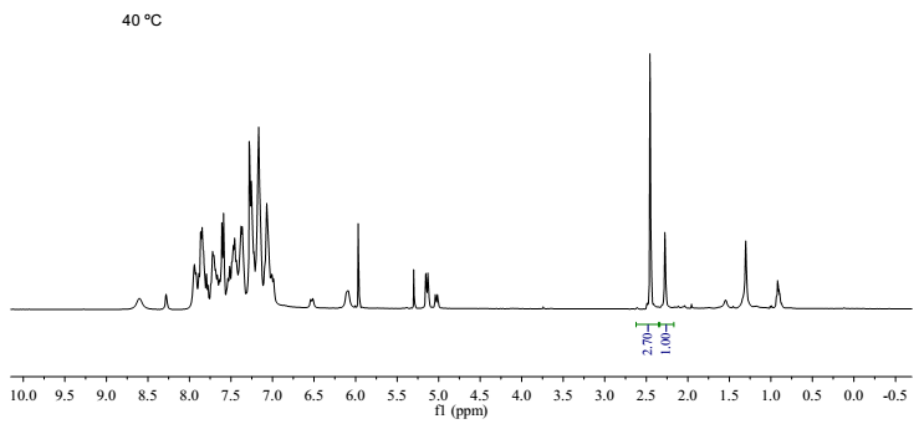


NMR spectra of compound Ts-3a

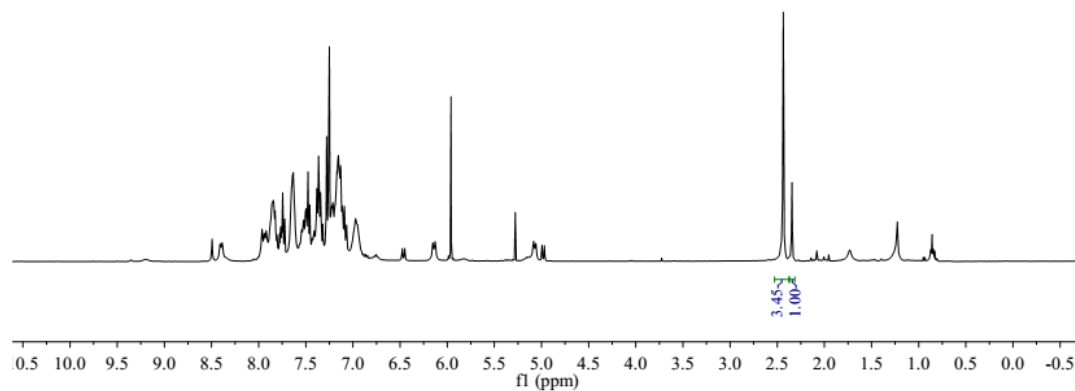


^1H NMR of Ts-3a (600 MHz, $\text{C}_2\text{D}_2\text{Cl}_4$) at different temperatures



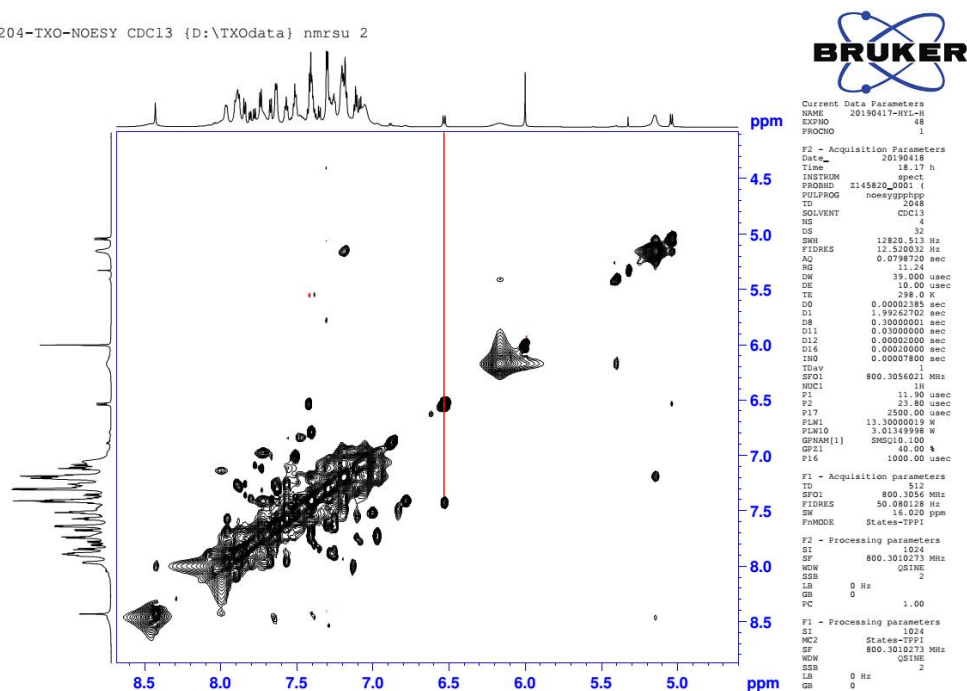


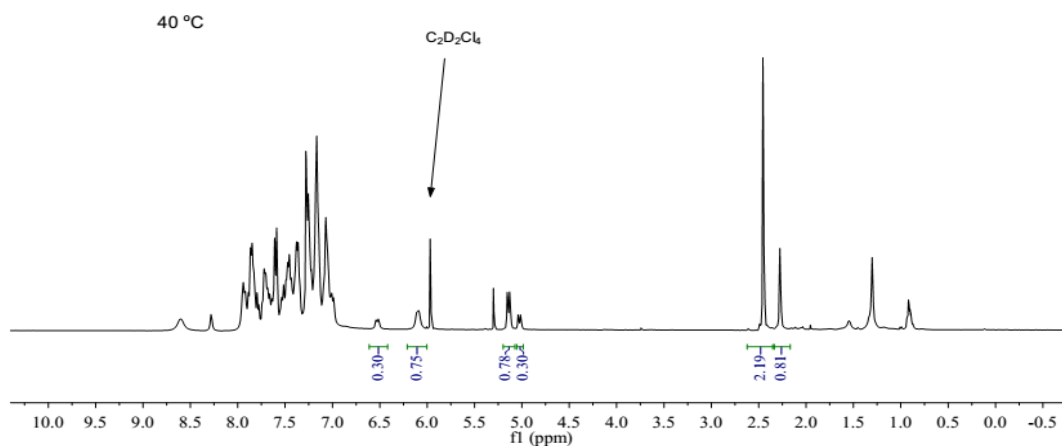
-10 °C



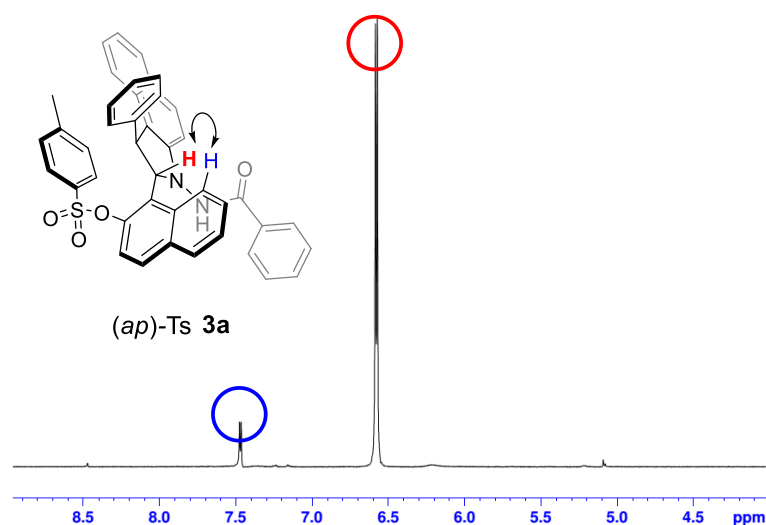
NOESY experiment of compound Ts-3a (800 MHz, CD₂Cl₂)

204-TXO-NOESY CDC13 {D:\TXOdata} nmrsu 2





Selective 1D NOE experiment of compound Ts-3a (800 MHz, CD_2Cl_2)



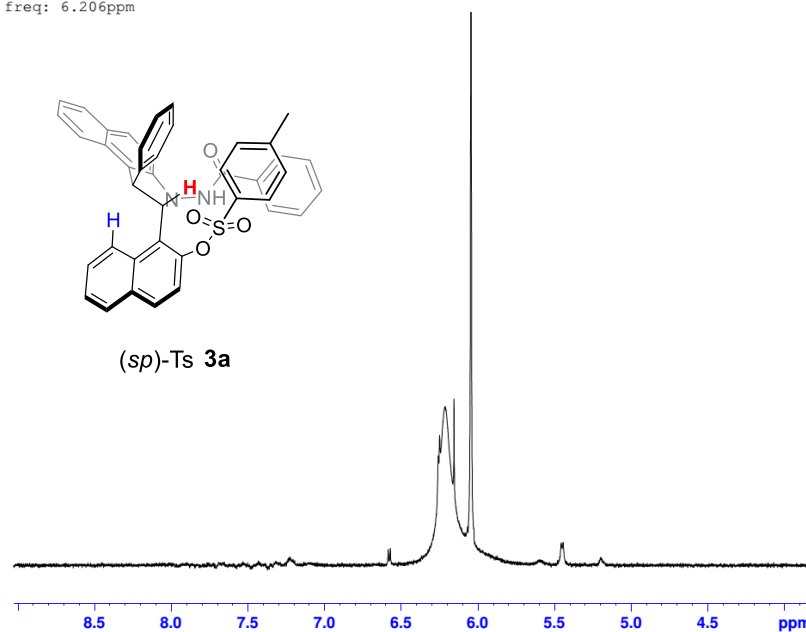
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FIDRES	0.489064 Hz
AQ	2.0447233 sec
RG	22.43
DW	31.200 usec
DE	10.00 usec
TE	298.0 K
D1	2.00000000 sec
D8	0.30000001 sec
D16	0.00020000 sec
D30	0.17281600 sec
D31	0.30000001 sec
TD0	1
ZGORTNS	-DCALC_SPOFFS
SFO1	800.3049419 MHz
NUC1	1H
CHT21	6.5791831
P1	11.90 usec
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P32	20000.00 usec
P44	150.00 usec
PLM1	13.30000019 W
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spoffa2	323.47 Hz
SPW2	0.00005380 W
SPH1M[29]	Crp60,20,20,10
SFOAL29	0.500
spoffa29	0 Hz
SPW29	0.07194100 W
SPH1M[30]	bip720,50,20,1
SFOAL30	0.500
spoffa30	0 Hz
SPW30	5.35729980 W
GP20	11.00 %
GP1M[1]	SMSQ10.100
GP21	15.00 %
GP1M[2]	SMSQ10.100
GP22	40.00 %
P16	1000.00 usec

F2 - Processing parameters

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PC	1.00

freq: 6.206ppm



Current Data Parameters

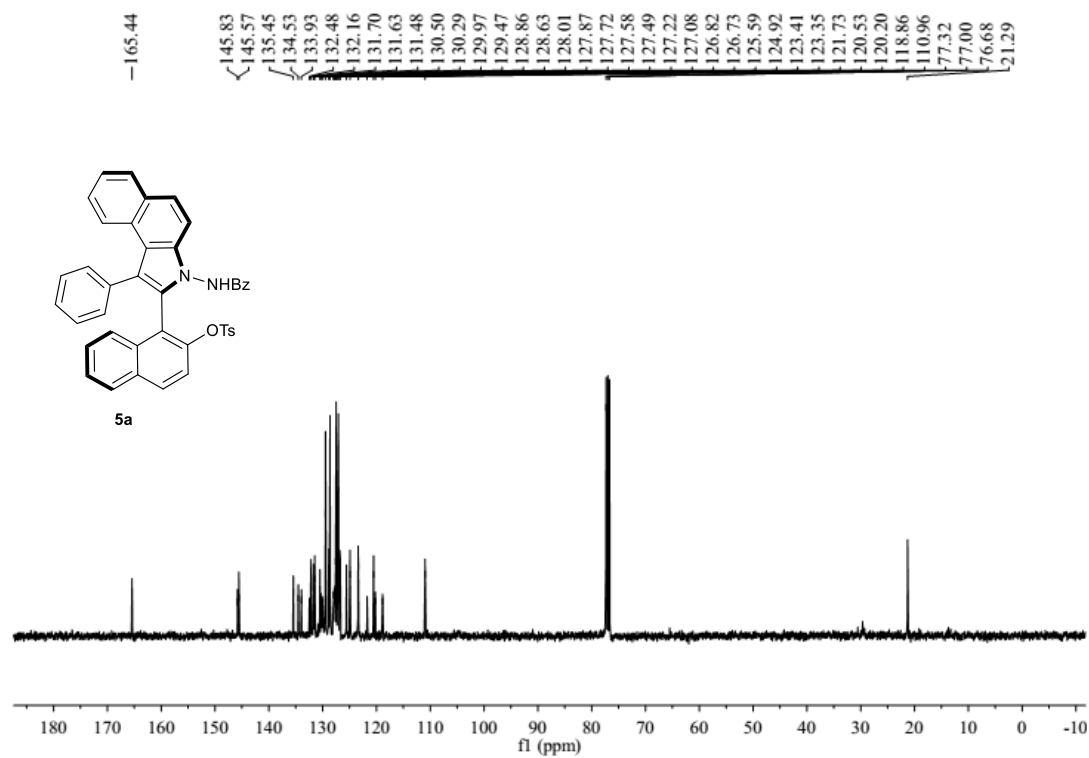
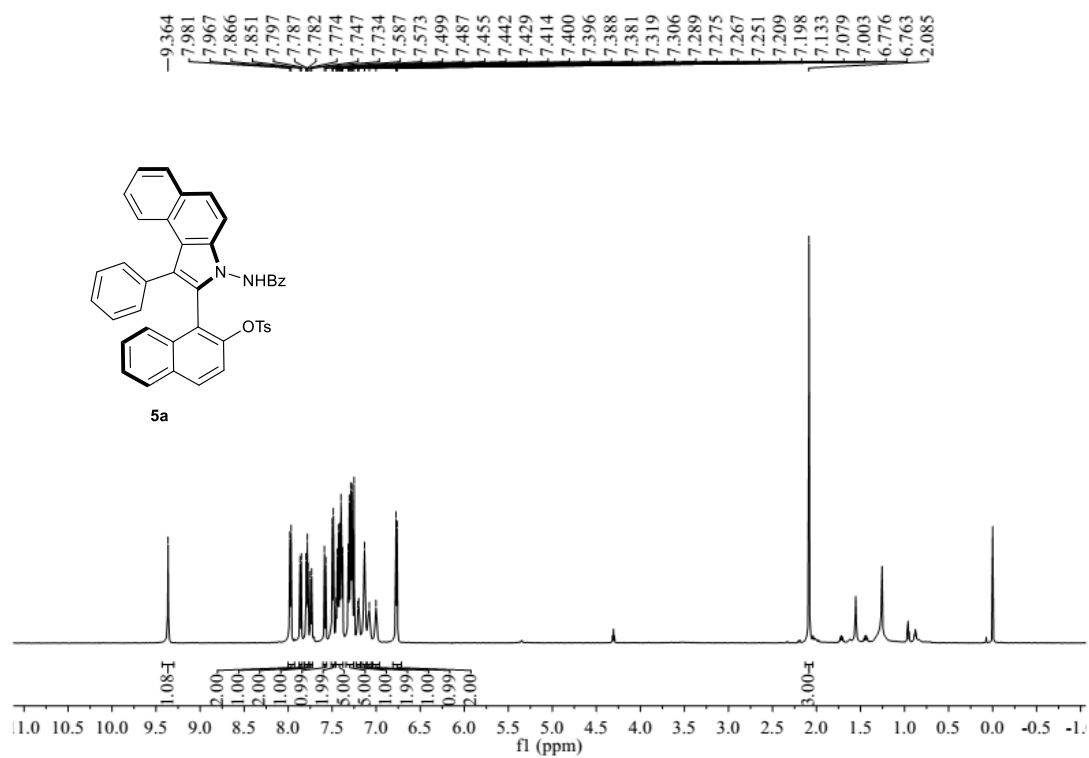
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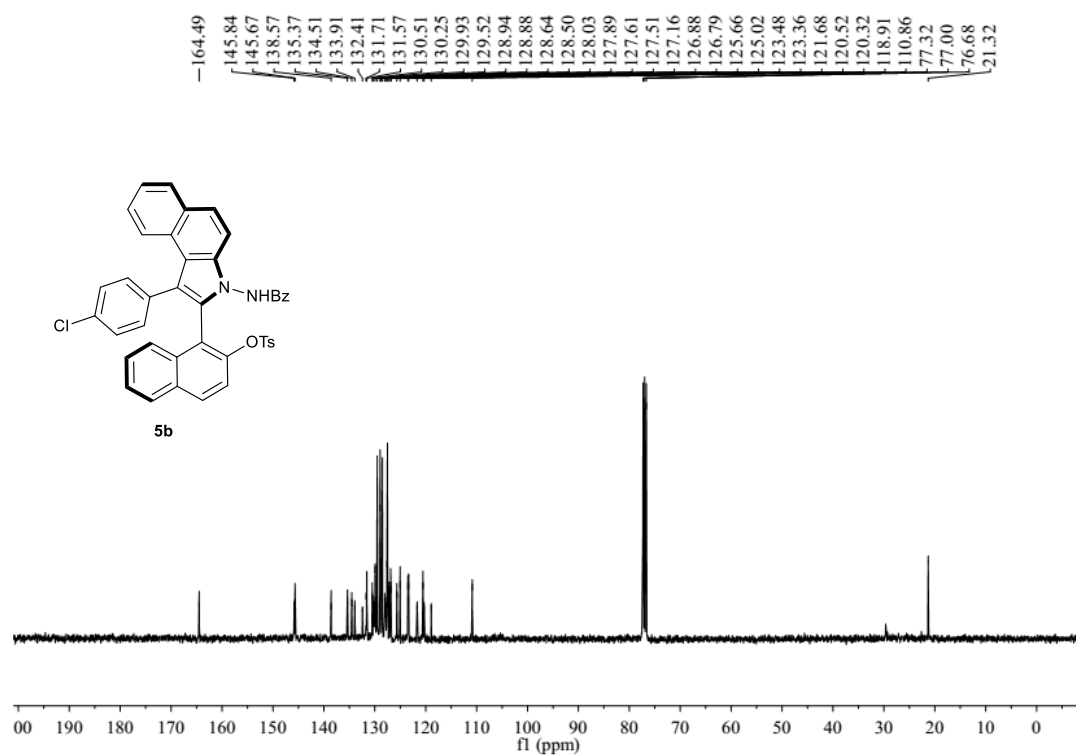
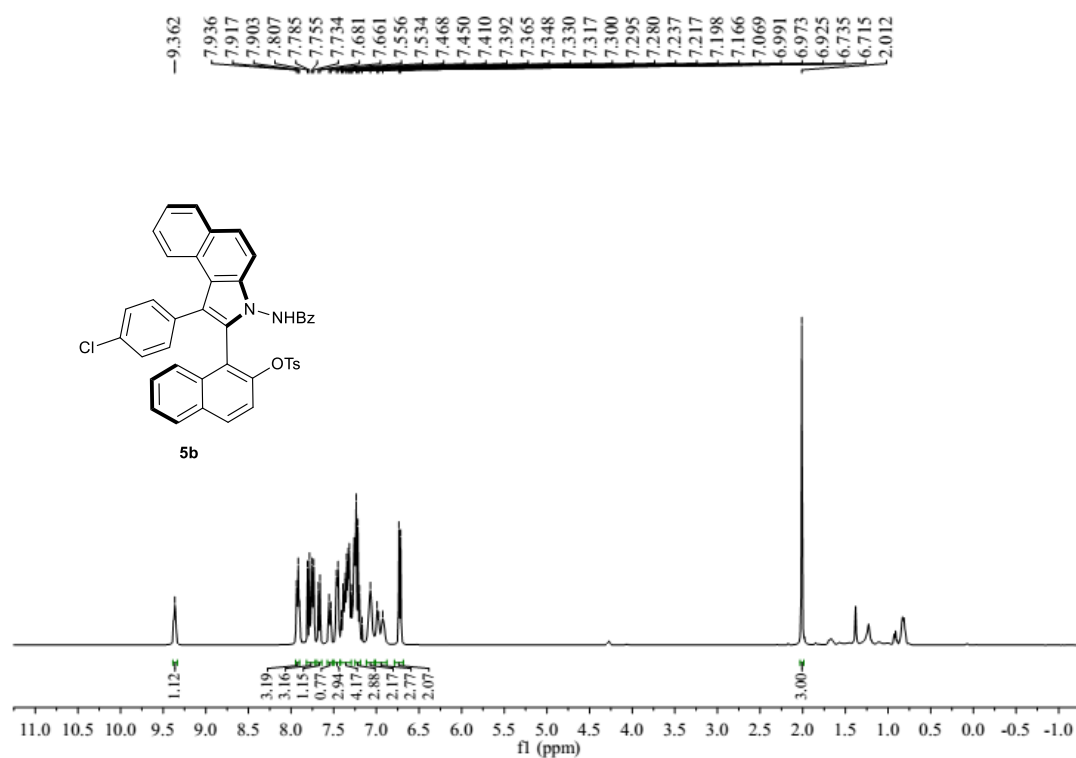
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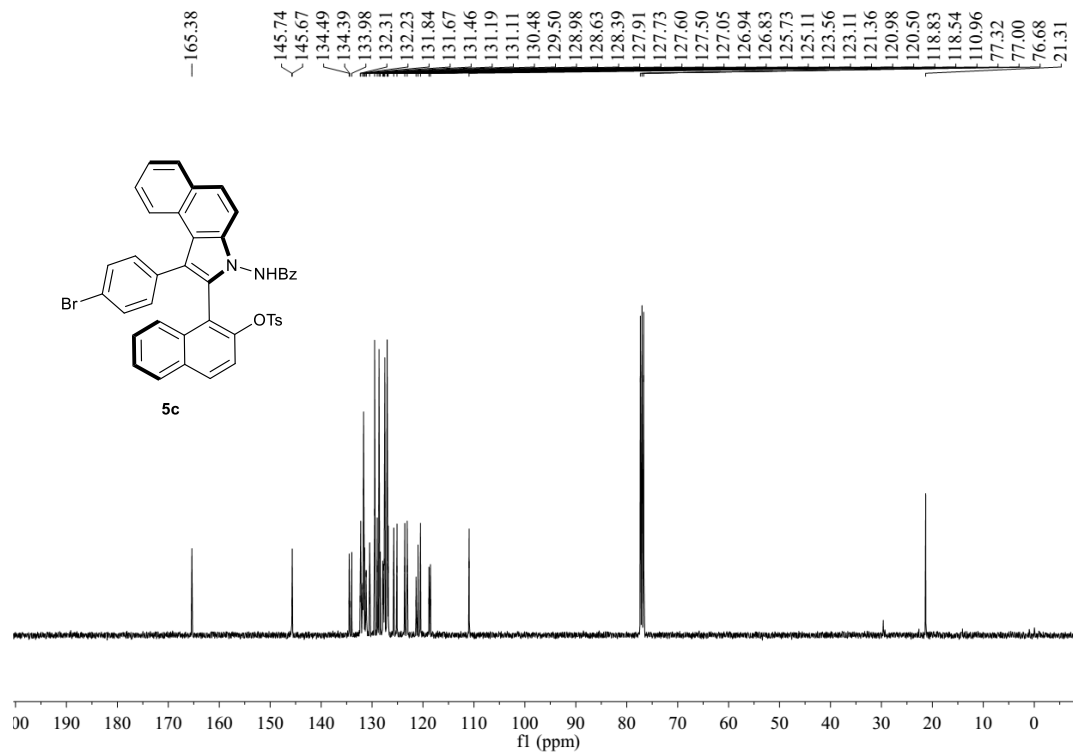
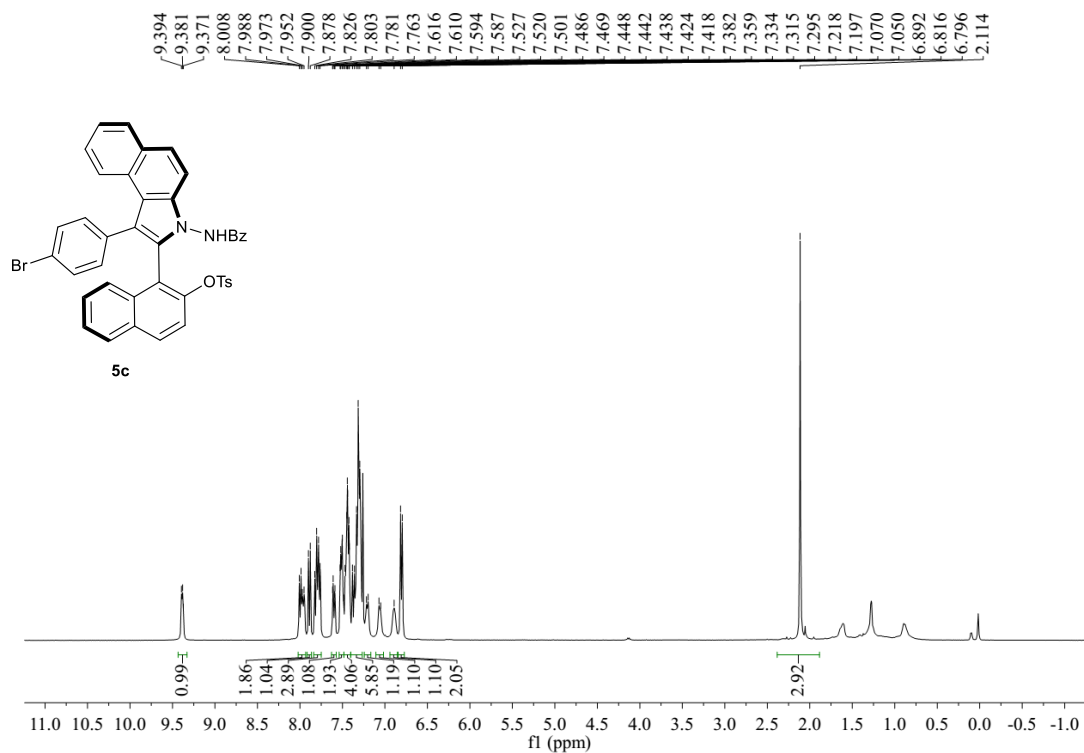
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FIDRES	0.489064 Hz
AQ	2.0447233 sec
RG	22.43
DW	31.200 usec
DE	10.00 usec
TE	298.0 K
D1	2.00000000 sec
D8	0.30000001 sec
D16	0.00020000 sec
D30	0.17281600 sec
D31	0.30000001 sec
TD0	1
ZGORTNS	-DCALC_SPOFFS
SFO1	800.3049419 MHz
NUC1	1H
CHT21	6.2062140
P1	11.90 usec
P12	8335.45 usec
P32	20000.00 usec
P44	150.00 usec
PLM1	13.30000019 W
SPH1M[2]	Gauss1_1000
SFOAL2	0.500
spoffa2	24.98 Hz
SPW2	0.00064009 W
SPH1M[29]	Crp60,20,20,10
SFOAL29	0.500
spoffa29	0 Hz
SPW29	0.07194100 W
SPH1M[30]	bip720,50,20,1
SFOAL30	0.500
spoffa30	0 Hz
SPW30	5.35729980 W
GP20	11.00 %
GP1M[1]	SMSQ10.100
GP21	15.00 %
GP1M[2]	SMSQ10.100
GP22	40.00 %
P16	1000.00 usec

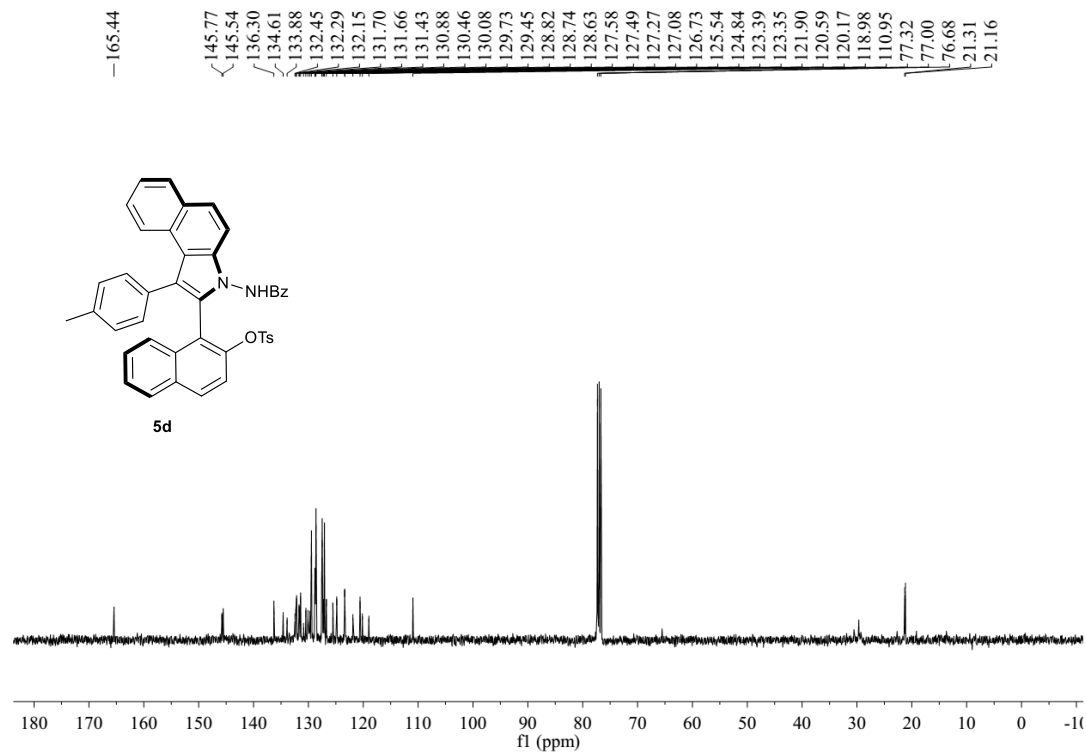
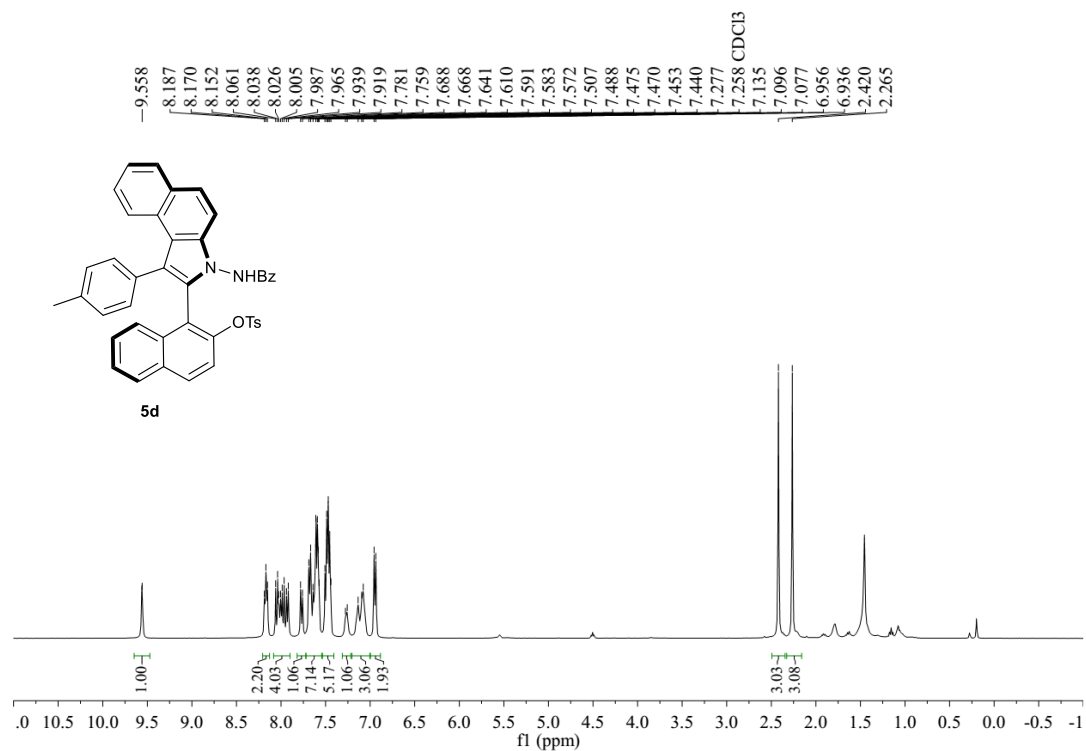
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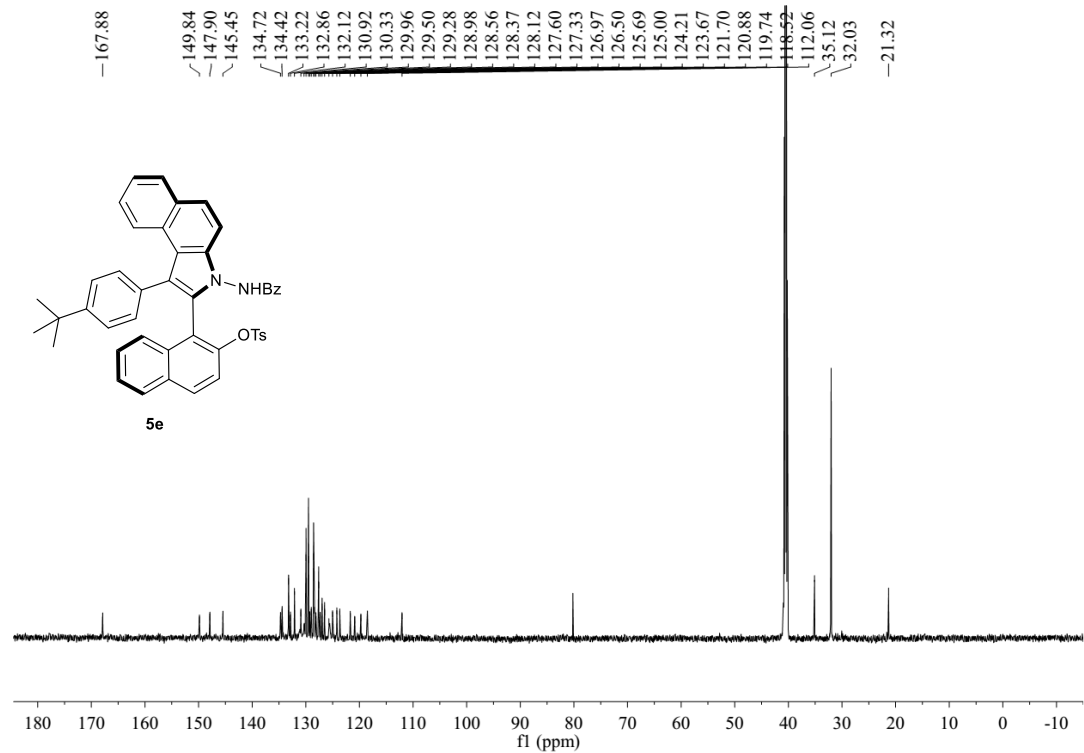
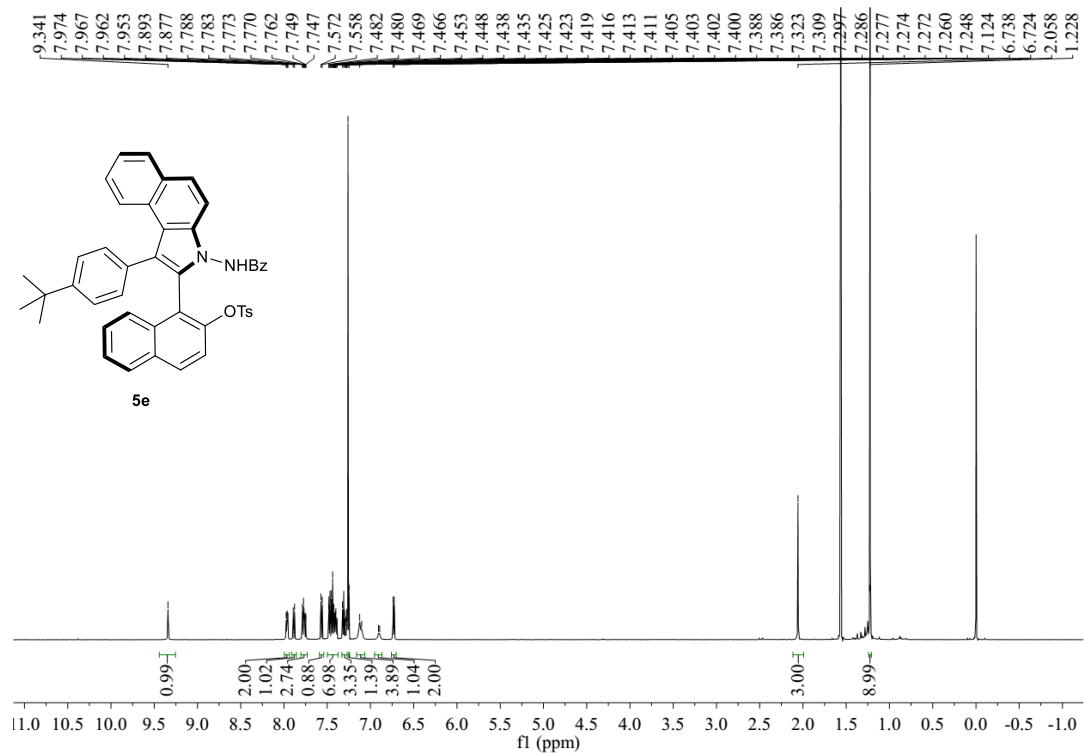
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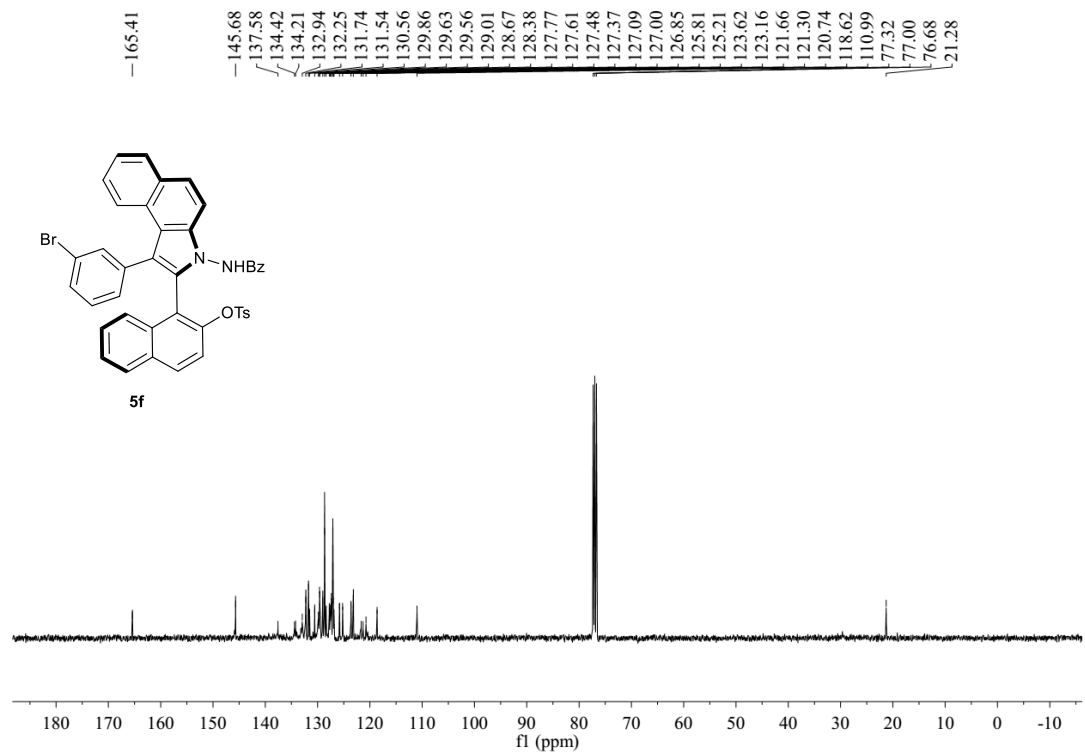
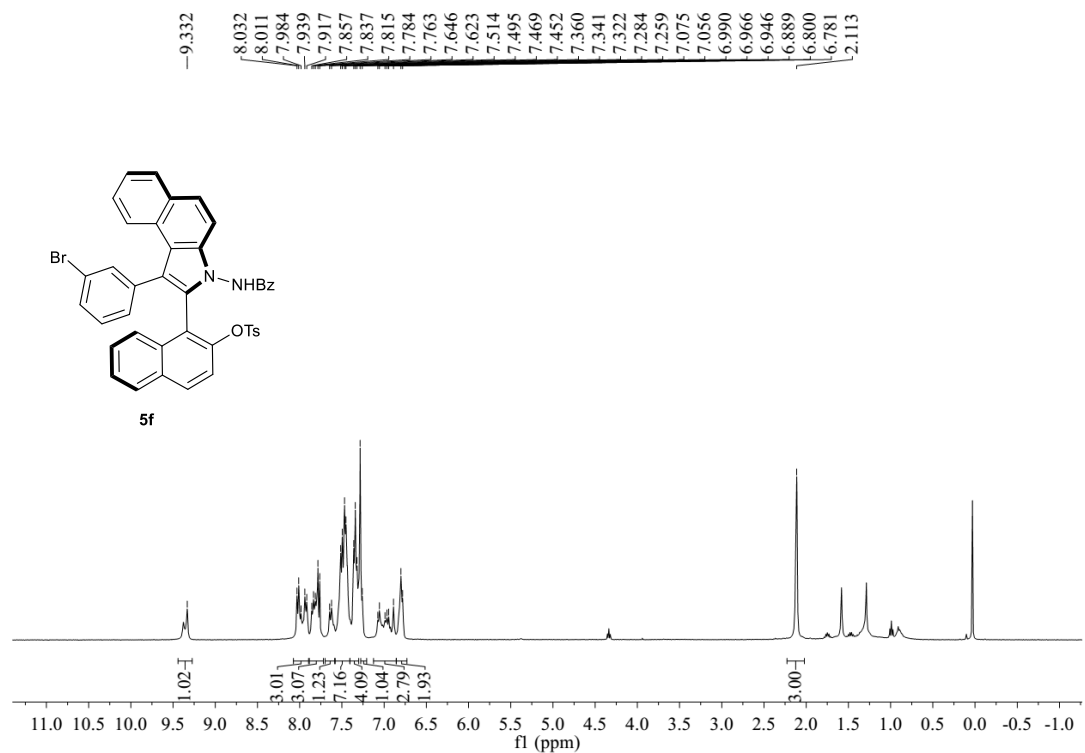


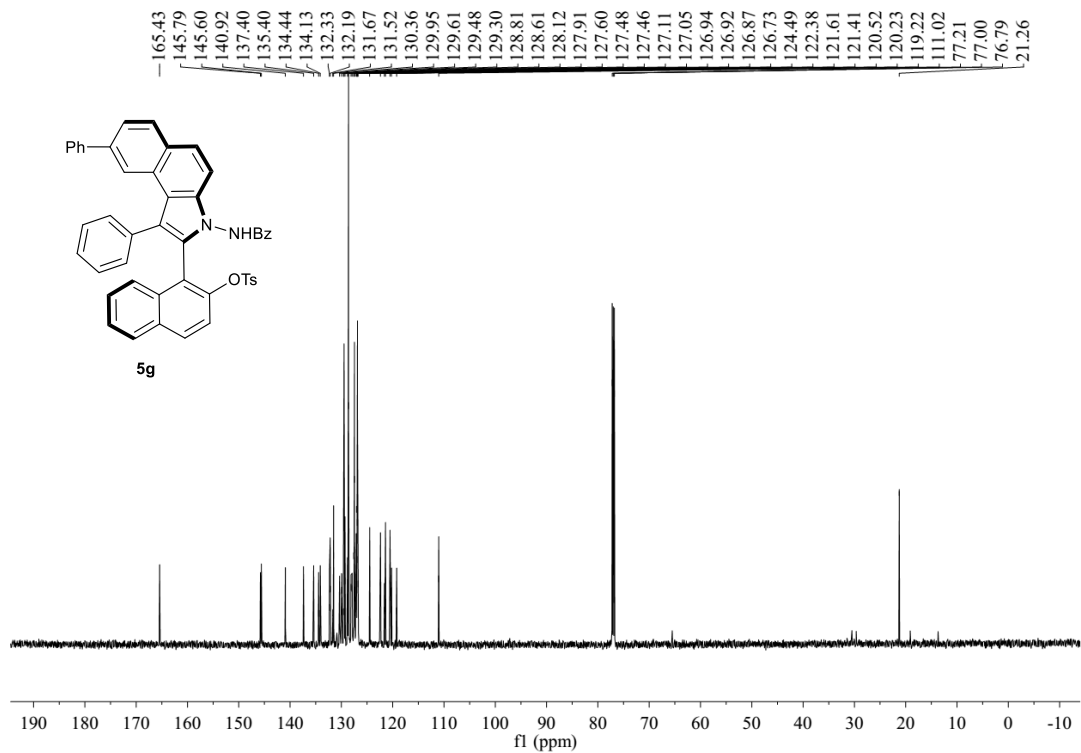
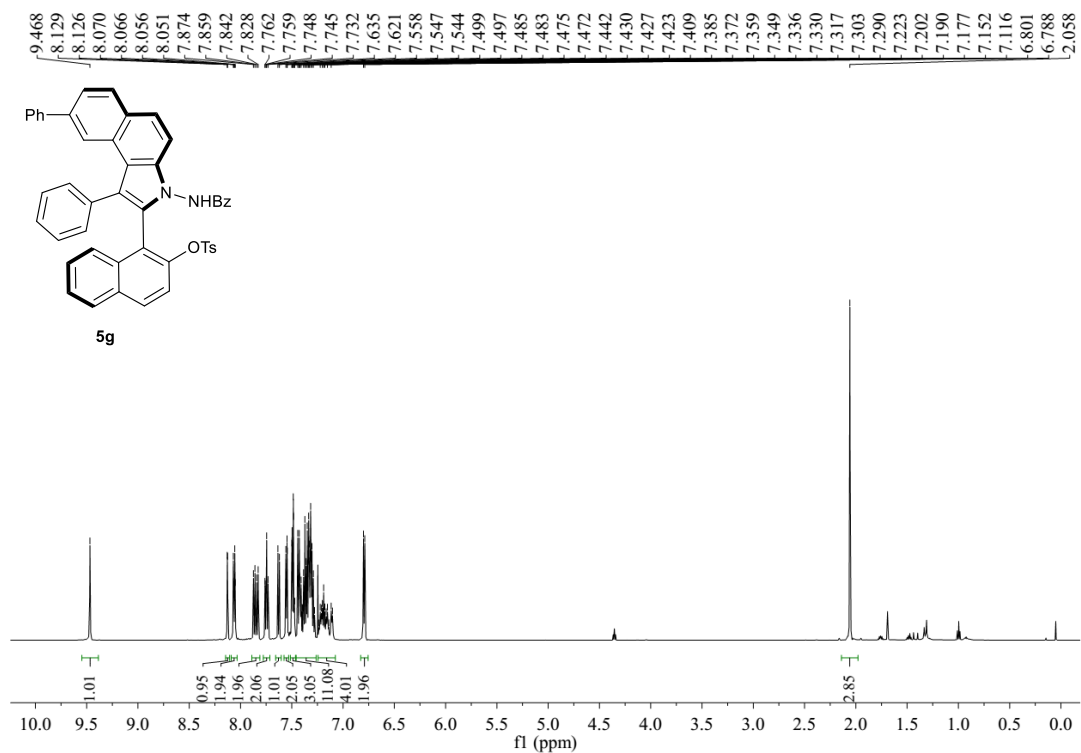


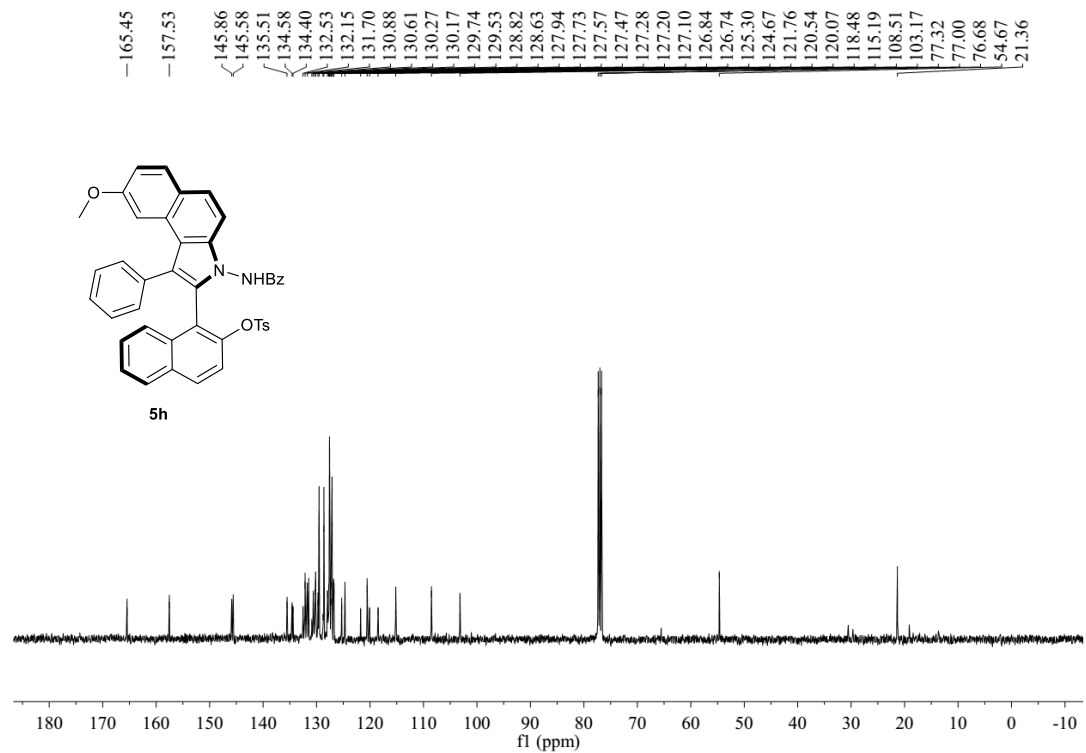
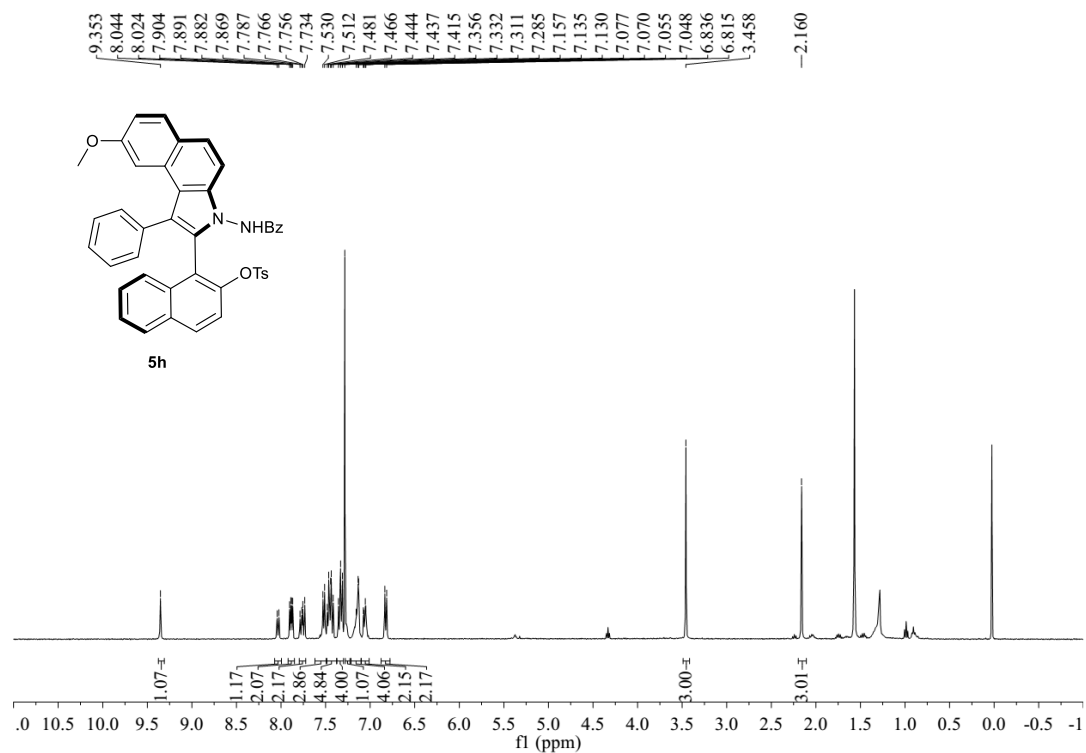


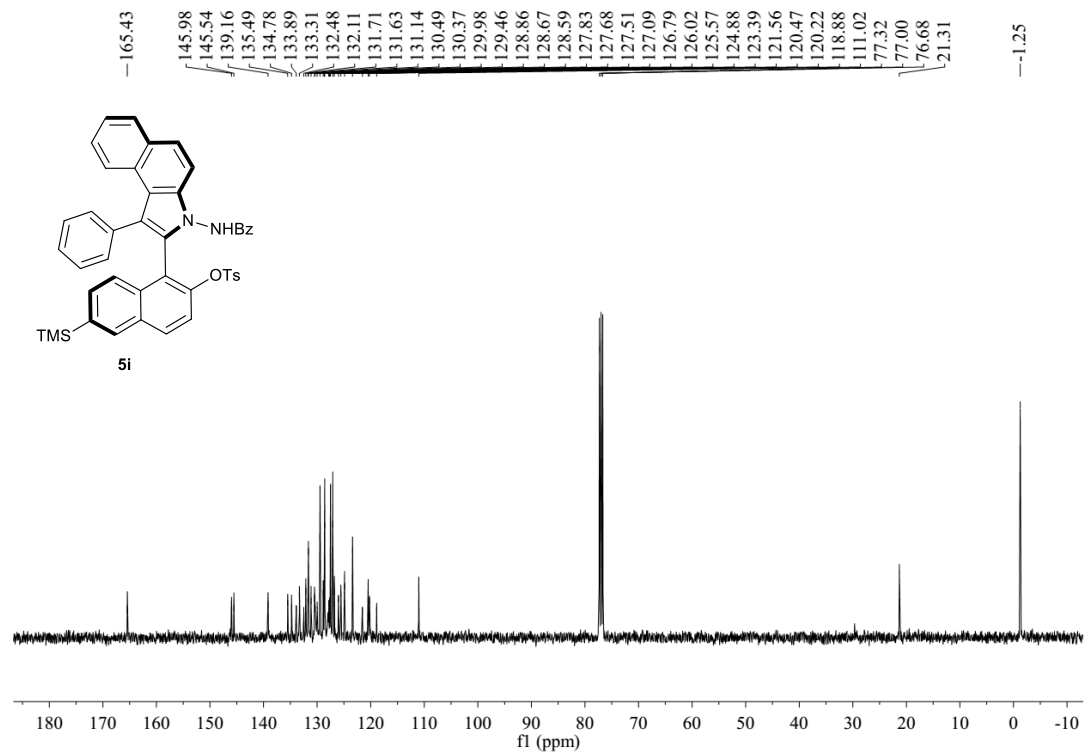
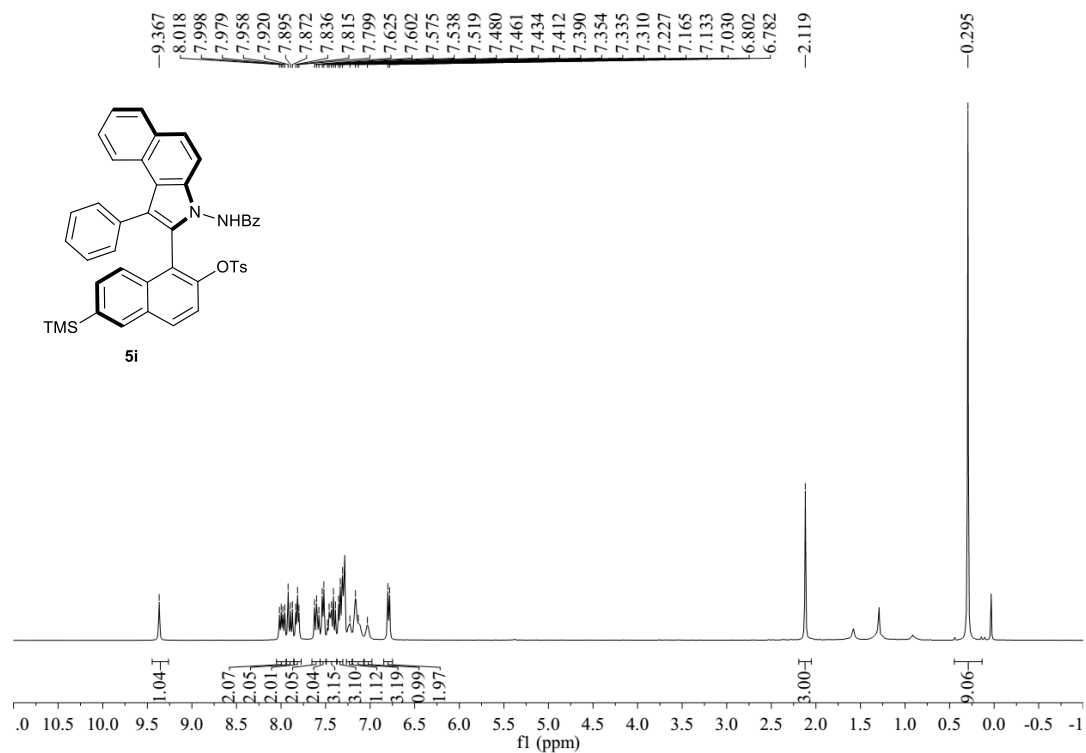


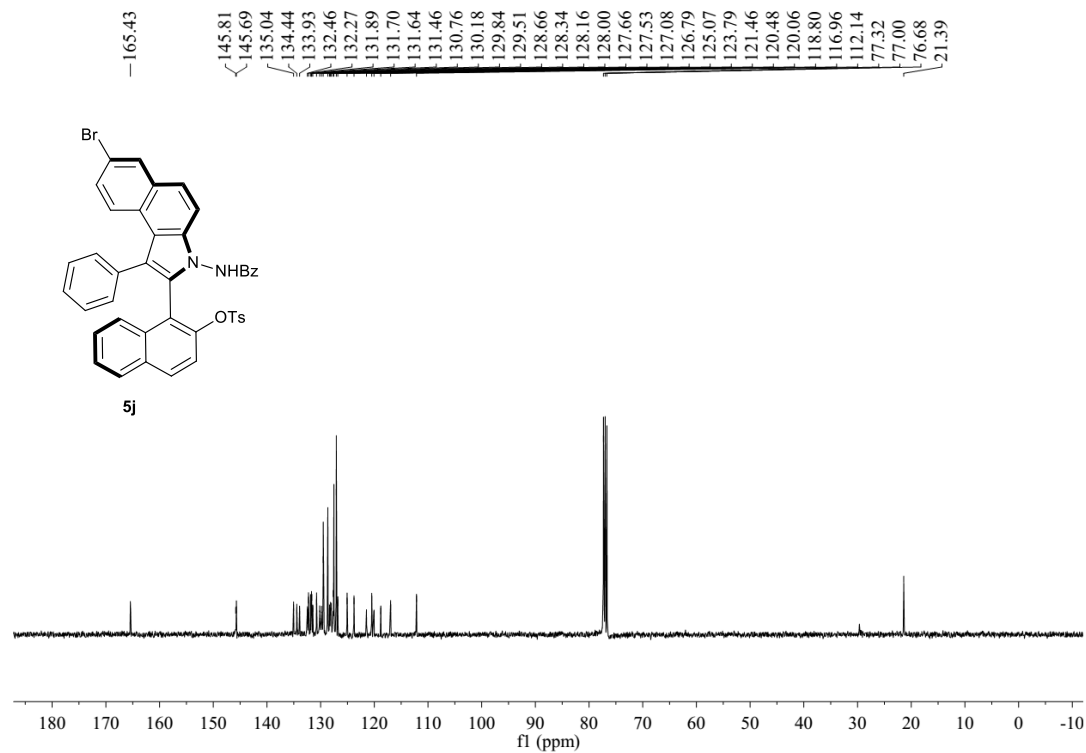
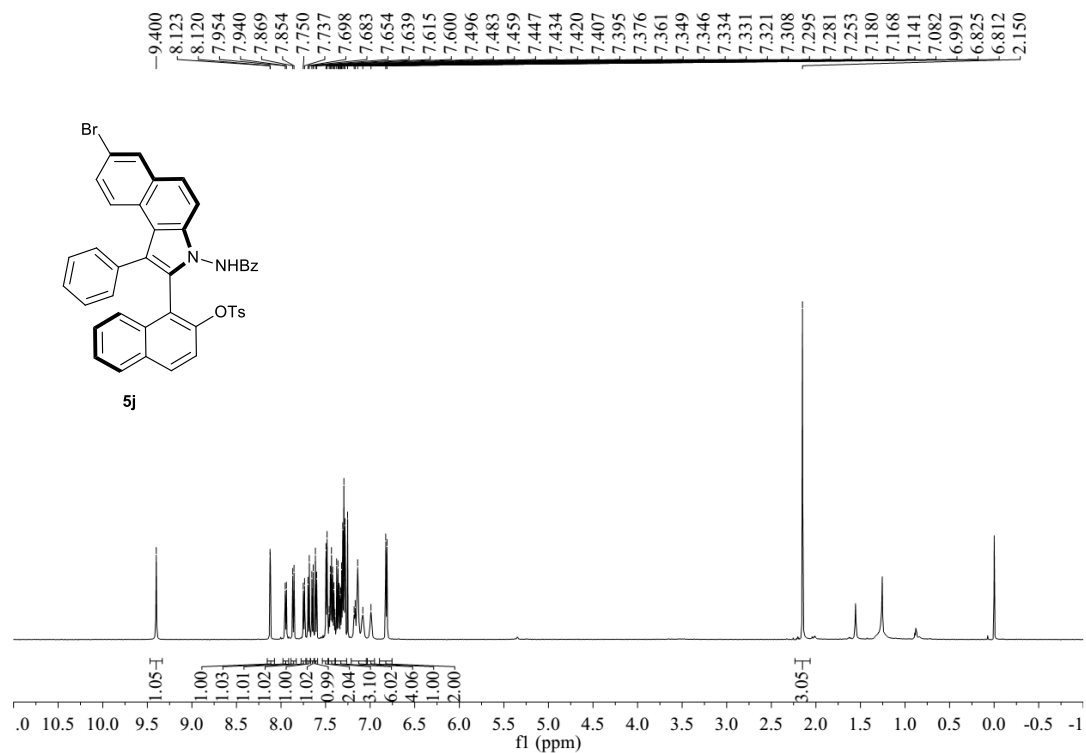


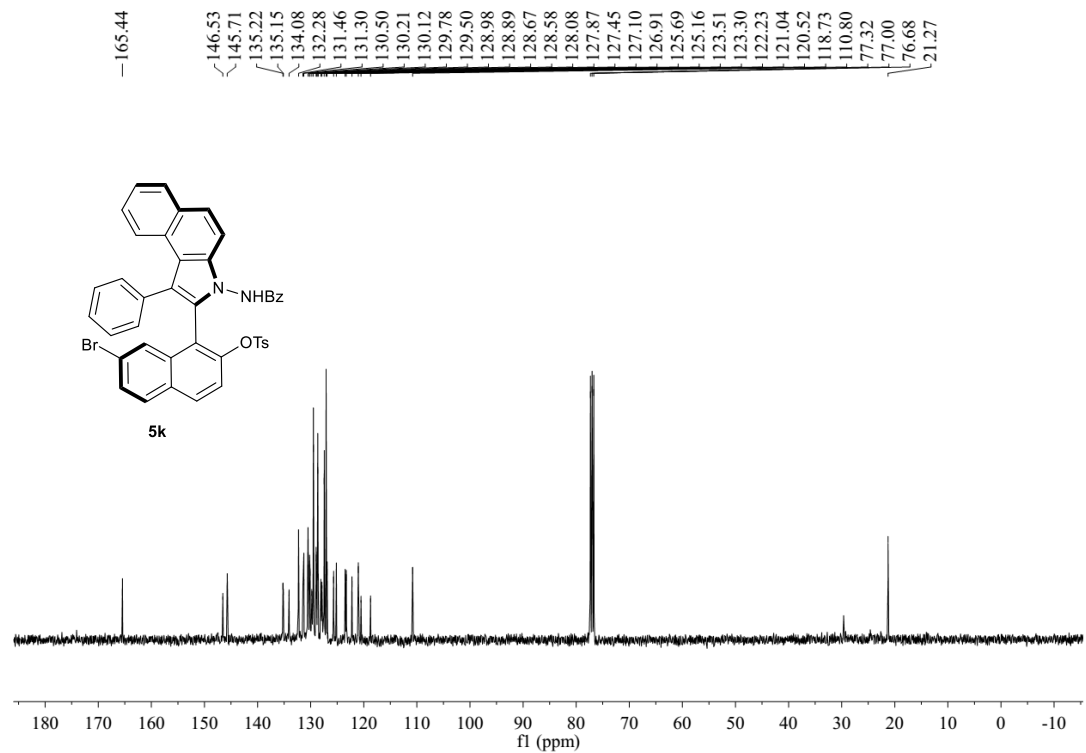
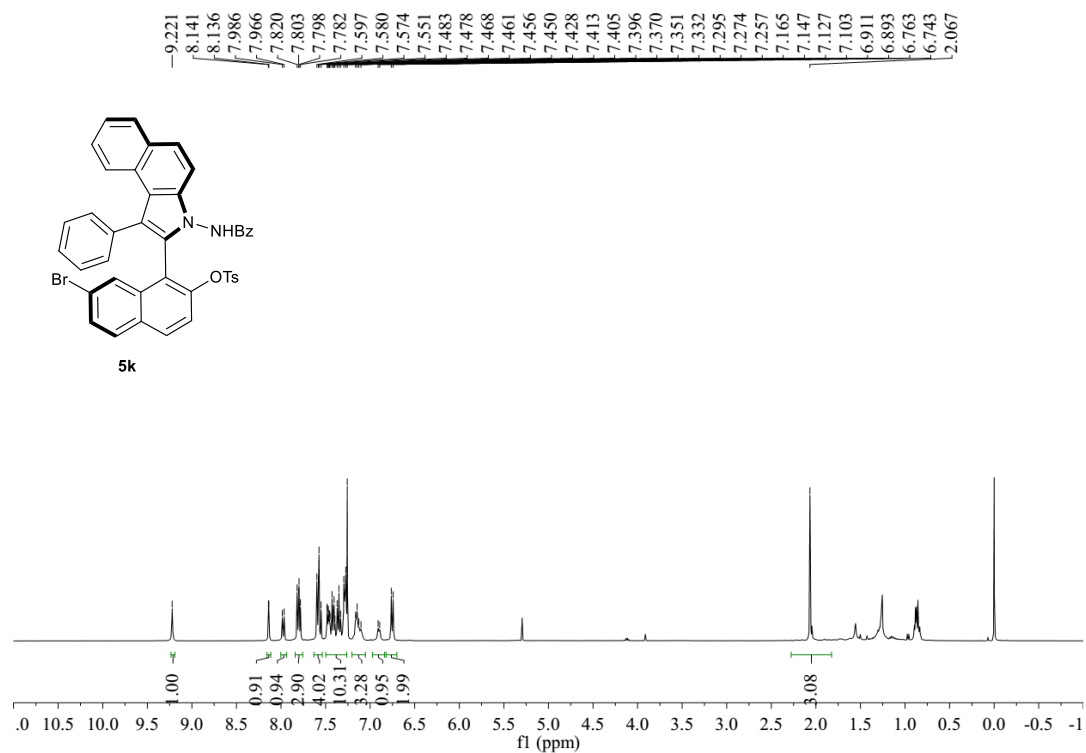


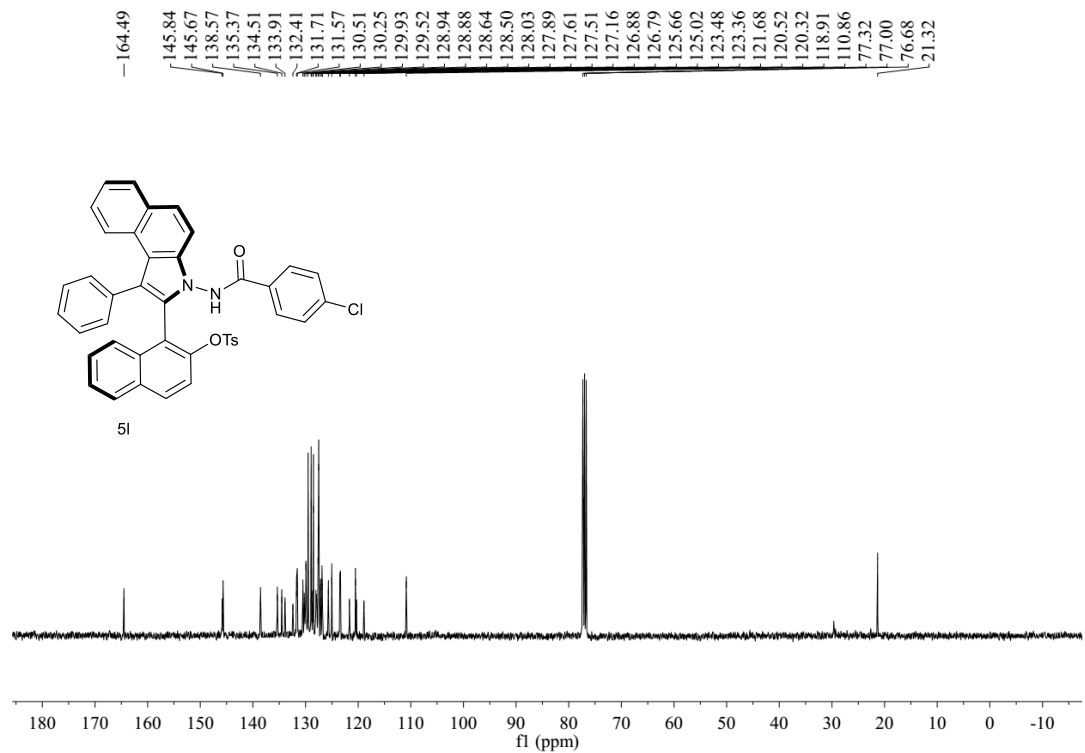
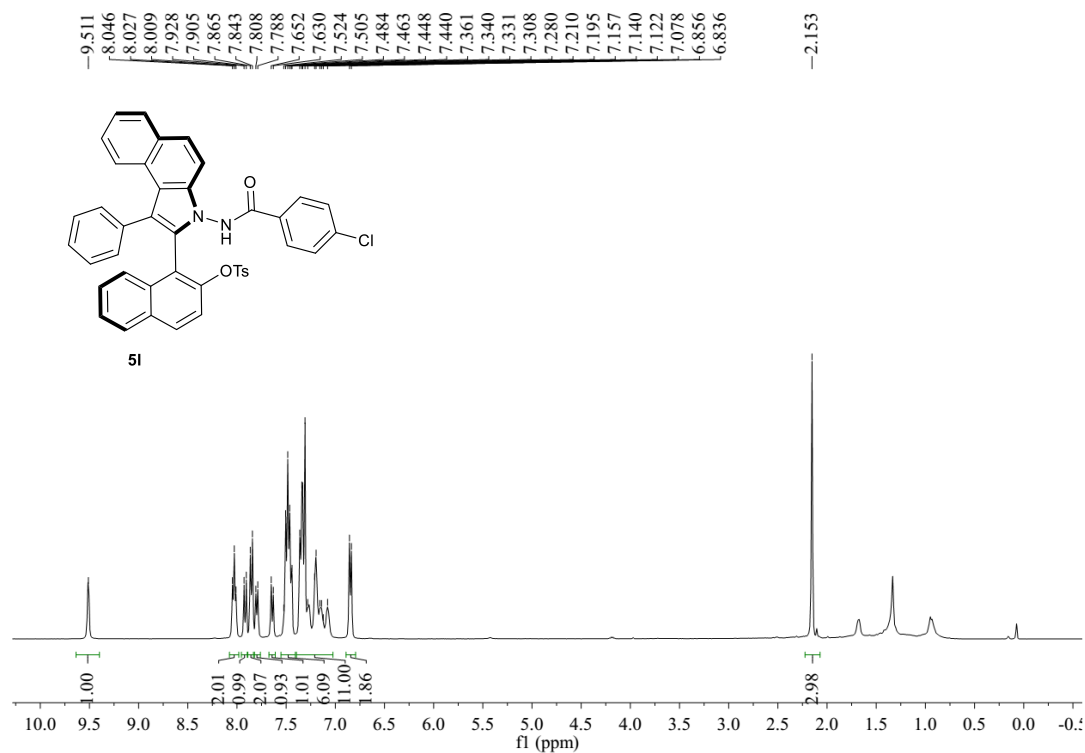


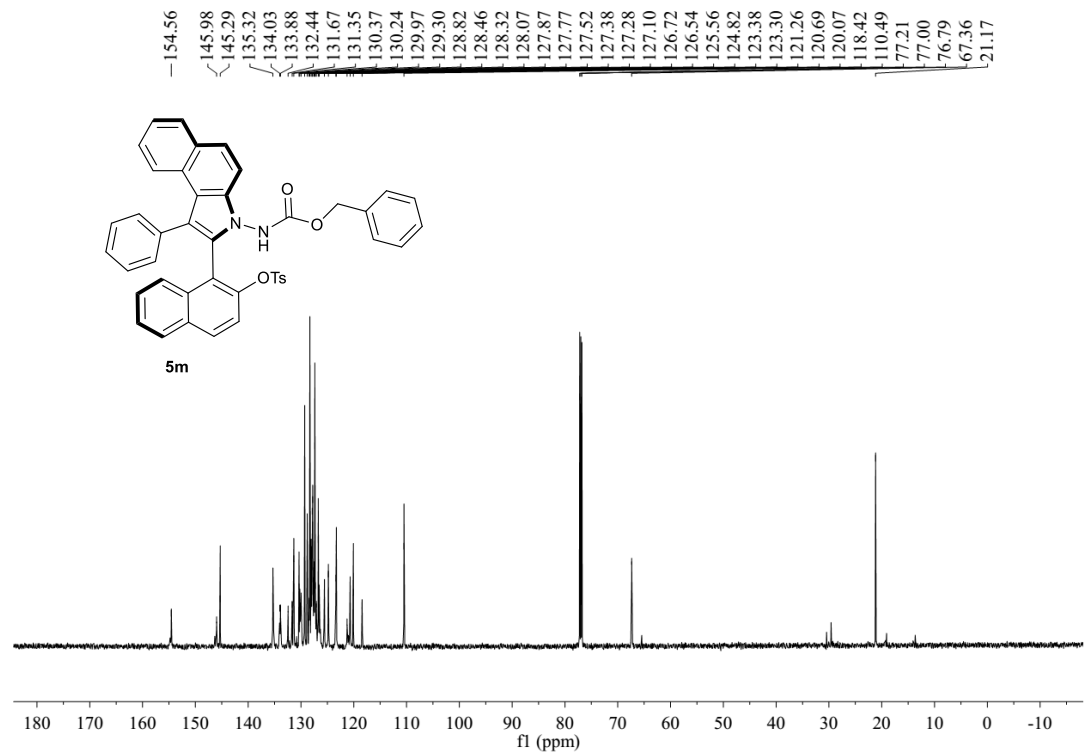
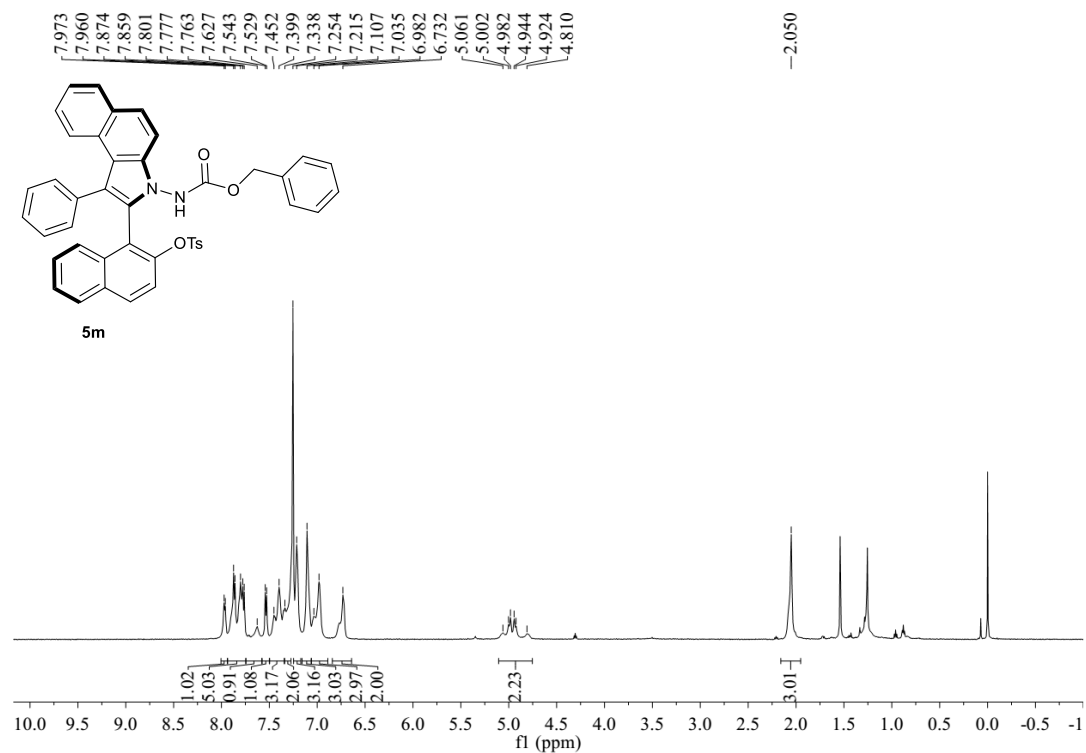


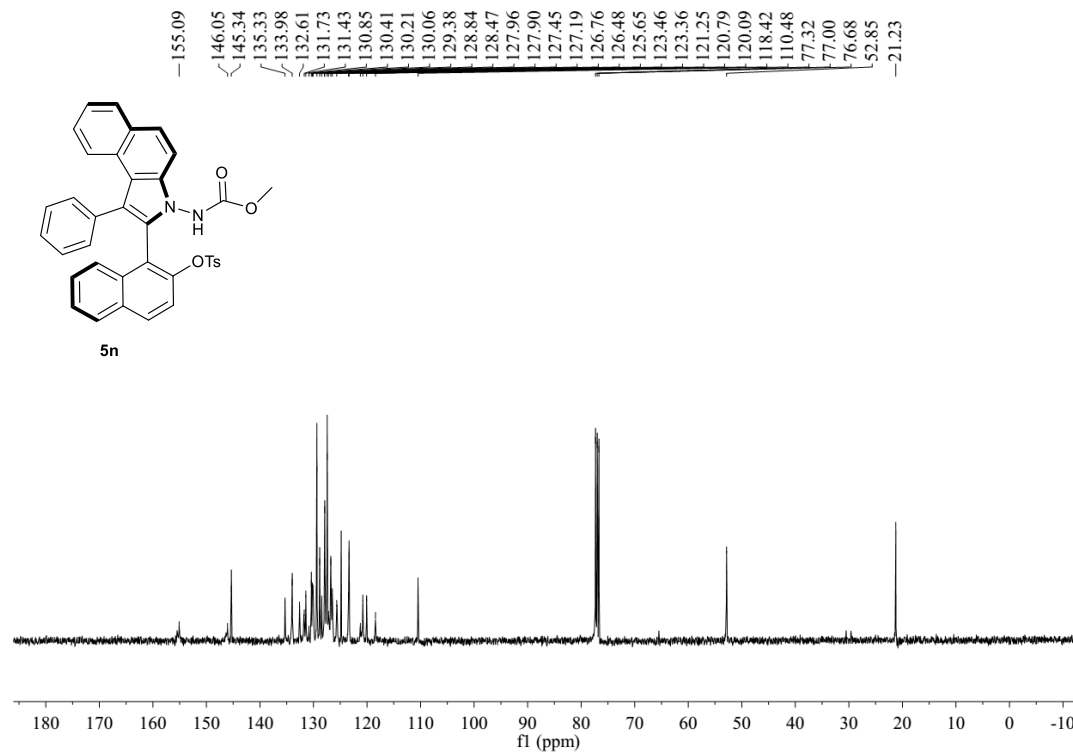
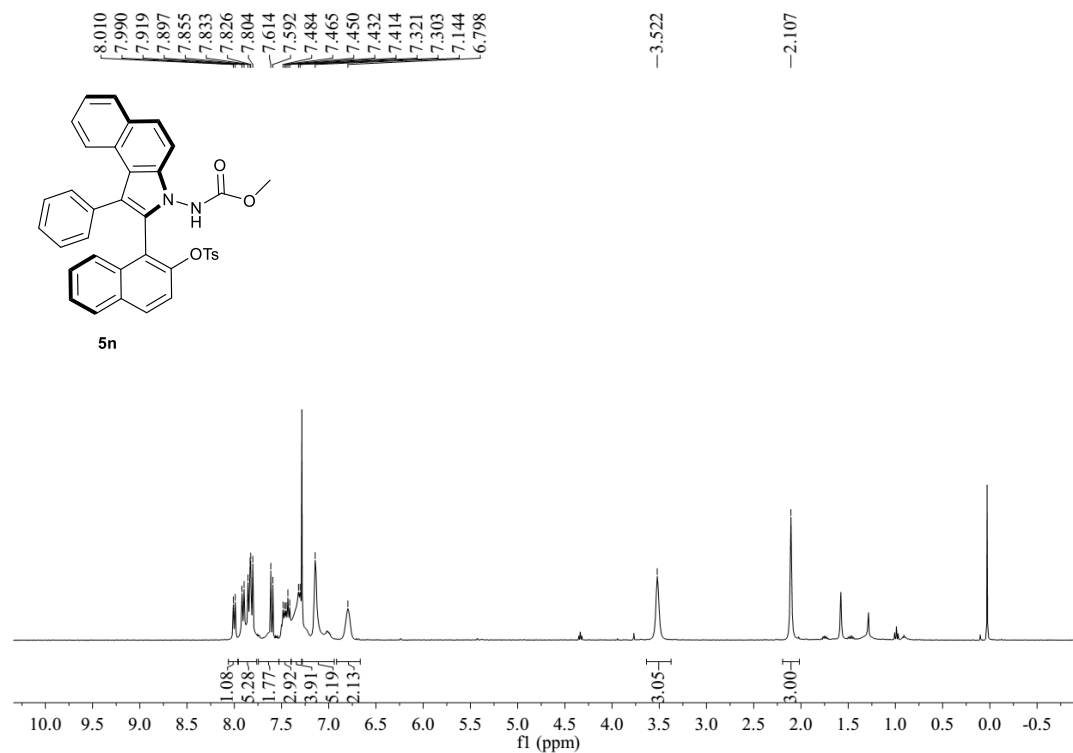


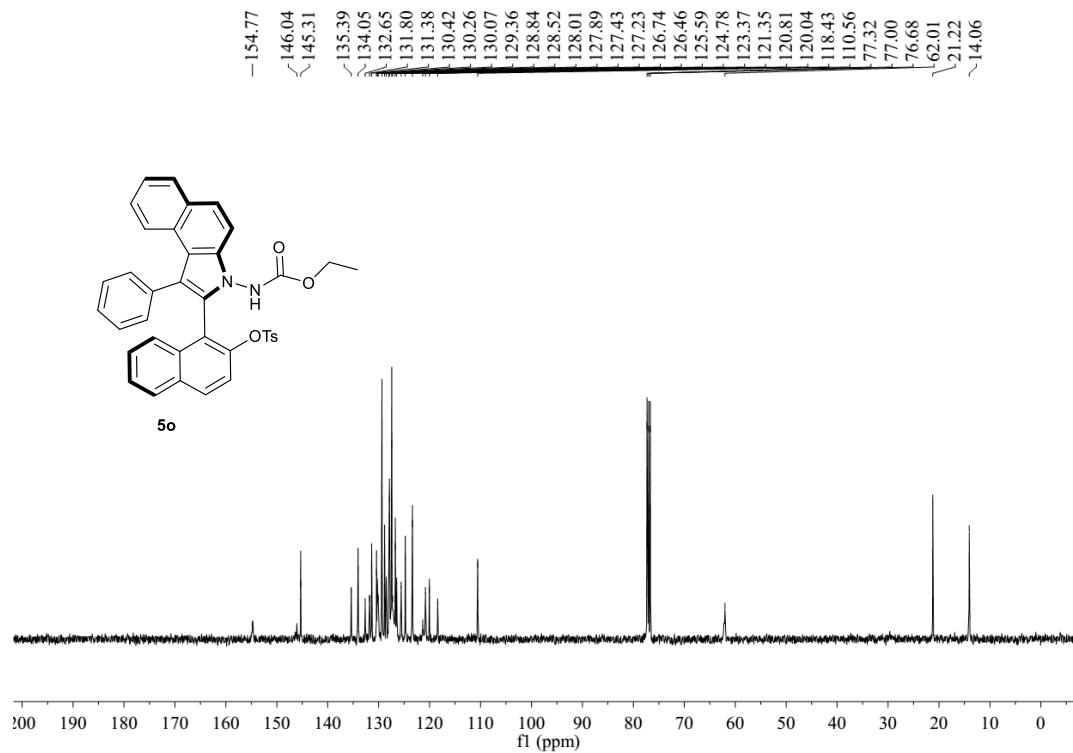
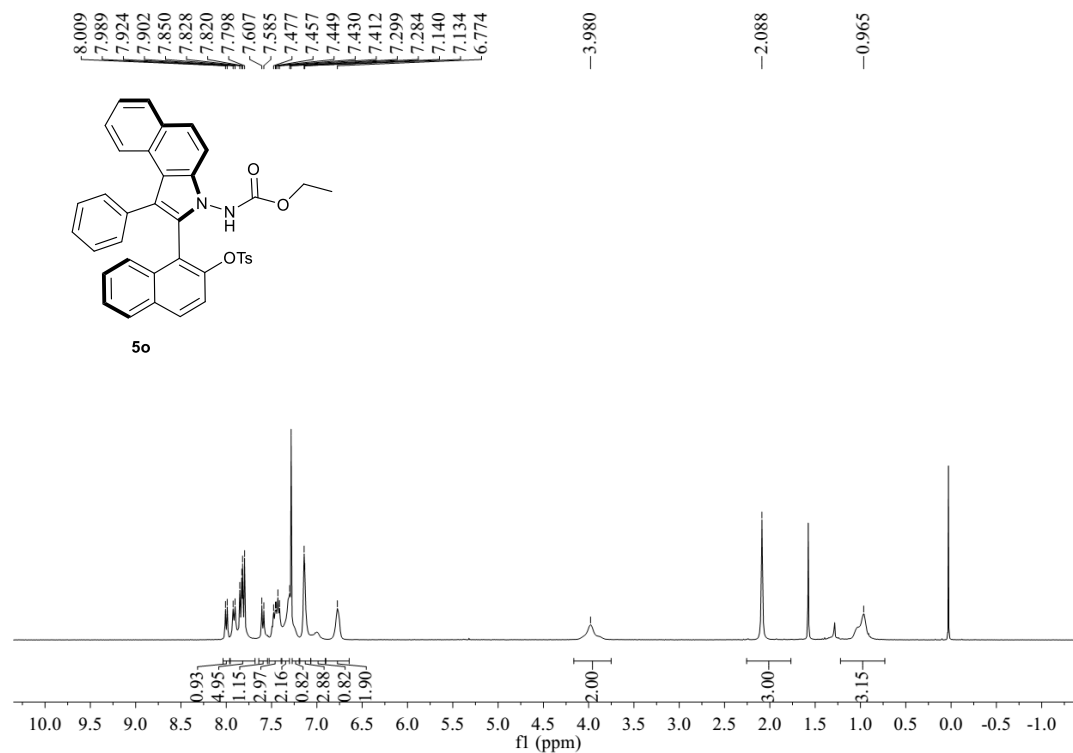


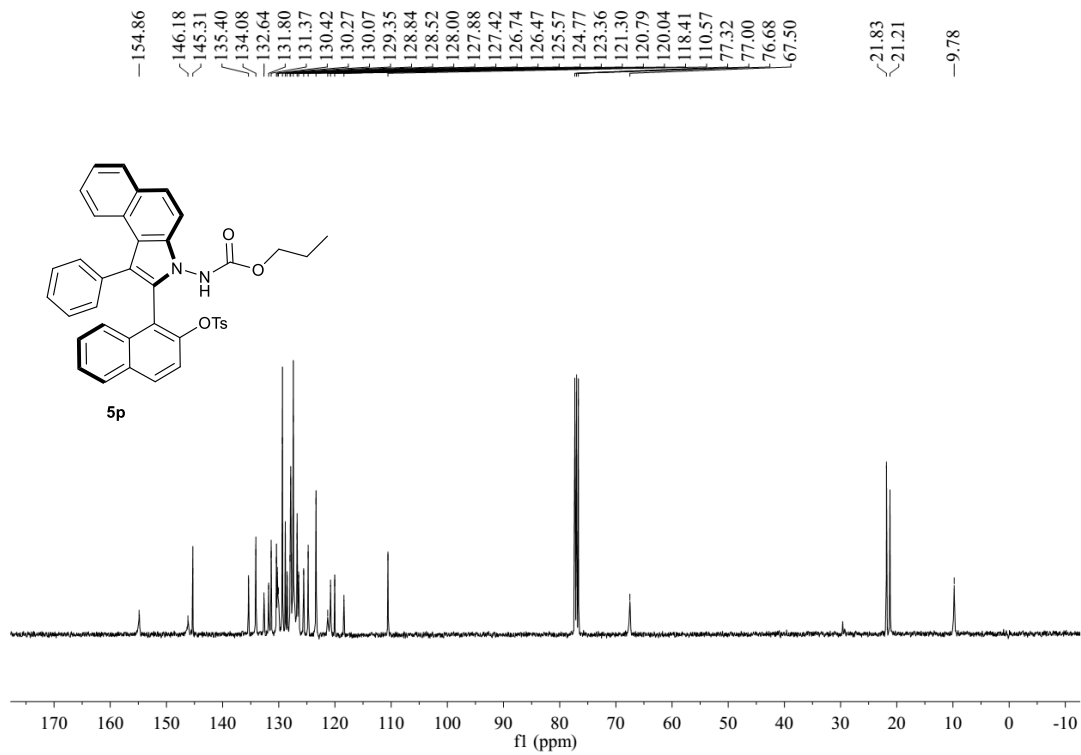
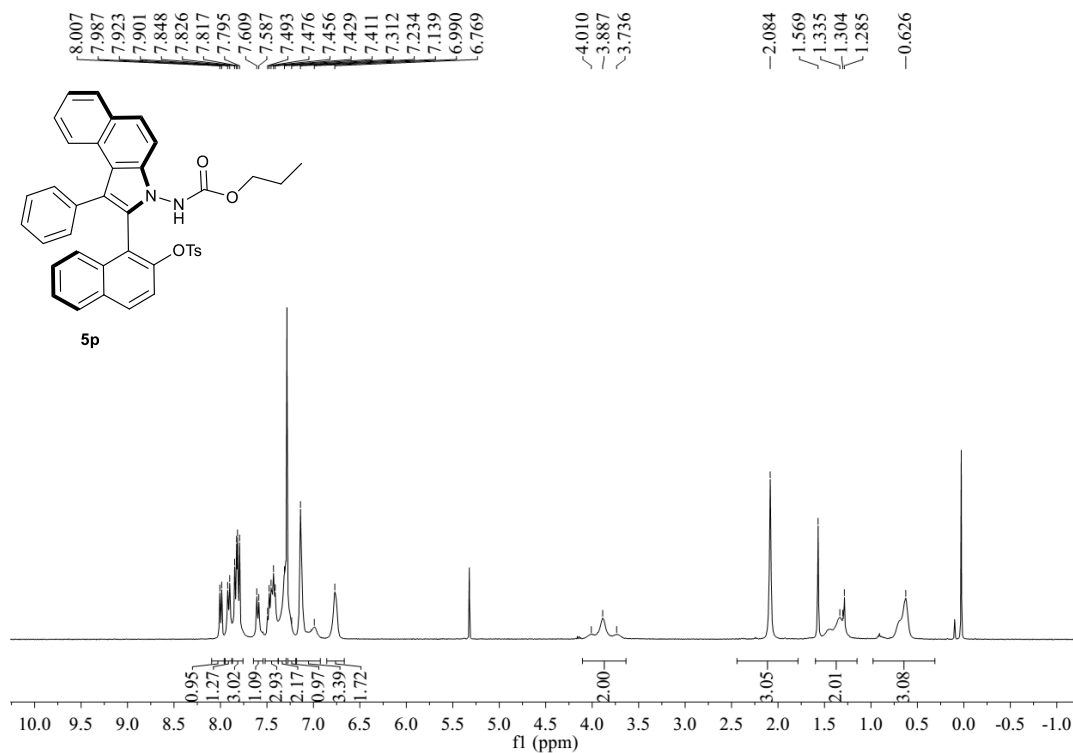


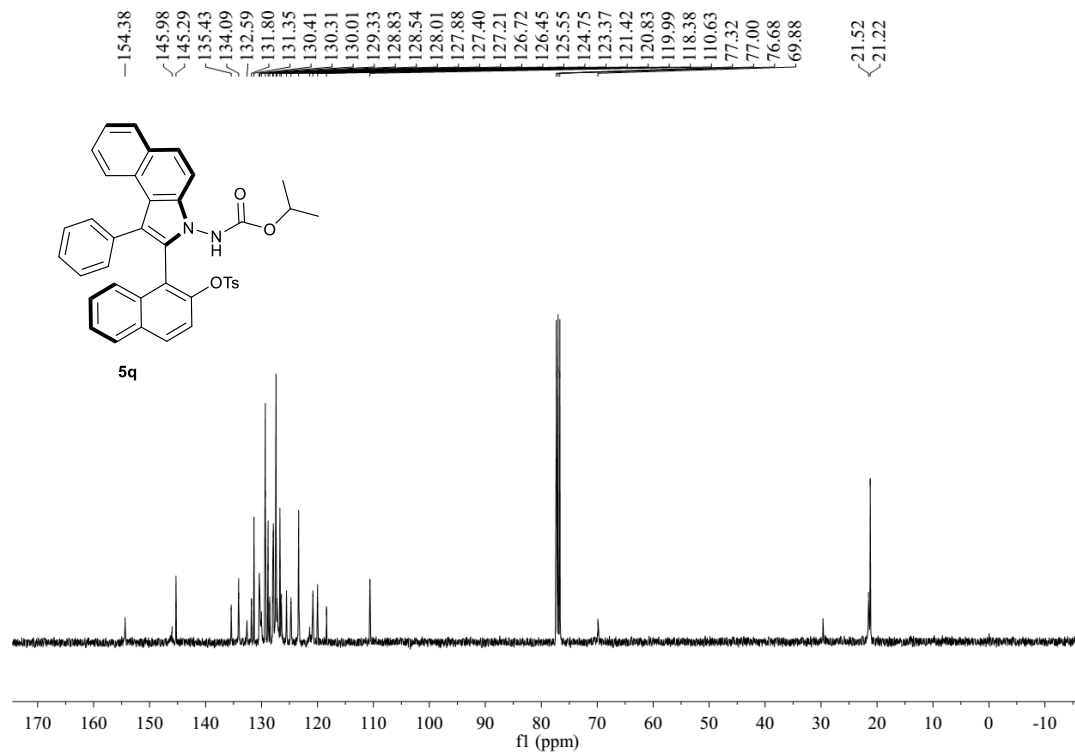
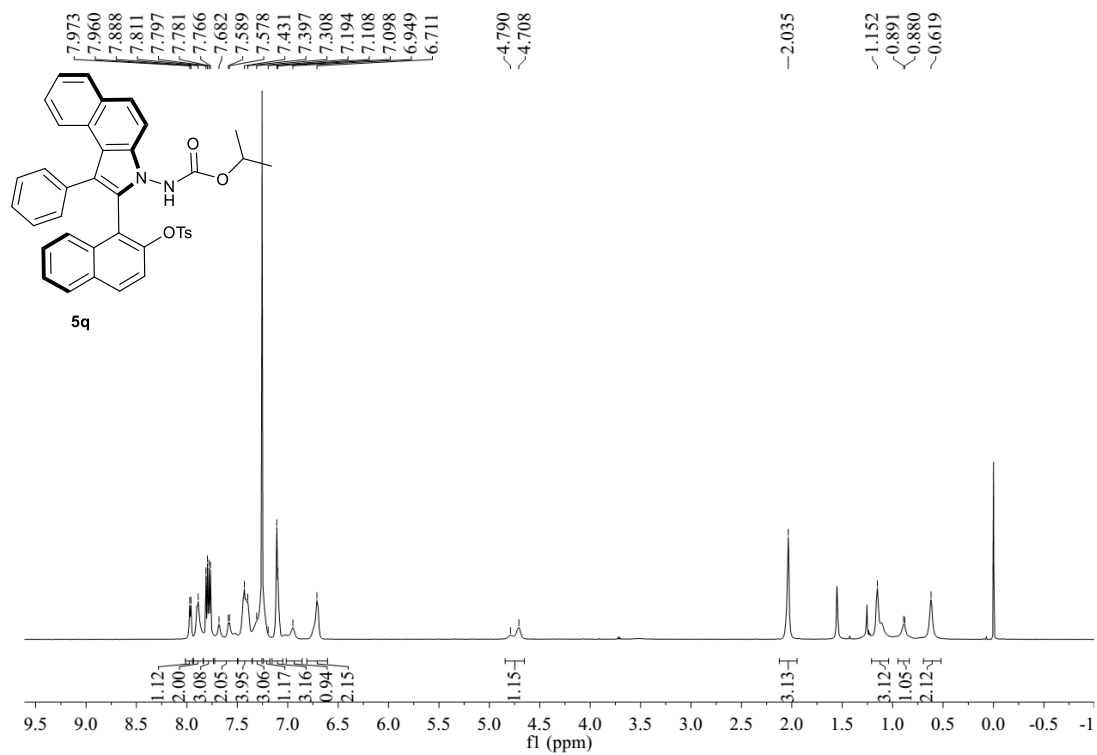


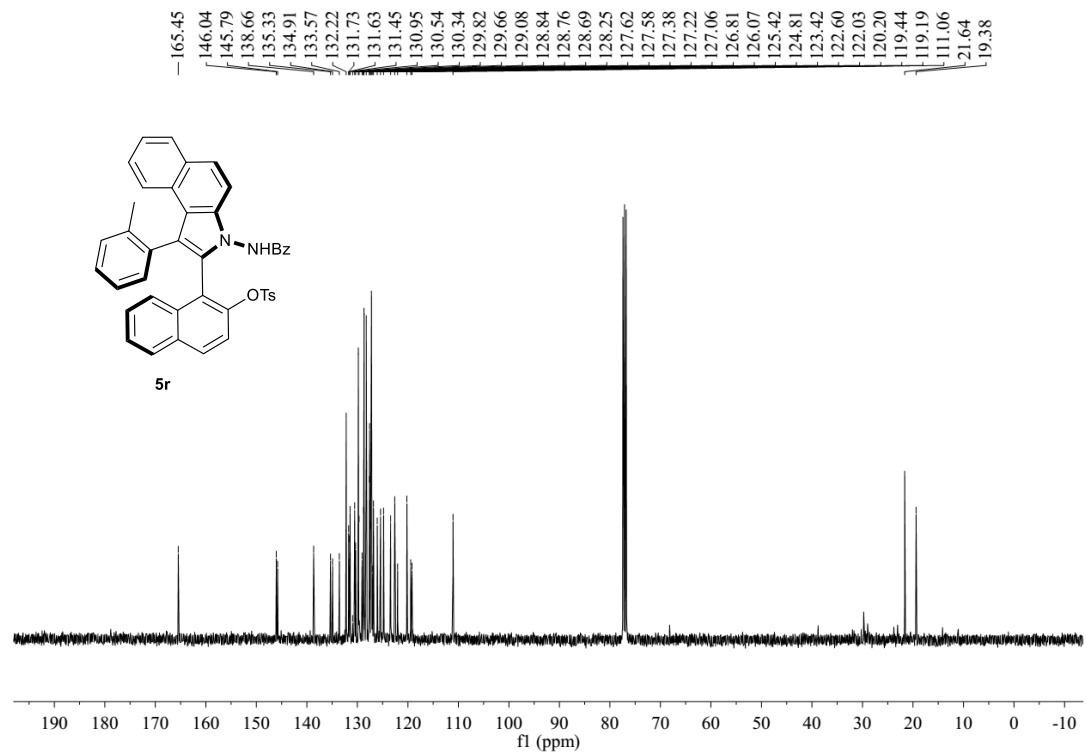
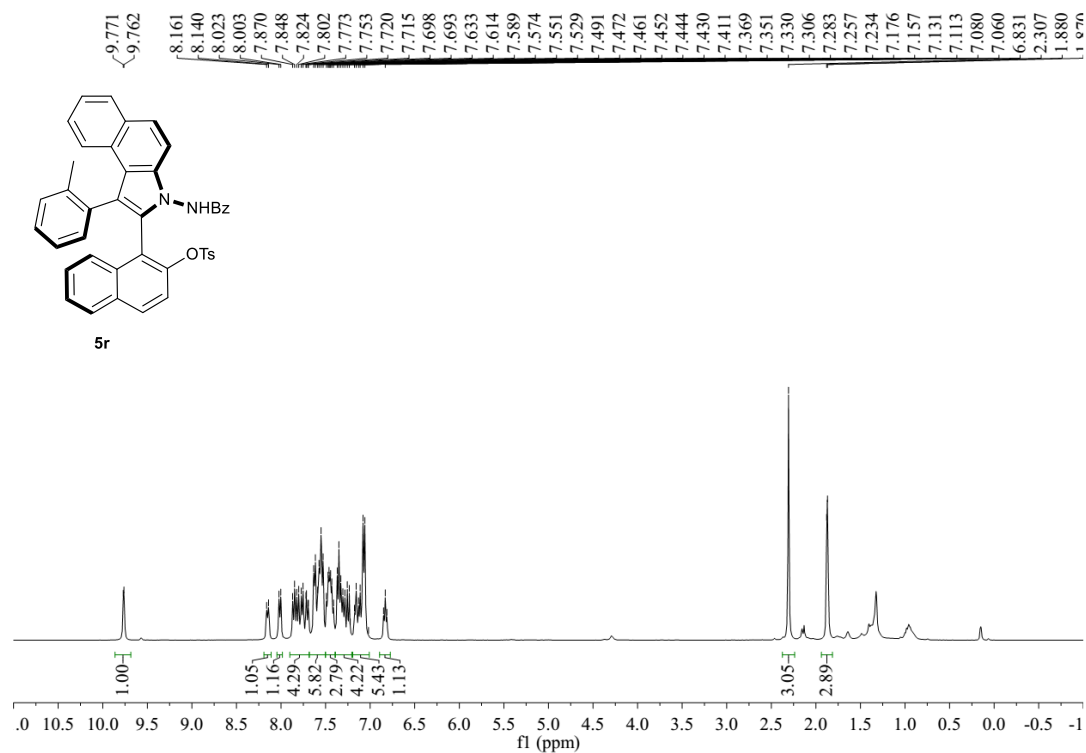


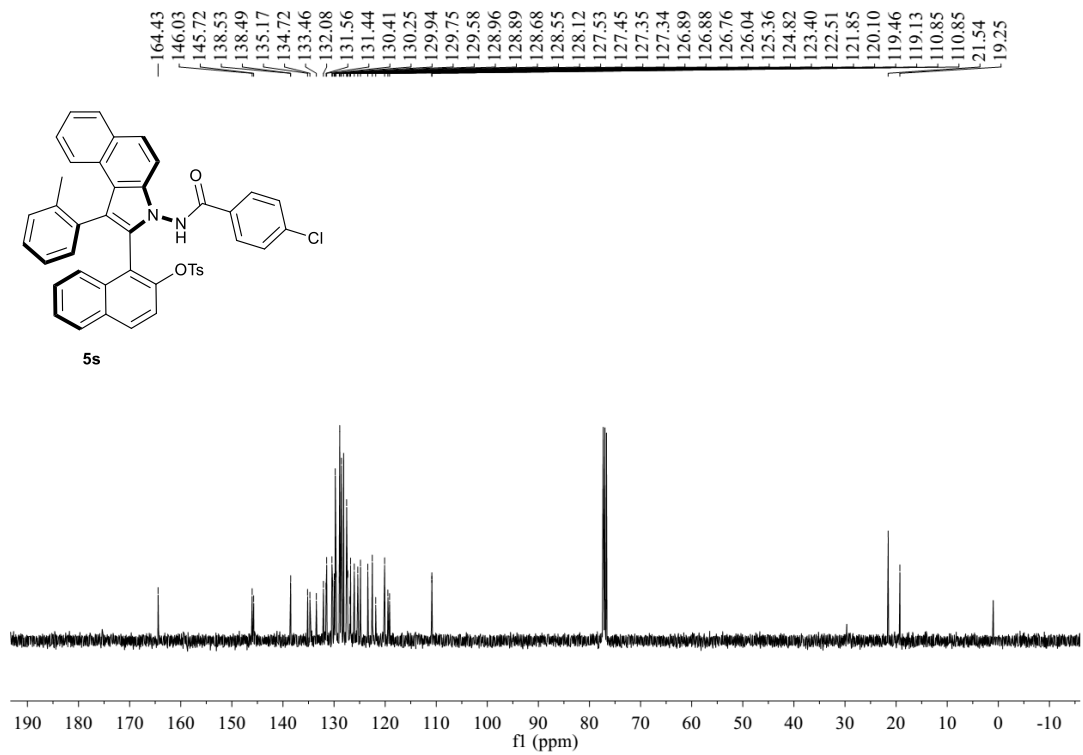
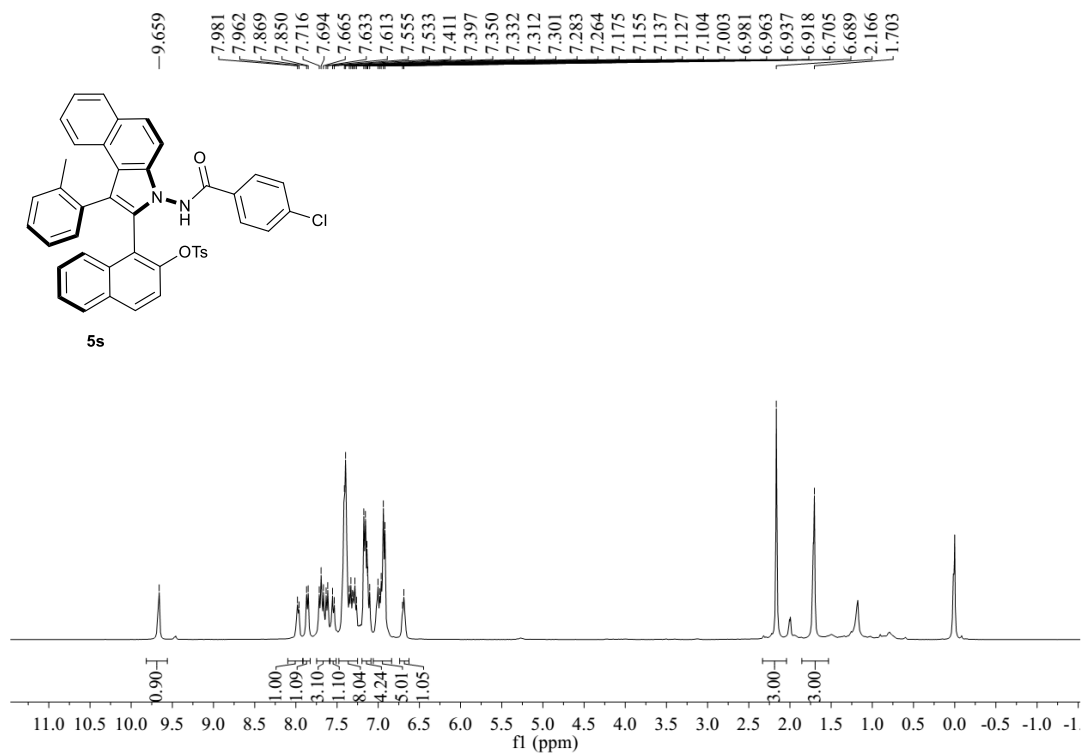


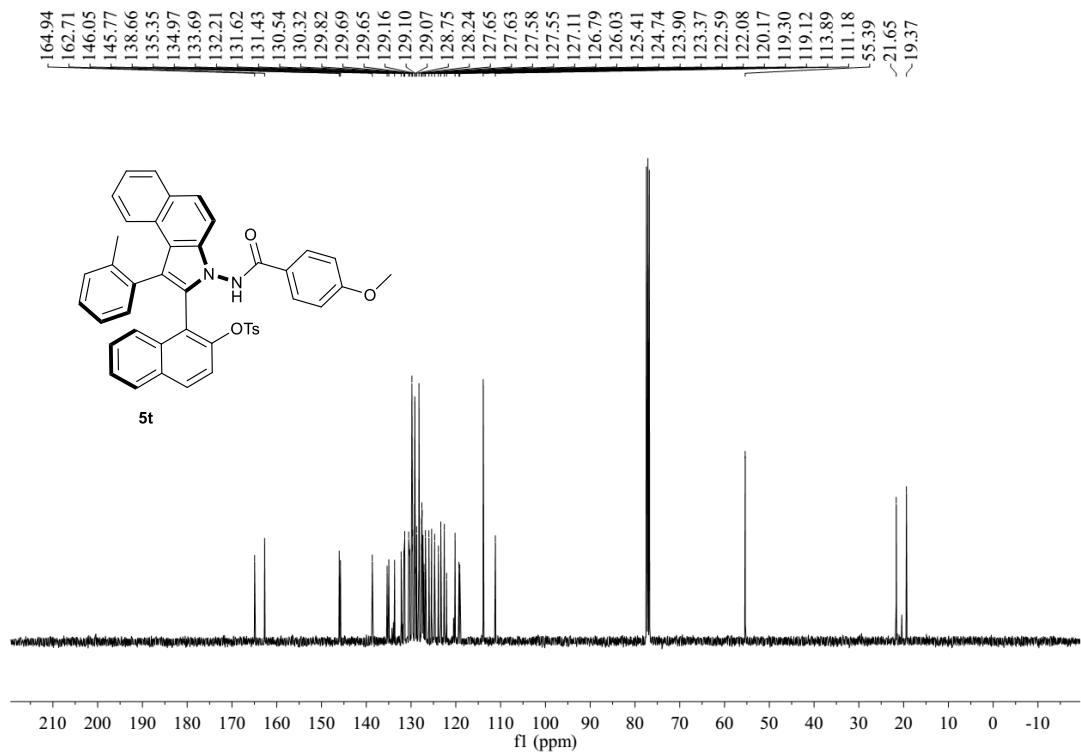
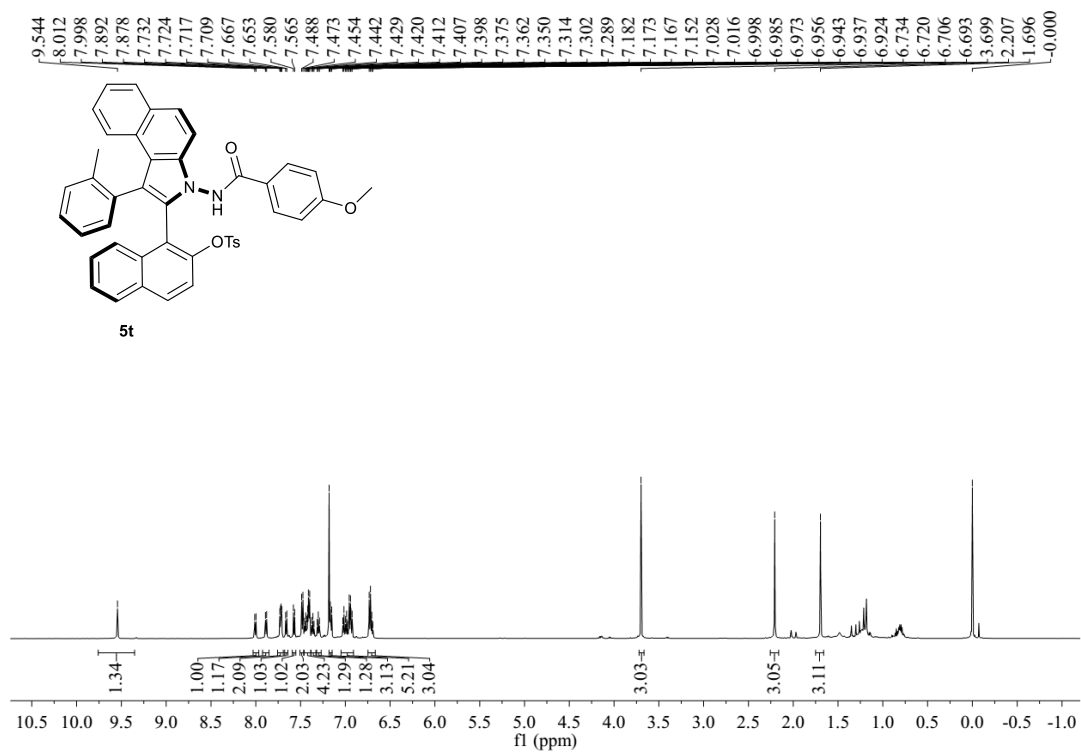


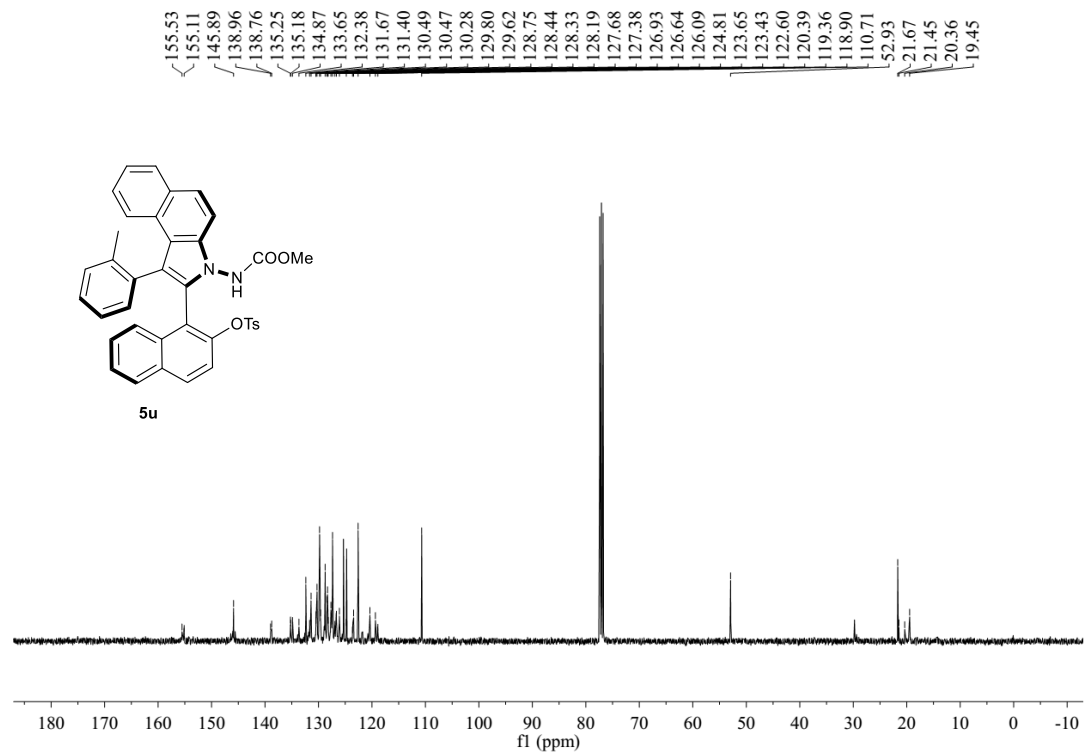
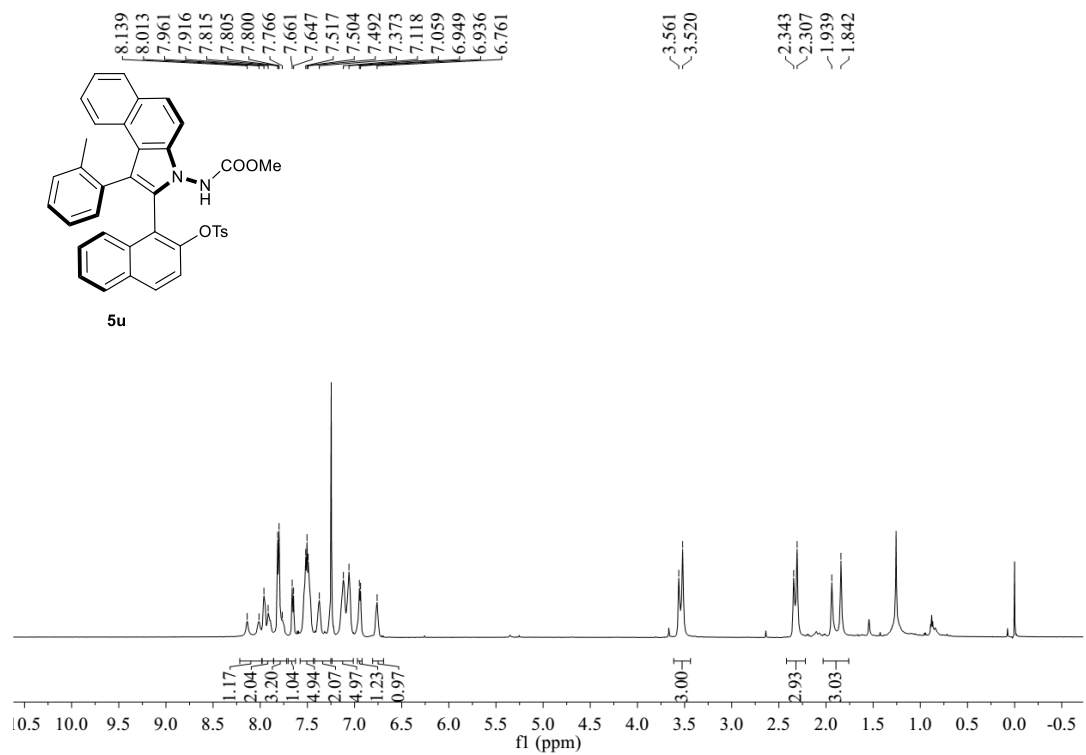


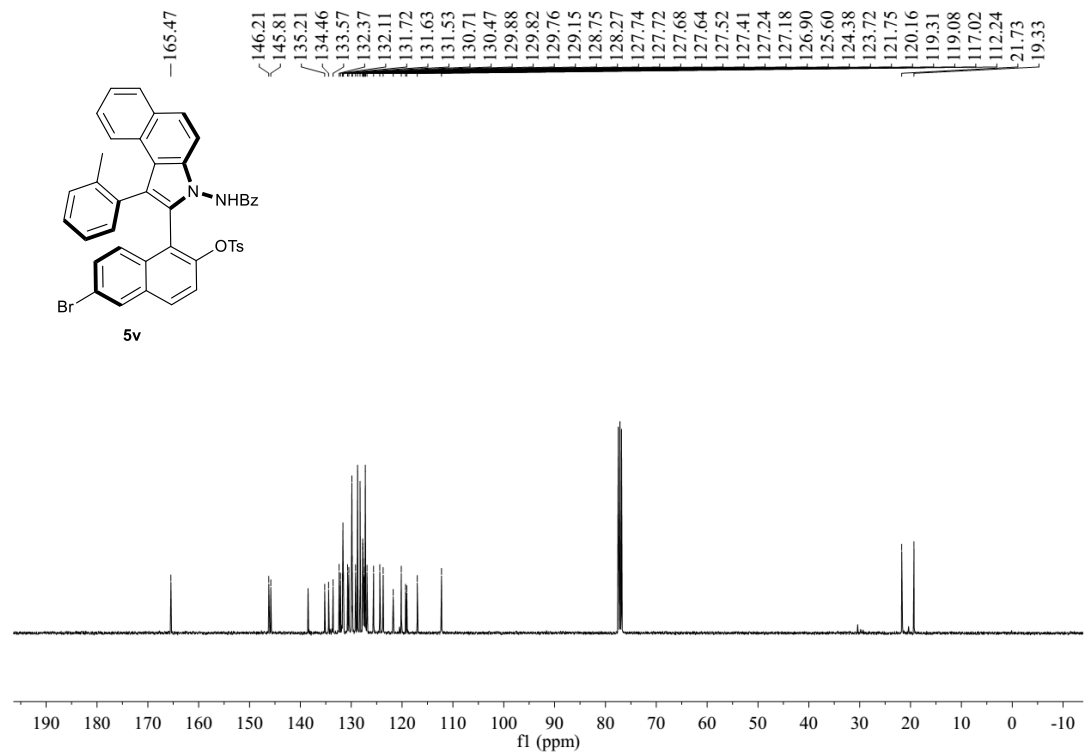
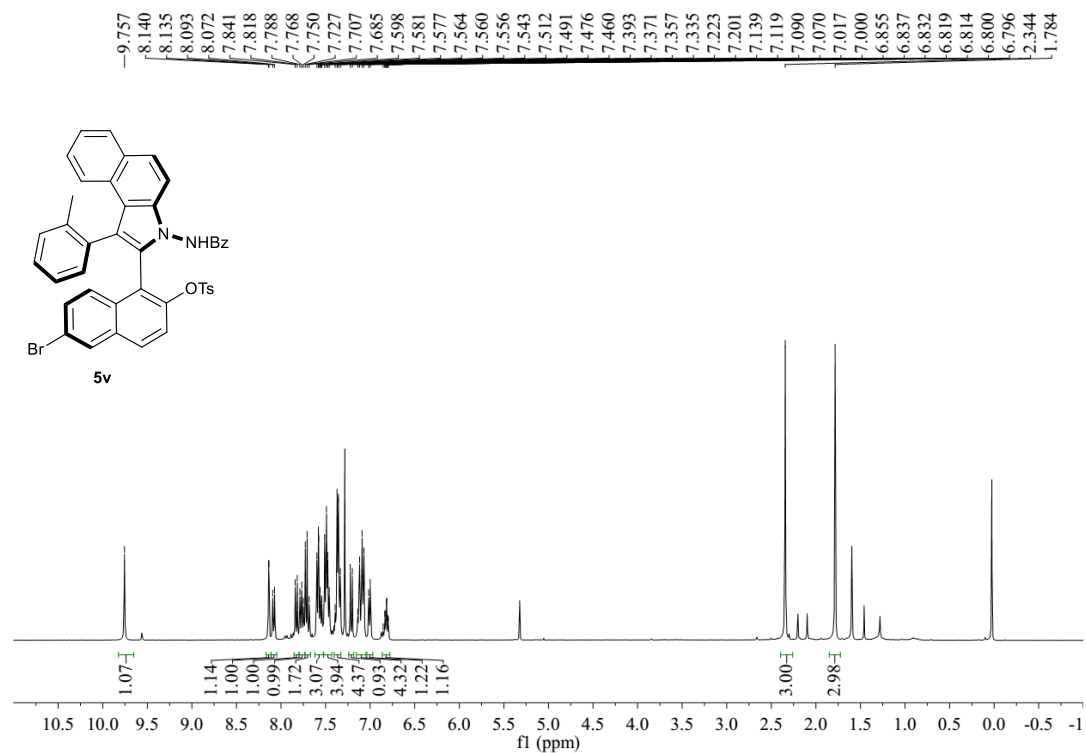


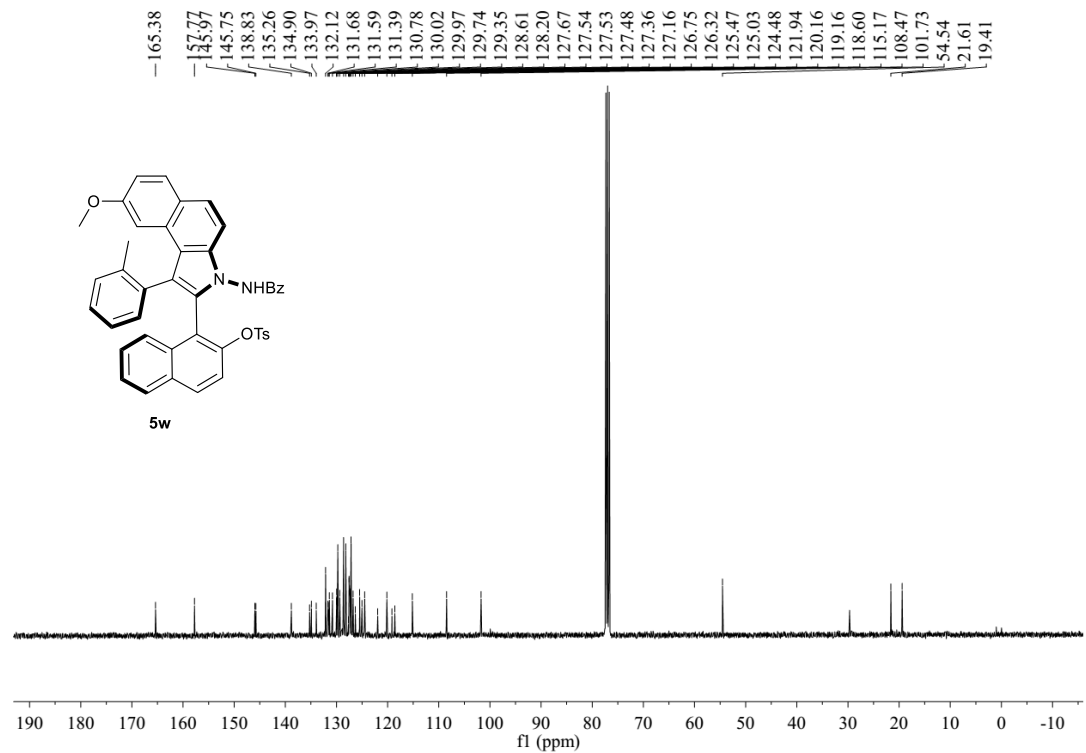
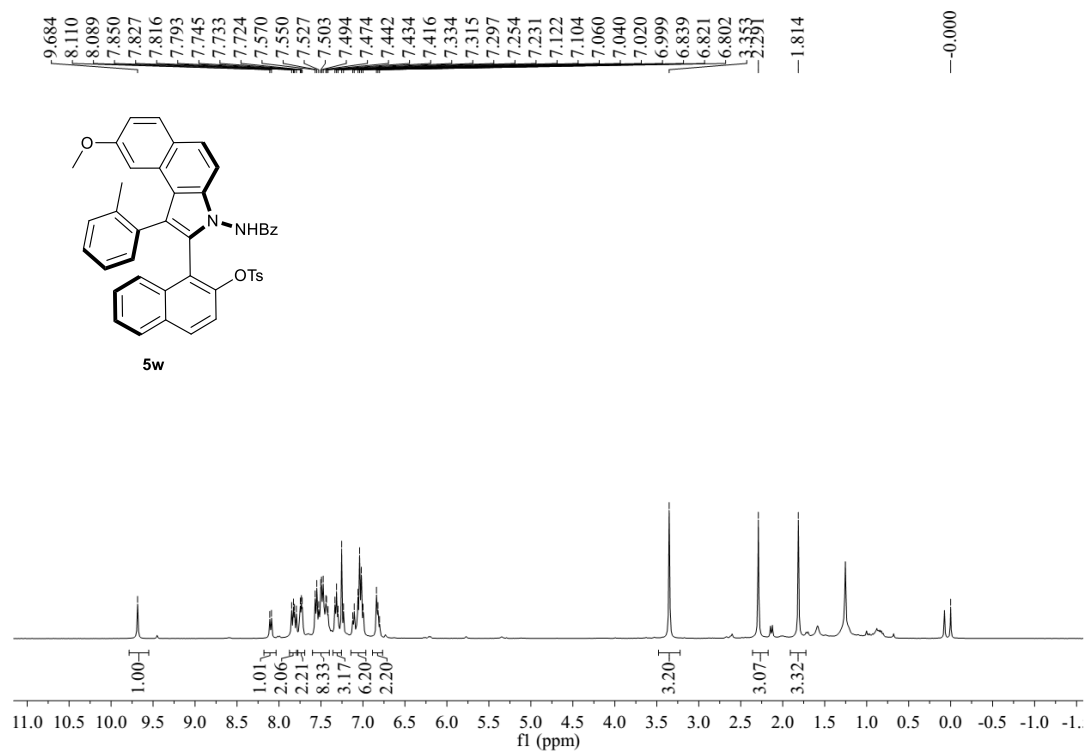


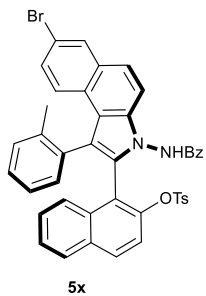
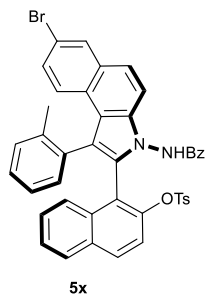


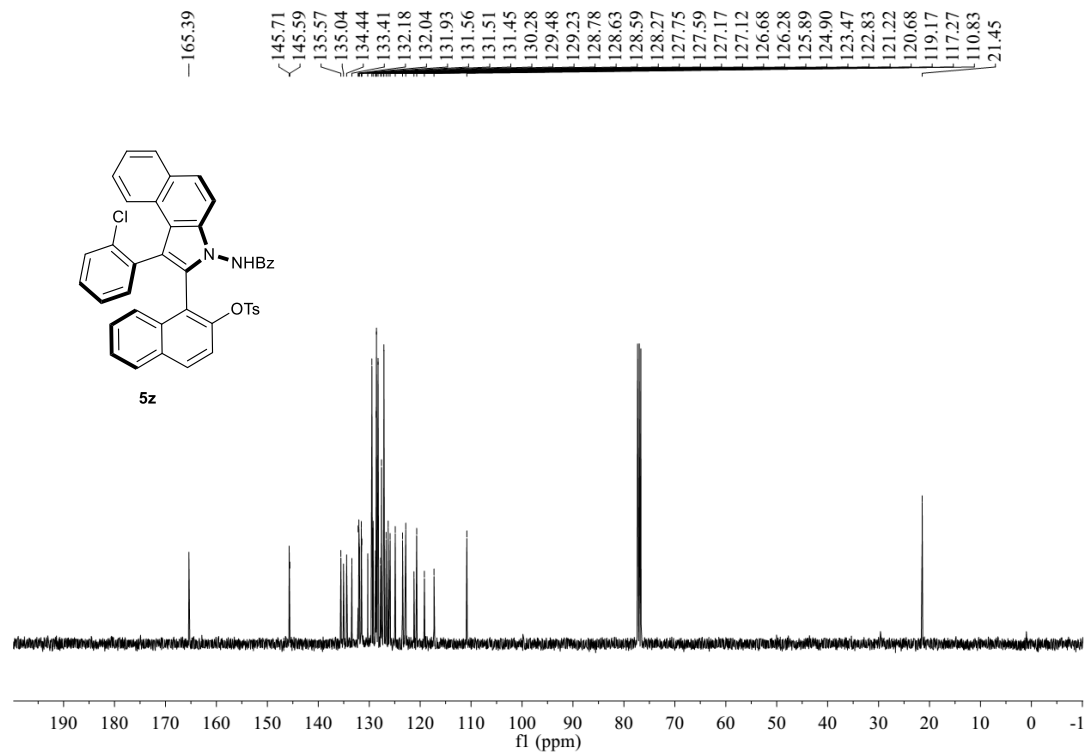
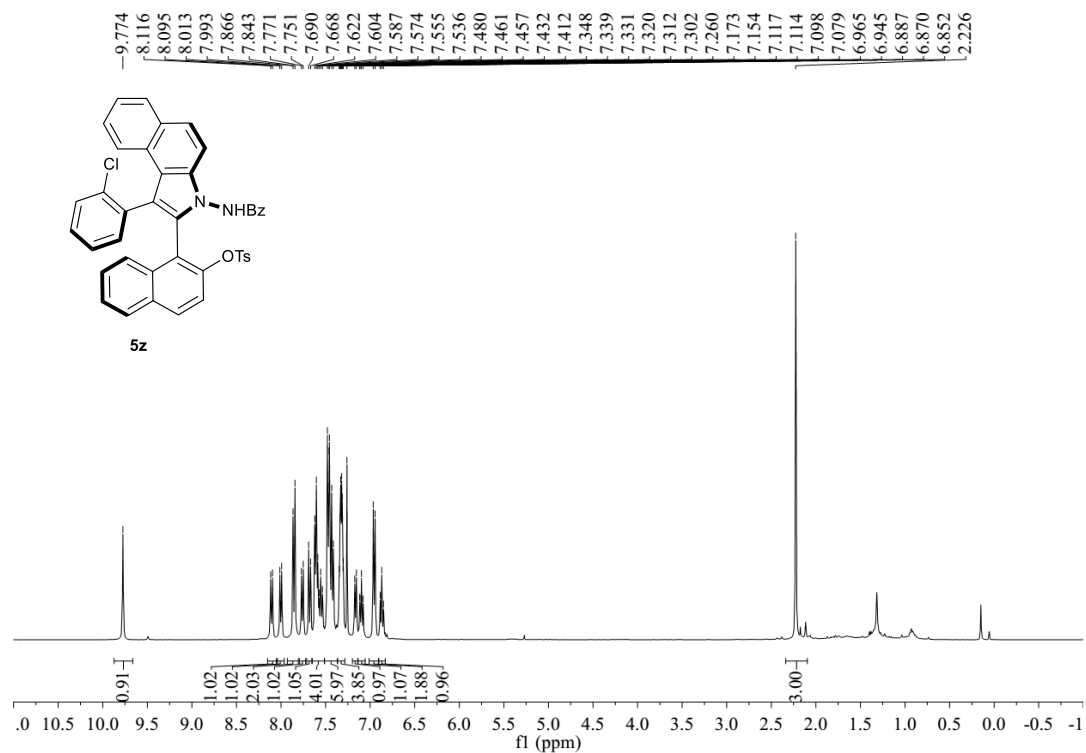


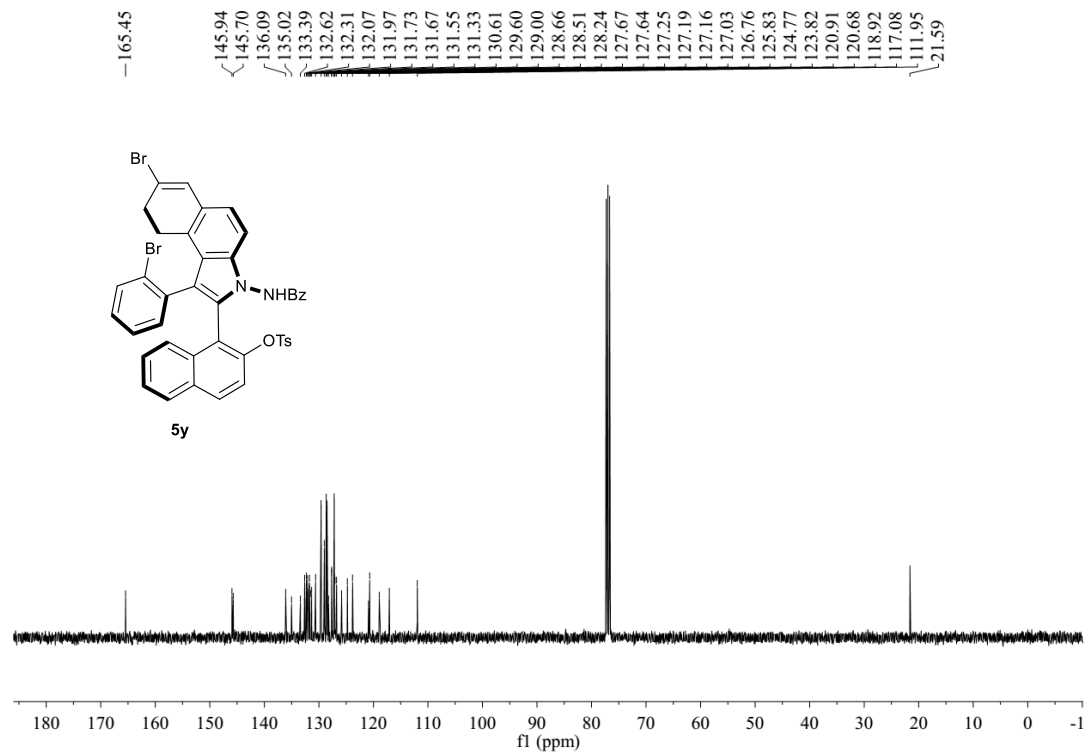
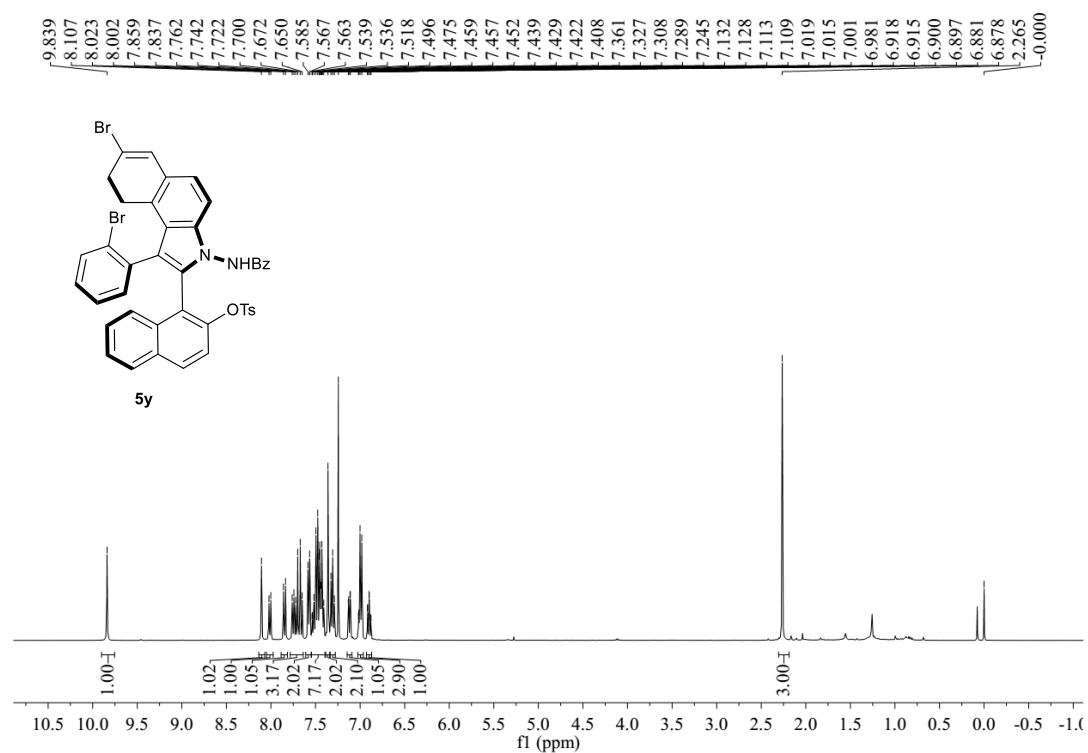


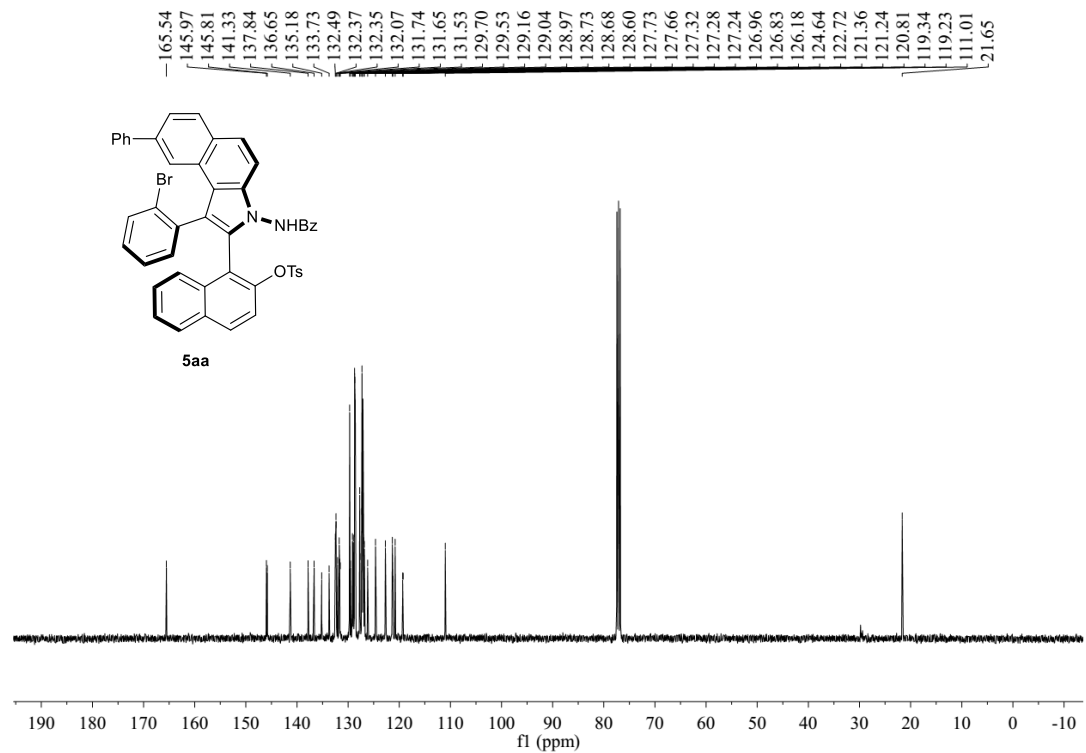
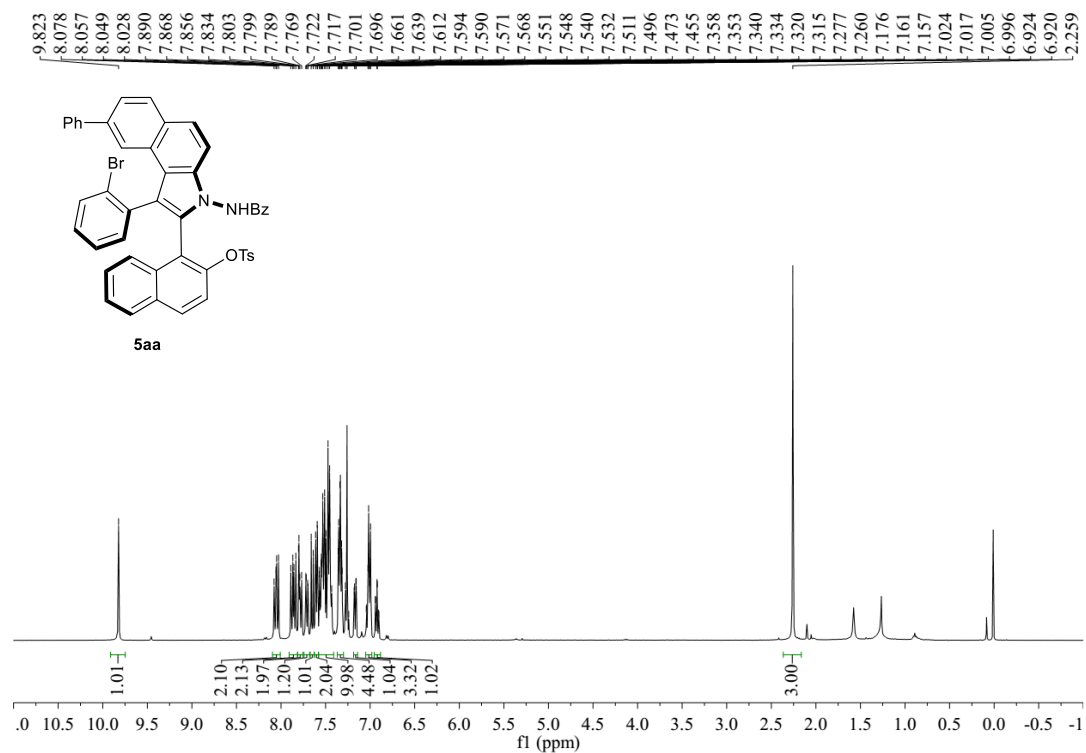


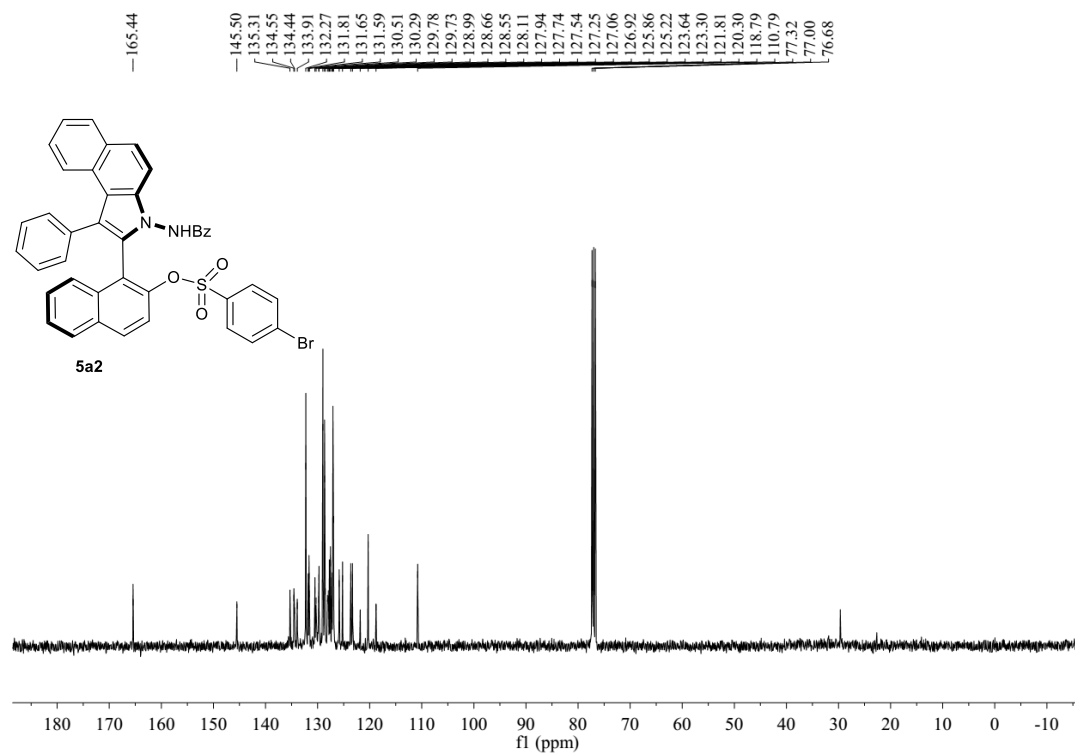
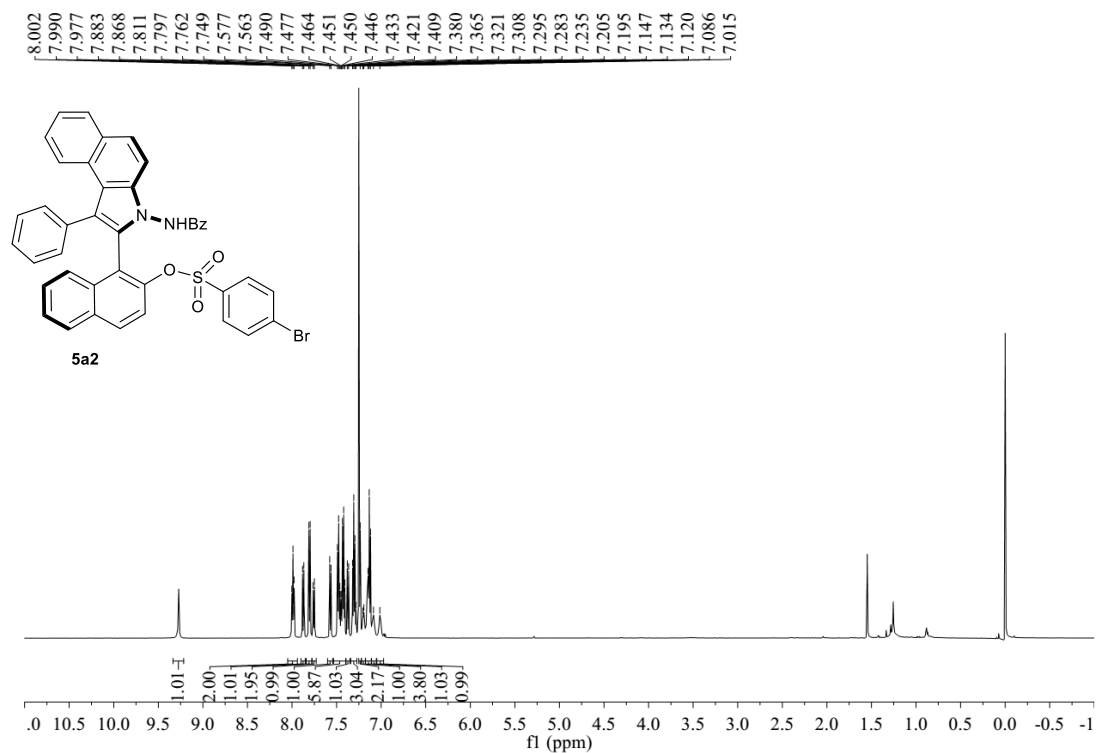


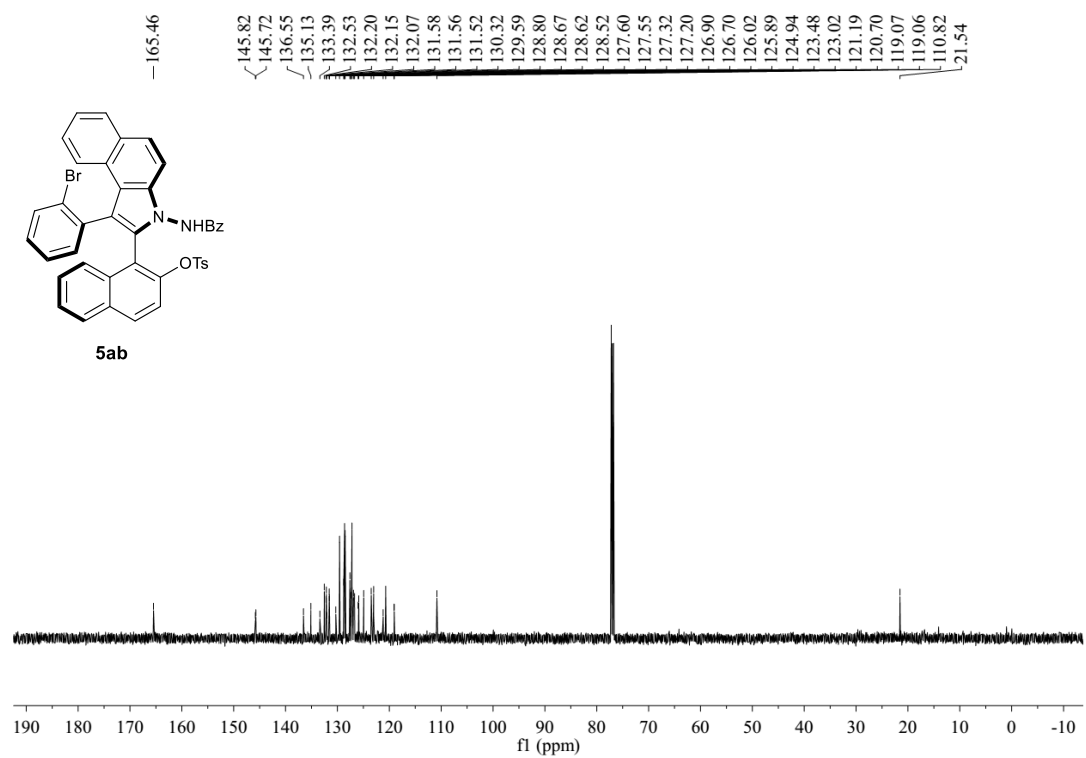
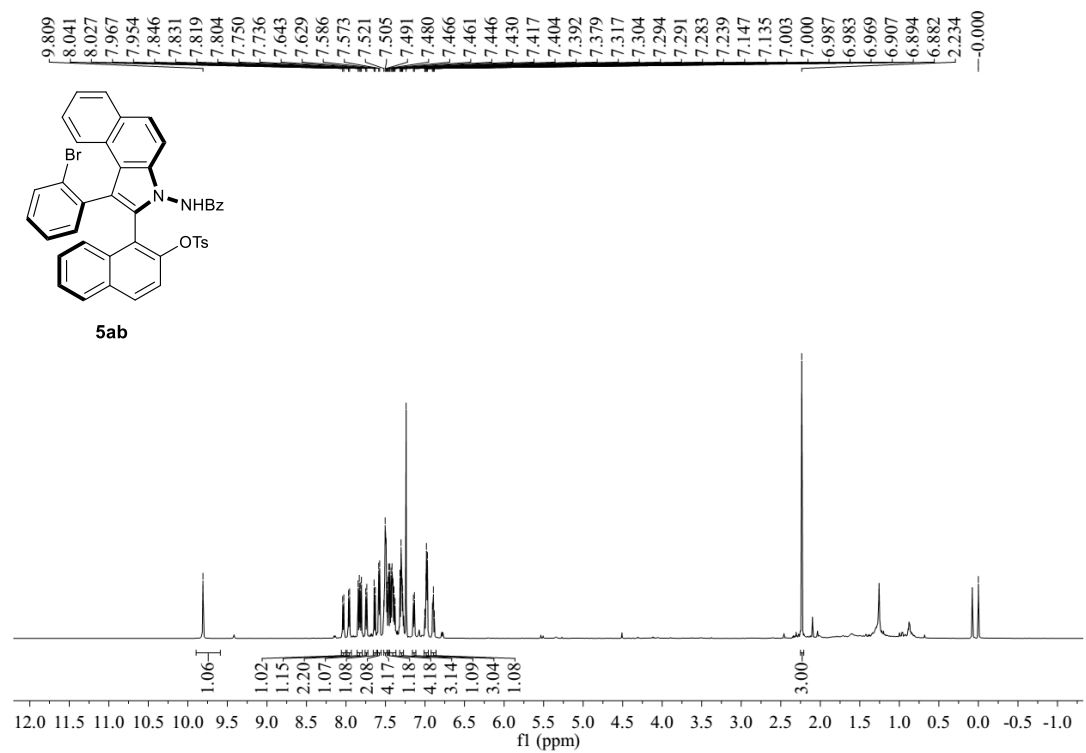


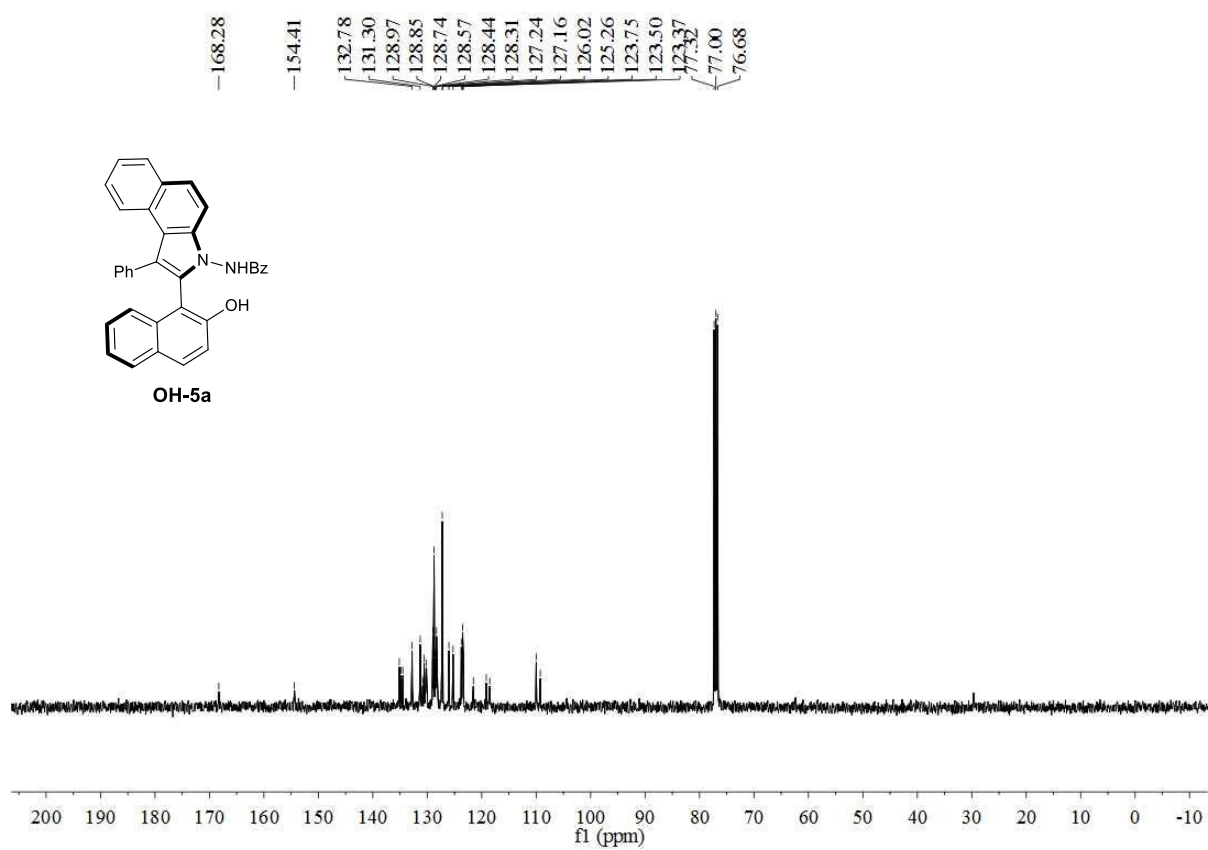
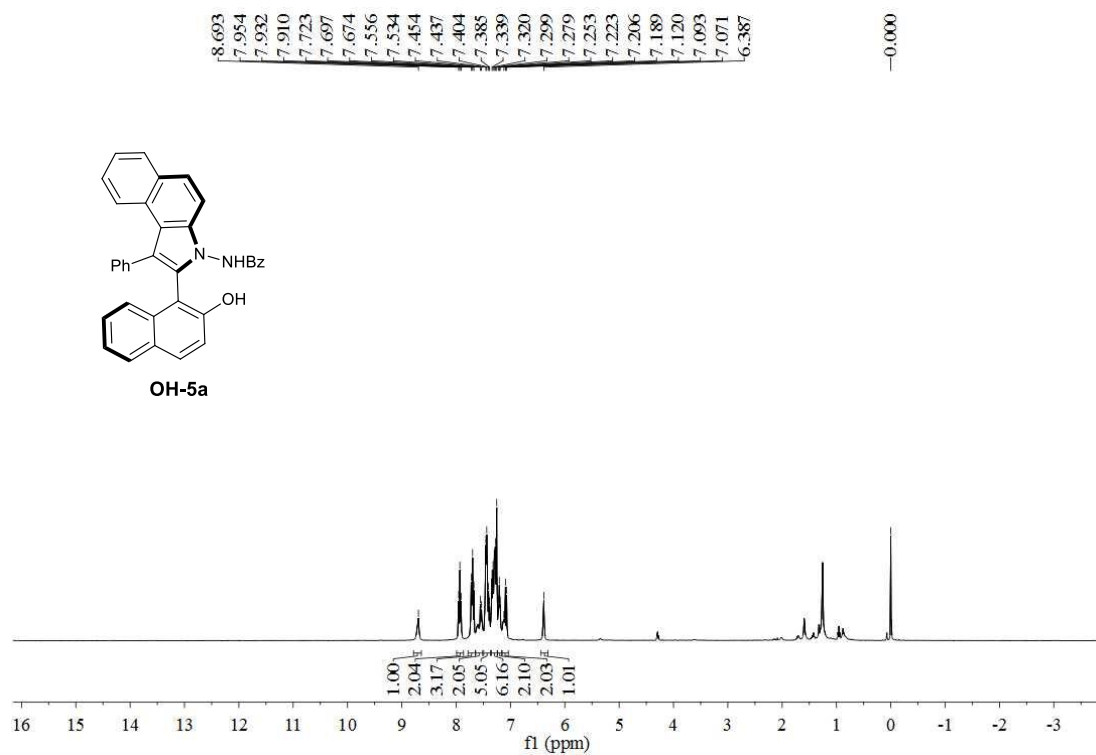


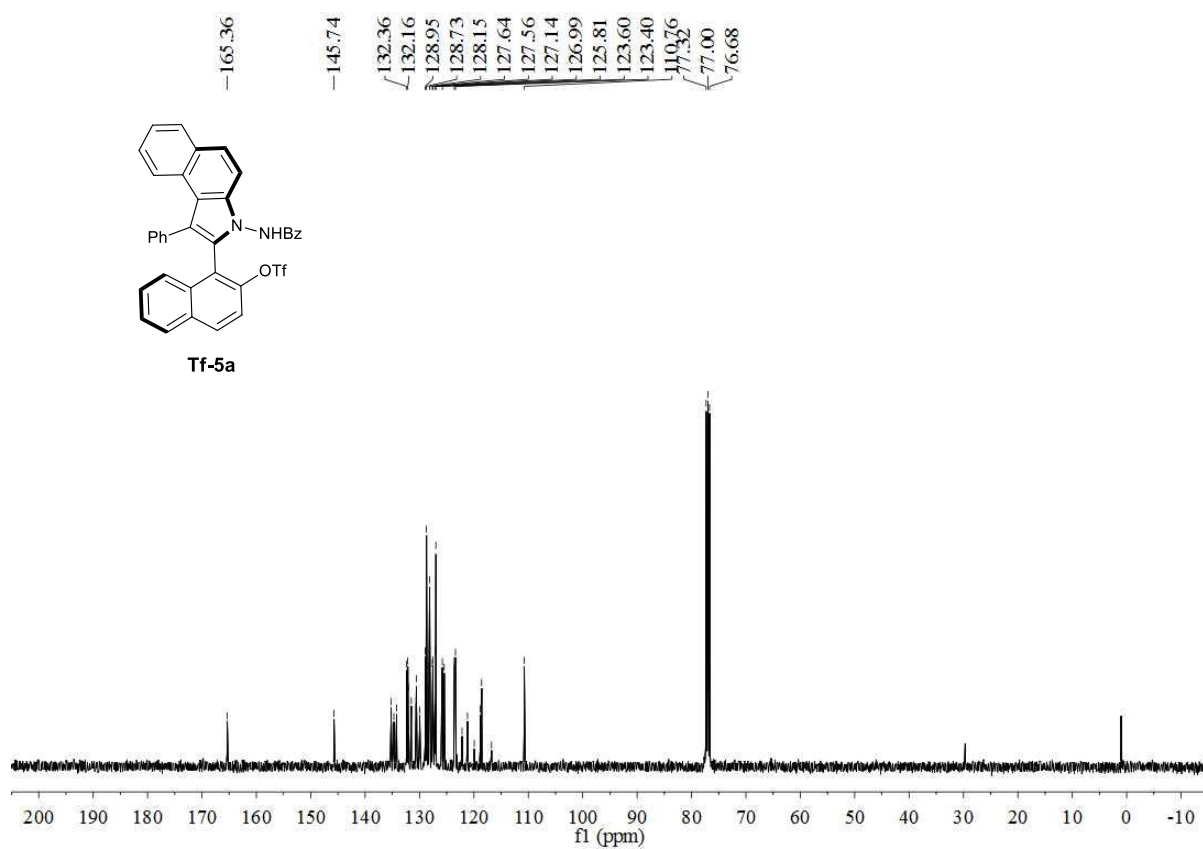
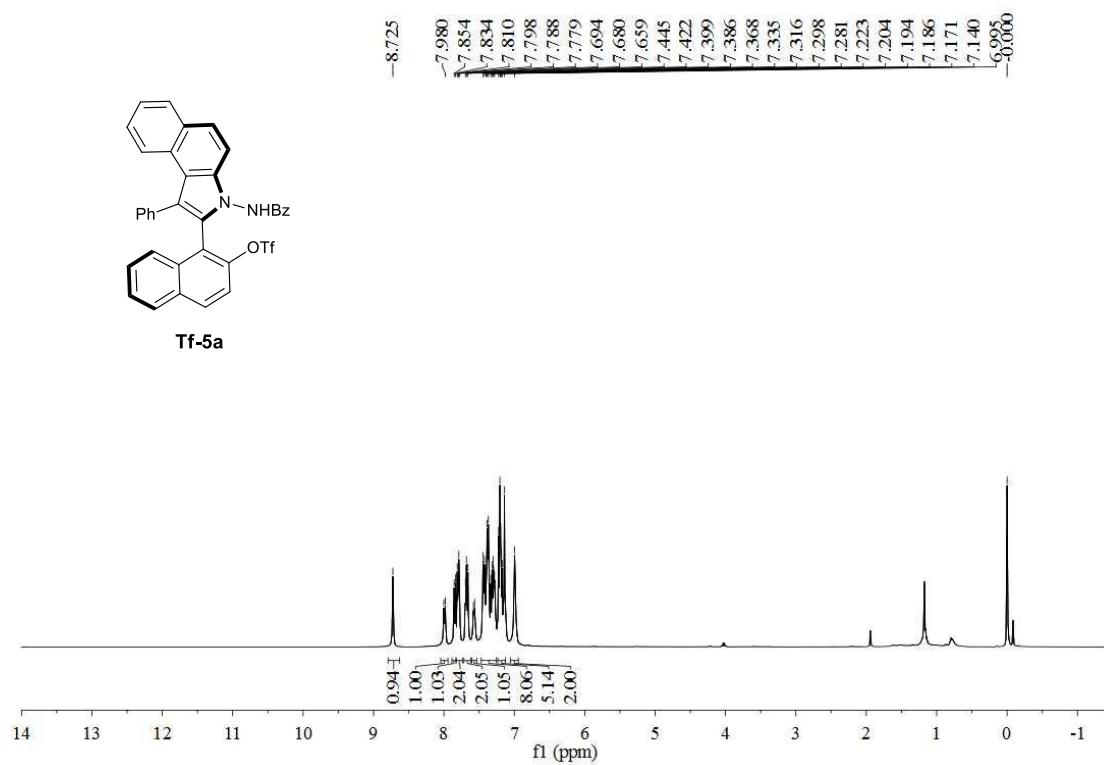


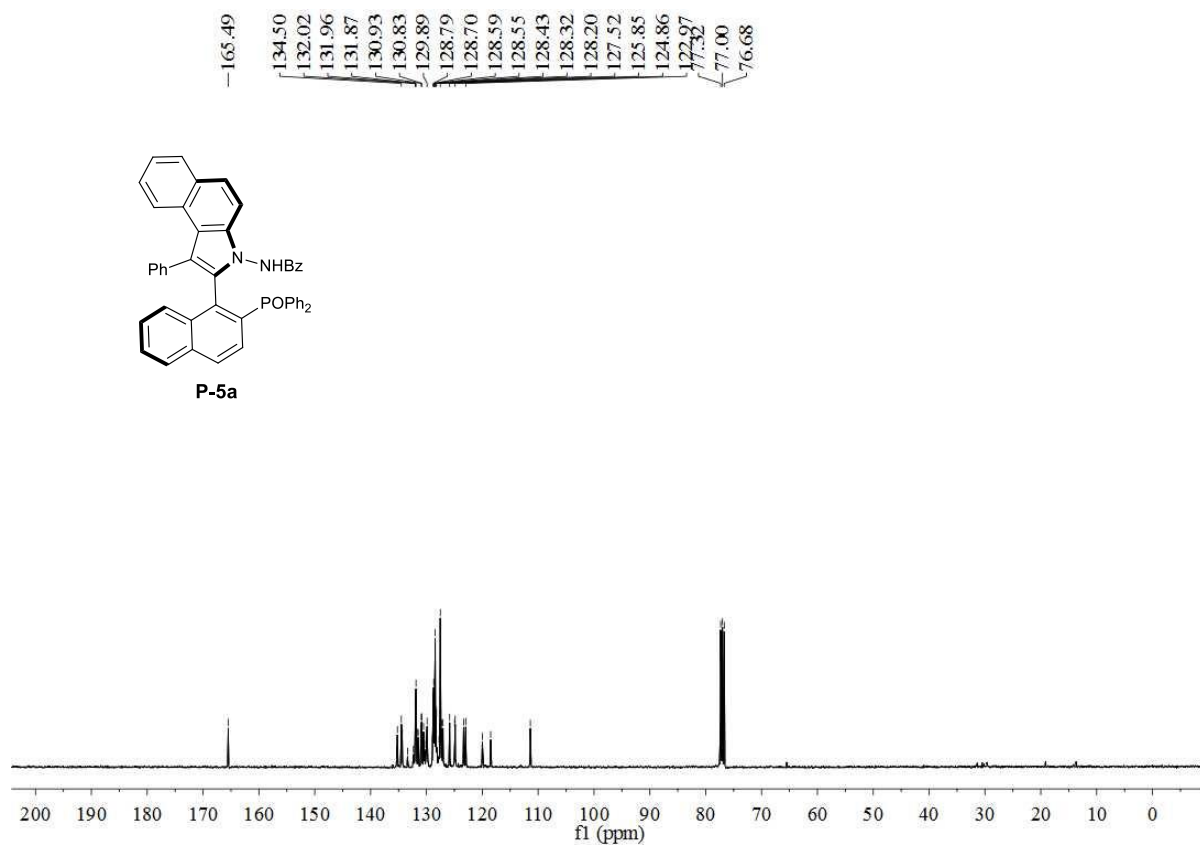
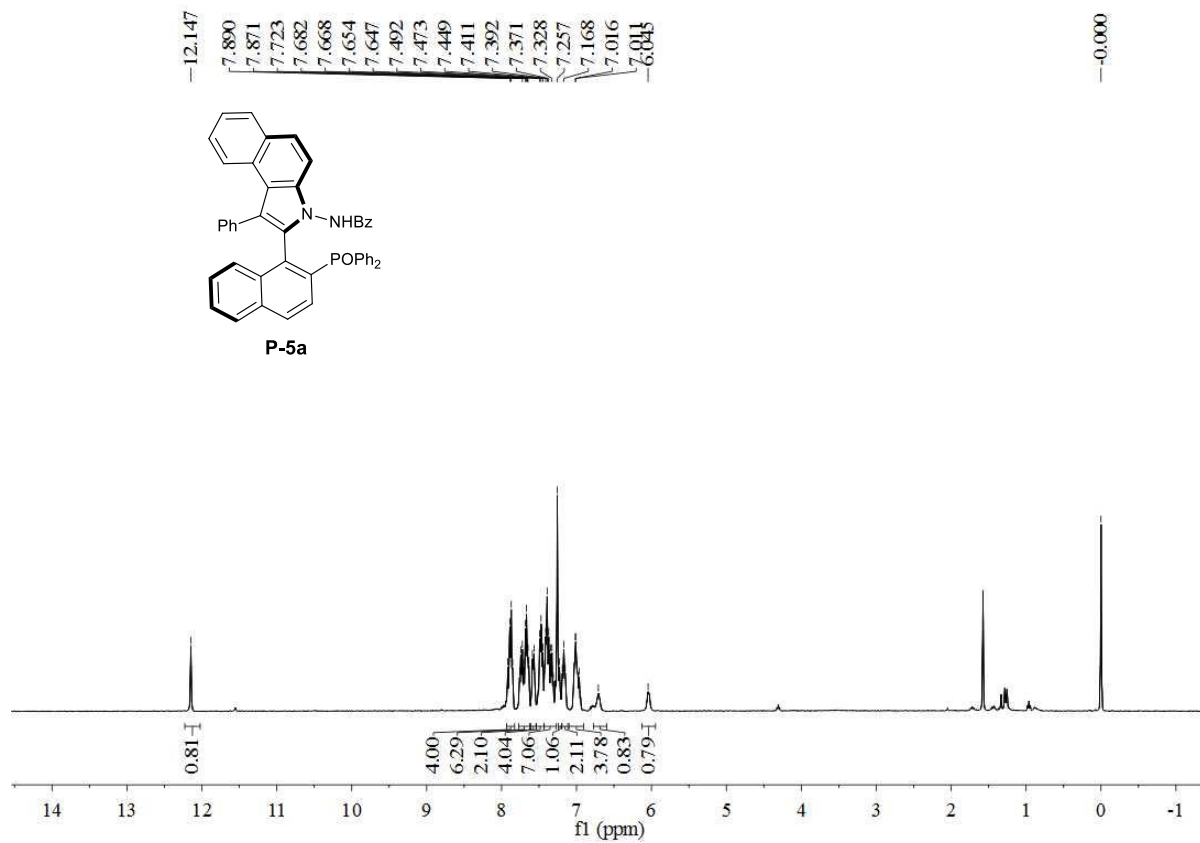




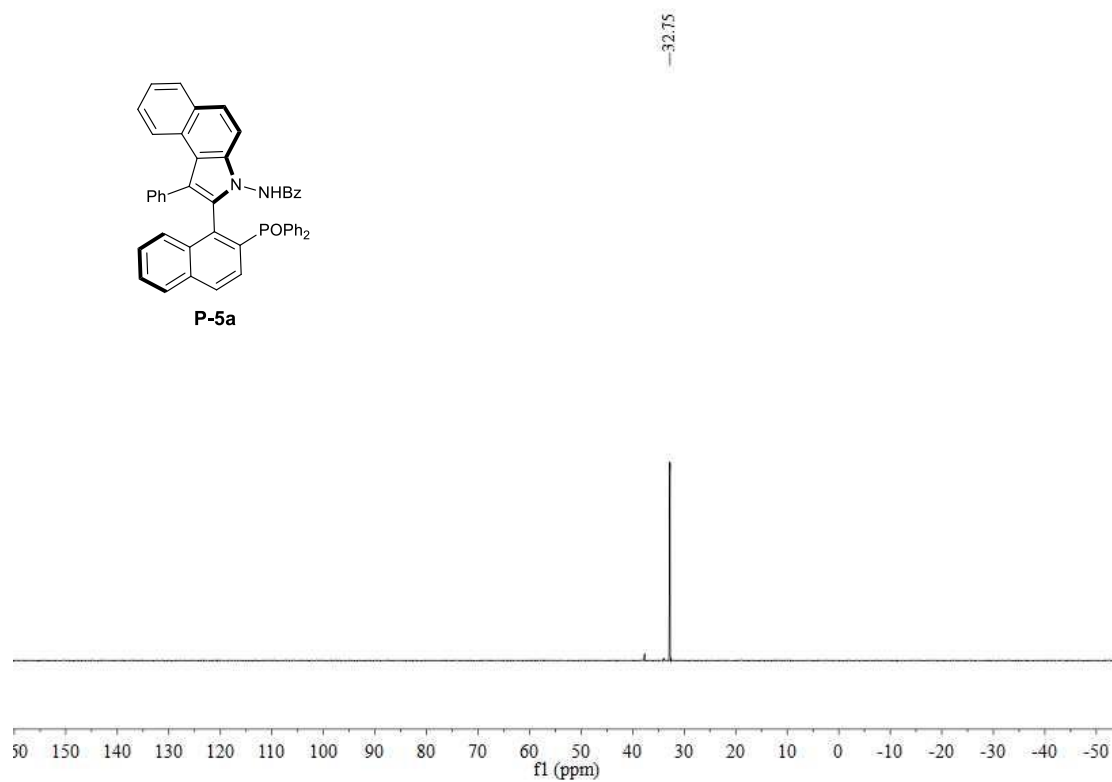


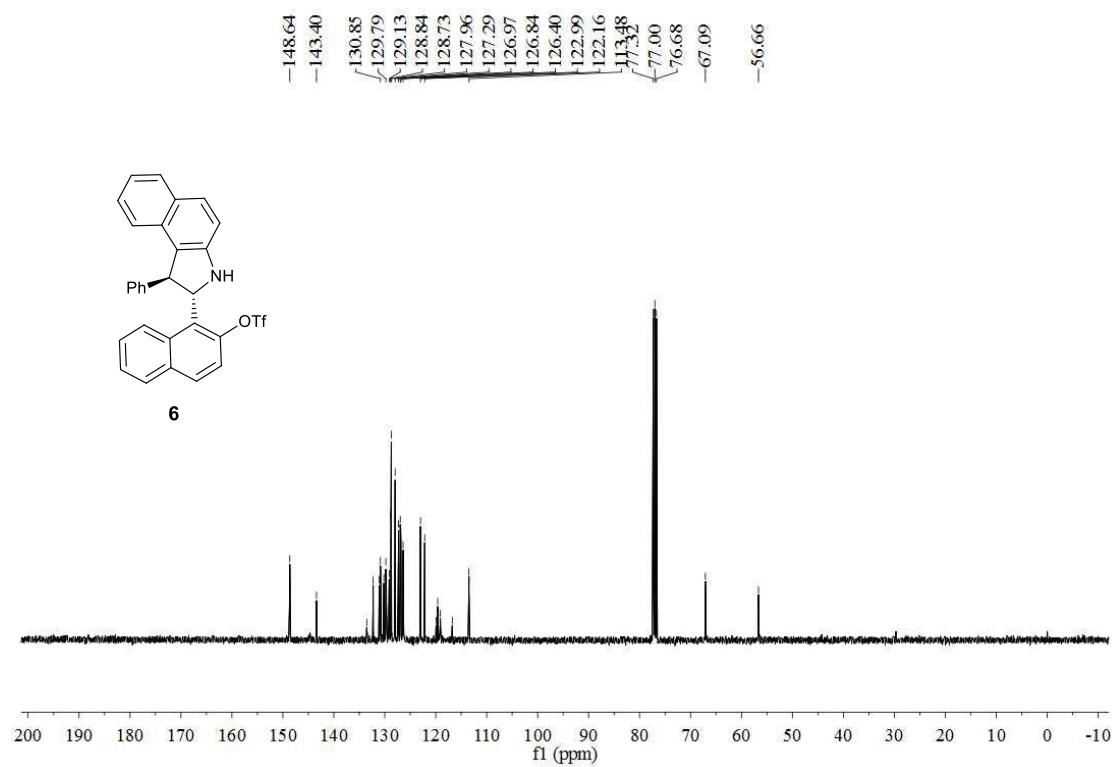
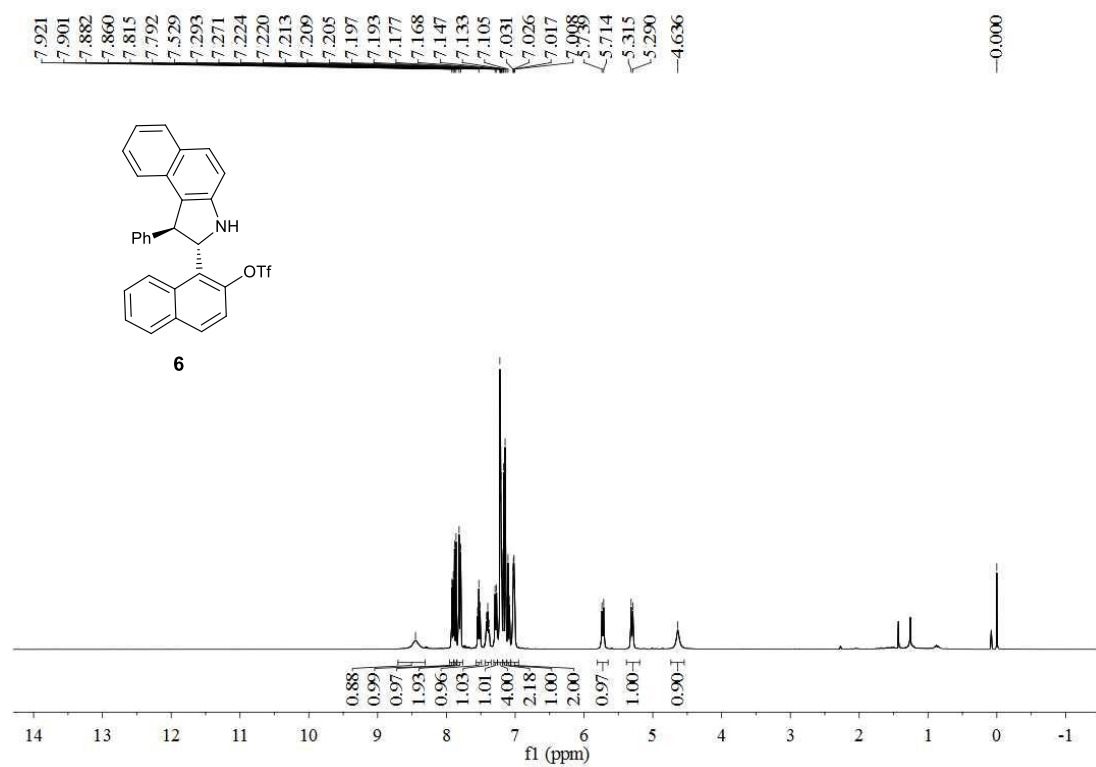


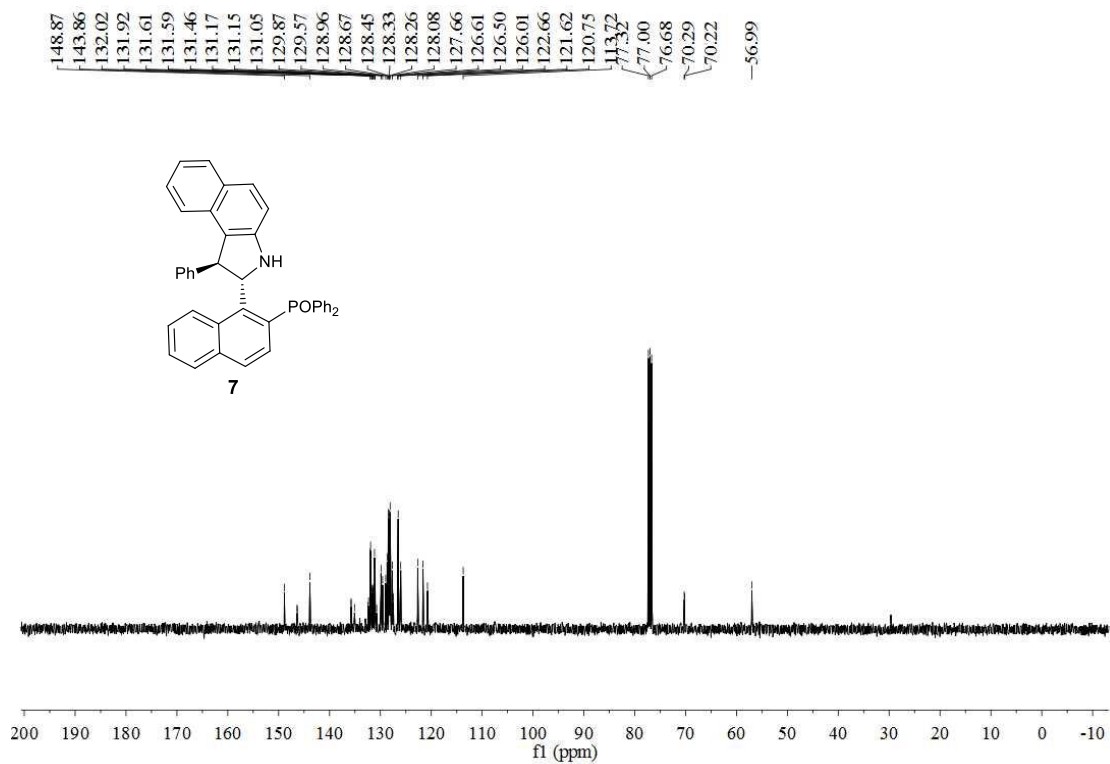
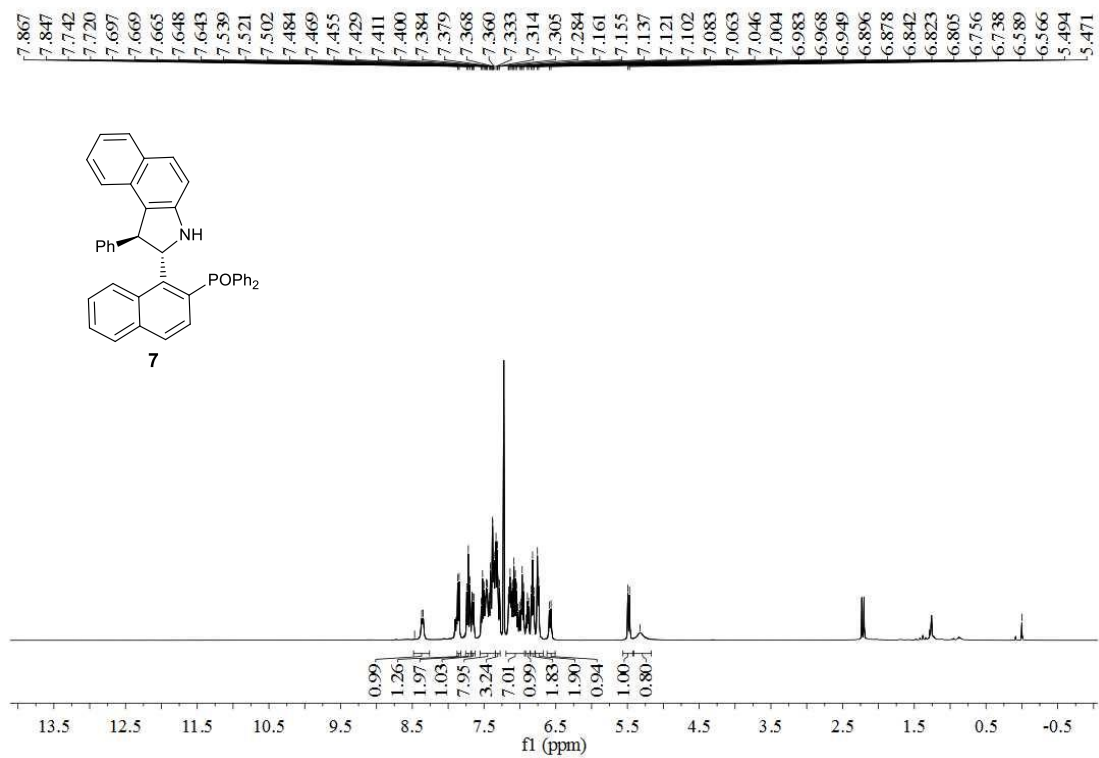




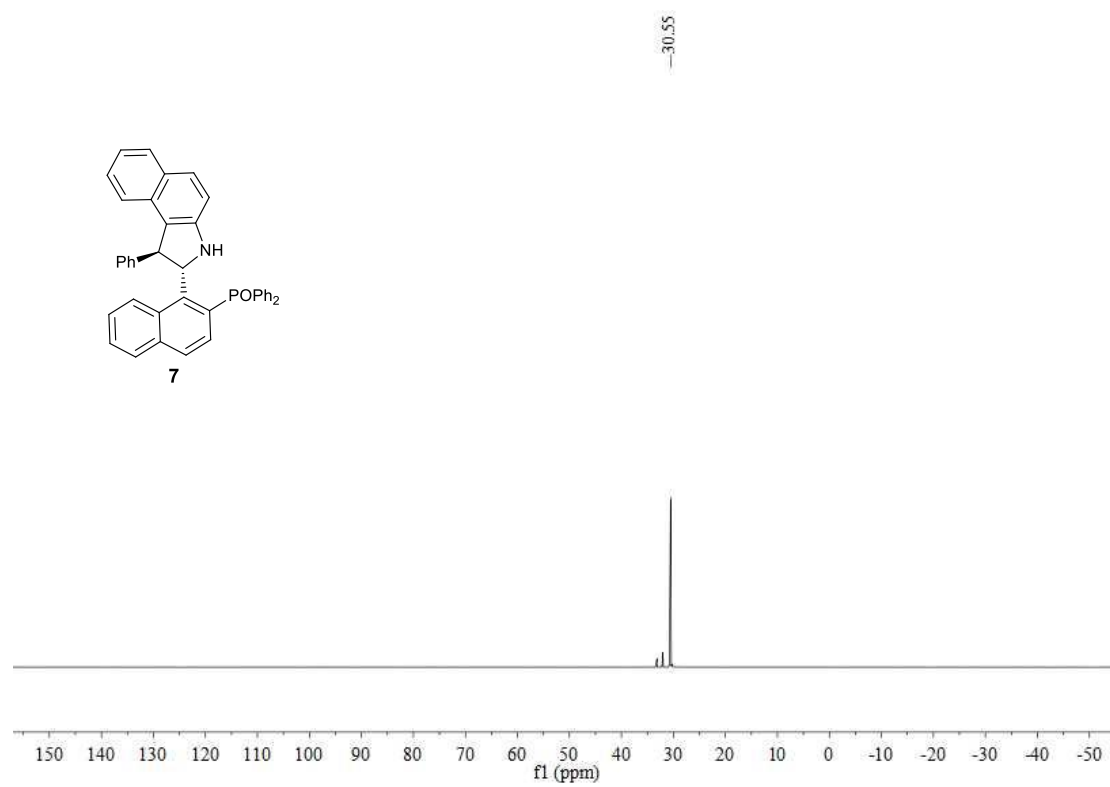
³¹P NMR

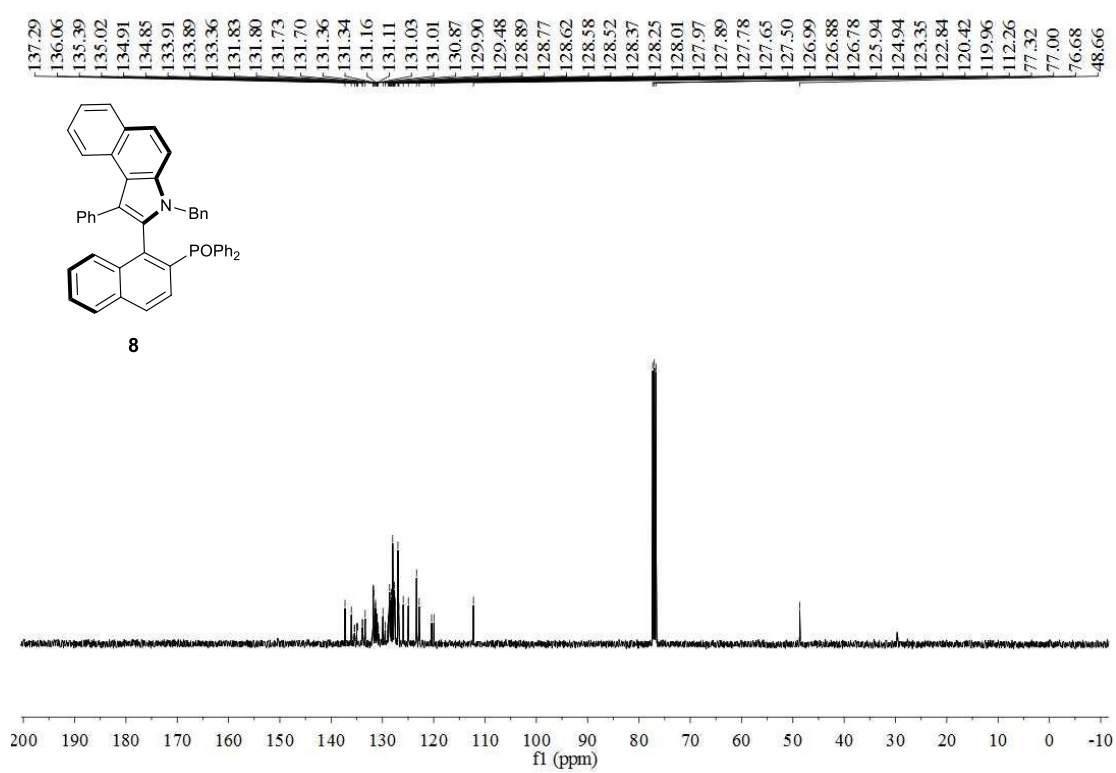
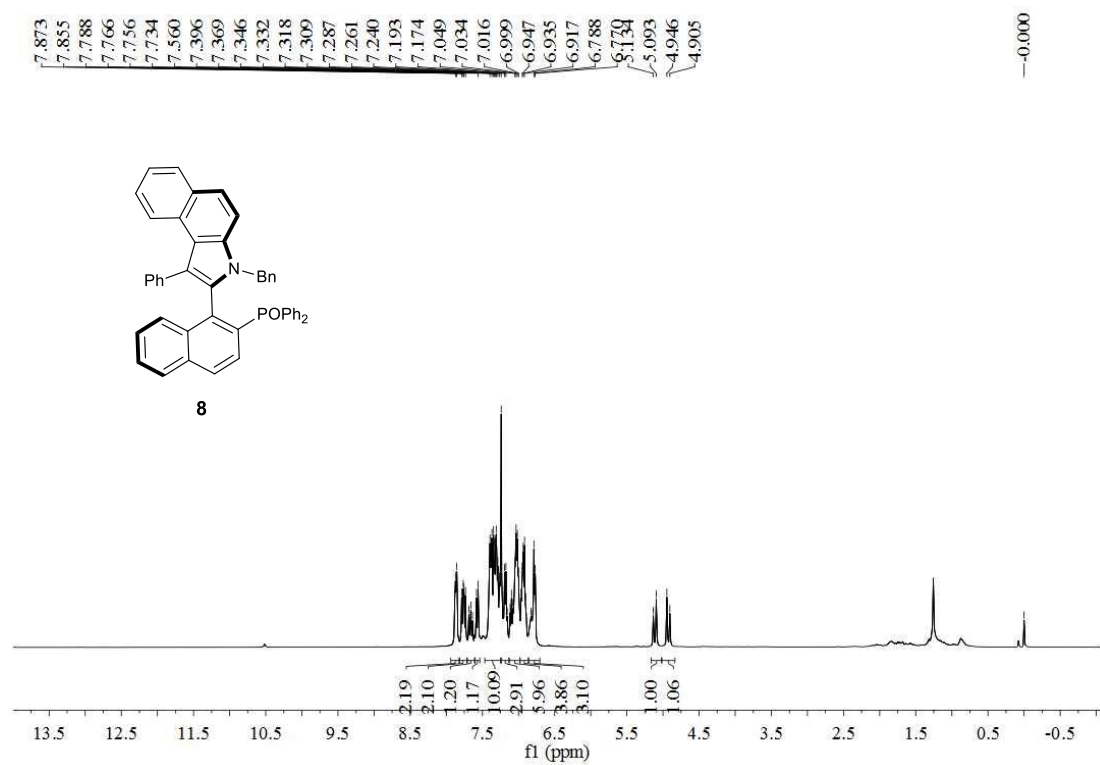


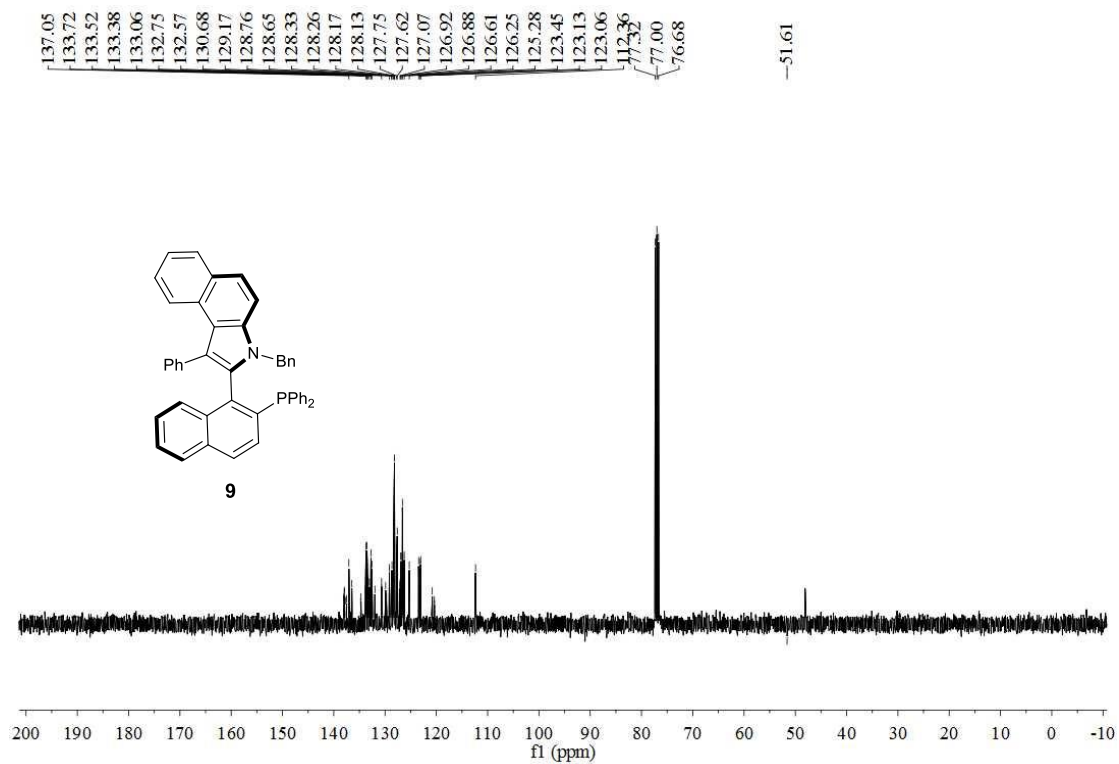
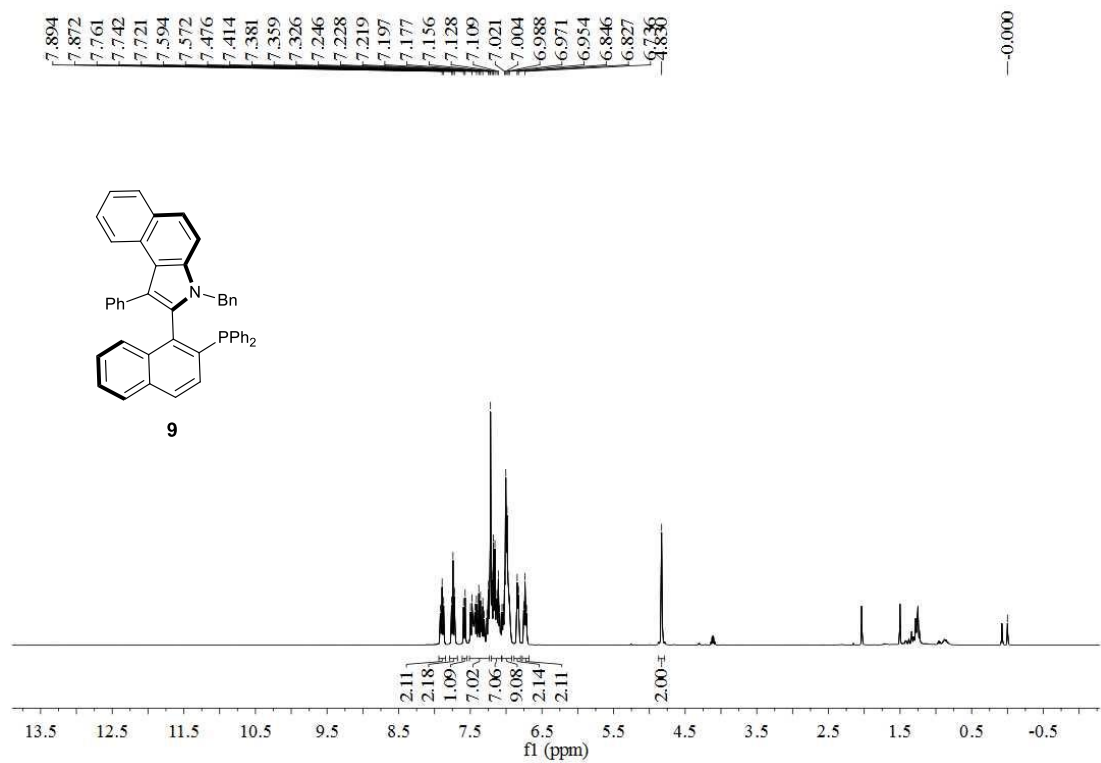




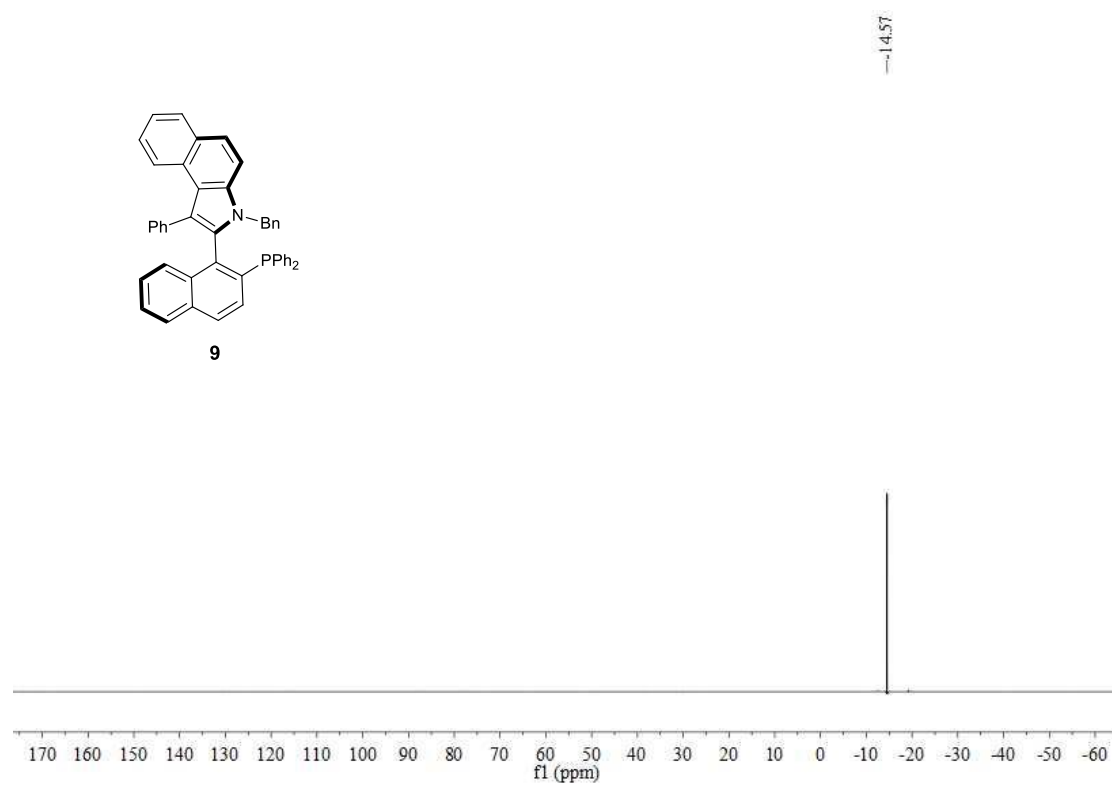
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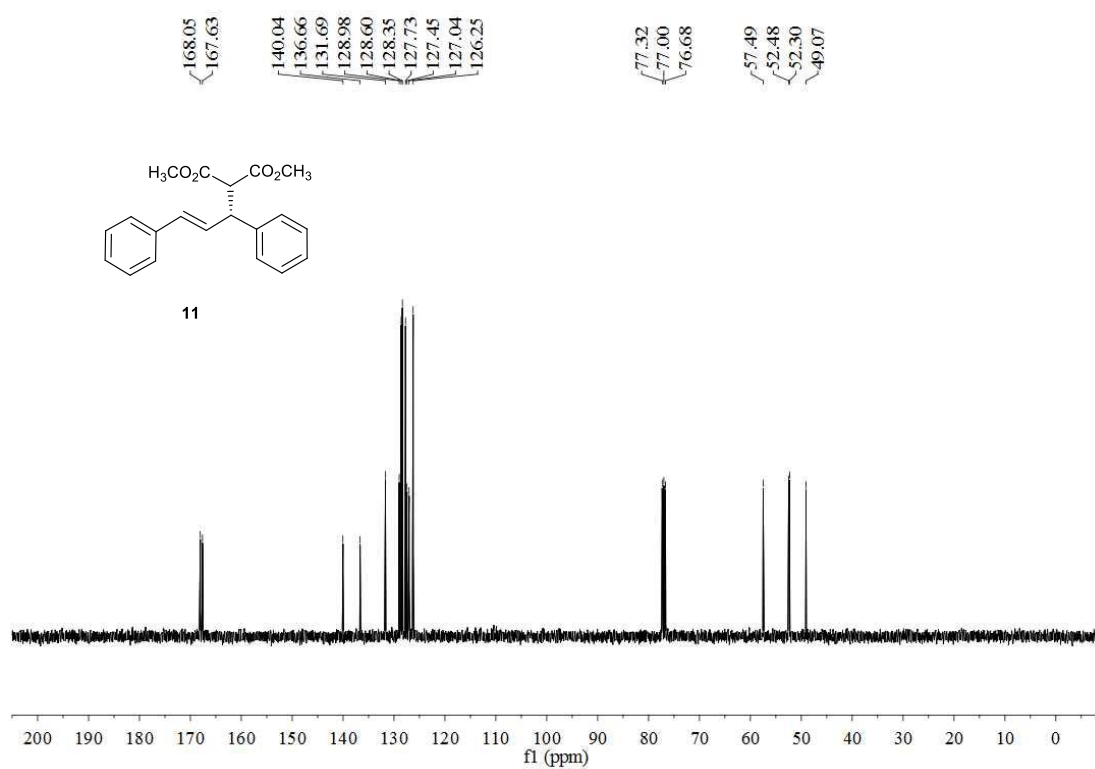
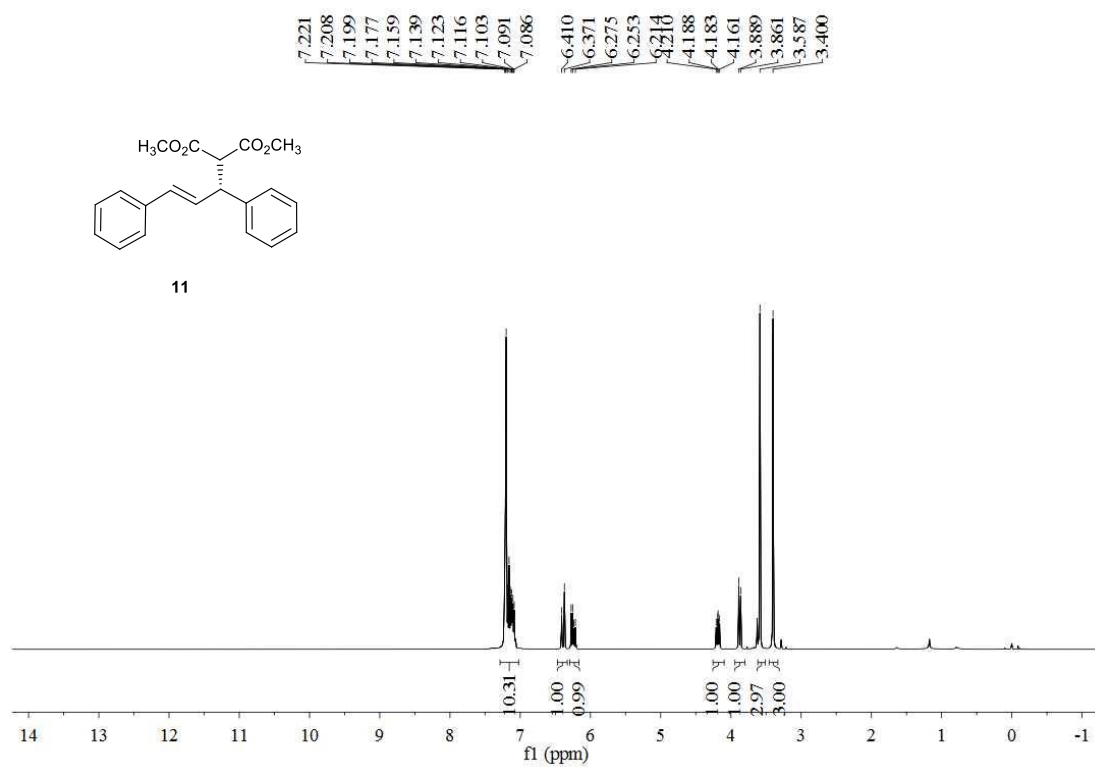




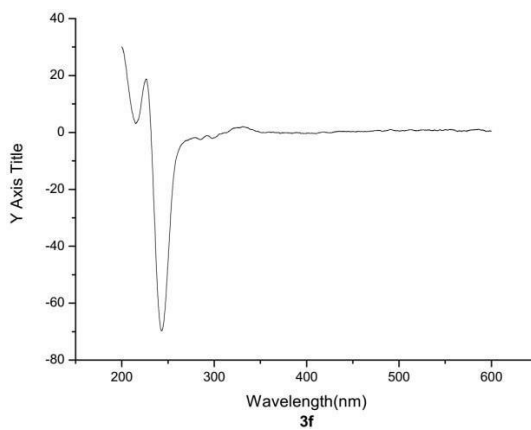
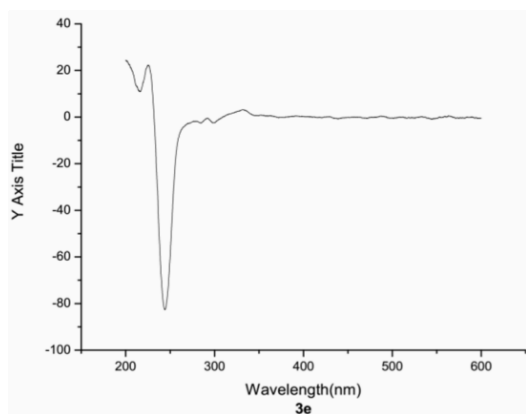
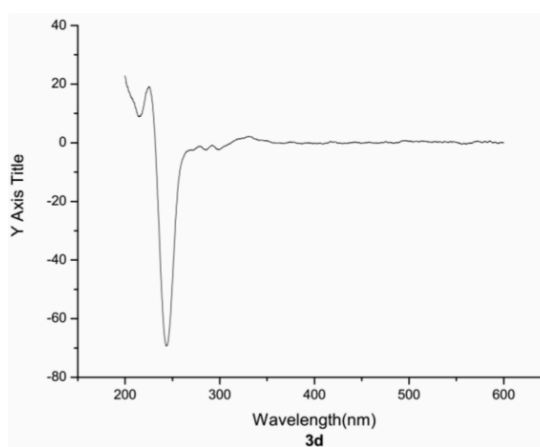
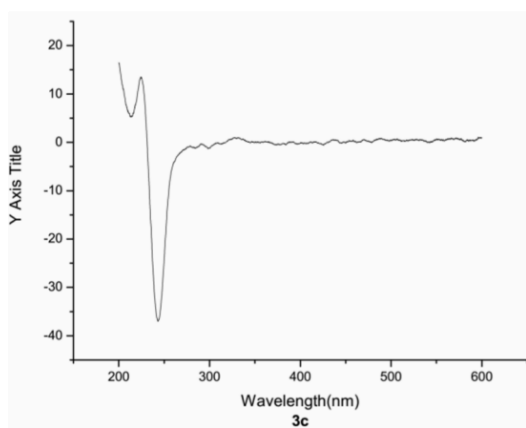
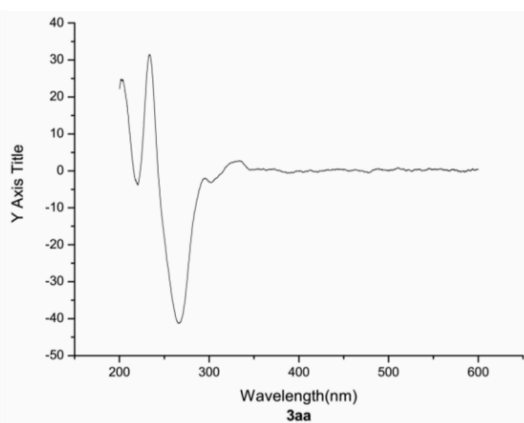
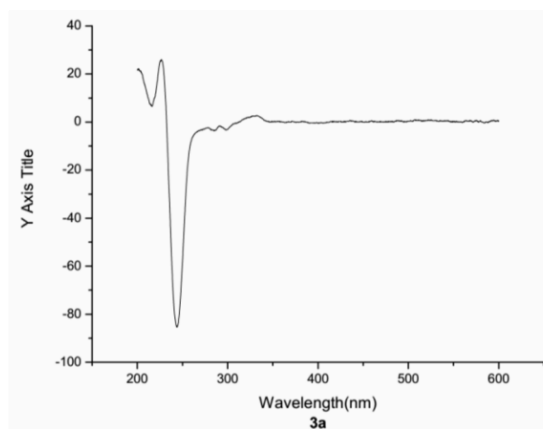


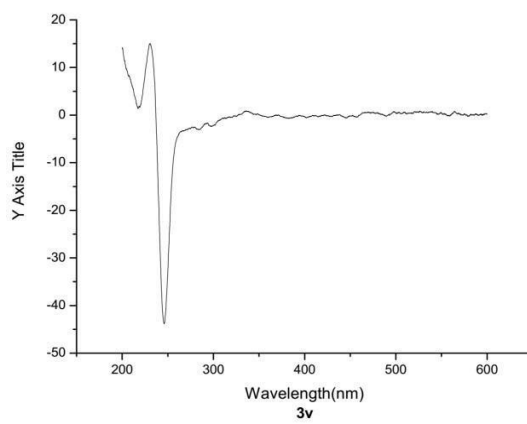
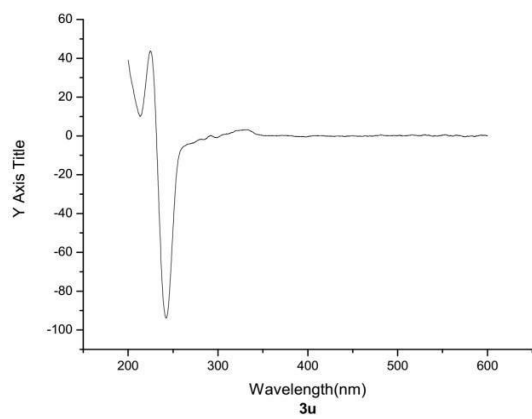
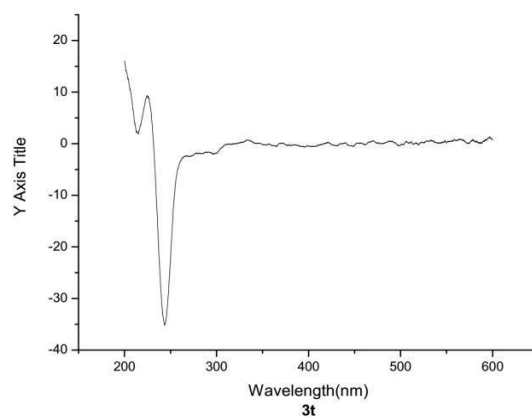
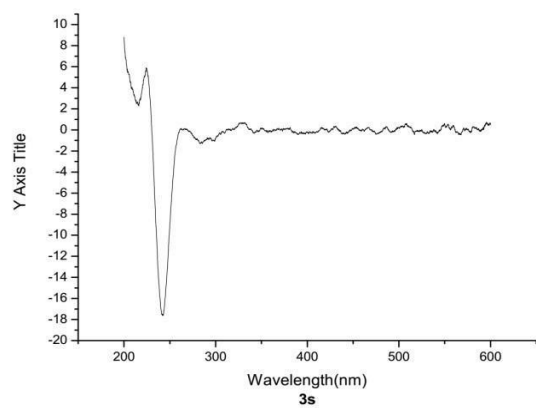
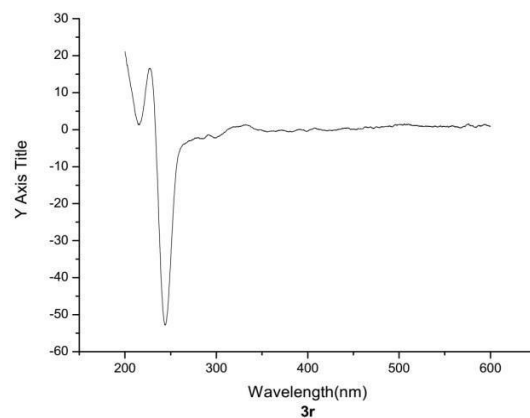
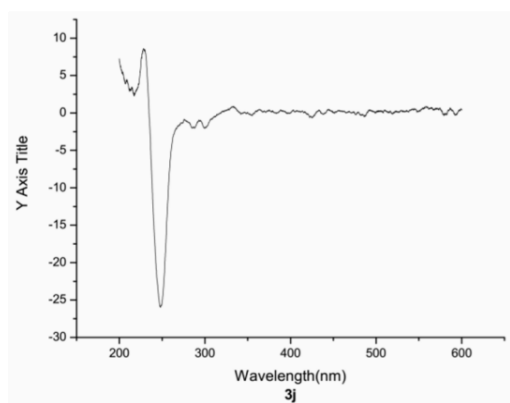
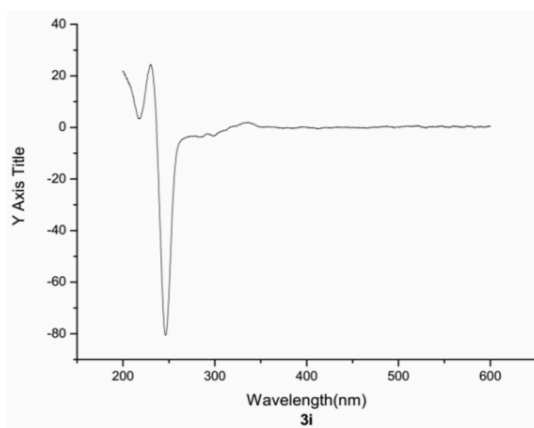
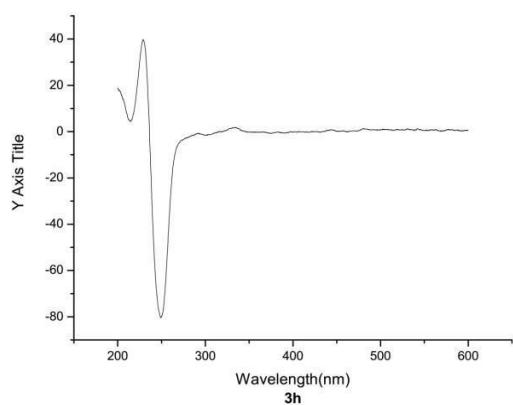
³¹P NMR

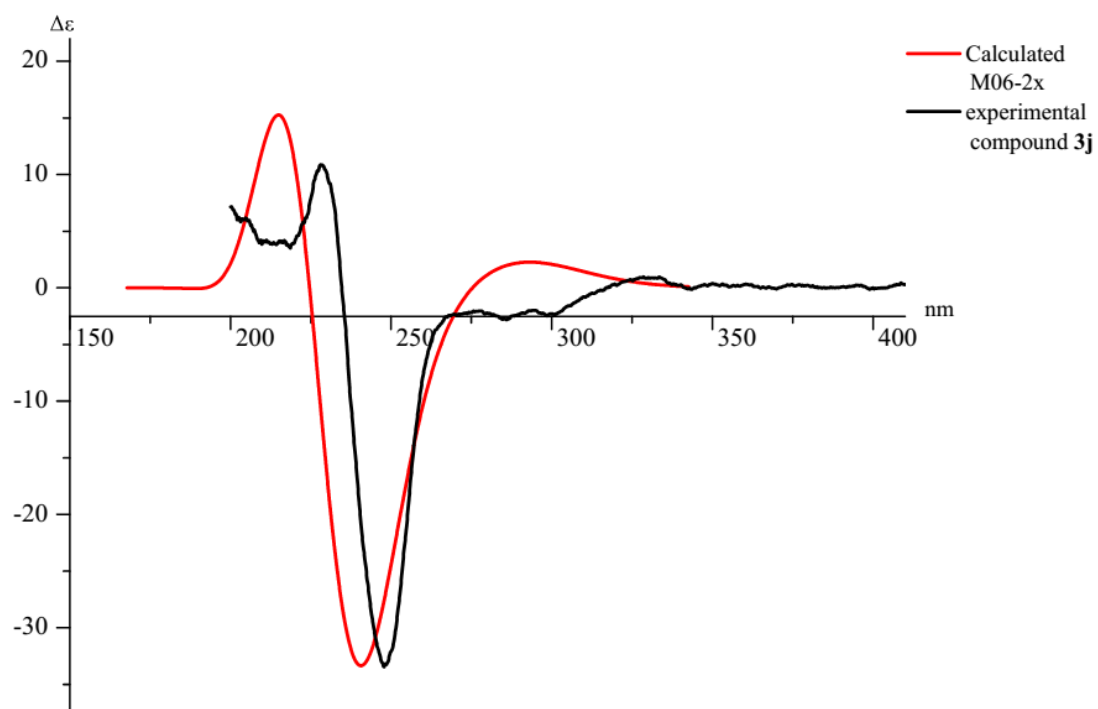
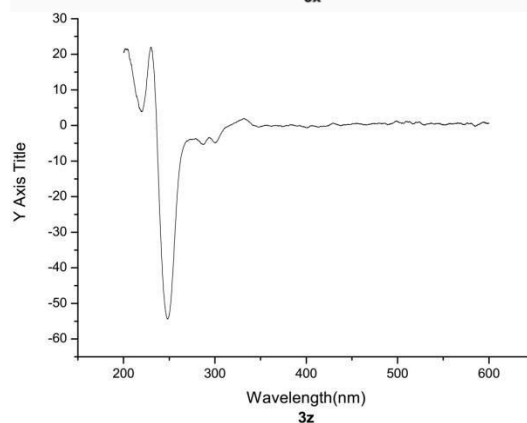
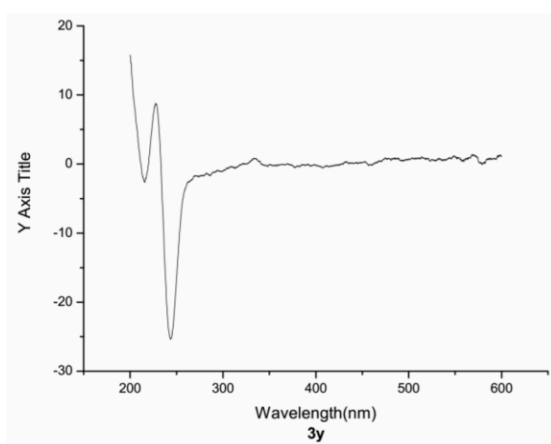
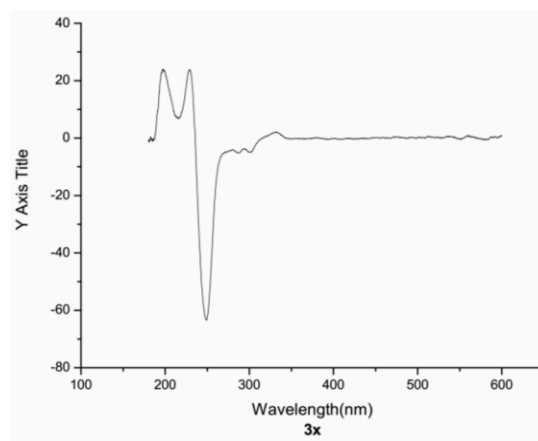
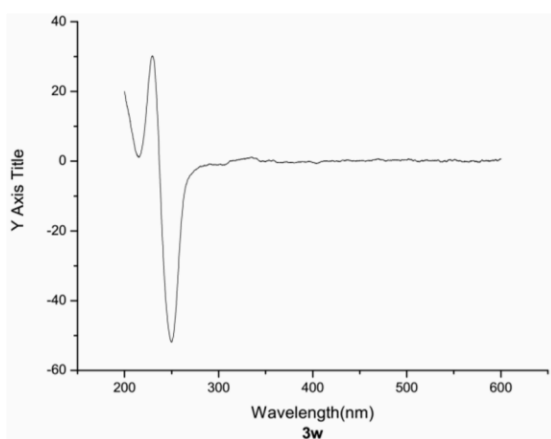


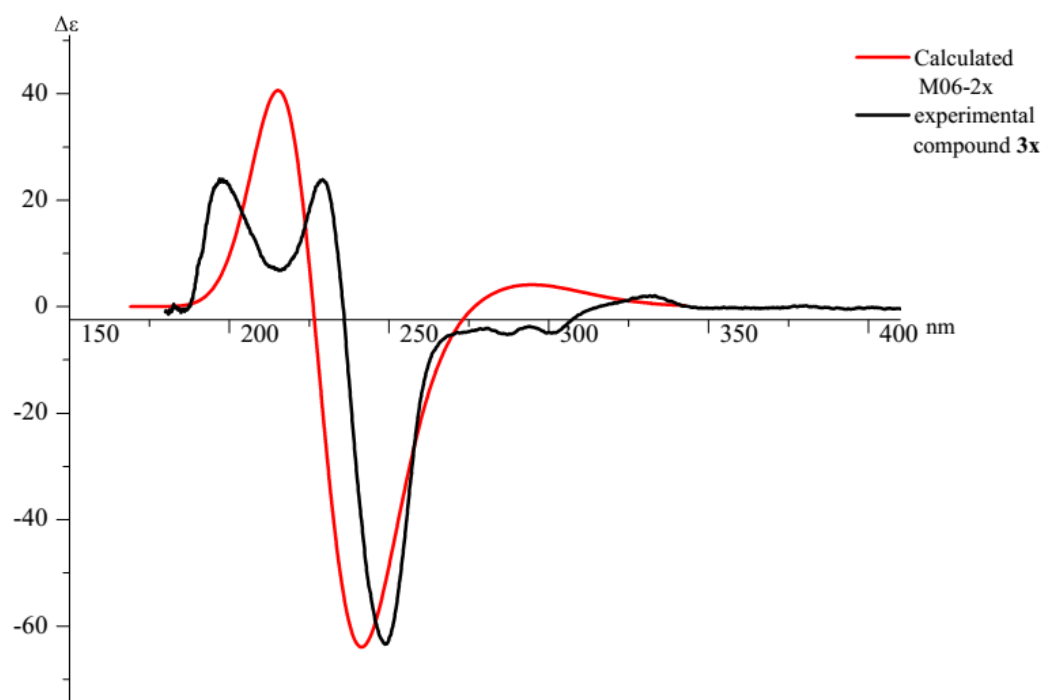


15. CD spectra









Calculation for 3j

167.80871	-0.00001	169.20829	-0.00002	170.60788	-0.00005
167.86702	-0.00001	169.26661	-0.00002	170.66619	-0.00005
167.92534	-0.00001	169.32492	-0.00002	170.72451	-0.00005
167.98365	-0.00001	169.38324	-0.00002	170.78283	-0.00005
168.04197	-0.00001	169.44156	-0.00002	170.84114	-0.00006
168.10029	-0.00001	169.49987	-0.00002	170.89946	-0.00006
168.15860	-0.00001	169.55819	-0.00002	170.95777	-0.00006
168.21692	-0.00001	169.61650	-0.00002	171.01609	-0.00006
168.27523	-0.00001	169.67482	-0.00002	171.07441	-0.00007
168.33355	-0.00001	169.73314	-0.00003	171.13272	-0.00007
168.39187	-0.00001	169.79145	-0.00003	171.19104	-0.00007
168.45018	-0.00001	169.84977	-0.00003	171.24935	-0.00007
168.50850	-0.00001	169.90809	-0.00003	171.30767	-0.00008
168.56682	-0.00001	169.96640	-0.00003	171.36599	-0.00008
168.62513	-0.00001	170.02472	-0.00003	171.42430	-0.00008
168.68345	-0.00001	170.08303	-0.00003	171.48262	-0.00009
168.74176	-0.00001	170.14135	-0.00003	171.54094	-0.00009
168.80008	-0.00001	170.19967	-0.00004	171.59925	-0.00009
168.85840	-0.00001	170.25798	-0.00004	171.65757	-0.00010
168.91671	-0.00001	170.31630	-0.00004	171.71588	-0.00010
168.97503	-0.00001	170.37461	-0.00004	171.77420	-0.00010
169.03334	-0.00002	170.43293	-0.00004	171.83252	-0.00011
169.09166	-0.00002	170.49125	-0.00004	171.89083	-0.00011
169.14998	-0.00002	170.54956	-0.00005	171.94915	-0.00012

172.00746	-0.00012	174.57337	-0.00055	177.13928	-0.00211
172.06578	-0.00012	174.63169	-0.00057	177.19759	-0.00217
172.12410	-0.00013	174.69000	-0.00059	177.25591	-0.00223
172.18241	-0.00013	174.74832	-0.00061	177.31423	-0.00230
172.24073	-0.00014	174.80664	-0.00063	177.37254	-0.00236
172.29904	-0.00014	174.86495	-0.00065	177.43086	-0.00243
172.35736	-0.00015	174.92327	-0.00067	177.48917	-0.00250
172.41568	-0.00015	174.98158	-0.00069	177.54749	-0.00257
172.47399	-0.00016	175.03990	-0.00072	177.60581	-0.00264
172.53231	-0.00017	175.09822	-0.00074	177.66412	-0.00271
172.59062	-0.00017	175.15653	-0.00076	177.72244	-0.00279
172.64894	-0.00018	175.21485	-0.00079	177.78076	-0.00286
172.70726	-0.00019	175.27316	-0.00081	177.83907	-0.00294
172.76557	-0.00019	175.33148	-0.00084	177.89739	-0.00302
172.82389	-0.00020	175.38980	-0.00087	177.95570	-0.00310
172.88220	-0.00021	175.44811	-0.00089	178.01402	-0.00319
172.94052	-0.00021	175.50643	-0.00092	178.07234	-0.00328
172.99884	-0.00022	175.56474	-0.00095	178.13065	-0.00336
173.05715	-0.00023	175.62306	-0.00098	178.18897	-0.00345
173.11547	-0.00024	175.68138	-0.00101	178.24728	-0.00355
173.17379	-0.00025	175.73969	-0.00104	178.30560	-0.00364
173.23210	-0.00025	175.79801	-0.00107	178.36392	-0.00374
173.29042	-0.00026	175.85632	-0.00111	178.42223	-0.00384
173.34873	-0.00027	175.91464	-0.00114	178.48055	-0.00394
173.40705	-0.00028	175.97296	-0.00118	178.53886	-0.00404
173.46537	-0.00029	176.03127	-0.00121	178.59718	-0.00415
173.52368	-0.00030	176.08959	-0.00125	178.65550	-0.00426
173.58200	-0.00031	176.14791	-0.00129	178.71381	-0.00437
173.64031	-0.00032	176.20622	-0.00133	178.77213	-0.00448
173.69863	-0.00034	176.26454	-0.00137	178.83044	-0.00460
173.75695	-0.00035	176.32285	-0.00141	178.88876	-0.00471
173.81526	-0.00036	176.38117	-0.00145	178.94708	-0.00483
173.87358	-0.00037	176.43949	-0.00149	179.00539	-0.00496
173.93189	-0.00038	176.49780	-0.00154	179.06371	-0.00508
173.99021	-0.00040	176.55612	-0.00158	179.12203	-0.00521
174.04853	-0.00041	176.61443	-0.00163	179.18034	-0.00534
174.10684	-0.00043	176.67275	-0.00168	179.23866	-0.00548
174.16516	-0.00044	176.73107	-0.00173	179.29697	-0.00561
174.22347	-0.00045	176.78938	-0.00178	179.35529	-0.00575
174.28179	-0.00047	176.84770	-0.00183	179.41361	-0.00590
174.34011	-0.00049	176.90601	-0.00188	179.47192	-0.00604
174.39842	-0.00050	176.96433	-0.00194	179.53024	-0.00619
174.45674	-0.00052	177.02265	-0.00199	179.58855	-0.00634
174.51506	-0.00054	177.08096	-0.00205	179.64687	-0.00650

179.70519	-0.00666	182.27109	-0.01735	184.83700	-0.03684
179.76350	-0.00682	182.32941	-0.01769	184.89532	-0.03737
179.82182	-0.00698	182.38773	-0.01804	184.95363	-0.03791
179.88013	-0.00715	182.44604	-0.01839	185.01195	-0.03845
179.93845	-0.00732	182.50436	-0.01875	185.07026	-0.03900
179.99677	-0.00749	182.56267	-0.01911	185.12858	-0.03954
180.05508	-0.00767	182.62099	-0.01947	185.18690	-0.04009
180.11340	-0.00785	182.67931	-0.01984	185.24521	-0.04064
180.17171	-0.00804	182.73762	-0.02022	185.30353	-0.04120
180.23003	-0.00823	182.79594	-0.02060	185.36185	-0.04175
180.28835	-0.00842	182.85425	-0.02099	185.42016	-0.04231
180.34666	-0.00861	182.91257	-0.02138	185.47848	-0.04286
180.40498	-0.00881	182.97089	-0.02177	185.53679	-0.04342
180.46329	-0.00901	183.02920	-0.02217	185.59511	-0.04398
180.52161	-0.00922	183.08752	-0.02258	185.65343	-0.04454
180.57993	-0.00943	183.14583	-0.02299	185.71174	-0.04511
180.63824	-0.00964	183.20415	-0.02340	185.77006	-0.04567
180.69656	-0.00986	183.26247	-0.02382	185.82837	-0.04623
180.75488	-0.01008	183.32078	-0.02424	185.88669	-0.04679
180.81319	-0.01031	183.37910	-0.02467	185.94501	-0.04735
180.87151	-0.01054	183.43741	-0.02511	186.00332	-0.04792
180.92982	-0.01077	183.49573	-0.02555	186.06164	-0.04848
180.98814	-0.01101	183.55405	-0.02599	186.11995	-0.04904
181.04646	-0.01125	183.61236	-0.02644	186.17827	-0.04959
181.10477	-0.01150	183.67068	-0.02689	186.23659	-0.05015
181.16309	-0.01175	183.72900	-0.02735	186.29490	-0.05071
181.22140	-0.01200	183.78731	-0.02781	186.35322	-0.05126
181.27972	-0.01226	183.84563	-0.02828	186.41153	-0.05181
181.33804	-0.01253	183.90394	-0.02875	186.46985	-0.05236
181.39635	-0.01279	183.96226	-0.02922	186.52817	-0.05290
181.45467	-0.01307	184.02058	-0.02970	186.58648	-0.05344
181.51298	-0.01334	184.07889	-0.03019	186.64480	-0.05398
181.57130	-0.01362	184.13721	-0.03067	186.70312	-0.05451
181.62962	-0.01391	184.19552	-0.03117	186.76143	-0.05504
181.68793	-0.01420	184.25384	-0.03166	186.81975	-0.05556
181.74625	-0.01449	184.31216	-0.03216	186.87806	-0.05608
181.80456	-0.01479	184.37047	-0.03267	186.93638	-0.05659
181.86288	-0.01510	184.42879	-0.03318	186.99470	-0.05710
181.92120	-0.01540	184.48710	-0.03369	187.05301	-0.05760
181.97951	-0.01572	184.54542	-0.03420	187.11133	-0.05810
182.03783	-0.01603	184.60374	-0.03472	187.16964	-0.05858
182.09614	-0.01636	184.66205	-0.03525	187.22796	-0.05906
182.15446	-0.01668	184.72037	-0.03577	187.28628	-0.05953
182.21278	-0.01702	184.77868	-0.03630	187.34459	-0.05999

187.40291	-0.06044	189.96882	-0.06206	192.53472	0.02560
187.46122	-0.06089	190.02713	-0.06142	192.59304	0.02949
187.51954	-0.06132	190.08545	-0.06073	192.65135	0.03349
187.57786	-0.06174	190.14376	-0.06000	192.70967	0.03760
187.63617	-0.06215	190.20208	-0.05922	192.76799	0.04182
187.69449	-0.06255	190.26040	-0.05839	192.82630	0.04616
187.75280	-0.06294	190.31871	-0.05751	192.88462	0.05062
187.81112	-0.06332	190.37703	-0.05658	192.94294	0.05519
187.86944	-0.06368	190.43534	-0.05560	193.00125	0.05989
187.92775	-0.06403	190.49366	-0.05456	193.05957	0.06471
187.98607	-0.06436	190.55198	-0.05348	193.11788	0.06965
188.04438	-0.06468	190.61029	-0.05233	193.17620	0.07472
188.10270	-0.06498	190.66861	-0.05113	193.23452	0.07992
188.16102	-0.06527	190.72692	-0.04987	193.29283	0.08525
188.21933	-0.06554	190.78524	-0.04856	193.35115	0.09071
188.27765	-0.06579	190.84356	-0.04718	193.40946	0.09631
188.33597	-0.06602	190.90187	-0.04574	193.46778	0.10204
188.39428	-0.06624	190.96019	-0.04424	193.52610	0.10792
188.45260	-0.06643	191.01850	-0.04267	193.58441	0.11393
188.51091	-0.06661	191.07682	-0.04104	193.64273	0.12009
188.56923	-0.06676	191.13514	-0.03934	193.70104	0.12639
188.62755	-0.06689	191.19345	-0.03757	193.75936	0.13284
188.68586	-0.06700	191.25177	-0.03573	193.81768	0.13944
188.74418	-0.06709	191.31009	-0.03382	193.87599	0.14619
188.80249	-0.06715	191.36840	-0.03184	193.93431	0.15310
188.86081	-0.06719	191.42672	-0.02978	193.99262	0.16016
188.91913	-0.06720	191.48503	-0.02765	194.05094	0.16738
188.97744	-0.06719	191.54335	-0.02543	194.10926	0.17476
189.03576	-0.06715	191.60167	-0.02314	194.16757	0.18230
189.09407	-0.06708	191.65998	-0.02077	194.22589	0.19000
189.15239	-0.06698	191.71830	-0.01832	194.28420	0.19788
189.21071	-0.06686	191.77661	-0.01578	194.34252	0.20592
189.26902	-0.06670	191.83493	-0.01315	194.40084	0.21413
189.32734	-0.06651	191.89325	-0.01044	194.45915	0.22252
189.38565	-0.06628	191.95156	-0.00764	194.51747	0.23108
189.44397	-0.06603	192.00988	-0.00475	194.57579	0.23982
189.50229	-0.06574	192.06819	-0.00177	194.63410	0.24874
189.56060	-0.06541	192.12651	0.00130	194.69242	0.25784
189.61892	-0.06505	192.18483	0.00448	194.75073	0.26713
189.67723	-0.06465	192.24314	0.00774	194.80905	0.27660
189.73555	-0.06422	192.30146	0.01111	194.86737	0.28626
189.79387	-0.06374	192.35977	0.01458	194.92568	0.29612
189.85218	-0.06322	192.41809	0.01815	194.98400	0.30617
189.91050	-0.06266	192.47641	0.02182	195.04231	0.31641

195.10063	0.32686	197.66654	1.01842	200.23244	2.28896
195.15895	0.33750	197.72485	1.04021	200.29076	2.32576
195.21726	0.34835	197.78317	1.06230	200.34908	2.36293
195.27558	0.35940	197.84149	1.08469	200.40739	2.40047
195.33389	0.37066	197.89980	1.10740	200.46571	2.43838
195.39221	0.38213	197.95812	1.13042	200.52403	2.47667
195.45053	0.39382	198.01643	1.15374	200.58234	2.51532
195.50884	0.40571	198.07475	1.17739	200.64066	2.55435
195.56716	0.41783	198.13307	1.20135	200.69897	2.59376
195.62547	0.43017	198.19138	1.22562	200.75729	2.63353
195.68379	0.44272	198.24970	1.25022	200.81561	2.67368
195.74211	0.45550	198.30801	1.27514	200.87392	2.71421
195.80042	0.46851	198.36633	1.30038	200.93224	2.75511
195.85874	0.48175	198.42465	1.32595	200.99055	2.79638
195.91706	0.49522	198.48296	1.35184	201.04887	2.83803
195.97537	0.50892	198.54128	1.37806	201.10719	2.88006
196.03369	0.52286	198.59959	1.40462	201.16550	2.92246
196.09200	0.53704	198.65791	1.43151	201.22382	2.96523
196.15032	0.55145	198.71623	1.45873	201.28213	3.00838
196.20864	0.56611	198.77454	1.48629	201.34045	3.05191
196.26695	0.58102	198.83286	1.51419	201.39877	3.09581
196.32527	0.59617	198.89117	1.54243	201.45708	3.14008
196.38358	0.61158	198.94949	1.57100	201.51540	3.18473
196.44190	0.62723	199.00781	1.59992	201.57371	3.22975
196.50022	0.64315	199.06612	1.62919	201.63203	3.27515
196.55853	0.65931	199.12444	1.65880	201.69035	3.32092
196.61685	0.67574	199.18276	1.68876	201.74866	3.36706
196.67516	0.69243	199.24107	1.71907	201.80698	3.41357
196.73348	0.70939	199.29939	1.74973	201.86529	3.46046
196.79180	0.72661	199.35770	1.78074	201.92361	3.50771
196.85011	0.74410	199.41602	1.81210	201.98193	3.55534
196.90843	0.76186	199.47434	1.84382	202.04024	3.60333
196.96674	0.77989	199.53265	1.87589	202.09856	3.65169
197.02506	0.79820	199.59097	1.90833	202.15688	3.70042
197.08338	0.81678	199.64928	1.94112	202.21519	3.74952
197.14169	0.83565	199.70760	1.97426	202.27351	3.79898
197.20001	0.85480	199.76592	2.00777	202.33182	3.84881
197.25832	0.87423	199.82423	2.04164	202.39014	3.89900
197.31664	0.89395	199.88255	2.07588	202.44846	3.94955
197.37496	0.91396	199.94086	2.11048	202.50677	4.00046
197.43327	0.93426	199.99918	2.14544	202.56509	4.05172
197.49159	0.95486	200.05750	2.18077	202.62340	4.10335
197.54991	0.97574	200.11581	2.21646	202.68172	4.15533
197.60822	0.99693	200.17413	2.25253	202.74004	4.20767

202.79835	4.26036	205.36426	6.89073	207.93017	9.89898
202.85667	4.31340	205.42258	6.95647	207.98848	9.96800
202.91498	4.36679	205.48089	7.02241	208.04680	10.03695
202.97330	4.42053	205.53921	7.08854	208.10512	10.10581
203.03162	4.47461	205.59752	7.15487	208.16343	10.17458
203.08993	4.52904	205.65584	7.22139	208.22175	10.24324
203.14825	4.58381	205.71416	7.28809	208.28006	10.31180
203.20656	4.63892	205.77247	7.35496	208.33838	10.38023
203.26488	4.69436	205.83079	7.42200	208.39670	10.44854
203.32320	4.75014	205.88910	7.48921	208.45501	10.51672
203.38151	4.80625	205.94742	7.55658	208.51333	10.58476
203.43983	4.86270	206.00574	7.62410	208.57164	10.65265
203.49814	4.91947	206.06405	7.69178	208.62996	10.72038
203.55646	4.97656	206.12237	7.75959	208.68828	10.78794
203.61478	5.03398	206.18068	7.82754	208.74659	10.85534
203.67309	5.09172	206.23900	7.89563	208.80491	10.92254
203.73141	5.14977	206.29732	7.96384	208.86322	10.98956
203.78973	5.20814	206.35563	8.03217	208.92154	11.05639
203.84804	5.26682	206.41395	8.10061	208.97986	11.12300
203.90636	5.32581	206.47226	8.16916	209.03817	11.18940
203.96467	5.38511	206.53058	8.23782	209.09649	11.25558
204.02299	5.44471	206.58890	8.30657	209.15480	11.32152
204.08131	5.50460	206.64721	8.37540	209.21312	11.38723
204.13962	5.56480	206.70553	8.44432	209.27144	11.45268
204.19794	5.62528	206.76385	8.51332	209.32975	11.51788
204.25625	5.68606	206.82216	8.58239	209.38807	11.58282
204.31457	5.74712	206.88048	8.65152	209.44638	11.64748
204.37289	5.80846	206.93879	8.72071	209.50470	11.71186
204.43120	5.87008	206.99711	8.78995	209.56302	11.77594
204.48952	5.93198	207.05543	8.85923	209.62133	11.83973
204.54783	5.99415	207.11374	8.92855	209.67965	11.90321
204.60615	6.05659	207.17206	8.99790	209.73797	11.96637
204.66447	6.11929	207.23037	9.06727	209.79628	12.02920
204.72278	6.18224	207.28869	9.13666	209.85460	12.09170
204.78110	6.24546	207.34701	9.20606	209.91291	12.15386
204.83941	6.30893	207.40532	9.27546	209.97123	12.21567
204.89773	6.37264	207.46364	9.34485	210.02955	12.27711
204.95605	6.43660	207.52195	9.41424	210.08786	12.33819
205.01436	6.50079	207.58027	9.48360	210.14618	12.39889
205.07268	6.56522	207.63859	9.55294	210.20449	12.45920
205.13100	6.62988	207.69690	9.62225	210.26281	12.51911
205.18931	6.69477	207.75522	9.69151	210.32113	12.57862
205.24763	6.75987	207.81353	9.76072	210.37944	12.63772
205.30594	6.82519	207.87185	9.82988	210.43776	12.69640

210.49607	12.75464	213.06198	14.75742	215.62789	15.19602
210.55439	12.81245	213.12030	14.78725	215.68620	15.18310
210.61271	12.86980	213.17861	14.81625	215.74452	15.16907
210.67102	12.92670	213.23693	14.84443	215.80284	15.15394
210.72934	12.98313	213.29525	14.87176	215.86115	15.13770
210.78765	13.03909	213.35356	14.89825	215.91947	15.12035
210.84597	13.09456	213.41188	14.92388	215.97779	15.10187
210.90429	13.14954	213.47019	14.94865	216.03610	15.08227
210.96260	13.20402	213.52851	14.97256	216.09442	15.06155
211.02092	13.25798	213.58683	14.99558	216.15273	15.03969
211.07923	13.31143	213.64514	15.01772	216.21105	15.01670
211.13755	13.36435	213.70346	15.03897	216.26937	14.99257
211.19587	13.41673	213.76177	15.05932	216.32768	14.96730
211.25418	13.46857	213.82009	15.07876	216.38600	14.94089
211.31250	13.51985	213.87841	15.09729	216.44431	14.91333
211.37082	13.57057	213.93672	15.11490	216.50263	14.88461
211.42913	13.62071	213.99504	15.13159	216.56095	14.85474
211.48745	13.67028	214.05335	15.14733	216.61926	14.82372
211.54576	13.71925	214.11167	15.16214	216.67758	14.79153
211.60408	13.76763	214.16999	15.17600	216.73589	14.75818
211.66240	13.81539	214.22830	15.18890	216.79421	14.72366
211.72071	13.86255	214.28662	15.20085	216.85253	14.68798
211.77903	13.90908	214.34494	15.21182	216.91084	14.65112
211.83734	13.95497	214.40325	15.22182	216.96916	14.61309
211.89566	14.00022	214.46157	15.23084	217.02747	14.57388
211.95398	14.04482	214.51988	15.23887	217.08579	14.53350
212.01229	14.08877	214.57820	15.24591	217.14411	14.49194
212.07061	14.13204	214.63652	15.25195	217.20242	14.44919
212.12892	14.17464	214.69483	15.25698	217.26074	14.40526
212.18724	14.21656	214.75315	15.26100	217.31906	14.36014
212.24556	14.25778	214.81146	15.26401	217.37737	14.31384
212.30387	14.29830	214.86978	15.26599	217.43569	14.26635
212.36219	14.33811	214.92810	15.26693	217.49400	14.21767
212.42050	14.37720	214.98641	15.26685	217.55232	14.16780
212.47882	14.41556	215.04473	15.26572	217.61064	14.11674
212.53714	14.45319	215.10304	15.26355	217.66895	14.06448
212.59545	14.49007	215.16136	15.26032	217.72727	14.01103
212.65377	14.52621	215.21968	15.25604	217.78558	13.95638
212.71209	14.56158	215.27799	15.25070	217.84390	13.90054
212.77040	14.59619	215.33631	15.24428	217.90222	13.84350
212.82872	14.63002	215.39462	15.23680	217.96053	13.78527
212.88703	14.66306	215.45294	15.22823	218.01885	13.72583
212.94535	14.69532	215.51126	15.21859	218.07716	13.66520
213.00367	14.72677	215.56957	15.20785	218.13548	13.60338

218.19380	13.54035	220.75970	9.60333	223.32561	3.61737
218.25211	13.47613	220.81802	9.48836	223.38393	3.46174
218.31043	13.41072	220.87634	9.37231	223.44224	3.30537
218.36874	13.34410	220.93465	9.25520	223.50056	3.14827
218.42706	13.27629	220.99297	9.13703	223.55888	2.99045
218.48538	13.20729	221.05128	9.01781	223.61719	2.83191
218.54369	13.13709	221.10960	8.89753	223.67551	2.67267
218.60201	13.06569	221.16792	8.77622	223.73382	2.51273
218.66032	12.99311	221.22623	8.65387	223.79214	2.35211
218.71864	12.91933	221.28455	8.53049	223.85046	2.19082
218.77696	12.84436	221.34286	8.40608	223.90877	2.02887
218.83527	12.76820	221.40118	8.28066	223.96709	1.86625
218.89359	12.69086	221.45950	8.15423	224.02540	1.70300
218.95191	12.61232	221.51781	8.02679	224.08372	1.53911
219.01022	12.53261	221.57613	7.89835	224.14204	1.37459
219.06854	12.45171	221.63444	7.76893	224.20035	1.20946
219.12685	12.36963	221.69276	7.63851	224.25867	1.04373
219.18517	12.28637	221.75108	7.50712	224.31698	0.87740
219.24349	12.20193	221.80939	7.37476	224.37530	0.71049
219.30180	12.11632	221.86771	7.24143	224.43362	0.54301
219.36012	12.02954	221.92603	7.10715	224.49193	0.37496
219.41843	11.94159	221.98434	6.97191	224.55025	0.20636
219.47675	11.85247	222.04266	6.83574	224.60856	0.03721
219.53507	11.76219	222.10097	6.69863	224.66688	-0.13246
219.59338	11.67074	222.15929	6.56059	224.72520	-0.30266
219.65170	11.57814	222.21761	6.42163	224.78351	-0.47336
219.71001	11.48438	222.27592	6.28176	224.84183	-0.64457
219.76833	11.38947	222.33424	6.14099	224.90014	-0.81626
219.82665	11.29341	222.39255	5.99931	224.95846	-0.98844
219.88496	11.19620	222.45087	5.85675	225.01678	-1.16108
219.94328	11.09786	222.50919	5.71331	225.07509	-1.33418
220.00159	10.99837	222.56750	5.56900	225.13341	-1.50772
220.05991	10.89775	222.62582	5.42382	225.19173	-1.68170
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220.23486	10.58912	222.80077	4.98319	225.36667	-2.20614
220.29317	10.48400	222.85908	4.83464	225.42499	-2.38175
220.35149	10.37777	222.91740	4.68526	225.48331	-2.55774
220.40981	10.27043	222.97571	4.53508	225.54162	-2.73410
220.46812	10.16198	223.03403	4.38409	225.59994	-2.91082
220.52644	10.05243	223.09235	4.23230	225.65825	-3.08789
220.58476	9.94179	223.15066	4.07973	225.71657	-3.26529
220.64307	9.83006	223.20898	3.92637	225.77489	-3.44301
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225.89152	-3.79939	228.45743	-11.77378	231.02333	-19.36190
225.94983	-3.97803	228.51574	-11.95401	231.08165	-19.52296
226.00815	-4.15694	228.57406	-12.13402	231.13997	-19.68337
226.06647	-4.33612	228.63237	-12.31381	231.19828	-19.84312
226.12478	-4.51556	228.69069	-12.49337	231.25660	-20.00221
226.18310	-4.69524	228.74901	-12.67267	231.31491	-20.16062
226.24141	-4.87516	228.80732	-12.85171	231.37323	-20.31835
226.29973	-5.05530	228.86564	-13.03049	231.43155	-20.47539
226.35805	-5.23566	228.92395	-13.20899	231.48986	-20.63174
226.41636	-5.41621	228.98227	-13.38719	231.54818	-20.78737
226.47468	-5.59696	229.04059	-13.56509	231.60649	-20.94229
226.53300	-5.77788	229.09890	-13.74268	231.66481	-21.09649
226.59131	-5.95897	229.15722	-13.91995	231.72313	-21.24996
226.64963	-6.14021	229.21553	-14.09689	231.78144	-21.40269
226.70794	-6.32160	229.27385	-14.27348	231.83976	-21.55468
226.76626	-6.50312	229.33217	-14.44972	231.89807	-21.70591
226.82458	-6.68476	229.39048	-14.62559	231.95639	-21.85639
226.88289	-6.86651	229.44880	-14.80109	232.01471	-22.00609
226.94121	-7.04836	229.50712	-14.97621	232.07302	-22.15502
226.99952	-7.23029	229.56543	-15.15093	232.13134	-22.30317
227.05784	-7.41230	229.62375	-15.32524	232.18965	-22.45052
227.11616	-7.59438	229.68206	-15.49915	232.24797	-22.59708
227.17447	-7.77651	229.74038	-15.67262	232.30629	-22.74284
227.23279	-7.95867	229.79870	-15.84566	232.36460	-22.88778
227.29110	-8.14087	229.85701	-16.01826	232.42292	-23.03191
227.34942	-8.32309	229.91533	-16.19040	232.48123	-23.17521
227.40774	-8.50532	229.97364	-16.36207	232.53955	-23.31768
227.46605	-8.68754	230.03196	-16.53327	232.59787	-23.45932
227.52437	-8.86974	230.09028	-16.70399	232.65618	-23.60010
227.58268	-9.05192	230.14859	-16.87421	232.71450	-23.74004
227.64100	-9.23406	230.20691	-17.04393	232.77282	-23.87912
227.69932	-9.41615	230.26522	-17.21314	232.83113	-24.01734
227.75763	-9.59818	230.32354	-17.38182	232.88945	-24.15468
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228.16585	-10.86977	230.73175	-18.54719	233.29766	-25.09124
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233.58924	-25.73283	236.15515	-30.30503	238.72106	-32.81058
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234.34735	-27.28916	236.91326	-31.26420	239.47916	-33.15377
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241.28696	-33.28603	243.85287	-32.00772	246.41878	-29.39857
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248.98468	-25.93255	251.55059	-22.05639	254.11650	-18.13810
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251.37564	-22.32564	253.94155	-18.40058	256.50746	-14.68436
251.43396	-22.23592	253.99987	-18.31297	256.56577	-14.60384
251.49228	-22.14617	254.05818	-18.22548	256.62409	-14.52353

256.68241	-14.44341	259.24831	-11.13531	261.81422	-8.28879
256.74072	-14.36350	259.30663	-11.06535	261.87254	-8.22963
256.79904	-14.28380	259.36495	-10.99564	261.93085	-8.17072
256.85735	-14.20430	259.42326	-10.92616	261.98917	-8.11205
256.91567	-14.12501	259.48158	-10.85693	262.04749	-8.05363
256.97399	-14.04592	259.53989	-10.78794	262.10580	-7.99545
257.03230	-13.96705	259.59821	-10.71919	262.16412	-7.93751
257.09062	-13.88839	259.65653	-10.65068	262.22243	-7.87982
257.14894	-13.80994	259.71484	-10.58242	262.28075	-7.82237
257.20725	-13.73170	259.77316	-10.51441	262.33907	-7.76516
257.26557	-13.65368	259.83147	-10.44664	262.39738	-7.70820
257.32388	-13.57587	259.88979	-10.37911	262.45570	-7.65147
257.38220	-13.49828	259.94811	-10.31183	262.51401	-7.59499
257.44052	-13.42091	260.00642	-10.24479	262.57233	-7.53876
257.49883	-13.34376	260.06474	-10.17800	262.63065	-7.48276
257.55715	-13.26682	260.12306	-10.11145	262.68896	-7.42700
257.61546	-13.19011	260.18137	-10.04515	262.74728	-7.37149
257.67378	-13.11362	260.23969	-9.97910	262.80559	-7.31621
257.73210	-13.03735	260.29800	-9.91329	262.86391	-7.26118
257.79041	-12.96131	260.35632	-9.84773	262.92223	-7.20639
257.84873	-12.88549	260.41464	-9.78241	262.98054	-7.15183
257.90704	-12.80990	260.47295	-9.71734	263.03886	-7.09751
257.96536	-12.73453	260.53127	-9.65252	263.09717	-7.04344
258.02368	-12.65939	260.58958	-9.58794	263.15549	-6.98960
258.08199	-12.58448	260.64790	-9.52361	263.21381	-6.93599
258.14031	-12.50980	260.70622	-9.45953	263.27212	-6.88263
258.19862	-12.43535	260.76453	-9.39569	263.33044	-6.82950
258.25694	-12.36113	260.82285	-9.33210	263.38876	-6.77661
258.31526	-12.28714	260.88116	-9.26876	263.44707	-6.72395
258.37357	-12.21338	260.93948	-9.20566	263.50539	-6.67153
258.43189	-12.13986	260.99780	-9.14281	263.56370	-6.61934
258.49020	-12.06657	261.05611	-9.08021	263.62202	-6.56739
258.54852	-11.99351	261.11443	-9.01785	263.68034	-6.51567
258.60684	-11.92069	261.17274	-8.95575	263.73865	-6.46419
258.66515	-11.84810	261.23106	-8.89388	263.79697	-6.41294
258.72347	-11.77575	261.28938	-8.83227	263.85528	-6.36192
258.78179	-11.70364	261.34769	-8.77090	263.91360	-6.31113
258.84010	-11.63176	261.40601	-8.70977	263.97192	-6.26058
258.89842	-11.56012	261.46432	-8.64890	264.03023	-6.21025
258.95673	-11.48872	261.52264	-8.58826	264.08855	-6.16016
259.01505	-11.41756	261.58096	-8.52788	264.14686	-6.11029
259.07337	-11.34664	261.63927	-8.46774	264.20518	-6.06066
259.13168	-11.27596	261.69759	-8.40785	264.26350	-6.01125
259.19000	-11.20551	261.75591	-8.34820	264.32181	-5.96207

264.38013	-5.91312	266.94604	-3.97524	269.51194	-2.42016
264.43844	-5.86440	267.00435	-3.93587	269.57026	-2.38878
264.49676	-5.81590	267.06267	-3.89671	269.62858	-2.35757
264.55508	-5.76763	267.12098	-3.85774	269.68689	-2.32653
264.61339	-5.71958	267.17930	-3.81896	269.74521	-2.29564
264.67171	-5.67176	267.23762	-3.78038	269.80352	-2.26492
264.73003	-5.62416	267.29593	-3.74200	269.86184	-2.23436
264.78834	-5.57679	267.35425	-3.70381	269.92016	-2.20396
264.84666	-5.52964	267.41256	-3.66581	269.97847	-2.17373
264.90497	-5.48271	267.47088	-3.62801	270.03679	-2.14365
264.96329	-5.43600	267.52920	-3.59039	270.09510	-2.11373
265.02161	-5.38952	267.58751	-3.55297	270.15342	-2.08398
265.07992	-5.34325	267.64583	-3.51573	270.21174	-2.05437
265.13824	-5.29721	267.70414	-3.47869	270.27005	-2.02493
265.19655	-5.25138	267.76246	-3.44183	270.32837	-1.99564
265.25487	-5.20577	267.82078	-3.40516	270.38668	-1.96651
265.31319	-5.16038	267.87909	-3.36868	270.44500	-1.93754
265.37150	-5.11521	267.93741	-3.33239	270.50332	-1.90871
265.42982	-5.07025	267.99573	-3.29628	270.56163	-1.88004
265.48813	-5.02551	268.05404	-3.26036	270.61995	-1.85153
265.54645	-4.98099	268.11236	-3.22461	270.67826	-1.82317
265.60477	-4.93668	268.17067	-3.18906	270.73658	-1.79495
265.66308	-4.89258	268.22899	-3.15368	270.79490	-1.76689
265.72140	-4.84870	268.28731	-3.11849	270.85321	-1.73898
265.77971	-4.80503	268.34562	-3.08348	270.91153	-1.71122
265.83803	-4.76157	268.40394	-3.04865	270.96985	-1.68361
265.89635	-4.71833	268.46225	-3.01400	271.02816	-1.65615
265.95466	-4.67529	268.52057	-2.97953	271.08648	-1.62883
266.01298	-4.63247	268.57889	-2.94523	271.14479	-1.60166
266.07129	-4.58985	268.63720	-2.91111	271.20311	-1.57463
266.12961	-4.54744	268.69552	-2.87717	271.26143	-1.54776
266.18793	-4.50524	268.75383	-2.84341	271.31974	-1.52102
266.24624	-4.46325	268.81215	-2.80982	271.37806	-1.49443
266.30456	-4.42146	268.87047	-2.77641	271.43637	-1.46799
266.36288	-4.37988	268.92878	-2.74317	271.49469	-1.44168
266.42119	-4.33850	268.98710	-2.71010	271.55301	-1.41552
266.47951	-4.29733	269.04541	-2.67721	271.61132	-1.38950
266.53782	-4.25637	269.10373	-2.64448	271.66964	-1.36362
266.59614	-4.21560	269.16205	-2.61193	271.72795	-1.33788
266.65446	-4.17504	269.22036	-2.57955	271.78627	-1.31228
266.71277	-4.13468	269.27868	-2.54733	271.84459	-1.28682
266.77109	-4.09452	269.33700	-2.51529	271.90290	-1.26150
266.82940	-4.05456	269.39531	-2.48341	271.96122	-1.23631
266.88772	-4.01480	269.45363	-2.45170	272.01953	-1.21126

272.07785	-1.18635	274.64376	-0.21562	277.20967	0.54165
272.13617	-1.16157	274.70207	-0.19621	277.26798	0.55671
272.19448	-1.13693	274.76039	-0.17691	277.32630	0.57168
272.25280	-1.11242	274.81871	-0.15771	277.38461	0.58656
272.31112	-1.08805	274.87702	-0.13863	277.44293	0.60135
272.36943	-1.06380	274.93534	-0.11965	277.50125	0.61605
272.42775	-1.03970	274.99365	-0.10078	277.55956	0.63067
272.48606	-1.01572	275.05197	-0.08201	277.61788	0.64520
272.54438	-0.99187	275.11029	-0.06336	277.67619	0.65965
272.60270	-0.96815	275.16860	-0.04480	277.73451	0.67400
272.66101	-0.94457	275.22692	-0.02636	277.79283	0.68828
272.71933	-0.92111	275.28523	-0.00801	277.85114	0.70246
272.77764	-0.89778	275.34355	0.01023	277.90946	0.71656
272.83596	-0.87458	275.40187	0.02836	277.96777	0.73058
272.89428	-0.85151	275.46018	0.04639	278.02609	0.74451
272.95259	-0.82856	275.51850	0.06432	278.08441	0.75836
273.01091	-0.80574	275.57682	0.08215	278.14272	0.77212
273.06922	-0.78305	275.63513	0.09987	278.20104	0.78580
273.12754	-0.76048	275.69345	0.11750	278.25935	0.79940
273.18586	-0.73803	275.75176	0.13502	278.31767	0.81292
273.24417	-0.71571	275.81008	0.15244	278.37599	0.82635
273.30249	-0.69351	275.86840	0.16976	278.43430	0.83970
273.36080	-0.67144	275.92671	0.18699	278.49262	0.85297
273.41912	-0.64948	275.98503	0.20411	278.55094	0.86616
273.47744	-0.62765	276.04334	0.22114	278.60925	0.87927
273.53575	-0.60594	276.10166	0.23806	278.66757	0.89230
273.59407	-0.58435	276.15998	0.25489	278.72588	0.90524
273.65238	-0.56288	276.21829	0.27163	278.78420	0.91811
273.71070	-0.54152	276.27661	0.28826	278.84252	0.93090
273.76902	-0.52029	276.33492	0.30480	278.90083	0.94361
273.82733	-0.49917	276.39324	0.32125	278.95915	0.95624
273.88565	-0.47817	276.45156	0.33759	279.01746	0.96879
273.94397	-0.45729	276.50987	0.35385	279.07578	0.98126
274.00228	-0.43653	276.56819	0.37001	279.13410	0.99366
274.06060	-0.41588	276.62650	0.38607	279.19241	1.00598
274.11891	-0.39534	276.68482	0.40204	279.25073	1.01822
274.17723	-0.37492	276.74314	0.41792	279.30904	1.03038
274.23555	-0.35462	276.80145	0.43371	279.36736	1.04247
274.29386	-0.33442	276.85977	0.44940	279.42568	1.05449
274.35218	-0.31435	276.91809	0.46500	279.48399	1.06642
274.41049	-0.29438	276.97640	0.48051	279.54231	1.07828
274.46881	-0.27452	277.03472	0.49593	279.60062	1.09007
274.52713	-0.25478	277.09303	0.51126	279.65894	1.10178
274.58544	-0.23515	277.15135	0.52650	279.71726	1.11342

279.77557	1.12498	282.34148	1.56448	284.90739	1.88279
279.83389	1.13647	282.39980	1.57299	284.96570	1.88876
279.89220	1.14788	282.45811	1.58143	285.02402	1.89467
279.95052	1.15922	282.51643	1.58981	285.08234	1.90054
280.00884	1.17049	282.57474	1.59813	285.14065	1.90635
280.06715	1.18168	282.63306	1.60639	285.19897	1.91210
280.12547	1.19281	282.69138	1.61459	285.25728	1.91781
280.18379	1.20386	282.74969	1.62273	285.31560	1.92346
280.24210	1.21484	282.80801	1.63080	285.37392	1.92906
280.30042	1.22574	282.86632	1.63882	285.43223	1.93461
280.35873	1.23658	282.92464	1.64677	285.49055	1.94010
280.41705	1.24734	282.98296	1.65467	285.54886	1.94555
280.47537	1.25804	283.04127	1.66250	285.60718	1.95094
280.53368	1.26866	283.09959	1.67028	285.66550	1.95628
280.59200	1.27921	283.15791	1.67799	285.72381	1.96157
280.65031	1.28970	283.21622	1.68565	285.78213	1.96681
280.70863	1.30011	283.27454	1.69325	285.84044	1.97200
280.76695	1.31045	283.33285	1.70079	285.89876	1.97714
280.82526	1.32073	283.39117	1.70827	285.95708	1.98222
280.88358	1.33094	283.44949	1.71569	286.01539	1.98726
280.94189	1.34107	283.50780	1.72305	286.07371	1.99225
281.00021	1.35114	283.56612	1.73035	286.13203	1.99718
281.05853	1.36114	283.62443	1.73760	286.19034	2.00207
281.11684	1.37108	283.68275	1.74479	286.24866	2.00691
281.17516	1.38094	283.74107	1.75192	286.30697	2.01169
281.23347	1.39074	283.79938	1.75900	286.36529	2.01643
281.29179	1.40048	283.85770	1.76601	286.42361	2.02112
281.35011	1.41014	283.91601	1.77297	286.48192	2.02576
281.40842	1.41974	283.97433	1.77988	286.54024	2.03035
281.46674	1.42927	284.03265	1.78672	286.59855	2.03489
281.52506	1.43874	284.09096	1.79352	286.65687	2.03939
281.58337	1.44814	284.14928	1.80025	286.71519	2.04383
281.64169	1.45747	284.20759	1.80693	286.77350	2.04823
281.70000	1.46675	284.26591	1.81355	286.83182	2.05258
281.75832	1.47595	284.32423	1.82012	286.89013	2.05688
281.81664	1.48509	284.38254	1.82663	286.94845	2.06113
281.87495	1.49417	284.44086	1.83309	287.00677	2.06534
281.93327	1.50318	284.49917	1.83949	287.06508	2.06949
281.99158	1.51213	284.55749	1.84584	287.12340	2.07360
282.04990	1.52101	284.61581	1.85213	287.18171	2.07767
282.10822	1.52983	284.67412	1.85837	287.24003	2.08168
282.16653	1.53859	284.73244	1.86456	287.29835	2.08565
282.22485	1.54728	284.79076	1.87069	287.35666	2.08958
282.28316	1.55591	284.84907	1.87676	287.41498	2.09345

287.47329	2.09728	290.03920	2.22215	292.60511	2.26992
287.53161	2.10107	290.09752	2.22405	292.66343	2.27020
287.58993	2.10480	290.15583	2.22591	292.72174	2.27045
287.64824	2.10850	290.21415	2.22772	292.78006	2.27067
287.70656	2.11214	290.27247	2.22950	292.83837	2.27085
287.76488	2.11574	290.33078	2.23124	292.89669	2.27100
287.82319	2.11930	290.38910	2.23294	292.95501	2.27112
287.88151	2.12281	290.44741	2.23460	293.01332	2.27120
287.93982	2.12627	290.50573	2.23622	293.07164	2.27125
287.99814	2.12969	290.56405	2.23780	293.12995	2.27127
288.05646	2.13306	290.62236	2.23935	293.18827	2.27126
288.11477	2.13639	290.68068	2.24085	293.24659	2.27121
288.17309	2.13968	290.73900	2.24232	293.30490	2.27113
288.23140	2.14292	290.79731	2.24375	293.36322	2.27102
288.28972	2.14612	290.85563	2.24514	293.42153	2.27088
288.34804	2.14927	290.91394	2.24650	293.47985	2.27070
288.40635	2.15238	290.97226	2.24781	293.53817	2.27050
288.46467	2.15544	291.03058	2.24909	293.59648	2.27026
288.52298	2.15846	291.08889	2.25033	293.65480	2.26999
288.58130	2.16144	291.14721	2.25154	293.71312	2.26969
288.63962	2.16437	291.20552	2.25270	293.77143	2.26936
288.69793	2.16727	291.26384	2.25383	293.82975	2.26900
288.75625	2.17011	291.32216	2.25493	293.88806	2.26860
288.81456	2.17292	291.38047	2.25598	293.94638	2.26818
288.87288	2.17568	291.43879	2.25700	294.00470	2.26772
288.93120	2.17840	291.49710	2.25799	294.06301	2.26724
288.98951	2.18108	291.55542	2.25893	294.12133	2.26672
289.04783	2.18371	291.61374	2.25984	294.17964	2.26618
289.10614	2.18630	291.67205	2.26072	294.23796	2.26560
289.16446	2.18885	291.73037	2.26156	294.29628	2.26500
289.22278	2.19136	291.78868	2.26236	294.35459	2.26436
289.28109	2.19383	291.84700	2.26313	294.41291	2.26370
289.33941	2.19625	291.90532	2.26386	294.47122	2.26300
289.39773	2.19864	291.96363	2.26455	294.52954	2.26228
289.45604	2.20098	292.02195	2.26522	294.58786	2.26153
289.51436	2.20328	292.08026	2.26584	294.64617	2.26074
289.57267	2.20554	292.13858	2.26643	294.70449	2.25993
289.63099	2.20776	292.19690	2.26699	294.76280	2.25909
289.68931	2.20993	292.25521	2.26751	294.82112	2.25823
289.74762	2.21207	292.31353	2.26800	294.87944	2.25733
289.80594	2.21417	292.37185	2.26845	294.93775	2.25640
289.86425	2.21622	292.43016	2.26887	294.99607	2.25545
289.92257	2.21824	292.48848	2.26925	295.05438	2.25447
289.98089	2.22022	292.54679	2.26961	295.11270	2.25346

295.17102	2.25242	297.73692	2.18124	300.30283	2.06779
295.22933	2.25136	297.79524	2.17909	300.36115	2.06481
295.28765	2.25026	297.85356	2.17692	300.41946	2.06181
295.34597	2.24914	297.91187	2.17472	300.47778	2.05880
295.40428	2.24800	297.97019	2.17251	300.53610	2.05577
295.46260	2.24682	298.02850	2.17027	300.59441	2.05272
295.52091	2.24562	298.08682	2.16801	300.65273	2.04966
295.57923	2.24439	298.14514	2.16573	300.71104	2.04659
295.63755	2.24314	298.20345	2.16343	300.76936	2.04350
295.69586	2.24185	298.26177	2.16111	300.82768	2.04039
295.75418	2.24055	298.32009	2.15877	300.88599	2.03727
295.81249	2.23921	298.37840	2.15641	300.94431	2.03413
295.87081	2.23785	298.43672	2.15402	301.00262	2.03098
295.92913	2.23646	298.49503	2.15162	301.06094	2.02781
295.98744	2.23505	298.55335	2.14920	301.11926	2.02463
296.04576	2.23361	298.61167	2.14675	301.17757	2.02144
296.10407	2.23214	298.66998	2.14429	301.23589	2.01823
296.16239	2.23065	298.72830	2.14181	301.29420	2.01501
296.22071	2.22914	298.78661	2.13930	301.35252	2.01177
296.27902	2.22760	298.84493	2.13678	301.41084	2.00852
296.33734	2.22603	298.90325	2.13424	301.46915	2.00525
296.39565	2.22444	298.96156	2.13168	301.52747	2.00198
296.45397	2.22282	299.01988	2.12910	301.58579	1.99868
296.51229	2.22118	299.07819	2.12650	301.64410	1.99538
296.57060	2.21952	299.13651	2.12389	301.70242	1.99206
296.62892	2.21783	299.19483	2.12125	301.76073	1.98873
296.68723	2.21611	299.25314	2.11860	301.81905	1.98539
296.74555	2.21437	299.31146	2.11592	301.87737	1.98203
296.80387	2.21261	299.36977	2.11323	301.93568	1.97866
296.86218	2.21083	299.42809	2.11052	301.99400	1.97527
296.92050	2.20902	299.48641	2.10780	302.05231	1.97188
296.97882	2.20718	299.54472	2.10505	302.11063	1.96847
297.03713	2.20532	299.60304	2.10229	302.16895	1.96505
297.09545	2.20344	299.66135	2.09951	302.22726	1.96162
297.15376	2.20154	299.71967	2.09671	302.28558	1.95817
297.21208	2.19961	299.77799	2.09389	302.34389	1.95472
297.27040	2.19766	299.83630	2.09106	302.40221	1.95125
297.32871	2.19569	299.89462	2.08821	302.46053	1.94777
297.38703	2.19369	299.95294	2.08534	302.51884	1.94428
297.44534	2.19167	300.01125	2.08246	302.57716	1.94078
297.50366	2.18963	300.06957	2.07956	302.63547	1.93726
297.56198	2.18757	300.12788	2.07664	302.69379	1.93374
297.62029	2.18548	300.18620	2.07371	302.75211	1.93020
297.67861	2.18337	300.24452	2.07076	302.81042	1.92665

302.86874	1.92309	305.43465	1.75748	308.00055	1.58026
302.92706	1.91953	305.49296	1.75355	308.05887	1.57616
302.98537	1.91595	305.55128	1.74961	308.11719	1.57206
303.04369	1.91236	305.60959	1.74566	308.17550	1.56796
303.10200	1.90875	305.66791	1.74171	308.23382	1.56386
303.16032	1.90514	305.72623	1.73776	308.29213	1.55976
303.21864	1.90152	305.78454	1.73380	308.35045	1.55566
303.27695	1.89789	305.84286	1.72984	308.40877	1.55155
303.33527	1.89425	305.90117	1.72586	308.46708	1.54744
303.39358	1.89060	305.95949	1.72189	308.52540	1.54334
303.45190	1.88694	306.01781	1.71791	308.58371	1.53923
303.51022	1.88327	306.07612	1.71392	308.64203	1.53512
303.56853	1.87959	306.13444	1.70993	308.70035	1.53101
303.62685	1.87590	306.19276	1.70594	308.75866	1.52689
303.68516	1.87220	306.25107	1.70194	308.81698	1.52278
303.74348	1.86849	306.30939	1.69793	308.87529	1.51867
303.80180	1.86478	306.36770	1.69392	308.93361	1.51456
303.86011	1.86105	306.42602	1.68991	308.99193	1.51044
303.91843	1.85732	306.48434	1.68589	309.05024	1.50633
303.97674	1.85357	306.54265	1.68187	309.10856	1.50221
304.03506	1.84982	306.60097	1.67785	309.16688	1.49810
304.09338	1.84606	306.65928	1.67382	309.22519	1.49399
304.15169	1.84229	306.71760	1.66978	309.28351	1.48987
304.21001	1.83851	306.77592	1.66575	309.34182	1.48576
304.26832	1.83473	306.83423	1.66171	309.40014	1.48164
304.32664	1.83094	306.89255	1.65766	309.45846	1.47753
304.38496	1.82713	306.95086	1.65361	309.51677	1.47341
304.44327	1.82333	307.00918	1.64956	309.57509	1.46930
304.50159	1.81951	307.06750	1.64551	309.63340	1.46519
304.55991	1.81568	307.12581	1.64145	309.69172	1.46107
304.61822	1.81185	307.18413	1.63739	309.75004	1.45696
304.67654	1.80801	307.24244	1.63332	309.80835	1.45285
304.73485	1.80417	307.30076	1.62926	309.86667	1.44874
304.79317	1.80031	307.35908	1.62519	309.92498	1.44463
304.85149	1.79645	307.41739	1.62112	309.98330	1.44052
304.90980	1.79258	307.47571	1.61704	310.04162	1.43641
304.96812	1.78871	307.53403	1.61296	310.09993	1.43230
305.02643	1.78483	307.59234	1.60888	310.15825	1.42820
305.08475	1.78094	307.65066	1.60480	310.21656	1.42409
305.14307	1.77705	307.70897	1.60072	310.27488	1.41999
305.20138	1.77314	307.76729	1.59663	310.33320	1.41589
305.25970	1.76924	307.82561	1.59254	310.39151	1.41178
305.31801	1.76532	307.88392	1.58845	310.44983	1.40768
305.37633	1.76140	307.94224	1.58435	310.50814	1.40359

310.56646	1.39949	313.13237	1.22178	315.69828	1.05227
310.62478	1.39539	313.19068	1.21782	315.75659	1.04855
310.68309	1.39130	313.24900	1.21387	315.81491	1.04483
310.74141	1.38721	313.30732	1.20992	315.87322	1.04111
310.79973	1.38312	313.36563	1.20597	315.93154	1.03741
310.85804	1.37903	313.42395	1.20203	315.98986	1.03371
310.91636	1.37495	313.48226	1.19809	316.04817	1.03001
310.97467	1.37086	313.54058	1.19415	316.10649	1.02632
311.03299	1.36678	313.59890	1.19023	316.16480	1.02264
311.09131	1.36270	313.65721	1.18630	316.22312	1.01897
311.14962	1.35862	313.71553	1.18238	316.28144	1.01530
311.20794	1.35455	313.77385	1.17847	316.33975	1.01164
311.26625	1.35048	313.83216	1.17456	316.39807	1.00798
311.32457	1.34641	313.89048	1.17065	316.45638	1.00433
311.38289	1.34234	313.94879	1.16675	316.51470	1.00069
311.44120	1.33828	314.00711	1.16286	316.57302	0.99706
311.49952	1.33421	314.06543	1.15897	316.63133	0.99343
311.55783	1.33015	314.12374	1.15508	316.68965	0.98980
311.61615	1.32610	314.18206	1.15121	316.74797	0.98619
311.67447	1.32204	314.24037	1.14733	316.80628	0.98258
311.73278	1.31799	314.29869	1.14346	316.86460	0.97898
311.79110	1.31394	314.35701	1.13960	316.92291	0.97538
311.84941	1.30990	314.41532	1.13574	316.98123	0.97180
311.90773	1.30586	314.47364	1.13189	317.03955	0.96822
311.96605	1.30182	314.53195	1.12804	317.09786	0.96464
312.02436	1.29778	314.59027	1.12419	317.15618	0.96107
312.08268	1.29375	314.64859	1.12036	317.21449	0.95751
312.14100	1.28972	314.70690	1.11653	317.27281	0.95396
312.19931	1.28569	314.76522	1.11270	317.33113	0.95041
312.25763	1.28167	314.82353	1.10888	317.38944	0.94688
312.31594	1.27765	314.88185	1.10506	317.44776	0.94334
312.37426	1.27364	314.94017	1.10126	317.50607	0.93982
312.43258	1.26962	314.99848	1.09745	317.56439	0.93630
312.49089	1.26562	315.05680	1.09365	317.62271	0.93279
312.54921	1.26161	315.11512	1.08986	317.68102	0.92929
312.60752	1.25761	315.17343	1.08608	317.73934	0.92579
312.66584	1.25361	315.23175	1.08230	317.79765	0.92230
312.72416	1.24962	315.29006	1.07852	317.85597	0.91882
312.78247	1.24563	315.34838	1.07475	317.91429	0.91535
312.84079	1.24165	315.40670	1.07099	317.97260	0.91188
312.89910	1.23767	315.46501	1.06724	318.03092	0.90842
312.95742	1.23369	315.52333	1.06349	318.08923	0.90497
313.01574	1.22972	315.58164	1.05974	318.14755	0.90152
313.07405	1.22575	315.63996	1.05600	318.20587	0.89808

318.26418	0.89465	320.83009	0.75131	323.39600	0.62351
318.32250	0.89123	320.88841	0.74823	323.45431	0.62079
318.38082	0.88781	320.94672	0.74516	323.51263	0.61808
318.43913	0.88441	321.00504	0.74210	323.57095	0.61538
318.49745	0.88100	321.06335	0.73904	323.62926	0.61268
318.55576	0.87761	321.12167	0.73599	323.68758	0.60999
318.61408	0.87423	321.17999	0.73296	323.74589	0.60732
318.67240	0.87085	321.23830	0.72992	323.80421	0.60465
318.73071	0.86748	321.29662	0.72690	323.86253	0.60198
318.78903	0.86411	321.35494	0.72389	323.92084	0.59933
318.84734	0.86076	321.41325	0.72088	323.97916	0.59668
318.90566	0.85741	321.47157	0.71788	324.03747	0.59405
318.96398	0.85407	321.52988	0.71489	324.09579	0.59142
319.02229	0.85074	321.58820	0.71191	324.15411	0.58879
319.08061	0.84741	321.64652	0.70893	324.21242	0.58618
319.13892	0.84410	321.70483	0.70597	324.27074	0.58358
319.19724	0.84079	321.76315	0.70301	324.32906	0.58098
319.25556	0.83749	321.82146	0.70006	324.38737	0.57839
319.31387	0.83419	321.87978	0.69712	324.44569	0.57581
319.37219	0.83091	321.93810	0.69418	324.50400	0.57324
319.43050	0.82763	321.99641	0.69126	324.56232	0.57067
319.48882	0.82436	322.05473	0.68834	324.62064	0.56812
319.54714	0.82110	322.11304	0.68543	324.67895	0.56557
319.60545	0.81784	322.17136	0.68253	324.73727	0.56303
319.66377	0.81459	322.22968	0.67964	324.79558	0.56050
319.72209	0.81135	322.28799	0.67675	324.85390	0.55798
319.78040	0.80812	322.34631	0.67388	324.91222	0.55546
319.83872	0.80490	322.40462	0.67101	324.97053	0.55296
319.89703	0.80168	322.46294	0.66815	325.02885	0.55046
319.95535	0.79848	322.52126	0.66530	325.08716	0.54797
320.01367	0.79528	322.57957	0.66245	325.14548	0.54548
320.07198	0.79208	322.63789	0.65962	325.20380	0.54301
320.13030	0.78890	322.69620	0.65679	325.26211	0.54054
320.18861	0.78572	322.75452	0.65397	325.32043	0.53808
320.24693	0.78256	322.81284	0.65116	325.37874	0.53563
320.30525	0.77939	322.87115	0.64836	325.43706	0.53319
320.36356	0.77624	322.92947	0.64557	325.49538	0.53076
320.42188	0.77310	322.98779	0.64278	325.55369	0.52833
320.48019	0.76996	323.04610	0.64000	325.61201	0.52591
320.53851	0.76683	323.10442	0.63723	325.67032	0.52351
320.59683	0.76371	323.16273	0.63447	325.72864	0.52110
320.65514	0.76060	323.22105	0.63172	325.78696	0.51871
320.71346	0.75750	323.27937	0.62898	325.84527	0.51632
320.77177	0.75440	323.33768	0.62624	325.90359	0.51395

325.96191	0.51158	328.52781	0.41513	331.09372	0.33326
326.02022	0.50922	328.58613	0.41311	331.15204	0.33156
326.07854	0.50686	328.64444	0.41110	331.21035	0.32987
326.13685	0.50452	328.70276	0.40909	331.26867	0.32818
326.19517	0.50218	328.76108	0.40710	331.32698	0.32650
326.25349	0.49985	328.81939	0.40511	331.38530	0.32483
326.31180	0.49753	328.87771	0.40313	331.44362	0.32316
326.37012	0.49522	328.93603	0.40116	331.50193	0.32150
326.42843	0.49291	328.99434	0.39919	331.56025	0.31985
326.48675	0.49061	329.05266	0.39723	331.61856	0.31820
326.54507	0.48832	329.11097	0.39528	331.67688	0.31656
326.60338	0.48604	329.16929	0.39334	331.73520	0.31493
326.66170	0.48377	329.22761	0.39140	331.79351	0.31331
326.72001	0.48150	329.28592	0.38947	331.85183	0.31169
326.77833	0.47924	329.34424	0.38755	331.91014	0.31007
326.83665	0.47699	329.40255	0.38564	331.96846	0.30847
326.89496	0.47475	329.46087	0.38373	332.02678	0.30687
326.95328	0.47252	329.51919	0.38183	332.08509	0.30528
327.01159	0.47029	329.57750	0.37994	332.14341	0.30369
327.06991	0.46807	329.63582	0.37805	332.20173	0.30211
327.12823	0.46586	329.69413	0.37617	332.26004	0.30054
327.18654	0.46366	329.75245	0.37430	332.31836	0.29898
327.24486	0.46146	329.81077	0.37244	332.37667	0.29742
327.30317	0.45928	329.86908	0.37059	332.43499	0.29586
327.36149	0.45710	329.92740	0.36874	332.49331	0.29432
327.41981	0.45492	329.98571	0.36690	332.55162	0.29278
327.47812	0.45276	330.04403	0.36506	332.60994	0.29125
327.53644	0.45060	330.10235	0.36323	332.66825	0.28972
327.59476	0.44846	330.16066	0.36141	332.72657	0.28820
327.65307	0.44632	330.21898	0.35960	332.78489	0.28668
327.71139	0.44418	330.27729	0.35780	332.84320	0.28518
327.76970	0.44206	330.33561	0.35600	332.90152	0.28368
327.82802	0.43994	330.39393	0.35421	332.95983	0.28218
327.88634	0.43783	330.45224	0.35242	333.01815	0.28069
327.94465	0.43573	330.51056	0.35064	333.07647	0.27921
328.00297	0.43363	330.56888	0.34887	333.13478	0.27774
328.06128	0.43155	330.62719	0.34711	333.19310	0.27627
328.11960	0.42947	330.68551	0.34536	333.25141	0.27480
328.17792	0.42740	330.74382	0.34361	333.30973	0.27335
328.23623	0.42533	330.80214	0.34186	333.36805	0.27190
328.29455	0.42328	330.86046	0.34013	333.42636	0.27045
328.35286	0.42123	330.91877	0.33840	333.48468	0.26902
328.41118	0.41919	330.97709	0.33668	333.54300	0.26758
328.46950	0.41715	331.03540	0.33497	333.60131	0.26616

333.65963	0.26474	336.22553	0.20814	338.79144	0.16197
333.71794	0.26333	336.28385	0.20698	338.84976	0.16103
333.77626	0.26192	336.34217	0.20583	338.90807	0.16010
333.83458	0.26052	336.40048	0.20468	338.96639	0.15917
333.89289	0.25912	336.45880	0.20354	339.02471	0.15824
333.95121	0.25773	336.51712	0.20240	339.08302	0.15732
334.00952	0.25635	336.57543	0.20127	339.14134	0.15640
334.06784	0.25498	336.63375	0.20014	339.19965	0.15549
334.12616	0.25361	336.69206	0.19902	339.25797	0.15458
334.18447	0.25224	336.75038	0.19790	339.31629	0.15368
334.24279	0.25088	336.80870	0.19679	339.37460	0.15278
334.30110	0.24953	336.86701	0.19568	339.43292	0.15189
334.35942	0.24818	336.92533	0.19458	339.49123	0.15100
334.41774	0.24684	336.98364	0.19348	339.54955	0.15011
334.47605	0.24551	337.04196	0.19239	339.60787	0.14923
334.53437	0.24418	337.10028	0.19131	339.66618	0.14835
334.59268	0.24286	337.15859	0.19023	339.72450	0.14748
334.65100	0.24154	337.21691	0.18915	339.78282	0.14661
334.70932	0.24023	337.27522	0.18808	339.84113	0.14575
334.76763	0.23892	337.33354	0.18701	339.89945	0.14489
334.82595	0.23762	337.39186	0.18595	339.95776	0.14403
334.88426	0.23633	337.45017	0.18490	340.01608	0.14318
334.94258	0.23504	337.50849	0.18385	340.07440	0.14234
335.00090	0.23376	337.56680	0.18280	340.13271	0.14150
335.05921	0.23249	337.62512	0.18176	340.19103	0.14066
335.11753	0.23121	337.68344	0.18073	340.24934	0.13982
335.17585	0.22995	337.74175	0.17970	340.30766	0.13899
335.23416	0.22869	337.80007	0.17867	340.36598	0.13817
335.29248	0.22744	337.85838	0.17765	340.42429	0.13735
335.35079	0.22619	337.91670	0.17663	340.48261	0.13653
335.40911	0.22495	337.97502	0.17562	340.54092	0.13572
335.46743	0.22371	338.03333	0.17462	340.59924	0.13491
335.52574	0.22248	338.09165	0.17362	340.65756	0.13410
335.58406	0.22126	338.14997	0.17262	340.71587	0.13330
335.64237	0.22004	338.20828	0.17163	340.77419	0.13251
335.70069	0.21882	338.26660	0.17064	340.83250	0.13171
335.75901	0.21761	338.32491	0.16966	340.89082	0.13092
335.81732	0.21641	338.38323	0.16868	340.94914	0.13014
335.87564	0.21521	338.44155	0.16771	341.00745	0.12936
335.93395	0.21402	338.49986	0.16674	341.06577	0.12858
335.99227	0.21283	338.55818	0.16578	341.12409	0.12781
336.05059	0.21165	338.61649	0.16482	341.18240	0.12704
336.10890	0.21048	338.67481	0.16387	341.24072	0.12628
336.16722	0.20931	338.73313	0.16292	341.29903	0.12552

341.35735	0.12476	341.88219	0.11812	342.40704	0.11179
341.41567	0.12401	341.94051	0.11740	342.46535	0.11110
341.47398	0.12326	341.99883	0.11669	342.52367	0.11042
341.53230	0.12251	342.05714	0.11598	342.58199	0.10974
341.59061	0.12177	342.11546	0.11527	342.64030	0.10907
341.64893	0.12103	342.17377	0.11457	342.69862	0.10840
341.70725	0.12030	342.23209	0.11387		
341.76556	0.11957	342.29041	0.11317		
341.82388	0.11884	342.34872	0.11248		

Calculation for 3x

169.03060	0.00003	171.45997	0.00017	173.88934	0.00086
169.08844	0.00003	171.51781	0.00018	173.94718	0.00089
169.14628	0.00003	171.57565	0.00019	174.00502	0.00093
169.20412	0.00003	171.63349	0.00020	174.06287	0.00096
169.26196	0.00004	171.69134	0.00020	174.12071	0.00099
169.31981	0.00004	171.74918	0.00021	174.17855	0.00103
169.37765	0.00004	171.80702	0.00022	174.23639	0.00107
169.43549	0.00004	171.86486	0.00023	174.29424	0.00111
169.49333	0.00004	171.92271	0.00024	174.35208	0.00115
169.55118	0.00004	171.98055	0.00025	174.40992	0.00119
169.60902	0.00005	172.03839	0.00026	174.46776	0.00123
169.66686	0.00005	172.09623	0.00027	174.52560	0.00127
169.72470	0.00005	172.15407	0.00028	174.58345	0.00132
169.78254	0.00005	172.21192	0.00029	174.64129	0.00136
169.84039	0.00005	172.26976	0.00030	174.69913	0.00141
169.89823	0.00006	172.32760	0.00032	174.75697	0.00146
169.95607	0.00006	172.38544	0.00033	174.81482	0.00151
170.01391	0.00006	172.44329	0.00034	174.87266	0.00157
170.07176	0.00006	172.50113	0.00035	174.93050	0.00162
170.12960	0.00007	172.55897	0.00037	174.98834	0.00168
170.18744	0.00007	172.61681	0.00038	175.04618	0.00174
170.24528	0.00007	172.67465	0.00040	175.10403	0.00180
170.30312	0.00008	172.73250	0.00041	175.16187	0.00186
170.36097	0.00008	172.79034	0.00043	175.21971	0.00192
170.41881	0.00008	172.84818	0.00044	175.27755	0.00199
170.47665	0.00009	172.90602	0.00046	175.33540	0.00206
170.53449	0.00009	172.96387	0.00048	175.39324	0.00213
170.59233	0.00009	173.02171	0.00050	175.45108	0.00220
170.65018	0.00010	173.07955	0.00052	175.50892	0.00228
170.70802	0.00010	173.13739	0.00054	175.56676	0.00235
170.76586	0.00011	173.19523	0.00056	175.62461	0.00243
170.82370	0.00011	173.25308	0.00058	175.68245	0.00251
170.88155	0.00012	173.31092	0.00060	175.74029	0.00260
170.93939	0.00012	173.36876	0.00062	175.79813	0.00269
170.99723	0.00013	173.42660	0.00064	175.85598	0.00278
171.05507	0.00013	173.48444	0.00067	175.91382	0.00287
171.11291	0.00014	173.54229	0.00069	175.97166	0.00296
171.17076	0.00014	173.60013	0.00072	176.02950	0.00306
171.22860	0.00015	173.65797	0.00075	176.08734	0.00316
171.28644	0.00015	173.71581	0.00077	176.14519	0.00327
171.34428	0.00016	173.77366	0.00080	176.20303	0.00338
171.40213	0.00017	173.83150	0.00083	176.26087	0.00349

176.31871	0.00360	178.86377	0.01372	181.40883	0.04494
176.37655	0.00372	178.92161	0.01412	181.46667	0.04609
176.43440	0.00384	178.97945	0.01453	181.52451	0.04727
176.49224	0.00397	179.03730	0.01494	181.58235	0.04847
176.55008	0.00409	179.09514	0.01537	181.64020	0.04971
176.60792	0.00423	179.15298	0.01582	181.69804	0.05097
176.66577	0.00436	179.21082	0.01627	181.75588	0.05226
176.72361	0.00450	179.26867	0.01673	181.81372	0.05357
176.78145	0.00465	179.32651	0.01721	181.87156	0.05492
176.83929	0.00480	179.38435	0.01770	181.92941	0.05630
176.89713	0.00495	179.44219	0.01820	181.98725	0.05771
176.95498	0.00511	179.50003	0.01871	182.04509	0.05915
177.01282	0.00527	179.55788	0.01924	182.10293	0.06062
177.07066	0.00544	179.61572	0.01977	182.16078	0.06212
177.12850	0.00561	179.67356	0.02033	182.21862	0.06366
177.18635	0.00579	179.73140	0.02089	182.27646	0.06523
177.24419	0.00597	179.78924	0.02148	182.33430	0.06683
177.30203	0.00615	179.84709	0.02207	182.39214	0.06847
177.35987	0.00635	179.90493	0.02268	182.44999	0.07014
177.41771	0.00654	179.96277	0.02331	182.50783	0.07185
177.47556	0.00675	180.02061	0.02395	182.56567	0.07360
177.53340	0.00696	180.07846	0.02461	182.62351	0.07538
177.59124	0.00717	180.13630	0.02528	182.68135	0.07721
177.64908	0.00739	180.19414	0.02597	182.73920	0.07907
177.70693	0.00762	180.25198	0.02668	182.79704	0.08097
177.76477	0.00785	180.30982	0.02740	182.85488	0.08291
177.82261	0.00809	180.36767	0.02814	182.91272	0.08489
177.88045	0.00834	180.42551	0.02890	182.97057	0.08691
177.93829	0.00859	180.48335	0.02968	183.02841	0.08898
177.99614	0.00885	180.54119	0.03047	183.08625	0.09109
178.05398	0.00912	180.59904	0.03129	183.14409	0.09324
178.11182	0.00939	180.65688	0.03212	183.20193	0.09544
178.16966	0.00968	180.71472	0.03298	183.25978	0.09768
178.22751	0.00997	180.77256	0.03385	183.31762	0.09997
178.28535	0.01026	180.83040	0.03475	183.37546	0.10231
178.34319	0.01057	180.88825	0.03566	183.43330	0.10469
178.40103	0.01088	180.94609	0.03660	183.49115	0.10712
178.45887	0.01121	181.00393	0.03756	183.54899	0.10961
178.51672	0.01154	181.06177	0.03854	183.60683	0.11214
178.57456	0.01188	181.11962	0.03955	183.66467	0.11472
178.63240	0.01223	181.17746	0.04058	183.72251	0.11736
178.69024	0.01259	181.23530	0.04163	183.78036	0.12005
178.74809	0.01295	181.29314	0.04271	183.83820	0.12279
178.80593	0.01333	181.35098	0.04381	183.89604	0.12559

183.95388	0.12844	186.49894	0.32497	189.04400	0.73809
184.01173	0.13135	186.55678	0.33147	189.10184	0.75111
184.06957	0.13431	186.61462	0.33808	189.15968	0.76433
184.12741	0.13734	186.67247	0.34480	189.21752	0.77774
184.18525	0.14042	186.73031	0.35163	189.27537	0.79135
184.24309	0.14357	186.78815	0.35858	189.33321	0.80516
184.30094	0.14677	186.84599	0.36565	189.39105	0.81917
184.35878	0.15004	186.90384	0.37283	189.44889	0.83338
184.41662	0.15337	186.96168	0.38014	189.50673	0.84780
184.47446	0.15677	187.01952	0.38756	189.56458	0.86243
184.53231	0.16023	187.07736	0.39512	189.62242	0.87726
184.59015	0.16376	187.13520	0.40279	189.68026	0.89231
184.64799	0.16735	187.19305	0.41060	189.73810	0.90758
184.70583	0.17102	187.25089	0.41853	189.79595	0.92306
184.76367	0.17475	187.30873	0.42659	189.85379	0.93877
184.82152	0.17856	187.36657	0.43479	189.91163	0.95469
184.87936	0.18243	187.42442	0.44311	189.96947	0.97084
184.93720	0.18638	187.48226	0.45158	190.02731	0.98722
184.99504	0.19040	187.54010	0.46018	190.08516	1.00383
185.05289	0.19450	187.59794	0.46892	190.14300	1.02067
185.11073	0.19867	187.65578	0.47780	190.20084	1.03774
185.16857	0.20293	187.71363	0.48682	190.25868	1.05505
185.22641	0.20726	187.77147	0.49599	190.31653	1.07260
185.28425	0.21167	187.82931	0.50531	190.37437	1.09039
185.34210	0.21616	187.88715	0.51477	190.43221	1.10843
185.39994	0.22073	187.94500	0.52438	190.49005	1.12671
185.45778	0.22539	188.00284	0.53415	190.54789	1.14524
185.51562	0.23013	188.06068	0.54406	190.60574	1.16403
185.57346	0.23496	188.11852	0.55414	190.66358	1.18306
185.63131	0.23987	188.17636	0.56437	190.72142	1.20236
185.68915	0.24487	188.23421	0.57476	190.77926	1.22192
185.74699	0.24997	188.29205	0.58531	190.83711	1.24173
185.80483	0.25515	188.34989	0.59602	190.89495	1.26182
185.86268	0.26043	188.40773	0.60691	190.95279	1.28217
185.92052	0.26580	188.46557	0.61795	191.01063	1.30279
185.97836	0.27127	188.52342	0.62917	191.06847	1.32368
186.03620	0.27683	188.58126	0.64056	191.12632	1.34485
186.09404	0.28249	188.63910	0.65212	191.18416	1.36630
186.15189	0.28825	188.69694	0.66386	191.24200	1.38803
186.20973	0.29411	188.75479	0.67577	191.29984	1.41004
186.26757	0.30007	188.81263	0.68787	191.35768	1.43234
186.32541	0.30614	188.87047	0.70014	191.41553	1.45493
186.38326	0.31231	188.92831	0.71260	191.47337	1.47781
186.44110	0.31859	188.98615	0.72525	191.53121	1.50099

191.58905	1.52446	194.13411	2.89622	196.67917	5.10713
191.64690	1.54823	194.19195	2.93615	196.73701	5.16919
191.70474	1.57231	194.24979	2.97651	196.79485	5.23183
191.76258	1.59669	194.30764	3.01731	196.85269	5.29503
191.82042	1.62139	194.36548	3.05855	196.91054	5.35882
191.87826	1.64639	194.42332	3.10024	196.96838	5.42318
191.93611	1.67171	194.48116	3.14237	197.02622	5.48812
191.99395	1.69734	194.53901	3.18496	197.08406	5.55365
192.05179	1.72330	194.59685	3.22801	197.14190	5.61976
192.10963	1.74958	194.65469	3.27151	197.19975	5.68646
192.16748	1.77619	194.71253	3.31547	197.25759	5.75376
192.22532	1.80312	194.77037	3.35990	197.31543	5.82164
192.28316	1.83039	194.82822	3.40480	197.37327	5.89013
192.34100	1.85799	194.88606	3.45017	197.43112	5.95921
192.39884	1.88593	194.94390	3.49601	197.48896	6.02890
192.45669	1.91421	195.00174	3.54233	197.54680	6.09919
192.51453	1.94283	195.05959	3.58913	197.60464	6.17009
192.57237	1.97180	195.11743	3.63641	197.66248	6.24159
192.63021	2.00112	195.17527	3.68418	197.72033	6.31371
192.68806	2.03080	195.23311	3.73244	197.77817	6.38644
192.74590	2.06083	195.29095	3.78120	197.83601	6.45979
192.80374	2.09121	195.34880	3.83045	197.89385	6.53375
192.86158	2.12196	195.40664	3.88019	197.95170	6.60834
192.91942	2.15308	195.46448	3.93045	198.00954	6.68355
192.97727	2.18456	195.52232	3.98120	198.06738	6.75938
193.03511	2.21642	195.58017	4.03247	198.12522	6.83584
193.09295	2.24864	195.63801	4.08424	198.18306	6.91293
193.15079	2.28125	195.69585	4.13653	198.24091	6.99065
193.20864	2.31423	195.75369	4.18934	198.29875	7.06901
193.26648	2.34760	195.81153	4.24267	198.35659	7.14800
193.32432	2.38136	195.86938	4.29653	198.41443	7.22762
193.38216	2.41550	195.92722	4.35091	198.47228	7.30789
193.44000	2.45004	195.98506	4.40581	198.53012	7.38879
193.49785	2.48497	196.04290	4.46126	198.58796	7.47034
193.55569	2.52030	196.10075	4.51724	198.64580	7.55253
193.61353	2.55603	196.15859	4.57375	198.70364	7.63537
193.67137	2.59217	196.21643	4.63081	198.76149	7.71886
193.72922	2.62871	196.27427	4.68841	198.81933	7.80299
193.78706	2.66567	196.33211	4.74656	198.87717	7.88778
193.84490	2.70304	196.38996	4.80527	198.93501	7.97322
193.90274	2.74083	196.44780	4.86452	198.99286	8.05931
193.96058	2.77904	196.50564	4.92433	199.05070	8.14605
194.01843	2.81767	196.56348	4.98470	199.10854	8.23346
194.07627	2.85673	196.62133	5.04563	199.16638	8.32152

199.22422	8.41024	201.76928	12.97431	204.31434	18.75960
199.28207	8.49962	201.82712	13.09295	204.37218	18.90306
199.33991	8.58966	201.88497	13.21223	204.43002	19.04697
199.39775	8.68036	201.94281	13.33214	204.48786	19.19132
199.45559	8.77173	202.00065	13.45270	204.54571	19.33610
199.51344	8.86376	202.05849	13.57390	204.60355	19.48131
199.57128	8.95646	202.11633	13.69573	204.66139	19.62693
199.62912	9.04982	202.17418	13.81819	204.71923	19.77296
199.68696	9.14385	202.23202	13.94128	204.77708	19.91939
199.74480	9.23855	202.28986	14.06500	204.83492	20.06621
199.80265	9.33392	202.34770	14.18933	204.89276	20.21342
199.86049	9.42995	202.40555	14.31429	204.95060	20.36100
199.91833	9.52666	202.46339	14.43987	205.00844	20.50896
199.97617	9.62403	202.52123	14.56606	205.06629	20.65727
200.03401	9.72208	202.57907	14.69286	205.12413	20.80594
200.09186	9.82079	202.63691	14.82026	205.18197	20.95495
200.14970	9.92018	202.69476	14.94827	205.23981	21.10430
200.20754	10.02024	202.75260	15.07688	205.29766	21.25397
200.26538	10.12097	202.81044	15.20608	205.35550	21.40396
200.32323	10.22237	202.86828	15.33588	205.41334	21.55426
200.38107	10.32444	202.92612	15.46627	205.47118	21.70486
200.43891	10.42719	202.98397	15.59723	205.52902	21.85575
200.49675	10.53060	203.04181	15.72878	205.58687	22.00692
200.55459	10.63469	203.09965	15.86090	205.64471	22.15837
200.61244	10.73945	203.15749	15.99360	205.70255	22.31007
200.67028	10.84487	203.21534	16.12686	205.76039	22.46203
200.72812	10.95097	203.27318	16.26068	205.81823	22.61423
200.78596	11.05774	203.33102	16.39506	205.87608	22.76666
200.84381	11.16518	203.38886	16.52999	205.93392	22.91931
200.90165	11.27328	203.44670	16.66547	205.99176	23.07218
200.95949	11.38205	203.50455	16.80149	206.04960	23.22524
201.01733	11.49149	203.56239	16.93805	206.10745	23.37850
201.07517	11.60159	203.62023	17.07514	206.16529	23.53194
201.13302	11.71236	203.67807	17.21276	206.22313	23.68555
201.19086	11.82379	203.73592	17.35089	206.28097	23.83932
201.24870	11.93589	203.79376	17.48954	206.33881	23.99324
201.30654	12.04865	203.85160	17.62870	206.39666	24.14729
201.36439	12.16206	203.90944	17.76837	206.45450	24.30147
201.42223	12.27613	203.96728	17.90853	206.51234	24.45577
201.48007	12.39087	204.02513	18.04918	206.57018	24.61017
201.53791	12.50625	204.08297	18.19032	206.62803	24.76466
201.59575	12.62229	204.14081	18.33194	206.68587	24.91923
201.65360	12.73898	204.19865	18.47403	206.74371	25.07387
201.71144	12.85632	204.25650	18.61658	206.80155	25.22857

206.85939	25.38331	209.40445	32.03660	211.94951	37.52246
206.91724	25.53809	209.46229	32.17935	212.00735	37.62270
206.97508	25.69288	209.52014	32.32150	212.06519	37.72160
207.03292	25.84769	209.57798	32.46301	212.12303	37.81915
207.09076	26.00249	209.63582	32.60389	212.18088	37.91531
207.14861	26.15727	209.69366	32.74410	212.23872	38.01009
207.20645	26.31203	209.75150	32.88364	212.29656	38.10345
207.26429	26.46674	209.80935	33.02249	212.35440	38.19539
207.32213	26.62140	209.86719	33.16064	212.41225	38.28589
207.37997	26.77599	209.92503	33.29806	212.47009	38.37493
207.43782	26.93050	209.98287	33.43474	212.52793	38.46249
207.49566	27.08492	210.04072	33.57066	212.58577	38.54857
207.55350	27.23923	210.09856	33.70581	212.64361	38.63313
207.61134	27.39342	210.15640	33.84017	212.70146	38.71618
207.66919	27.54748	210.21424	33.97372	212.75930	38.79768
207.72703	27.70139	210.27208	34.10646	212.81714	38.87763
207.78487	27.85514	210.32993	34.23835	212.87498	38.95601
207.84271	28.00872	210.38777	34.36939	212.93283	39.03280
207.90055	28.16210	210.44561	34.49955	212.99067	39.10799
207.95840	28.31529	210.50345	34.62883	213.04851	39.18156
208.01624	28.46825	210.56130	34.75720	213.10635	39.25350
208.07408	28.62099	210.61914	34.88464	213.16419	39.32379
208.13192	28.77348	210.67698	35.01115	213.22204	39.39241
208.18977	28.92572	210.73482	35.13670	213.27988	39.45935
208.24761	29.07768	210.79266	35.26127	213.33772	39.52460
208.30545	29.22935	210.85051	35.38486	213.39556	39.58813
208.36329	29.38072	210.90835	35.50744	213.45341	39.64994
208.42113	29.53178	210.96619	35.62900	213.51125	39.71001
208.47898	29.68250	211.02403	35.74951	213.56909	39.76832
208.53682	29.83287	211.08188	35.86897	213.62693	39.82486
208.59466	29.98289	211.13972	35.98735	213.68477	39.87962
208.65250	30.13253	211.19756	36.10464	213.74262	39.93257
208.71034	30.28177	211.25540	36.22083	213.80046	39.98371
208.76819	30.43061	211.31324	36.33588	213.85830	40.03302
208.82603	30.57903	211.37109	36.44980	213.91614	40.08049
208.88387	30.72701	211.42893	36.56256	213.97399	40.12610
208.94171	30.87454	211.48677	36.67414	214.03183	40.16983
208.99956	31.02160	211.54461	36.78453	214.08967	40.21168
209.05740	31.16817	211.60245	36.89371	214.14751	40.25163
209.11524	31.31425	211.66030	37.00166	214.20535	40.28967
209.17308	31.45981	211.71814	37.10837	214.26320	40.32578
209.23092	31.60485	211.77598	37.21383	214.32104	40.35995
209.28877	31.74933	211.83382	37.31800	214.37888	40.39216
209.34661	31.89326	211.89167	37.42088	214.43672	40.42241

214.49456	40.45068	217.03962	39.56033	219.58468	34.07489
214.55241	40.47695	217.09746	39.48834	219.64252	33.89500
214.61025	40.50121	217.15531	39.41394	219.70036	33.71269
214.66809	40.52346	217.21315	39.33711	219.75821	33.52796
214.72593	40.54367	217.27099	39.25787	219.81605	33.34082
214.78378	40.56184	217.32883	39.17620	219.87389	33.15127
214.84162	40.57796	217.38667	39.09210	219.93173	32.95933
214.89946	40.59200	217.44452	39.00556	219.98957	32.76500
214.95730	40.60396	217.50236	38.91659	220.04742	32.56828
215.01514	40.61383	217.56020	38.82517	220.10526	32.36918
215.07299	40.62160	217.61804	38.73131	220.16310	32.16771
215.13083	40.62725	217.67589	38.63500	220.22094	31.96387
215.18867	40.63077	217.73373	38.53624	220.27878	31.75767
215.24651	40.63215	217.79157	38.43502	220.33663	31.54912
215.30436	40.63138	217.84941	38.33135	220.39447	31.33822
215.36220	40.62845	217.90725	38.22521	220.45231	31.12499
215.42004	40.62335	217.96510	38.11661	220.51015	30.90943
215.47788	40.61607	218.02294	38.00555	220.56800	30.69154
215.53572	40.60659	218.08078	37.89203	220.62584	30.47135
215.59357	40.59491	218.13862	37.77604	220.68368	30.24885
215.65141	40.58102	218.19647	37.65758	220.74152	30.02405
215.70925	40.56490	218.25431	37.53665	220.79936	29.79697
215.76709	40.54655	218.31215	37.41325	220.85721	29.56762
215.82494	40.52596	218.36999	37.28738	220.91505	29.33599
215.88278	40.50311	218.42783	37.15904	220.97289	29.10211
215.94062	40.47801	218.48568	37.02822	221.03073	28.86598
215.99846	40.45063	218.54352	36.89494	221.08858	28.62762
216.05630	40.42097	218.60136	36.75919	221.14642	28.38702
216.11415	40.38903	218.65920	36.62097	221.20426	28.14421
216.17199	40.35479	218.71705	36.48028	221.26210	27.89920
216.22983	40.31824	218.77489	36.33712	221.31994	27.65199
216.28767	40.27938	218.83273	36.19149	221.37779	27.40259
216.34552	40.23820	218.89057	36.04340	221.43563	27.15103
216.40336	40.19469	218.94841	35.89284	221.49347	26.89730
216.46120	40.14884	219.00626	35.73983	221.55131	26.64143
216.51904	40.10065	219.06410	35.58435	221.60916	26.38342
216.57688	40.05011	219.12194	35.42642	221.66700	26.12328
216.63473	39.99721	219.17978	35.26604	221.72484	25.86103
216.69257	39.94194	219.23763	35.10320	221.78268	25.59669
216.75041	39.88431	219.29547	34.93791	221.84052	25.33026
216.80825	39.82429	219.35331	34.77018	221.89837	25.06175
216.86610	39.76189	219.41115	34.60001	221.95621	24.79119
216.92394	39.69711	219.46899	34.42741	222.01405	24.51858
216.98178	39.62992	219.52684	34.25236	222.07189	24.24394

222.12974	23.96727	224.67479	10.03805	227.21985	-6.22280
222.18758	23.68861	224.73263	9.68773	227.27769	-6.60509
222.24542	23.40795	224.79048	9.33620	227.33553	-6.98760
222.30326	23.12532	224.84832	8.98350	227.39338	-7.37030
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222.41895	22.55418	224.96400	8.27465	227.50906	-8.13618
222.47679	22.26571	225.02185	7.91854	227.56690	-8.51931
222.53463	21.97532	225.07969	7.56133	227.62474	-8.90255
222.59247	21.68303	225.13753	7.20305	227.68259	-9.28586
222.65032	21.38886	225.19537	6.84372	227.74043	-9.66922
222.70816	21.09281	225.25321	6.48336	227.79827	-10.05261
222.76600	20.79492	225.31106	6.12199	227.85611	-10.43601
222.82384	20.49518	225.36890	5.75964	227.91396	-10.81940
222.88168	20.19362	225.42674	5.39632	227.97180	-11.20274
222.93953	19.89026	225.48458	5.03205	228.02964	-11.58603
222.99737	19.58511	225.54243	4.66687	228.08748	-11.96923
223.05521	19.27819	225.60027	4.30079	228.14532	-12.35232
223.11305	18.96951	225.65811	3.93383	228.20317	-12.73528
223.17089	18.65909	225.71595	3.56602	228.26101	-13.11809
223.22874	18.34696	225.77379	3.19738	228.31885	-13.50072
223.28658	18.03312	225.83164	2.82793	228.37669	-13.88316
223.34442	17.71760	225.88948	2.45769	228.43454	-14.26537
223.40226	17.40041	225.94732	2.08668	228.49238	-14.64734
223.46011	17.08157	226.00516	1.71494	228.55022	-15.02905
223.51795	16.76109	226.06300	1.34247	228.60806	-15.41046
223.57579	16.43901	226.12085	0.96931	228.66590	-15.79157
223.63363	16.11533	226.17869	0.59547	228.72375	-16.17234
223.69147	15.79007	226.23653	0.22098	228.78159	-16.55276
223.74932	15.46325	226.29437	-0.15413	228.83943	-16.93280
223.80716	15.13490	226.35222	-0.52986	228.89727	-17.31244
223.86500	14.80502	226.41006	-0.90616	228.95511	-17.69165
223.92284	14.47365	226.46790	-1.28303	229.01296	-18.07043
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224.03853	13.80647	226.58358	-2.03835	229.12864	-18.82655
224.09637	13.47070	226.64143	-2.41675	229.18648	-19.20386
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224.38558	11.77092	226.93064	-4.31536	229.47569	-21.08200
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229.76491	-22.94416	232.30996	-38.25402	234.85502	-50.62283
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229.88059	-23.68396	232.42565	-38.88964	234.97070	-51.09710
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230.05412	-24.78772	232.59917	-39.83123	235.14423	-51.79304
230.11196	-25.15397	232.65702	-40.14187	235.20207	-52.02087
230.16980	-25.51935	232.71486	-40.45088	235.25991	-52.24662
230.22764	-25.88384	232.77270	-40.75825	235.31776	-52.47027
230.28549	-26.24743	232.83054	-41.06396	235.37560	-52.69182
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230.45901	-27.33254	233.00407	-41.97098	235.54913	-53.34383
230.51685	-27.69230	233.06191	-42.26991	235.60697	-53.55693
230.57470	-28.05105	233.11975	-42.56712	235.66481	-53.76790
230.63254	-28.40877	233.17760	-42.86258	235.72265	-53.97674
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231.38449	-32.95723	233.92954	-46.53981	236.47460	-56.49560
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237.45792	-59.23201	240.00298	-63.37921	242.54803	-63.56997
237.51576	-59.37314	240.06082	-63.42554	242.60587	-63.53310
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238.15202	-60.78006	240.69708	-63.80087	243.24214	-63.01817
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254.29000	-36.09790	256.83506	-28.99187	259.38011	-22.60097
254.34784	-35.93053	256.89290	-28.83779	259.43795	-22.46556
254.40568	-35.76337	256.95074	-28.68408	259.49580	-22.33060
254.46353	-35.59642	257.00858	-28.53076	259.55364	-22.19610
254.52137	-35.42969	257.06642	-28.37782	259.61148	-22.06206
254.57921	-35.26319	257.12427	-28.22528	259.66932	-21.92848
254.63705	-35.09692	257.18211	-28.07312	259.72717	-21.79536
254.69489	-34.93089	257.23995	-27.92135	259.78501	-21.66270
254.75274	-34.76510	257.29779	-27.76998	259.84285	-21.53051
254.81058	-34.59955	257.35564	-27.61901	259.90069	-21.39877
254.86842	-34.43425	257.41348	-27.46843	259.95853	-21.26751
254.92626	-34.26921	257.47132	-27.31826	260.01638	-21.13670
254.98411	-34.10442	257.52916	-27.16849	260.07422	-21.00636
255.04195	-33.93990	257.58700	-27.01914	260.13206	-20.87648
255.09979	-33.77565	257.64485	-26.87018	260.18990	-20.74707
255.15763	-33.61166	257.70269	-26.72165	260.24775	-20.61813

260.30559	-20.48965	262.85064	-15.30049	265.39570	-10.99548
260.36343	-20.36164	262.90849	-15.19303	265.45354	-10.90737
260.42127	-20.23410	262.96633	-15.08604	265.51139	-10.81968
260.47911	-20.10702	263.02417	-14.97950	265.56923	-10.73240
260.53696	-19.98041	263.08201	-14.87342	265.62707	-10.64553
260.59480	-19.85428	263.13986	-14.76780	265.68491	-10.55908
260.65264	-19.72861	263.19770	-14.66263	265.74275	-10.47303
260.71048	-19.60340	263.25554	-14.55792	265.80060	-10.38740
260.76833	-19.47867	263.31338	-14.45366	265.85844	-10.30217
260.82617	-19.35441	263.37122	-14.34986	265.91628	-10.21735
260.88401	-19.23062	263.42907	-14.24651	265.97412	-10.13293
260.94185	-19.10730	263.48691	-14.14361	266.03197	-10.04892
260.99969	-18.98444	263.54475	-14.04117	266.08981	-9.96531
261.05754	-18.86206	263.60259	-13.93917	266.14765	-9.88210
261.11538	-18.74015	263.66044	-13.83763	266.20549	-9.79929
261.17322	-18.61870	263.71828	-13.73653	266.26333	-9.71688
261.23106	-18.49773	263.77612	-13.63588	266.32118	-9.63486
261.28890	-18.37722	263.83396	-13.53568	266.37902	-9.55325
261.34675	-18.25719	263.89180	-13.43592	266.43686	-9.47202
261.40459	-18.13763	263.94965	-13.33661	266.49470	-9.39119
261.46243	-18.01853	264.00749	-13.23774	266.55255	-9.31076
261.52027	-17.89991	264.06533	-13.13932	266.61039	-9.23071
261.57812	-17.78175	264.12317	-13.04134	266.66823	-9.15105
261.63596	-17.66407	264.18101	-12.94380	266.72607	-9.07178
261.69380	-17.54685	264.23886	-12.84670	266.78391	-8.99290
261.75164	-17.43010	264.29670	-12.75004	266.84176	-8.91440
261.80948	-17.31382	264.35454	-12.65381	266.89960	-8.83628
261.86733	-17.19801	264.41238	-12.55803	266.95744	-8.75855
261.92517	-17.08267	264.47023	-12.46268	267.01528	-8.68120
261.98301	-16.96779	264.52807	-12.36776	267.07312	-8.60423
262.04085	-16.85338	264.58591	-12.27328	267.13097	-8.52763
262.09870	-16.73944	264.64375	-12.17923	267.18881	-8.45141
262.15654	-16.62597	264.70159	-12.08562	267.24665	-8.37557
262.21438	-16.51296	264.75944	-11.99243	267.30449	-8.30010
262.27222	-16.40041	264.81728	-11.89967	267.36234	-8.22501
262.33006	-16.28834	264.87512	-11.80735	267.42018	-8.15028
262.38791	-16.17672	264.93296	-11.71545	267.47802	-8.07593
262.44575	-16.06557	264.99081	-11.62397	267.53586	-8.00194
262.50359	-15.95489	265.04865	-11.53292	267.59370	-7.92832
262.56143	-15.84467	265.10649	-11.44230	267.65155	-7.85507
262.61928	-15.73491	265.16433	-11.35209	267.70939	-7.78218
262.67712	-15.62561	265.22217	-11.26231	267.76723	-7.70965
262.73496	-15.51678	265.28002	-11.17295	267.82507	-7.63748
262.79280	-15.40840	265.33786	-11.08401	267.88292	-7.56568

267.94076	-7.49423	270.48581	-4.68375	273.03087	-2.44533
267.99860	-7.42314	270.54366	-4.62696	273.08871	-2.40023
268.05644	-7.35240	270.60150	-4.57047	273.14656	-2.35536
268.11428	-7.28202	270.65934	-4.51427	273.20440	-2.31074
268.17213	-7.21199	270.71718	-4.45835	273.26224	-2.26634
268.22997	-7.14232	270.77503	-4.40273	273.32008	-2.22218
268.28781	-7.07299	270.83287	-4.34740	273.37792	-2.17826
268.34565	-7.00401	270.89071	-4.29235	273.43577	-2.13456
268.40350	-6.93538	270.94855	-4.23759	273.49361	-2.09110
268.46134	-6.86709	271.00639	-4.18311	273.55145	-2.04787
268.51918	-6.79915	271.06424	-4.12892	273.60929	-2.00486
268.57702	-6.73155	271.12208	-4.07500	273.66714	-1.96208
268.63486	-6.66429	271.17992	-4.02137	273.72498	-1.91953
268.69271	-6.59738	271.23776	-3.96802	273.78282	-1.87721
268.75055	-6.53080	271.29561	-3.91494	273.84066	-1.83511
268.80839	-6.46455	271.35345	-3.86214	273.89850	-1.79323
268.86623	-6.39865	271.41129	-3.80961	273.95635	-1.75157
268.92408	-6.33307	271.46913	-3.75736	274.01419	-1.71014
268.98192	-6.26783	271.52697	-3.70538	274.07203	-1.66892
269.03976	-6.20292	271.58482	-3.65367	274.12987	-1.62792
269.09760	-6.13834	271.64266	-3.60224	274.18772	-1.58714
269.15544	-6.07409	271.70050	-3.55107	274.24556	-1.54658
269.21329	-6.01017	271.75834	-3.50016	274.30340	-1.50623
269.27113	-5.94657	271.81619	-3.44952	274.36124	-1.46610
269.32897	-5.88330	271.87403	-3.39915	274.41908	-1.42618
269.38681	-5.82035	271.93187	-3.34904	274.47693	-1.38647
269.44466	-5.75772	271.98971	-3.29919	274.53477	-1.34698
269.50250	-5.69541	272.04755	-3.24961	274.59261	-1.30769
269.56034	-5.63342	272.10540	-3.20028	274.65045	-1.26861
269.61818	-5.57175	272.16324	-3.15121	274.70830	-1.22975
269.67602	-5.51039	272.22108	-3.10240	274.76614	-1.19108
269.73387	-5.44934	272.27892	-3.05384	274.82398	-1.15263
269.79171	-5.38861	272.33677	-3.00554	274.88182	-1.11438
269.84955	-5.32819	272.39461	-2.95749	274.93966	-1.07634
269.90739	-5.26809	272.45245	-2.90970	274.99751	-1.03849
269.96523	-5.20829	272.51029	-2.86215	275.05535	-1.00085
270.02308	-5.14879	272.56813	-2.81486	275.11319	-0.96342
270.08092	-5.08961	272.62598	-2.76781	275.17103	-0.92618
270.13876	-5.03072	272.68382	-2.72101	275.22888	-0.88914
270.19660	-4.97215	272.74166	-2.67445	275.28672	-0.85230
270.25445	-4.91387	272.79950	-2.62815	275.34456	-0.81565
270.31229	-4.85589	272.85734	-2.58208	275.40240	-0.77921
270.37013	-4.79821	272.91519	-2.53626	275.46024	-0.74296
270.42797	-4.74083	272.97303	-2.49067	275.51809	-0.70690

275.57593	-0.67104	278.12099	0.72847	280.66604	1.82236
275.63377	-0.63537	278.17883	0.75650	280.72388	1.84410
275.69161	-0.59989	278.23667	0.78437	280.78173	1.86572
275.74945	-0.56460	278.29451	0.81209	280.83957	1.88720
275.80730	-0.52950	278.35235	0.83965	280.89741	1.90855
275.86514	-0.49460	278.41020	0.86706	280.95525	1.92977
275.92298	-0.45988	278.46804	0.89432	281.01310	1.95087
275.98082	-0.42534	278.52588	0.92142	281.07094	1.97184
276.03867	-0.39100	278.58372	0.94837	281.12878	1.99268
276.09651	-0.35683	278.64156	0.97516	281.18662	2.01339
276.15435	-0.32286	278.69941	1.00181	281.24446	2.03398
276.21219	-0.28906	278.75725	1.02831	281.30231	2.05444
276.27003	-0.25545	278.81509	1.05466	281.36015	2.07477
276.32788	-0.22203	278.87293	1.08085	281.41799	2.09499
276.38572	-0.18878	278.93078	1.10690	281.47583	2.11507
276.44356	-0.15571	278.98862	1.13281	281.53367	2.13504
276.50140	-0.12282	279.04646	1.15856	281.59152	2.15487
276.55925	-0.09011	279.10430	1.18417	281.64936	2.17459
276.61709	-0.05758	279.16214	1.20963	281.70720	2.19418
276.67493	-0.02523	279.21999	1.23495	281.76504	2.21366
276.73277	0.00695	279.27783	1.26012	281.82289	2.23301
276.79061	0.03895	279.33567	1.28515	281.88073	2.25223
276.84846	0.07078	279.39351	1.31003	281.93857	2.27134
276.90630	0.10244	279.45136	1.33477	281.99641	2.29033
276.96414	0.13392	279.50920	1.35937	282.05425	2.30920
277.02198	0.16523	279.56704	1.38383	282.11210	2.32795
277.07983	0.19637	279.62488	1.40815	282.16994	2.34657
277.13767	0.22734	279.68272	1.43232	282.22778	2.36508
277.19551	0.25813	279.74057	1.45636	282.28562	2.38348
277.25335	0.28876	279.79841	1.48026	282.34347	2.40175
277.31119	0.31923	279.85625	1.50401	282.40131	2.41991
277.36904	0.34952	279.91409	1.52763	282.45915	2.43795
277.42688	0.37965	279.97194	1.55112	282.51699	2.45587
277.48472	0.40961	280.02978	1.57446	282.57483	2.47368
277.54256	0.43941	280.08762	1.59767	282.63268	2.49137
277.60041	0.46904	280.14546	1.62074	282.69052	2.50894
277.65825	0.49851	280.20330	1.64368	282.74836	2.52641
277.71609	0.52782	280.26115	1.66648	282.80620	2.54375
277.77393	0.55696	280.31899	1.68915	282.86405	2.56098
277.83177	0.58595	280.37683	1.71168	282.92189	2.57810
277.88962	0.61477	280.43467	1.73408	282.97973	2.59511
277.94746	0.64343	280.49252	1.75635	283.03757	2.61200
278.00530	0.67193	280.55036	1.77849	283.09541	2.62878
278.06314	0.70028	280.60820	1.80049	283.15326	2.64545

283.21110	2.66200	285.75616	3.28505	288.30121	3.72001
283.26894	2.67845	285.81400	3.29693	288.35905	3.72790
283.32678	2.69478	285.87184	3.30872	288.41690	3.73570
283.38463	2.71100	285.92968	3.32040	288.47474	3.74342
283.44247	2.72711	285.98752	3.33199	288.53258	3.75105
283.50031	2.74311	286.04537	3.34349	288.59042	3.75860
283.55815	2.75901	286.10321	3.35489	288.64827	3.76607
283.61599	2.77479	286.16105	3.36619	288.70611	3.77345
283.67384	2.79046	286.21889	3.37740	288.76395	3.78075
283.73168	2.80603	286.27674	3.38851	288.82179	3.78796
283.78952	2.82148	286.33458	3.39953	288.87963	3.79510
283.84736	2.83683	286.39242	3.41046	288.93748	3.80215
283.90521	2.85207	286.45026	3.42129	288.99532	3.80912
283.96305	2.86721	286.50810	3.43203	289.05316	3.81600
284.02089	2.88224	286.56595	3.44267	289.11100	3.82281
284.07873	2.89716	286.62379	3.45322	289.16885	3.82953
284.13657	2.91197	286.68163	3.46368	289.22669	3.83617
284.19442	2.92668	286.73947	3.47405	289.28453	3.84273
284.25226	2.94129	286.79732	3.48433	289.34237	3.84921
284.31010	2.95579	286.85516	3.49451	289.40021	3.85561
284.36794	2.97018	286.91300	3.50460	289.45806	3.86193
284.42578	2.98447	286.97084	3.51460	289.51590	3.86817
284.48363	2.99866	287.02868	3.52451	289.57374	3.87432
284.54147	3.01274	287.08653	3.53433	289.63158	3.88040
284.59931	3.02672	287.14437	3.54406	289.68943	3.88640
284.65715	3.04059	287.20221	3.55369	289.74727	3.89232
284.71500	3.05436	287.26005	3.56324	289.80511	3.89816
284.77284	3.06803	287.31789	3.57270	289.86295	3.90393
284.83068	3.08160	287.37574	3.58207	289.92079	3.90961
284.88852	3.09507	287.43358	3.59135	289.97864	3.91521
284.94636	3.10843	287.49142	3.60054	290.03648	3.92074
285.00421	3.12170	287.54926	3.60964	290.09432	3.92619
285.06205	3.13486	287.60711	3.61865	290.15216	3.93157
285.11989	3.14792	287.66495	3.62758	290.21000	3.93686
285.17773	3.16088	287.72279	3.63641	290.26785	3.94208
285.23558	3.17375	287.78063	3.64516	290.32569	3.94722
285.29342	3.18651	287.83847	3.65383	290.38353	3.95229
285.35126	3.19917	287.89632	3.66240	290.44137	3.95728
285.40910	3.21173	287.95416	3.67089	290.49922	3.96219
285.46694	3.22420	288.01200	3.67929	290.55706	3.96702
285.52479	3.23657	288.06984	3.68761	290.61490	3.97179
285.58263	3.24883	288.12769	3.69584	290.67274	3.97647
285.64047	3.26101	288.18553	3.70398	290.73058	3.98108
285.69831	3.27308	288.24337	3.71204	290.78843	3.98562

290.84627	3.99008	293.39133	4.11610	295.93638	4.11826
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290.96195	3.99878	293.50701	4.11873	296.05207	4.11574
291.01980	4.00302	293.56485	4.11995	296.10991	4.11440
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291.13548	4.01128	293.68054	4.12220	296.22559	4.11157
291.19332	4.01530	293.73838	4.12323	296.28344	4.11007
291.25116	4.01924	293.79622	4.12420	296.34128	4.10853
291.30901	4.02311	293.85406	4.12511	296.39912	4.10693
291.36685	4.02691	293.91191	4.12596	296.45696	4.10528
291.42469	4.03064	293.96975	4.12674	296.51480	4.10357
291.48253	4.03430	294.02759	4.12746	296.57265	4.10182
291.54038	4.03788	294.08543	4.12812	296.63049	4.10002
291.59822	4.04140	294.14327	4.12872	296.68833	4.09816
291.65606	4.04484	294.20112	4.12926	296.74617	4.09626
291.71390	4.04821	294.25896	4.12973	296.80402	4.09430
291.77174	4.05151	294.31680	4.13015	296.86186	4.09230
291.82959	4.05474	294.37464	4.13051	296.91970	4.09024
291.88743	4.05790	294.43249	4.13080	296.97754	4.08814
291.94527	4.06098	294.49033	4.13104	297.03538	4.08598
292.00311	4.06400	294.54817	4.13122	297.09323	4.08378
292.06096	4.06695	294.60601	4.13134	297.15107	4.08153
292.11880	4.06983	294.66385	4.13140	297.20891	4.07923
292.17664	4.07264	294.72170	4.13140	297.26675	4.07688
292.23448	4.07538	294.77954	4.13134	297.32460	4.07449
292.29232	4.07806	294.83738	4.13122	297.38244	4.07205
292.35017	4.08066	294.89522	4.13105	297.44028	4.06956
292.40801	4.08320	294.95307	4.13081	297.49812	4.06702
292.46585	4.08567	295.01091	4.13053	297.55596	4.06443
292.52369	4.08807	295.06875	4.13018	297.61381	4.06180
292.58154	4.09040	295.12659	4.12977	297.67165	4.05912
292.63938	4.09266	295.18443	4.12931	297.72949	4.05640
292.69722	4.09486	295.24228	4.12880	297.78733	4.05363
292.75506	4.09699	295.30012	4.12822	297.84518	4.05081
292.81290	4.09906	295.35796	4.12759	297.90302	4.04795
292.87075	4.10106	295.41580	4.12691	297.96086	4.04504
292.92859	4.10299	295.47365	4.12616	298.01870	4.04209
292.98643	4.10486	295.53149	4.12537	298.07654	4.03910
293.04427	4.10666	295.58933	4.12451	298.13439	4.03605
293.10211	4.10839	295.64717	4.12361	298.19223	4.03297
293.15996	4.11006	295.70501	4.12265	298.25007	4.02984
293.21780	4.11167	295.76286	4.12163	298.30791	4.02666
293.27564	4.11321	295.82070	4.12056	298.36576	4.02345
293.33348	4.11469	295.87854	4.11943	298.42360	4.02019

298.48144	4.01688	301.02650	3.83245	303.57155	3.58514
298.53928	4.01354	301.08434	3.82746	303.62940	3.57894
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298.77065	3.99973	301.31571	3.80715	303.86076	3.55392
298.82849	3.99617	301.37355	3.80199	303.91861	3.54762
298.88633	3.99257	301.43139	3.79680	303.97645	3.54129
298.94418	3.98893	301.48923	3.79158	304.03429	3.53494
299.00202	3.98525	301.54708	3.78634	304.09213	3.52857
299.05986	3.98153	301.60492	3.78106	304.14998	3.52218
299.11770	3.97776	301.66276	3.77575	304.20782	3.51577
299.17555	3.97396	301.72060	3.77041	304.26566	3.50933
299.23339	3.97012	301.77844	3.76504	304.32350	3.50288
299.29123	3.96624	301.83629	3.75964	304.38134	3.49641
299.34907	3.96232	301.89413	3.75421	304.43919	3.48992
299.40691	3.95835	301.95197	3.74876	304.49703	3.48341
299.46476	3.95435	302.00981	3.74327	304.55487	3.47688
299.52260	3.95031	302.06766	3.73776	304.61271	3.47033
299.58044	3.94624	302.12550	3.73222	304.67055	3.46377
299.63828	3.94212	302.18334	3.72665	304.72840	3.45718
299.69613	3.93797	302.24118	3.72105	304.78624	3.45058
299.75397	3.93378	302.29902	3.71542	304.84408	3.44396
299.81181	3.92955	302.35687	3.70977	304.90192	3.43732
299.86965	3.92528	302.41471	3.70409	304.95977	3.43066
299.92749	3.92097	302.47255	3.69838	305.01761	3.42399
299.98534	3.91663	302.53039	3.69265	305.07545	3.41730
300.04318	3.91226	302.58824	3.68689	305.13329	3.41059
300.10102	3.90784	302.64608	3.68111	305.19113	3.40387
300.15886	3.90339	302.70392	3.67529	305.24898	3.39712
300.21671	3.89891	302.76176	3.66945	305.30682	3.39037
300.27455	3.89438	302.81960	3.66359	305.36466	3.38359
300.33239	3.88983	302.87745	3.65770	305.42250	3.37680
300.39023	3.88523	302.93529	3.65179	305.48035	3.37000
300.44807	3.88060	302.99313	3.64585	305.53819	3.36317
300.50592	3.87594	303.05097	3.63989	305.59603	3.35634
300.56376	3.87125	303.10882	3.63390	305.65387	3.34949
300.62160	3.86651	303.16666	3.62788	305.71171	3.34262
300.67944	3.86175	303.22450	3.62185	305.76956	3.33574
300.73729	3.85695	303.28234	3.61579	305.82740	3.32884
300.79513	3.85212	303.34018	3.60970	305.88524	3.32193
300.85297	3.84725	303.39803	3.60360	305.94308	3.31501
300.91081	3.84235	303.45587	3.59747	306.00093	3.30807
300.96865	3.83742	303.51371	3.59131	306.05877	3.30112

306.11661	3.29415	308.66167	2.97707	311.20672	2.64928
306.17445	3.28717	308.71951	2.96968	311.26457	2.64181
306.23229	3.28018	308.77735	2.96229	311.32241	2.63434
306.29014	3.27317	308.83519	2.95490	311.38025	2.62688
306.34798	3.26615	308.89304	2.94750	311.43809	2.61941
306.40582	3.25912	308.95088	2.94009	311.49593	2.61195
306.46366	3.25208	309.00872	2.93268	311.55378	2.60449
306.52151	3.24502	309.06656	2.92527	311.61162	2.59703
306.57935	3.23796	309.12440	2.91785	311.66946	2.58957
306.63719	3.23088	309.18225	2.91043	311.72730	2.58212
306.69503	3.22379	309.24009	2.90301	311.78515	2.57467
306.75287	3.21668	309.29793	2.89558	311.84299	2.56722
306.81072	3.20957	309.35577	2.88814	311.90083	2.55977
306.86856	3.20244	309.41362	2.88071	311.95867	2.55233
306.92640	3.19531	309.47146	2.87327	312.01651	2.54489
306.98424	3.18816	309.52930	2.86582	312.07436	2.53745
307.04209	3.18100	309.58714	2.85838	312.13220	2.53002
307.09993	3.17384	309.64498	2.85093	312.19004	2.52259
307.15777	3.16666	309.70283	2.84348	312.24788	2.51516
307.21561	3.15947	309.76067	2.83602	312.30573	2.50774
307.27345	3.15227	309.81851	2.82856	312.36357	2.50031
307.33130	3.14507	309.87635	2.82111	312.42141	2.49290
307.38914	3.13785	309.93420	2.81364	312.47925	2.48549
307.44698	3.13063	309.99204	2.80618	312.53709	2.47808
307.50482	3.12339	310.04988	2.79872	312.59494	2.47067
307.56266	3.11615	310.10772	2.79125	312.65278	2.46327
307.62051	3.10890	310.16556	2.78378	312.71062	2.45588
307.67835	3.10163	310.22341	2.77631	312.76846	2.44848
307.73619	3.09437	310.28125	2.76884	312.82631	2.44110
307.79403	3.08709	310.33909	2.76137	312.88415	2.43371
307.85188	3.07980	310.39693	2.75390	312.94199	2.42634
307.90972	3.07251	310.45477	2.74643	312.99983	2.41896
307.96756	3.06521	310.51262	2.73895	313.05767	2.41160
308.02540	3.05790	310.57046	2.73148	313.11552	2.40423
308.08324	3.05058	310.62830	2.72401	313.17336	2.39688
308.14109	3.04326	310.68614	2.71653	313.23120	2.38953
308.19893	3.03593	310.74399	2.70906	313.28904	2.38218
308.25677	3.02860	310.80183	2.70158	313.34689	2.37484
308.31461	3.02125	310.85967	2.69411	313.40473	2.36750
308.37246	3.01390	310.91751	2.68663	313.46257	2.36018
308.43030	3.00655	310.97535	2.67916	313.52041	2.35285
308.48814	2.99919	311.03320	2.67169	313.57825	2.34554
308.54598	2.99182	311.09104	2.66422	313.63610	2.33822
308.60382	2.98445	311.14888	2.65675	313.69394	2.33092

313.75178	2.32362	316.29684	2.01024	318.84189	1.71662
313.80962	2.31633	316.35468	2.00333	318.89974	1.71022
313.86746	2.30904	316.41252	1.99642	318.95758	1.70383
313.92531	2.30177	316.47036	1.98952	319.01542	1.69746
313.98315	2.29449	316.52821	1.98264	319.07326	1.69110
314.04099	2.28723	316.58605	1.97577	319.13111	1.68475
314.09883	2.27997	316.64389	1.96890	319.18895	1.67841
314.15668	2.27272	316.70173	1.96205	319.24679	1.67209
314.21452	2.26548	316.75957	1.95521	319.30463	1.66578
314.27236	2.25824	316.81742	1.94838	319.36247	1.65949
314.33020	2.25101	316.87526	1.94156	319.42032	1.65321
314.38804	2.24379	316.93310	1.93475	319.47816	1.64694
314.44589	2.23658	316.99094	1.92795	319.53600	1.64068
314.50373	2.22937	317.04879	1.92116	319.59384	1.63444
314.56157	2.22217	317.10663	1.91439	319.65168	1.62821
314.61941	2.21498	317.16447	1.90762	319.70953	1.62200
314.67726	2.20780	317.22231	1.90087	319.76737	1.61579
314.73510	2.20062	317.28015	1.89413	319.82521	1.60961
314.79294	2.19345	317.33800	1.88740	319.88305	1.60343
314.85078	2.18630	317.39584	1.88068	319.94090	1.59727
314.90862	2.17914	317.45368	1.87397	319.99874	1.59112
314.96647	2.17200	317.51152	1.86728	320.05658	1.58499
315.02431	2.16487	317.56937	1.86059	320.11442	1.57887
315.08215	2.15774	317.62721	1.85392	320.17226	1.57277
315.13999	2.15063	317.68505	1.84726	320.23011	1.56667
315.19784	2.14352	317.74289	1.84061	320.28795	1.56059
315.25568	2.13642	317.80073	1.83397	320.34579	1.55453
315.31352	2.12933	317.85858	1.82735	320.40363	1.54848
315.37136	2.12225	317.91642	1.82074	320.46148	1.54244
315.42920	2.11518	317.97426	1.81414	320.51932	1.53642
315.48705	2.10812	318.03210	1.80755	320.57716	1.53041
315.54489	2.10106	318.08995	1.80097	320.63500	1.52442
315.60273	2.09402	318.14779	1.79441	320.69284	1.51844
315.66057	2.08698	318.20563	1.78786	320.75069	1.51247
315.71842	2.07996	318.26347	1.78132	320.80853	1.50652
315.77626	2.07294	318.32131	1.77479	320.86637	1.50058
315.83410	2.06594	318.37916	1.76828	320.92421	1.49465
315.89194	2.05894	318.43700	1.76178	320.98206	1.48874
315.94978	2.05195	318.49484	1.75529	321.03990	1.48285
316.00763	2.04498	318.55268	1.74881	321.09774	1.47696
316.06547	2.03801	318.61053	1.74235	321.15558	1.47110
316.12331	2.03105	318.66837	1.73589	321.21342	1.46524
316.18115	2.02410	318.72621	1.72946	321.27127	1.45940
316.23900	2.01717	318.78405	1.72303	321.32911	1.45358

321.38695	1.44777	323.93201	1.20656	326.47706	0.99407
321.44479	1.44197	323.98985	1.20141	326.53491	0.98957
321.50264	1.43619	324.04769	1.19628	326.59275	0.98509
321.56048	1.43042	324.10553	1.19116	326.65059	0.98062
321.61832	1.42467	324.16338	1.18605	326.70843	0.97617
321.67616	1.41893	324.22122	1.18096	326.76628	0.97173
321.73400	1.41321	324.27906	1.17589	326.82412	0.96731
321.79185	1.40750	324.33690	1.17083	326.88196	0.96290
321.84969	1.40180	324.39475	1.16578	326.93980	0.95851
321.90753	1.39612	324.45259	1.16075	326.99764	0.95413
321.96537	1.39046	324.51043	1.15574	327.05549	0.94977
322.02322	1.38481	324.56827	1.15074	327.11333	0.94542
322.08106	1.37917	324.62611	1.14575	327.17117	0.94108
322.13890	1.37355	324.68396	1.14078	327.22901	0.93676
322.19674	1.36794	324.74180	1.13583	327.28686	0.93246
322.25458	1.36235	324.79964	1.13089	327.34470	0.92816
322.31243	1.35677	324.85748	1.12596	327.40254	0.92389
322.37027	1.35120	324.91533	1.12105	327.46038	0.91963
322.42811	1.34566	324.97317	1.11615	327.51822	0.91538
322.48595	1.34012	325.03101	1.11127	327.57607	0.91114
322.54379	1.33460	325.08885	1.10641	327.63391	0.90692
322.60164	1.32910	325.14669	1.10155	327.69175	0.90272
322.65948	1.32361	325.20454	1.09672	327.74959	0.89853
322.71732	1.31813	325.26238	1.09190	327.80744	0.89435
322.77516	1.31267	325.32022	1.08709	327.86528	0.89019
322.83301	1.30722	325.37806	1.08230	327.92312	0.88605
322.89085	1.30179	325.43590	1.07752	327.98096	0.88191
322.94869	1.29638	325.49375	1.07276	328.03880	0.87779
323.00653	1.29097	325.55159	1.06801	328.09665	0.87369
323.06437	1.28559	325.60943	1.06328	328.15449	0.86960
323.12222	1.28021	325.66727	1.05856	328.21233	0.86552
323.18006	1.27486	325.72512	1.05386	328.27017	0.86146
323.23790	1.26951	325.78296	1.04917	328.32801	0.85742
323.29574	1.26419	325.84080	1.04450	328.38586	0.85338
323.35359	1.25887	325.89864	1.03984	328.44370	0.84937
323.41143	1.25358	325.95648	1.03520	328.50154	0.84536
323.46927	1.24829	326.01433	1.03057	328.55938	0.84137
323.52711	1.24302	326.07217	1.02595	328.61723	0.83739
323.58495	1.23777	326.13001	1.02135	328.67507	0.83343
323.64280	1.23253	326.18785	1.01677	328.73291	0.82948
323.70064	1.22731	326.24570	1.01220	328.79075	0.82555
323.75848	1.22210	326.30354	1.00764	328.84859	0.82163
323.81632	1.21691	326.36138	1.00310	328.90644	0.81773
323.87417	1.21173	326.41922	0.99858	328.96428	0.81383

329.02212	0.80996	331.56718	0.65286	334.11223	0.52070
329.07996	0.80609	331.62502	0.64959	334.17008	0.51797
329.13781	0.80224	331.68286	0.64633	334.22792	0.51525
329.19565	0.79841	331.74070	0.64308	334.28576	0.51254
329.25349	0.79459	331.79855	0.63985	334.34360	0.50984
329.31133	0.79078	331.85639	0.63663	334.40145	0.50716
329.36917	0.78698	331.91423	0.63342	334.45929	0.50448
329.42702	0.78320	331.97207	0.63023	334.51713	0.50182
329.48486	0.77944	332.02992	0.62704	334.57497	0.49917
329.54270	0.77568	332.08776	0.62387	334.63281	0.49652
329.60054	0.77195	332.14560	0.62072	334.69066	0.49390
329.65839	0.76822	332.20344	0.61757	334.74850	0.49128
329.71623	0.76451	332.26128	0.61444	334.80634	0.48867
329.77407	0.76081	332.31913	0.61132	334.86418	0.48607
329.83191	0.75713	332.37697	0.60822	334.92203	0.48349
329.88975	0.75346	332.43481	0.60512	334.97987	0.48092
329.94760	0.74980	332.49265	0.60204	335.03771	0.47835
330.00544	0.74616	332.55050	0.59897	335.09555	0.47580
330.06328	0.74253	332.60834	0.59591	335.15339	0.47326
330.12112	0.73891	332.66618	0.59287	335.21124	0.47073
330.17897	0.73531	332.72402	0.58984	335.26908	0.46822
330.23681	0.73172	332.78186	0.58682	335.32692	0.46571
330.29465	0.72815	332.83971	0.58381	335.38476	0.46321
330.35249	0.72459	332.89755	0.58082	335.44261	0.46073
330.41033	0.72104	332.95539	0.57783	335.50045	0.45825
330.46818	0.71750	333.01323	0.57486	335.55829	0.45579
330.52602	0.71398	333.07108	0.57191	335.61613	0.45334
330.58386	0.71047	333.12892	0.56896	335.67397	0.45090
330.64170	0.70698	333.18676	0.56602	335.73182	0.44847
330.69955	0.70350	333.24460	0.56310	335.78966	0.44604
330.75739	0.70003	333.30244	0.56019	335.84750	0.44364
330.81523	0.69657	333.36029	0.55730	335.90534	0.44124
330.87307	0.69313	333.41813	0.55441	335.96319	0.43885
330.93091	0.68970	333.47597	0.55154	336.02103	0.43647
330.98876	0.68629	333.53381	0.54867	336.07887	0.43410
331.04660	0.68289	333.59166	0.54582	336.13671	0.43175
331.10444	0.67950	333.64950	0.54299	336.19455	0.42940
331.16228	0.67612	333.70734	0.54016	336.25240	0.42706
331.22012	0.67276	333.76518	0.53734	336.31024	0.42474
331.27797	0.66941	333.82302	0.53454	336.36808	0.42243
331.33581	0.66607	333.88087	0.53175	336.42592	0.42012
331.39365	0.66275	333.93871	0.52897	336.48377	0.41783
331.45149	0.65944	333.99655	0.52620	336.54161	0.41554
331.50934	0.65614	334.05439	0.52345	336.59945	0.41327

336.65729	0.41101	338.62393	0.33993	340.59056	0.27942
336.71513	0.40875	338.68177	0.33801	340.64840	0.27779
336.77298	0.40651	338.73961	0.33609	340.70625	0.27616
336.83082	0.40428	338.79745	0.33418	340.76409	0.27455
336.88866	0.40206	338.85530	0.33229	340.82193	0.27294
336.94650	0.39984	338.91314	0.33040	340.87977	0.27134
337.00434	0.39764	338.97098	0.32852	340.93761	0.26975
337.06219	0.39545	339.02882	0.32665	340.99546	0.26816
337.12003	0.39327	339.08666	0.32479	341.05330	0.26659
337.17787	0.39109	339.14451	0.32293	341.11114	0.26502
337.23571	0.38893	339.20235	0.32109	341.16898	0.26346
337.29356	0.38678	339.26019	0.31926	341.22683	0.26190
337.35140	0.38464	339.31803	0.31743	341.28467	0.26036
337.40924	0.38250	339.37588	0.31561	341.34251	0.25882
337.46708	0.38038	339.43372	0.31380	341.40035	0.25729
337.52492	0.37827	339.49156	0.31200	341.45819	0.25577
337.58277	0.37616	339.54940	0.31021	341.51604	0.25425
337.64061	0.37407	339.60724	0.30843	341.57388	0.25275
337.69845	0.37199	339.66509	0.30666	341.63172	0.25125
337.75629	0.36991	339.72293	0.30489	341.68956	0.24975
337.81414	0.36785	339.78077	0.30313	341.74741	0.24827
337.87198	0.36579	339.83861	0.30139	341.80525	0.24679
337.92982	0.36375	339.89645	0.29965	341.86309	0.24532
337.98766	0.36171	339.95430	0.29792	341.92093	0.24386
338.04550	0.35968	340.01214	0.29619	341.97877	0.24241
338.10335	0.35766	340.06998	0.29448	342.03662	0.24096
338.16119	0.35566	340.12782	0.29277	342.09446	0.23952
338.21903	0.35366	340.18567	0.29107	342.15230	0.23809
338.27687	0.35167	340.24351	0.28938	342.21014	0.23666
338.33472	0.34969	340.30135	0.28770	342.26799	0.23525
338.39256	0.34772	340.35919	0.28603	342.32583	0.23383
338.45040	0.34576	340.41703	0.28437	342.38367	0.23243
338.50824	0.34381	340.47488	0.28271	342.44151	0.23104
338.56608	0.34186	340.53272	0.28106	342.49935	0.22965