Electronic Supplementary Information (ESI) for

Diamine-mediated N^2-selective β-selenoalkylation of triazoles with alkenes

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Contents

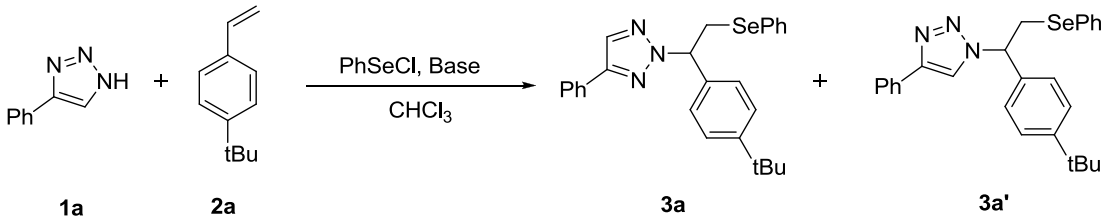
1. General Conditions

All reactions were run under air atmosphere. All reagents were purchased from commercial sources and used as received. Column chromatography was performed using 200-300 mesh silica with the proper solvent system according to TLC analysis by staining with an ethanolic solution of phosphomolybdic acid and UV light to visualize the reaction components. Unless otherwise noted, nuclear magnetic resonance spectra were recorded on 400 MHz spectrometer. NMR data were reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, m = multiplet and brs = broad singlet), coupling constant in Hz and integration. Chemical shifts for ^{13}C NMR spectra were recorded in parts per million from tetramethylsilane using the central peak of deuterochloroform (77.0 ppm) as the internal standard. HRMS data were obtained using ESI ionization. The isolated yields of N^2-fuctionalized products were reported in the part of 'Analytical Data'. The total yield of each reaction (on the main text) was calculated based on the isolated yield of N^2-fuctionalized product and the ratio of N^2/N^1 on the crude ^1H NMR.

2. Typical Experimental Procedure

A mixture of 1,2,3-triazole (0.5 mmol), N,N'-dimethylpiperazine (0.25 mmol) and alkene (1.0 mmol) in $CHCl_3$ (3 mL) was stirred 5 min under an air atmosphere at 30 ^oC, which was added to a suspension of PhSeCl (0.5 mmol) in $CHCl_3$(2 mL). When the reaction completed, the solution was diluted with 50 mL EtOAc and washed with water (3×10 mL) and brine (10 mL). The organic phase was dried over Na_2SO_4, filtered and concentrated *in vacuo*. Purification of the crude product through chromatography on silica gel with a gradient eluant of petroleum ether and ethyl acetate afforded β-selenoalkylated product.

Table S1. Screening of Optimal Reaction Conditions.[a]



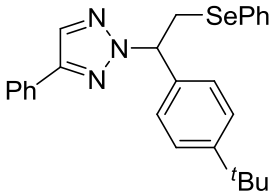
1a **2a** **3a** **3a'**

Entry	Base(eq.)	Additive(mol%)	Yield[b] （%）	**3a**/**3a'**[c]
1	-	-	90	2/1
2	Et_3N (1.0)	-	65	5/1
3	DABCO (1.0)	-	35	3/1
4	DBU (1.0.)	-	42	3/1
5	TMEDA (1.0)	-	63	6/1
6	TMEDA (0.5)	-	90	9/1
7	TMEDA (0.25)	-	85	6/1
8	TMEDA (0.1)	-	82	5/1
9	TMEDA(2.0)	-	32	2/1
10	TMEDA (0.5)	$Zn(OTf)_2$ (10)	28	1/1
11	TMEDA (0.5)	$CuCl_2$ (10)	21	1/1
12	1,8-Bis(dimethylamino)-Naphthalene (0.5)	-	49	6/1
13	5,10-Dimethyldihydro-phenazine (0.5)	-	56	6/1
14	TMPDA (0.5)	-	84	4/1
15	TMMDA(0.5)	-	68	2/1
16	N,N'-DiMethylpiperazine (0.5)	-	99	8/1
17[d]	N,N'-DiMethylpiperazine (0.5)	-	99	10/1

[a] Reaction conditions unless specified otherwise: **1a** (0.5 mmol), **2a** (1.0 mmol), PhSeCl (1.0 mmol), base, $CHCl_3$ (5 ml), under air atmosphere, 70 °C, 2 h. [b] Isolated yield of N2 and N1 product. [c] The ratio of N2 and N1 isomer was determined by 1H NMR analysis of crude product. [d]The reaction temperature was 30 °C.

3. Product Characterization

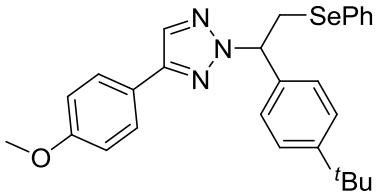
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-phenyl-2*H*-1,2,3-triazole (3a)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a white solid (m. p. 48 – 50 °C) in 90% yield (207.4 mg, 99% yield in total of N^2 and N^1 isomers) and 91% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.6; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.83 (s, 1H), 7.77 (d, J = 7.1 Hz, 2H), 7.53 – 7.47 (m, 2H), 7.41 (t, J = 7.4 Hz, 2H), 7.36 – 7.27 (m, 5H), 7.27 – 7.21 (m, 3H), 5.82 (dd, J = 10.0, 5.3 Hz, 1H), 4.05 (dd, J = 13.0, 10.1 Hz, 1H), 3.61 (dd, J = 13.0, 5.3 Hz, 1H), 1.27 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.5, 147.6, 135.9, 133.8, 131.1, 130.5, 129.3, 129.2, 128.8, 128.4, 127.6, 126.6, 126.0, 125.7, 69.1, 34.6, 33.0, 31.3; **HRMS** (ESI) calcd for $C_{26}H_{27}N_3NaSe$ $[M+Na]^+$: 484.1262, found: 484.1267.

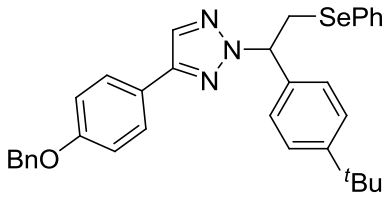
2-(1-(4-tert-butylphenyl)-2-(phenylselanyl)ethyl)-4-(4-methoxyphenyl)-2*H*-1,2,3-triazole (3b)



4-(4-methoxyphenyl)-1,2,3-triazole (87.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 50:1) to afford the title compound as a white solid (m. p. 68 – 70 °C) in 86% yield (211.7 mg, 97% yield in total of N^2 and N^1 isomers) and 89% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.7; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.81 (s, 1H), 7.74 (d, J = 8.7 Hz, 2H), 7.59 – 7.51 (m, 2H), 7.39 – 7.31 (m, 4H), 7.29 (dd, J = 3.8, 2.4 Hz, 3H), 6.99 (d, J = 8.6 Hz, 2H), 5.93 – 5.77 (m, 1H), 4.09 (ddd, J = 12.0, 10.1, 1.8 Hz, 1H), 3.87 (s, 3H), 3.65 (dd, J = 13.0, 5.3 Hz, 1H), 1.31 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 159.8, 151.4, 147.5, 136.0, 133.8, 130.5, 129.3, 129.2, 127.5, 127.3, 126.6, 125.7, 123.2, 114.2, 69.0, 55.4, 34.6, 33.0, 31.3; **HRMS** (ESI) calcd for $C_{27}H_{30}N_3OSe$ $[M+H]^+$: 492.1549, found: 492.1539.

4-(4-(benzyloxy)phenyl)-2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazole (3c)

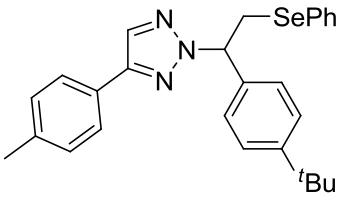


4-(4-(benzyloxy)phenyl)-1,2,3-triazole (125.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 64 – 66 °C) in 77% yield (219.3 mg, 88% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.76 (s, 1H), 7.70 (d, J = 8.7 Hz, 2H), 7.53 – 7.49 (m, 2H), 7.45 (d, J = 6.9 Hz, 2H), 7.40 (t, J = 7.2 Hz, 2H), 7.36 – 7.32 (m, 3H), 7.29 (d, J = 8.6 Hz, 2H), 7.26 – 7.23 (m, 3H), 7.02 (d, J = 8.8 Hz, 2H), 5.81 (dd, J = 10.0, 5.3 Hz, 1H), 5.11 (s,

2H), 4.05 (dd, *J* = 13.0, 10.0 Hz, 1H), 3.61 (dd, *J* = 13.0, 5.4 Hz, 1H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): *δ* 159.0, 151.5, 147.5, 136.9, 136.0, 133.9, 130.6, 129.4, 129.3, 128.7, 128.1, 127.6, 127.4, 126.7, 125.8, 123.6, 115.3, 70.2, 69.1, 34.7, 33.0, 31.4; **HRMS** (ESI) calcd for $C_{33}H_{34}N_3OSe$ $[M+H]^+$: 568.1862, found: 568.1861.

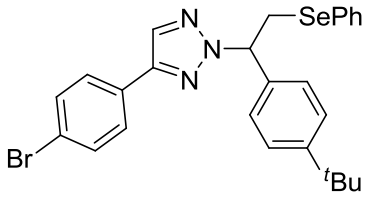
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-p-tolyl-2*H*-1,2,3-triazole (3d)



4-*p*-tolyl-1,2,3-triazole (79.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 42 – 44 ºC) in 86% yield (204.6 mg, 98% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): *δ* 7.80 (s, 1H), 7.67 (d, *J* = 8.2 Hz, 2H), 7.52 – 7.50 (m, 2H), 7.33 (d, *J* = 8.6 Hz, 2H), 7.30 (d, *J* = 8.5 Hz, 2H), 7.26 – 7.20 (m, 5H), 5.82 (dd, *J* = 10.0, 5.4 Hz, 1H), 4.05 (dd, *J* = 13.0, 10.0 Hz, 1H), 3.62 (dd, *J* = 13.0, 5.4 Hz, 1H), 2.38 (s, 3H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): *δ* 151.5, 147.8, 138.3, 136.0, 133.9, 131.0, 129.6, 129.4, 129.3, 127.8, 127.6, 126.7, 126.0, 125.8, 69.1, 34.7, 33.0, 31.4, 21.4; **HRMS** (ESI) calcd for $C_{27}H_{30}N_3Se$ $[M+H]^+$: 476.1599, found: 476.1603.

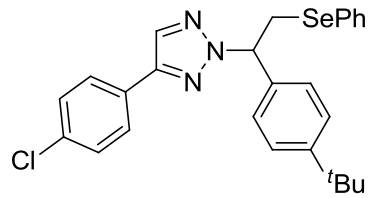
4-(4-bromophenyl)-2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazole (3e)



4-(4-bromophenyl)-1,2,3-triazole (112.0 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 60 – 62 °C) in 77% yield (208.7 mg, 90% yield in total of N^2 and N^1 isomers) and 86% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.80 (s, 1H), 7.63 (d, J = 8.7 Hz, 2H), 7.55 – 7.51 (m, 2H), 7.51 – 7.47 (m, 2H), 7.36 – 7.27 (m, 4H), 7.26 – 7.21 (m, 3H), 5.81 (dd, J = 10.1, 5.2 Hz, 1H), 4.04 (dd, J = 13.1, 10.1 Hz, 1H), 3.60 (dd, J = 13.1, 5.2 Hz, 1H), 1.27 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.7, 146.7, 135.8, 133.9, 132.0, 131.1, 129.6, 129.3, 129.2, 127.7, 127.6, 126.6, 125.8, 122.4, 69.4, 34.7, 33.0, 31.3; **HRMS** (ESI) calcd for $C_{26}H_{27}BrN_3Se$ $[M+H]^+$: 540.0548, found: 540.0547.

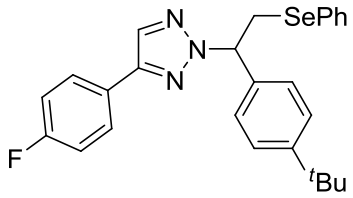
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(4-chlorophenyl)-2*H*-1,2,3-triazole (3f)



4-(4-chlorophenyl)-1,2,3-triazole (89.8 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a white solid (m. p. 50 – 52 °C) in 81% yield (199.3 mg, 97% yield in total of N^2 and N^1 isomers) and 83% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.80 (s, 1H), 7.70 (d, J = 8.6 Hz, 2H), 7.53 – 7.47 (m, 2H), 7.38 (d, J = 8.6 Hz, 2H), 7.33 (d, J = 8.7 Hz, 2H), 7.29 (d, J = 8.6 Hz, 2H), 7.26 – 7.21 (m, 3H), 5.81 (dd, J = 10.1, 5.2 Hz, 1H), 4.04 (dd, J = 13.1, 10.1 Hz, 1H), 3.60 (dd, J = 13.1, 5.2 Hz, 1H), 1.27 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.7, 146.7, 135.8, 134.2, 133.9, 131.1, 129.3, 129.2, 129.1, 129.0, 127.7, 127.3,126.6, 69.4, 34.7, 33.0, 31.3; **HRMS** (ESI) calcd for $C_{26}H_{27}ClN_3Se$ $[M+H]^+$: 496.1053, found: 496.1048.

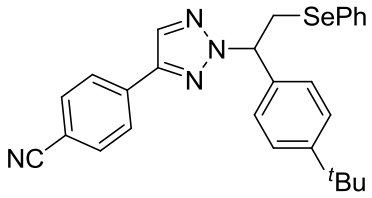
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(4-fluorophenyl)-2*H*-1,2,3-triazole (3g)



4-(4-fluorophenyl)-1,2,3-triazole (81.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a white solid (m. p. 46 – 48 ^{o}C) in 77% yield (183.2 mg, 88% yield in total of N^2 and N^1 isomers) and 87% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.79 (s, 1H), 7.78 – 7.71 (m, 2H), 7.52 – 7.50 (m, 2H), 7.36 – 7.28 (m, 4H), 7.27 – 7.22 (m, 3H), 7.11 (t, J = 8.8 Hz, 2H), 5.83 (dd, J = 10.1, 5.2 Hz, 1H), 4.06 (dd, J = 13.0, 10.1 Hz, 1H), 3.62 (dd, J = 13.0, 5.3 Hz, 1H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 162.9 (d, J_{C-F} = 246.3 Hz), 151.6, 146.9, 135.9, 133.9, 130.9, 129.3, 127.8 (d, J_{C-F} = 8.1 Hz), 127.7, 126.7, 125.8, 115.8(d, J_{C-F} = 21.6 Hz), 69.3, 34.7, 33.0, 31.4; **HRMS** (ESI) calcd for $C_{26}H_{27}FN_3Se$ $[M+H]^+$: 480.1349, found: 480.1349.

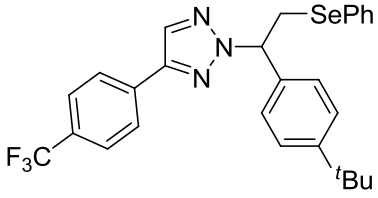
4-(2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazol-4-yl)benzonitrile (3h)



4-(4-cynaophenyl)-1,2,3-triazole (85.1 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 30:1) to afford the title compound as a pale yellow oil in 81% yield (196.9 mg, 92% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.3; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.88(s, 1H); 7.86 (d, J = 8.2 Hz, 2H), 7.69 (d, J = 8.2 Hz, 2H), 7.50 – 7.47 (m, 2H), 7.33 (d, J = 8.4 Hz, 2H), 7.29 (d, J = 8.5 Hz, 2H), 7.25 – 7.22 (m, 3H), 5.82 (dd, J = 10.3, 5.1 Hz, 1H), 4.04 (dd, J = 13.1, 10.3 Hz, 1H), 3.60 (dd, J = 13.2, 5.0 Hz, 1H), 1.27 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.8, 145.9, 135.5, 135.0, 134.0, 132.7, 131.8, 129.3, 129.0, 127.7, 126.6, 126.5, 125.9, 118.9, 111.8, 69.7, 34.7, 32.9, 31.3; **HRMS** (ESI) calcd for $C_{27}H_{27}N_4Se$ $[M+H]^+$: 487.1395, found: 487.1388.

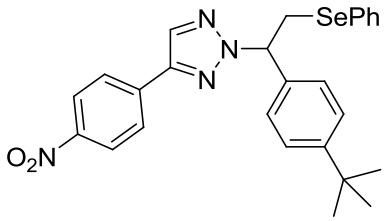
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(4-(trifluoromethyl)phenyl)-2*H*-1,2,3-triazole (3i)



4-(4-(trifluoromethyl))-1,2,3-triazole (106.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 150:1) to afford the title compound as a colorless oil in 76% yield (199.6 mg, 91% yield in total of N^2 and N^1 isomers) and 83% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.3; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.89(s, 1H), 7.88 (d, J = 8.1 Hz, 2H), 7.67 (d, J = 8.2 Hz, 2H), 7.53 – 7.49 (m, 2H), 7.35 (d, J = 8.7 Hz, 2H), 7.31 (d, J = 8.7 Hz, 2H), 7.27 – 7.22 (m, 3H), 5.85 (dd, J = 10.2, 5.2 Hz, 1H), 4.07 (dd, J = 13.1, 10.2 Hz, 1H), 3.62 (dd, J = 13.1, 5.2 Hz, 1H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.8, 146.4, 135.7, 134.0, 131.6, 130.2 (q, J_{C-F} = 32.4 Hz), 129.3, 129.1, 127.7, 126.7, 126.3, 125.9, 124.2 (q, J_{C-F} = 270.4 Hz), 69.5, 34.6, 32.9, 31.3; **HRMS** (ESI) calcd for $C_{27}H_{27}F_3N_3Se$ $[M+H]^+$: 530.1317, found: 530.1319.

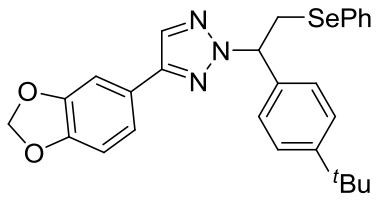
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(4-nitrophenyl)-2*H*-1,2,3-triazole (3j)



4-(4-nitrophenyl)-1,2,3-triazole (95.0 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a pale yellow oil in 80% yield (202.4 mg, 91% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.6; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.27 (d, J = 9.0 Hz, 2H), 7.92 (s, 1H), 7.91 (d, J = 8.8 Hz, 2H), 7.52 – 7.47 (m, 2H), 7.37 – 7.30 (m, 4H), 7.26 – 7.22 (m, 3H), 5.85 (dd, J = 10.3, 5.0 Hz, 1H), 4.06 (dd, J = 13.1, 10.3 Hz, 1H), 3.62 (dd, J = 13.2, 5.1 Hz, 1H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.9, 147.5, 145.5, 136.8, 135.5, 134.0, 132.1, 129.3, 129.0, 127.8, 126.7, 126.6, 125.9, 124.3, 69.8, 34.7, 32.9, 31.3; **HRMS** (ESI) calcd for $C_{26}H_{27}N_4O_2Se$ $[M+H]^+$: 507.1294, found: 507.1295.

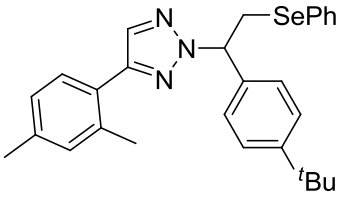
4-(benzo[*d*][1,3]dioxol-5-yl)-2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazole (3k)



4-(benzo[*d*][1,3]dioxol-5-yl)-1,2,3-triazole (94.5 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 30:1) to afford the title compound as a white solid (m. p. 67 – 69 ºC) in 82% yield (206.1 mg, 95% yield in total of N^2 and N^1 isomers) and 86% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.72 (s, 1H), 7.52 – 7.47 (m, 2H), 7.34 – 7.21 (m, 9H), 6.84 (d, J = 8.0 Hz, 1H), 5.98 (s, 2H), 5.78 (dd, J = 10.0, 5.3 Hz, 1H), 4.02 (dd, J = 13.0, 10.0 Hz, 1H), 3.59 (dd, J = 13.0, 5.3 Hz, 1H), 1.26 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.5, 148.2, 147.8, 147.5, 135.9, 133.9, 130.7, 129.3, 129.2, 127.6, 126.6, 125.8, 124.8, 119.8, 108.7, 106.7, 101.3, 69.1, 34.6, 33.0, 31.3; **HRMS** (ESI) calcd for $C_{27}H_{28}N_3O_2Se$ $[M+H]^+$: 506.1341, found: 506.1344.

2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(2,4-dimethylphenyl)-2*H*-1,2,3-triazole (3l)

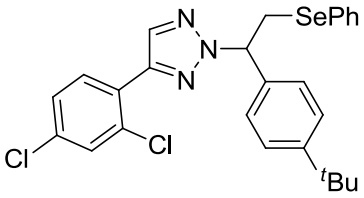


4-(2,4-dimethylphenyl)-1,2,3-triazole (86.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc

= 150:1) to afford the title compound as a colorless oil in 70% yield (172.0 mg, 80% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.6; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.72 (s, 1H), 7.63 – 7.46 (m, 3H), 7.45 – 7.29 (m, 4H), 7.29 – 7.18 (m, 3H), 7.14 – 6.99 (m, 2H), 5.84 (dd, *J* = 10.3, 5.5 Hz, 1H), 4.06 (dd, *J* = 13.1, 10.0 Hz, 1H), 3.62 (dd, *J* = 13.1, 5.4 Hz, 1H), 2.47 (s, 3H), 2.36 (s, 3H), 1.29 (s, 9H);**^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.5, 147.6, 138.2, 136.0, 133.9, 133.2, 131.9, 129.4, 129.3, 129.1, 127.6, 127.1, 126.7, 125.8, 69.0, 34.7, 33.2, 31.4, 21.4, 21.3; **HRMS** (ESI) calcd for $C_{28}H_{32}N_3Se$ $[M+H]^+$: 490.1756, found: 490.1758.

2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(2,4-dichlorophenyl)-2*H*-1,2,3-triazole (3m)

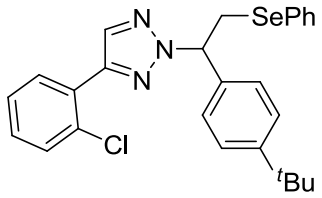


4-(2,4-dichlorophenyl)-1,2,3-triazole (106.0 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a white solid (m. p. 39 – 41 ^{o}C) in 68% yield (180.1 mg, 84% yield in total of N^2 and N^1 isomers) and 81% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.7; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.13 (s, 1H), 7.83 (d, *J* = 8.5 Hz, 1H), 7.50 (dd, *J* = 6.6, 2.9 Hz, 2H), 7.47 (d, *J* = 2.1 Hz, 1H), 7.34 (d, *J* = 8.5 Hz, 2H), 7.32 – 7.28 (m, 3H), 7.26 – 7.22 (m, 3H), 5.84 (dd, *J* = 10.1, 5.3 Hz, 1H), 4.05 (dd, *J* = 13.1, 10.1 Hz, 1H), 3.62 (dd, *J* = 13.1, 5.3 Hz, 1H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.7, 144.0, 135.7, 134.5, 134.2, 133.9, 132.7,

131.3, 130.2, 129.3, 129.2, 128.1, 127.7, 127.5, 126.7, 125.9, 69.5, 34.7, 33.0, 31.4; **HRMS** (ESI) calcd for $C_{26}H_{26}Cl_2N_3Se$ $[M+H]^+$: 530.0664, found: 530.0648.

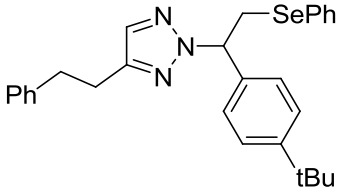
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-(2-chlorophenyl)-2*H*-1,2,3-triazole (3n)



4-(2-chlorophenyl)-1,2,3-triazole (89.9 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 150:1) to afford the title compound as a colorless oil in 71% yield (176.8 mg, 85% yield in total of N^2 and N^1 isomers) and 84% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 8.15 (s, 1H), 7.88 (dd, J = 7.7, 1.9 Hz, 1H), 7.53 – 7.49 (m, 2H), 7.45 (dd, J = 7.7, 1.5 Hz, 1H), 7.35 (d, J = 8.8 Hz, 2H), 7.33 – 7.29 (m, 3H), 7.28 – 7.23 (m, 4H), 5.85 (dd, J = 10.0, 5.4 Hz, 1H), 4.06 (dd, J = 13.0, 10.0 Hz, 1H), 3.63 (dd, J = 13.0, 5.4 Hz, 1H), 1.28 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.6, 144.9, 135.8, 134.3, 133.9, 132.2, 130.6, 130.5, 129.4, 129.4, 129.3, 129.3, 127.7, 127.1, 126.7, 125.8, 69.3, 34.7, 33.0, 31.4; **HRMS** (ESI) calcd for $C_{26}H_{26}ClN_3Se$ $[M+H]^+$: 496.1053, found: 496.1059.

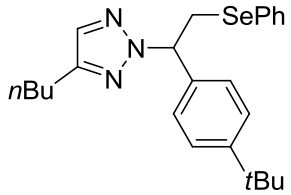
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-4-phenethyl-2*H*-1,2,3-triazole (3o)



4-phenethyl-1,2,3-triazole (89.9 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 83% yield (202.2 mg, 89% yield in total of N^2 and N^1 isomers) and 93% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (dd, *J* = 6.3, 3.0 Hz, 2H), 7.36 – 7.18 (m, 13H), 5.75 (dd, *J* = 10.1, 5.3 Hz, 1H), 4.00 (dd, *J* = 12.9, 10.1 Hz, 1H), 3.57 (dd, *J* = 13.0, 5.3 Hz, 1H), 2.99 (s, 4H), 1.30 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.4, 147.73, 141.2, 136.2, 133.8, 132.9, 129.5, 129.2, 128.6, 128.5, 127.6, 126.6, 126.2, 125.7, 68.7, 35.6, 34.7, 33.0, 31.4, 27.6; **HRMS** (ESI) calcd for $C_{28}H_{32}N_3Se$ $[M+H]^+$: 490.1756, found: 490.1766.

4-butyl-2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazole (3p)

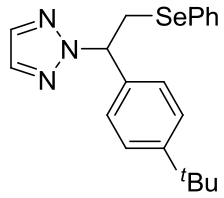


4-butyl-1,2,3-triazole (62.6 mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 150:1) to afford the title compound as a colorless oil in 62% yield (137.2 mg, 67% yield in total of N^2 and N^1 isomers) and 93% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.53 – 7.45 (m, 2H), 7.36 (s, 1H), 7.31 (d, *J* = 8.5 Hz, 2H), 7.27 – 7.19 (m, 5H), 5.73 (dd, *J* = 9.9, 5.5 Hz, 1H), 3.97 (dd, *J* = 12.9, 9.9 Hz, 1H), 3.55 (dd, *J* = 12.9, 5.5 Hz, 1H), 2.76 – 2.54 (m, 2H), 1.66 – 1.59 (m, 2H), 1.42 – 1.33 (m, 2H), 1.27 (s, 9H), 0.93 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.3, 148.7, 136.1, 133.7, 132.6, 129.4,

129.1, 127.5, 126.5, 125.6, 68.6, 34.6, 33.0, 31.4, 31.3, 25.3, 22.4, 13.9; **HRMS** (ESI) calcd for $C_{24}H_{32}N_3Se$ $[M+H]^+$: 442.1756, found: 442.1758.

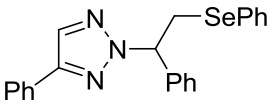
2-(1-(4-*tert*-butylphenyl)-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazole (3q)



1,2,3-triazole (59.6mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (51 – 53 ℃)in 77% yield (147.3 mg, 97% yield in total of N^2 and N^1 isomers) and 79% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.65 (s, 2H), 7.53 (dd, J = 6.4, 3.1 Hz, 2H), 7.35 (d, J = 8.4 Hz, 2H), 7.30 – 7.28 (m, 5H), 5.84 (dd, J = 10.0, 5.4 Hz, 1H), 4.03 (dd, J = 13.0, 10.0 Hz, 1H), 3.62 (dd, J = 13.0, 5.4 Hz, 1H), 1.30 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.6, 135.8, 134.3, 133.9, 129.3, 129.3, 127.7, 126.6, 125.8, 68.9, 34.7, 32.9, 31.3; **HRMS** (ESI) calcd for $C_{20}H_{24}N_3Se$ $[M+H]^+$: 386.1130, found: 386.1130.

4-phenyl-2-(1-phenyl-2-(phenylselanyl)ethyl)-2*H*-1,2,3-triazole (3r)

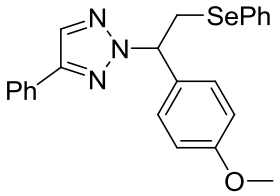


4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with styrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford

the title compound as a white solid (m. p. 60 – 62 °C) in 78% yield (157.7 mg, 92% yield in total of N^2 and N^1 isomers) and 85% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.83 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.53 – 7.48 (m, 2H), 7.40 (t, J = 7.4 Hz, 2H), 7.37 – 7.19 (m, 9H), 5.83 (dd, J = 9.9, 5.5 Hz, 1H), 4.05 (dd, J = 13.0, 9.9 Hz, 1H), 3.61 (dd, J = 13.0, 5.5 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.8, 138.9, 133.9, 131.2, 130.5, 129.3, 129.2, 128.9, 128.8, 128.6, 128.5, 127.7, 126.9, 126.1, 69.4, 33.0; **HRMS** (ESI) calcd for $C_{22}H_{20}N_3Se$ $[M+H]^+$: 406.0817, found: 406.0822.

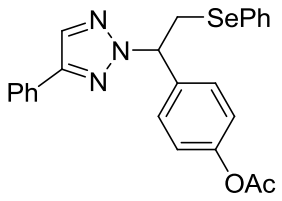
2-(1-(4-methoxyphenyl)-2-(phenylselanyl)ethyl)-4-phenyl-2*H*-1,2,3-triazole (3s)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 4-methoxystyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 82% yield (177.9 mg, 91% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.3; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.82 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.55 – 7.47 (m, 2H), 7.41 (t, J = 7.4 Hz, 2H), 7.36 – 7.29 (m, 3H), 7.27 – 7.22 (m, 3H), 6.84 (d, J = 8.8 Hz, 2H), 5.78 (dd, J = 9.5, 5.9 Hz, 1H), 4.01 (dd, J = 12.9, 9.6 Hz, 1H), 3.76 (s, 3H), 3.62 (dd, J = 12.9, 5.9 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 159.7, 147.6, 133.8, 131.0, 130.9, 130.5, 129.2, 128.8, 128.4, 128.3, 127.6, 126.0, 114.1, 68.8, 55.3, 32.9; **HRMS** (ESI) calcd for $C_{23}H_{22}N_3OSe$ $[M+H]^+$: 436.0923, found: 436.0931.

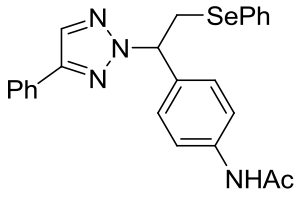
4-(1-(4-phenyl-2*H*-1,2,3-triazol-2-yl)-2-(phenylselanyl)ethyl)phenyl acetate (3t)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 4-vinylphenyl acetate according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 50:1) to afford the title compound as a colorless oil in 82% yield (189.1 mg, 94% yield in total of N^2 and N^1 isomers) and 87% N^2-selectivity.

Rf (petroleum ether: EtOAc = 5:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.83 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.54 – 7.46 (m, 2H), 7.43 – 7.36 (m, 4H), 7.36 – 7.30 (m, 1H), 7.27 – 7.21 (m, 3H), 7.03 (d, J = 8.6 Hz, 2H), 5.82 (dd, J = 9.9, 5.4 Hz, 1H), 4.03 (dd, J = 13.1, 9.9 Hz, 1H), 3.58 (dd, J = 13.1, 5.4 Hz, 1H), 2.25 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 169.3, 150.7, 147.9, 136.4, 133.9, 131.2, 130.4, 129.2, 129.0, 128.8, 128.5, 128.2, 127.7, 126.1, 121.9, 68.8, 32.9, 21.1; **HRMS** (ESI) calcd for $C_{24}H_{22}N_3O_2Se$ $[M+H]^+$: 464.0872, found: 464.0873.

***N*-(4-(1-(4-phenyl-2*H*-1,2,3-triazol-2-yl)-2-(phenylselanyl)ethyl)phenyl)acetamide (3u)**

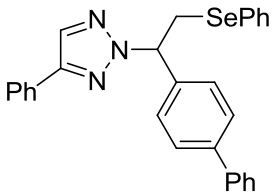


4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with N-(4-vinylphenyl)acetamide according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc

= 3:1) to afford the title compound as a pale yellow oil in 61% yield (139.8mg, 73% yield in total of N^2 and N^1 isomers) and 83% N^2-selectivity.

Rf (petroleum ether: EtOAc = 3:1): 0.2; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.82 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.53 – 7.48 (m, 2H), 7.43 – 7.39 (m, 4H), 7.38 – 7.28 (m, 4H), 7.24 – 7.23 (m, 2H), 5.78 (dd, J = 9.6, 5.8 Hz, 1H), 4.01 (dd, J = 13.0, 9.7 Hz, 1H), 3.59 (dd, J = 13.0, 5.8 Hz, 1H), 2.63 (br, 1H), 2.13 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 168.3, 147.8, 138.1, 134.6, 133.8, 131.1, 130.4, 129.2, 129.1, 128.8, 128.4, 127.7, 127.6, 126.0, 120.0, 68.8, 32.8, 24.6; **HRMS** (ESI) calcd for $C_{24}H_{23}N_4OSe$ $[M+H]^+$: 463.1032, found: 463.1032.

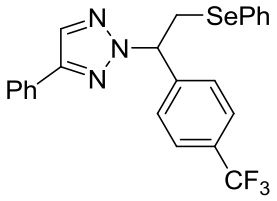
2-(1-(biphenyl-4-yl)-2-(phenylselanyl)ethyl)-4-phenyl-2*H*-1,2,3-triazole (3v)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 4-phenylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 95 – 97 ^{o}C) in 77% yield (184.0 mg, 83% yield in total of N^2 and N^1 isomers) and 93% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.84 (s, 1H), 7.78 (d, J = 7.1 Hz, 2H), 7.55 – 7.48 (m, 6H), 7.46 – 7.35 (m, 6H), 7.35 – 7.26 (m, 2H), 7.26 – 7.20 (m, 3H), 5.88 (dd, J = 9.6, 5.7 Hz, 1H), 4.07 (dd, J = 13.0, 9.7 Hz, 1H), 3.66 (dd, J = 13.0, 5.7 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.9, 141.5, 140.5, 137.8, 133.9, 131.3, 130.5, 129.3, 129.2, 128.9, 128.8, 128.5, 127.7, 127.6, 127.5, 127.2, 126.1, 69.2, 32.9; **HRMS** (ESI) calcd for $C_{28}H_{24}N_3Se$ $[M+H]^+$: 482.1130, found: 482.1120.

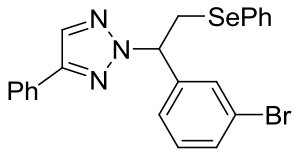
4-phenyl-2-(2-(phenylselanyl)-1-(4-(trifluoromethyl)phenyl)ethyl)-2*H*-1,2,3-triazole (3w)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 4-trifluoromethylstyrene at 70 °C according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 150:1) to afford the title compound as a white solid (m. p. 60 – 62 °C) in 70% yield (166.3 mg, 80% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.6; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.85 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.55 (d, J = 8.3 Hz, 2H), 7.51 – 7.38 (m, 6H), 7.36 – 7.32 (m, 1H), 7.28 – 7.20 (m, 3H), 5.87 (dd, J = 9.2, 6.2 Hz, 1H), 4.01 (dd, J = 13.1, 9.2 Hz, 1H), 3.62 (dd, J = 13.1, 6.1 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 148.1, 142.5, 134.0, 131.4, 130.73 (q, $J_{C\text{-}F}$ = 32.4 Hz), 130.2, 129.3, 128.9, 128.8, 128.6, 127.9, 127.5, 126.1, 125.8 (q, $J_{C\text{-}F}$ = 3.7 Hz), 123.9 (q, $J_{C\text{-}F}$ = 270.6 Hz), 68.83, 32.52; **HRMS** (ESI) calcd for $C_{23}H_{19}F_3N_3Se$ $[M+H]^+$: 474.0691, found: 474.0699.

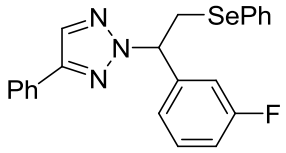
2-(1-(3-bromophenyl)-2-(phenylselanyl)ethyl)-4-phenyl-2*H*-1,2,3-triazole (3x)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 3-bromostyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 44 – 46 °C) in 79% yield (191.4 mg, 91% yield in total of N^2 and N^1 isomers) and 87% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.3; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.84 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.50 – 7.48 (m, 3H), 7.44 – 7.37 (m, 3H), 7.36 – 7.31 (m, 1H), 7.27 – 7.21 (m, 4H), 7.15 (t, J = 7.9 Hz, 1H), 5.76 (dd, J = 9.6, 5.8 Hz, 1H), 3.99 (dd, J = 13.1, 9.6 Hz, 1H), 3.58 (dd, J = 13.1, 5.8 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 148.0, 140.9, 134.0, 131.7, 131.4, 130.4, 130.3, 130.1, 129.3, 128.9, 128.8, 128.6, 127.8, 126.1, 125.7, 122.8, 68.7, 32.6; **HRMS** (ESI) calcd for $C_{22}H_{19}BrN_3Se$ $[M+H]^+$: 483.9922, found: 483.9925.

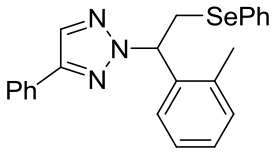
2-(1-(3-fluorophenyl)-2-(phenylselanyl)ethyl)-4-phenyl-2H-1,2,3-triazole (3y)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 3-fluorostyrene at 70 ^{o}C according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 43 – 45 ^{o}C) in 77% yield (163.5 mg, 90% yield in total of N^2 and N^1 isomers) and 86% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.3; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.84 (s, 1H), 7.76 (d, J = 7.1 Hz, 2H), 7.50 (dd, J = 6.5, 3.0 Hz, 2H), 7.40 (t, J = 8.1 Hz, 2H), 7.36 – 7.29 (m, 1H), 7.30 – 7.19 (m, 4H), 7.14 – 7.04 (m, 2H), 7.00 – 6.91 (m, 1H), 5.81 (dd, J = 9.6, 5.7 Hz, 1H), 4.00 (dd, J = 13.1, 9.7 Hz, 1H), 3.59 (dd, J = 13.1, 5.7 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 162.9 (d, J_{C-F} = 245.6 Hz) , 148.0, 141.2 (d, J_{C-F} = 7.0 Hz), 134.0, 131.3, 130.4, 130.3, 129.3, 128.9, 128.8, 128.6, 127.8, 126.1, 122.7 (d, J_{C-F} = 3.0 Hz), 115.5 (d, J_{C-F} = 21.0 Hz), 114.1 (d, J_{C-F} = 22.4 Hz), 68.8, 32.7; **HRMS** (ESI) calcd for $C_{22}H_{19}FN_3Se$ $[M+H]^+$: 424.0723, found: 424.0715.

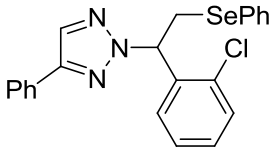
4-phenyl-2-(2-(phenylselanyl)-1-*o*-tolylethyl)-2*H*-1,2,3-triazole (3z)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 2-methylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 70% yield (147.4 mg, 87% yield in total of N^2 and N^1 isomers) and 81% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (s, 1H), 7.78 (d, *J* = 7.1 Hz, 2H), 7.61 – 7.51 (m, 2H), 7.40 (t, *J* = 7.5 Hz, 2H), 7.38 – 7.30 (m, 2H), 7.28 – 7.23 (m, 3H), 7.18 – 7.07 (m, 3H), 6.10 (dd, *J* = 10.2, 4.9 Hz, 1H), 4.03 (dd, *J* = 13.1, 10.2 Hz, 1H), 3.49 (dd, *J* = 13.1, 4.9 Hz, 1H), 2.24 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.7, 137.2, 135.3, 134.4, 131.1, 130.7, 130.6, 129.2, 129.2, 128.8, 128.4, 128.3, 127.8, 126.6, 126.1, 65.2, 32.6, 19.1; **HRMS** (ESI) calcd for $C_{23}H_{22}N_3Se$ $[M+H]^+$: 420.0973, found: 420.0982.

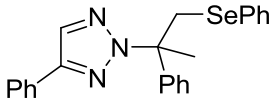
2-(1-(2-chlorophenyl)-2-(phenylselanyl)ethyl)-4-phenyl-2*H*-1,2,3-triazole (3aa)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 2-chlorostyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 73% yield (159.9 mg, 90% yield in total of N^2 and N^1 isomers) and 81% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.89 (s, 1H), 7.80 (d, *J* = 7.1 Hz, 2H), 7.62 – 7.51 (m, 2H), 7.42 (t, *J* = 7.4 Hz, 2H), 7.34 (t, *J* = 7.6 Hz, 2H), 7.26 – 7.24 (m, 4H), 7.21 – 7.14 (m, 2H), 6.39 (dd, *J* = 10.5, 4.4 Hz, 1H), 3.94 (dd, *J* = 13.1, 10.5 Hz, 1H), 3.58 (dd, *J* = 13.2, 4.4 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 148.0, 136.8, 134.4, 132.5, 131.3, 130.4, 129.8, 129.5, 129.1, 129.0, 128.9, 128.5, 127.8, 127.7, 127.4, 126.1, 65.7, 32.0; **HRMS** (ESI) calcd for $C_{22}H_{19}ClN_3Se$ $[M+H]^+$: 440.0427, found: 440.0429.

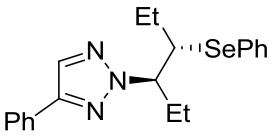
4-phenyl-2-(2-phenyl-1-(phenylselanyl)propan-2-yl)-2*H*-1,2,3-triazole (3ab)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with prop-1-en-2-ylbenzene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 66% yield (137.4 mg, 73% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.90 (s, 1H), 7.80 (d, *J* = 7.1 Hz, 2H), 7.50 – 7.45 (m, 2H), 7.41 (t, *J* = 7.4 Hz, 2H), 7.33 (t, *J* = 7.4 Hz, 1H), 7.29 – 7.22 (m, 3H), 7.22 – 7.17 (m, 3H), 6.98 (dd, *J* = 8.0, 1.6 Hz, 2H), 4.29 (d, *J* = 12.7 Hz, 1H), 3.76 (d, *J* = 12.7 Hz, 1H), 2.25 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.3, 144.5, 133.6, 131.2, 130.9, 130.6, 129.0, 128.8, 128.5, 128.4, 127.7, 127.2, 126.1, 125.1, 71.2, 41.5, 26.4; **HRMS** (ESI) calcd for $C_{23}H_{22}N_3Se$ $[M+H]^+$: 420.0973, found: 420.0969.

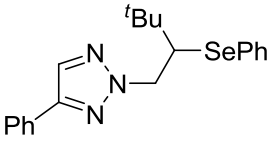
4-phenyl-2-((*3R*,4S)-4-(phenylselanyl)hexan-3-yl)-2*H*-1,2,3-triazole (3ac)**



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with (*E*)-hex-3-ene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 150:1) to afford the title compound as a colorless oil in 76% yield (145.2 mg, 83% yield in total of N^2 and N^1 isomers) and 91% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.6; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.81 (s, 1H), 7.77 (d, *J* = 7.1 Hz, 2H), 7.61 – 7.54 (m, 2H), 7.41 (t, *J* = 7.5 Hz, 2H), 7.33 (t, *J* = 7.4 Hz, 1H), 7.29 – 7.24 (m, 3H), 4.56 (ddd, *J* = 11.1, 9.6, 3.2 Hz, 1H), 3.51 (ddd, *J* = 9.4, 7.9, 4.6 Hz, 1H), 2.55 – 2.45 (m, 1H), 2.23 – 2.12 (m, 1H), 1.40 – 1.26 (m, 2H), 1.04 (t, *J* = 7.2 Hz, 3H), 0.75 (t, *J* = 7.3 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.3, 135.0, 130.6, 130.5, 129.1, 128.8, 128.7, 128.3, 127.8, 126.0, 71.5, 52.8, 26.9, 25.0, 12.1, 10.8; **HRMS** (ESI) Calcd for $C_{20}H_{24}N_3Se$ $[M+H]^+$: 386.1130, found: 386.1120.

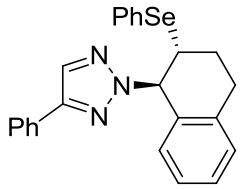
2-(3,3-dimethyl-2-(phenylselanyl)butyl)-4-phenyl-2*H*-1,2,3-triazole (3ad)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 3,3-dimethylbut-1-ene at 70 °C according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a white solid (m. p. 85 – 87 °C) in 66% yield (126.9 mg, 71% yield in total of N^2 and N^1 isomers) and 93% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.76 – 7.61 (m, 3H), 7.40 (t, *J* = 7.4 Hz, 2H), 7.34 – 7.31 (m, 3H), 7.13 – 7.01 (m, 3H), 4.97 (dd, *J* = 14.0, 4.8 Hz, 1H), 4.66 (dd, *J* = 14.0, 10.0 Hz, 1H), 3.81 (dd, *J* = 10.0, 4.8 Hz, 1H), 1.17 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.5, 134.0, 130.7, 130.5, 130.2, 128.8, 128.7, 128.3, 127.1, 126.0, 60.1, 57.7, 35.2, 28.5; **HRMS** (ESI) Calcd for $C_{20}H_{24}N_3Se$ $[M+H]^+$: 386.1130, found: 386.1131.

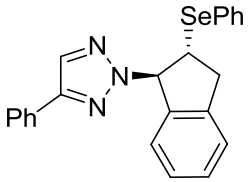
4-phenyl-2-((*1R*,2R)-2-(phenylselanyl)-1,2,3,4-tetrahydronaphthalen-1-yl)-2*H*-1,2,3-triazole (3ae)**



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 1,2-dihydronaphthalene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 77% yield (164.6 mg, 85% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.3; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.84 (s, 1H), 7.79 (dd, *J* = 8.5, 1.5 Hz, 2H), 7.70 – 7.55 (m, 2H), 7.43 (t, *J* = 7.5 Hz, 2H), 7.35 (t, *J* = 7.4 Hz, 1H), 7.31 – 7.21 (m, 3H), 7.22 – 7.07 (m, 2H), 7.08 – 7.00 (m, 1H), 6.76 (d, *J* = 8.1 Hz, 1H), 5.93 (d, *J* = 9.7 Hz, 1H), 4.19 (ddd, *J* = 11.3, 9.2, 3.3 Hz, 1H), 3.44 – 3.03 (m, 1H), 2.96 (dt, *J* = 17.3, 5.3 Hz, 1H), 2.68 – 2.46 (m, 1H), 2.18 – 1.88 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.8, 136.2, 136.1, 133.9, 131.2, 130.6, 129.1, 129.1, 128.9, 128.5, 128.3, 128.1, 127.8, 126.7, 126.6, 126.1, 68.8, 44.2, 29.4, 29.3; **HRMS** (ESI) Calcd for $C_{24}H_{22}N_3Se$ $[M+H]^+$: 432.0973, found: 432.0966.

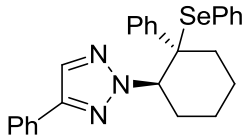
4-phenyl-2-((*1R*,2R)-2-(phenylselanyl)-2,3-dihydro-1*H*-inden-1-yl)-2*H*-1,2,3-triazole (3af)**



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 1*H*-indene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a pale pinke solid (m. p. 62 – 64 °C)in 78% yield (163.0 mg, 87% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.4; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.80 (s, 1H), 7.73 (d, *J* = 7.1 Hz, 2H), 7.59 – 7.50 (m, 2H), 7.40 (t, *J* = 7.4 Hz, 2H), 7.33 (t, *J* = 7.3 Hz, 1H), 7.29 – 7.23 (m, 2H), 7.22 – 7.12 (m, 4H), 7.02 (d, *J* = 7.7 Hz, 1H), 6.18 (d, *J* = 7.1 Hz, 1H), 4.60 (dd, *J* = 15.2, 7.9 Hz, 1H), 3.67 (dd, *J* = 16.2, 8.0 Hz, 1H), 3.14 (dd, *J* = 16.2, 7.9 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 148.0, 141.5, 139.9, 135.3, 131.5, 130.4, 129.1, 129.1, 128.8, 128.4, 128.0, 127.6, 127.4, 126.0, 124.8, 124.3, 75.6, 45.3, 38.4; **HRMS** (ESI) Calcd for $C_{23}H_{20}N_3Se$ $[M+H]^+$: 418.0817, found: 418.0822.

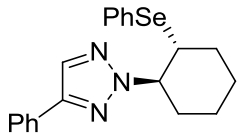
4-phenyl-2-((1R*,2R*)-2-phenyl-2-(phenylselanyl)cyclohexyl)-2*H*-1,2,3-triazole (3ag)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with cyclohexenylbenzene at 70 °C according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a white solid (m. p. 82 – 83 °C) in 44%yield (101.9 mg, 63% yield in total of N^2 and N^1 isomers) and 70% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.5; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.85 (s, 1H), 7.79 (dd, J = 8.5, 1.5 Hz, 2H), 7.54 – 7.37 (m, 2H), 7.34 – 7.32 (m, 1H), 7.31 – 7.27 (m, 2H), 7.24 – 7.15 (m, 3H), 7.17 – 7.02 (m, 5H), 4.88 (d, J = 3.3 Hz, 1H), 3.28 (d, J = 17.9 Hz, 1H), 2.75 (td, J = 13.3, 4.1 Hz, 1H), 2.44 – 2.23 (m, 1H), 2.16 (dd, J = 16.6, 2.1 Hz, 1H), 2.00 – 1.80 (m, 1H), 1.81 – 1.58 (m, 1H), 1.53 (dd, J = 8.9, 7.7 Hz, 1H), 1.37 – 1.22 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.3, 143.4, 135.0, 130.9, 130.8, 130.3, 128.9, 128.8, 128.4, 128.1, 127.7, 127.6, 126.1, 125.6, 72.1, 53.1, 30.3, 29.7, 21.6, 20.8; **HRMS** (ESI) Calcd for $C_{26}H_{26}N_3Se$ $[M+H]^+$: 460.1286, found: 460.1283.

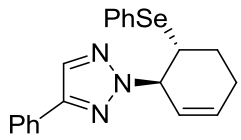
4-phenyl-2-((1*R,2*R**)-2-(phenylselanyl)cyclohexyl)-2H-1,2,3-triazole (3ah)**



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with cyclohexene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 100:1) to afford the title compound as a colorless oil in 76% yield (146.1 mg, 84% yield in total of N^2 and N^1 isomers) and 91% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.5; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.75 (d, J = 7.1 Hz, 2H), 7.74 (s, 1H), 7.48 (dd, J = 8.0, 1.5 Hz, 2H), 7.41 (t, J = 7.5 Hz, 2H), 7.32 (t, J = 7.4 Hz, 1H), 7.23 – 7.13 (m, 3H), 4.51 (td, J = 11.4, 4.2 Hz, 1H), 3.78 – 3.66 (m, 1H), 2.37 – 2.32 (m, 1H), 2.22 – 2.17 (m, 1H), 2.03 (qd, J = 12.8, 3.8 Hz, 1H), 1.91 – 1.82 (m, 1H), 1.81 – 1.72 (m, 1H), 1.61 – 1.51 (m, 1H), 1.50 – 1.32 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.1, 136.3, 130.8, 130.4, 128.8, 128.7, 128.2, 127.9, 126.9, 126.0, 68.6, 46.9, 34.2, 34.1, 26.6, 24.9; **HRMS** (ESI) Calcd for $C_{20}H_{22}N_3Se$ $[M+H]^+$: 384.0973, found: 384.0982.

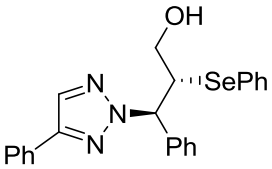
4-phenyl-2-((1*R,6*R**)-6-(phenylselanyl)cyclohex-2-enyl)-2*H*-1,2,3-triazole (3ai)**



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with cyclohexa-1,3-diene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a colorless oil in 83% yield (157.5 mg, 92% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 20:1): 0.4; ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.79 (s, 1H), 7.77 (d, J = 7.1 Hz, 2H), 7.55 (dd, J = 7.7, 1.8 Hz, 2H), 7.42 (t, J = 7.4 Hz, 2H), 7.33 (t, J = 7.4 Hz, 1H), 7.26 – 7.18 (m, 3H), 6.07 – 5.96 (m, 1H), 5.73 (dd, J = 10.0, 1.9 Hz, 1H), 5.39 – 5.24 (m, 1H), 3.94 (ddd, J = 11.2, 8.3, 3.0 Hz, 1H), 2.39 – 2.22 (m, 3H), 2.03 – 1.79 (m, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 147.7, 135.7, 131.0, 130.9, 130.6, 128.9, 128.8, 128.3, 128.0, 127.1, 126.0, 125.0, 66.0, 43.6, 28.4, 25.1.

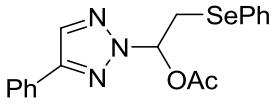
(*2R,*3R**)-3-phenyl-3-(4-phenyl-2*H*-1,2,3-triazol-2-yl)-2-(phenylselanyl)propan-1-ol (3aj)**



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with cinnamic alcohol according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 10:1) to afford the title compound as a white solid (m. p. 43 – 45 ^{o}C) in 59% yield (127.1 mg, 65% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 3:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.85 (s, 1H), 7.76 (d, *J* = 7.1 Hz, 2H), 7.45 (dd, *J* = 6.5, 3.1 Hz, 2H), 7.41 (dt, *J* = 10.9, 4.3 Hz, 4H), 7.35 – 7.27 (m, 5H), 7.25 – 7.20 (m, 2H), 5.97 (d, *J* = 10.2 Hz, 1H), 4.25 (dt, *J* = 10.1, 4.1 Hz, 1H), 3.70 – 3.64 (m, 1H), 3.62 – 3.57 (m, 1H), 2.98 (dd, *J* = 7.7, 5.6 Hz, 1H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 148.0, 137.0, 135.7, 131.2, 130.1, 129.2, 128.9, 128.7, 128.6, 128.4, 128.1, 127.6, 126.1, 70.2, 61.5, 53.1; **HRMS** (ESI) calcd for $C_{23}H_{22}N_3OSe$ $[M+H]^+$: 436.0923, found: 436.0918.

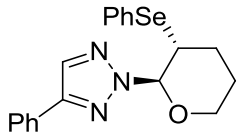
1-(4-phenyl-2*H*-1,2,3-triazol-2-yl)-2-(phenylselanyl)ethyl acetate (3ak)



4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with vinyl acetate at 70 °C according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 20:1) to afford the title compound as a colorless oil in 63% yield (121.7 mg, 70% yield in total of N^2 and N^1 isomers) and 90% N^2-selectivity.

Rf (petroleum ether: EtOAc = 3:1): 0.6; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.87 (s, 1H), 7.77 (d, *J* = 7.0 Hz, 2H), 7.58 – 7.51 (m, 2H), 7.43 (t, *J* = 7.3 Hz, 2H), 7.37 (t, *J* = 7.3 Hz, 1H), 7.29 – 7.23 (m, 3H), 7.13 (dd, *J* = 7.7, 6.2 Hz, 1H), 3.75 (dd, *J* = 13.3, 7.7 Hz, 1H), 3.64 (dd, *J* = 13.3, 6.2 Hz, 1H), 2.04 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 169.0, 148.8, 133.9, 132.3, 129.7, 129.3, 128.9, 128.9, 128.2, 127.9, 126.2, 83.9, 29.4, 20.7; **HRMS** (ESI) calcd for $C_{18}H_{18}N_3O_2Se$ $[M+H]^+$: 388.0559, found: 388.0552.

4-phenyl-2-((*2R*,3R)-3-(phenylselanyl)tetrahydro-2*H*-pyran-2-yl)-2*H*-1,2,3-triazole (3al)**

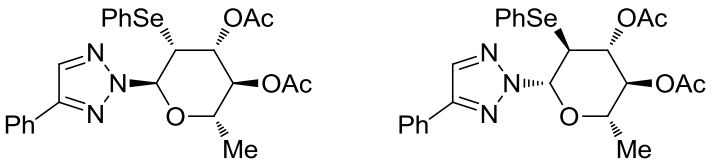


4-phenyl-1,2,3-triazole (72.6 mg, 0.5 mmol) was reacted with 3,4-dihydro-2*H*-pyran according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 80:1) to afford the title compound as a white solid (m. p. 58 – 60 °C) in 77% yield (148.8 mg, 88% yield in total of N^2 and N^1 isomers) and 88% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.77 (s, 1H), 7.73 (dd, J = 8.5, 1.5 Hz, 2H), 7.46 (dd, J = 8.3, 1.5 Hz, 2H), 7.44 – 7.27 (m, 3H), 7.23 – 7.09 (m, 3H), 5.66 (d, J = 9.9 Hz, 1H), 4.12 (ddd, J = 6.9, 4.4, 2.1 Hz, 1H), 4.06 – 3.91 (m, 1H), 3.65 (td, J = 11.9, 2.5 Hz, 1H), 2.55 – 2.42 (m, 1H), 2.13 – 1.86 (m, 1H), 1.80 – 1.66 (m, 2H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 148.3, 136.6, 131.8, 130.2, 128.9, 128.8, 128.7, 128.4, 126.3, 125.9, 93.2, 68.1, 42.3, 30.8, 26.6; **HRMS** (ESI) calcd for $C_{19}H_{20}N_3OSe$ $[M+H]^+$: 386.0766, found: 386.0759.

(*2S*,3R*,4R*,5R*,6R)-4-methyl-6-(4-phenyl-2*H*-1,2,3-triazol-2-yl)-5-(phenylselanyl)tetrahydro-2*H*-pyran-2,3-diyl diacetate (3am)**

(*2S*,3R*,4R*,5R*,6R)-4-methyl-6-(4-phenyl-1*H*-1,2,3-triazol-1-yl)-5-(phenylselanyl)tetrahydro-2*H*-pyran-2,3-diyl diacetate (3an)**



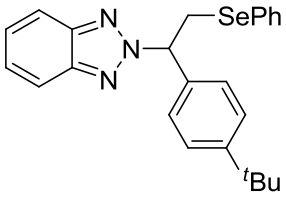
3am, **3an**, 66% (dr = 1:1.2, N^2/N^1 > 95/5)

4-phenyl-1,2,3-triazole (108.8 mg, 0.75 mmol) was reacted with diacetyl-L-rhamnal (107.1 mg, 0.5 mmol) according at 70 ^{o}C to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 20:1) to afford the title compound as a pale yellow oil in 66% yield (76 mg of **3am**; 93 mg of **3an**) and N^1 isomers have not been found on crude ^{1}H NMR.

3am: Rf (petroleum ether: EtOAc = 3:1): 0.5; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.89 (s, 1H), 7.79 (d, *J* = 7.0 Hz, 2H), 7.54 (dd, *J* = 7.8, 1.7 Hz, 2H), 7.44 (t, *J* = 7.3 Hz, 2H), 7.37 (t, *J* = 7.3 Hz, 1H), 7.27 – 7.20 (m, 3H), 6.35 (d, *J* = 3.9 Hz, 1H), 5.98 (dd, *J* = 7.4, 4.6 Hz, 1H), 5.16 (dd, *J* = 8.3, 7.7 Hz, 1H), 4.66 – 4.56 (m, 1H), 3.94 – 3.87 (m, 1H), 2.09 (s, 3H), 1.97 (s, 3H), 1.25 (d, *J* = 6.3 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 170.0, 169.8, 148.4, 135.2, 132.0, 129.8, 129.3, 128.9, 128.9, 128.4, 127.7, 126.2, 89.0, 72.2, 71.7, 70.0, 45.0, 20.9, 20.7, 17.6; **HRMS** (ESI) calcd for $C_{24}H_{26}N_3O_5Se$ $[M+H]^+$: 516.1032, found: 516.1033.

3an: Rf (petroleum ether: EtOAc = 3:1): 0.4; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.88 (s, 1H), 7.74 (dd, *J* = 8.3, 1.3 Hz, 2H), 7.48 – 7.45 (m, 2H), 7.42 (d, *J* = 7.5 Hz, 2H), 7.37 (t, *J* = 7.3 Hz, 1H), 7.30 – 7.26 (m, 1H), 7.22 (t, *J* = 7.2 Hz, 2H), 5.67 (d, *J* = 10.6 Hz, 1H), 5.25 (dd, *J* = 11.4, 9.0 Hz, 1H), 4.97 (t, *J* = 9.4 Hz, 1H), 4.19 – 4.08 (m, 1H), 3.70 – 3.63 (m, 1H), 2.12 (s, 3H), 2.06 (s, 3H), 1.22 (d, *J* = 6.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 170.2, 169.9, 148.7, 136.9, 132.2, 129.8, 129.1, 128.9, 128.8, 128.8, 126.2, 124.6, 90.2, 74.3, 72.7, 72.4, 46.1, 20.9, 20.8, 17.3; **HRMS** calcd for $C_{24}H_{26}N_3O_5Se$ $[M+H]^+$: 516.1032, found: 516.1039.

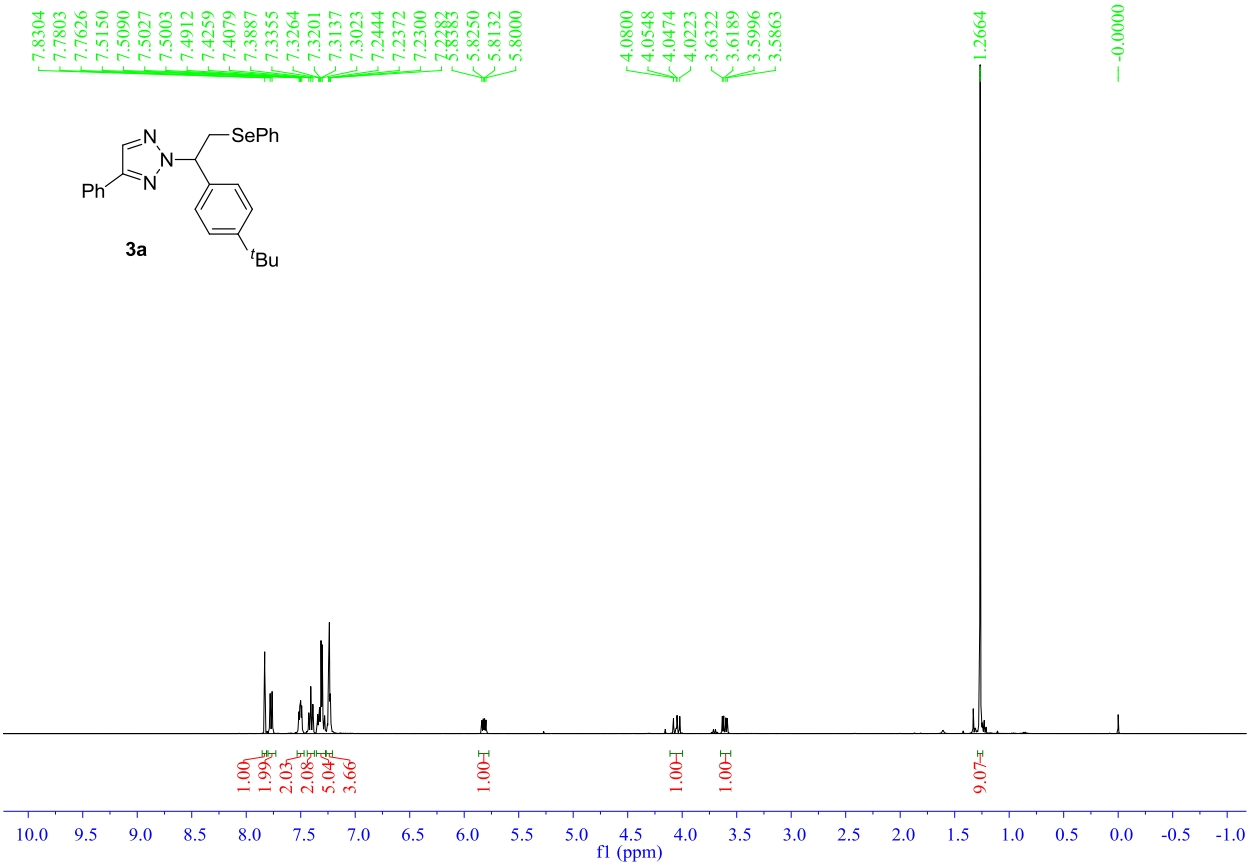
2-(1-(4-tert-butylphenyl)-2-(phenylselanyl)ethyl)-2H-benzo[d][1,2,3]triazole (5)



Benzotriazole (59.6mg, 0.5 mmol) was reacted with 4-*t*-butylstyrene according to General Procedure. The crude product was purified by column chromatography (petroleum ether: EtOAc = 200:1) to afford the title compound as a white solid (65 – 67 ℃)in 69% yield (148.9 mg, 98% yield in total of N^2 and N^1 isomers) and 70% N^2-selectivity.

Rf (petroleum ether: EtOAc = 10:1): 0.6; **^{1}H NMR** (400 MHz, $CDCl_3$): δ 7.87 – 7.79 (m, 2H), 7.51 – 7.44 (m, 2H), 7.38 – 7.30 (m, 6H), 7.23 – 7.16 (m, 3H), 6.08 (dd, *J* = 9.9, 5.4 Hz, 1H), 4.20 (dd, *J* = 13.1, 9.9 Hz, 1H), 3.71 (dd, *J* = 13.1, 5.4 Hz, 1H), 1.25 (s, 9H); **^{13}C NMR** (100 MHz, $CDCl_3$): δ 151.8, 144.2, 135.4, 134.0, 129.2, 128.9, 127.7, 126.8, 126.3, 125.8, 118.3, 70.8, 34.6, 32.7, 31.3; **HRMS** (ESI) calcd for $C_{24}H_{26}N_3Se$ $[M+H]^+$: 436.1286, found: 436.1294.

4. ^{1}H and ^{13}C NMR Spectra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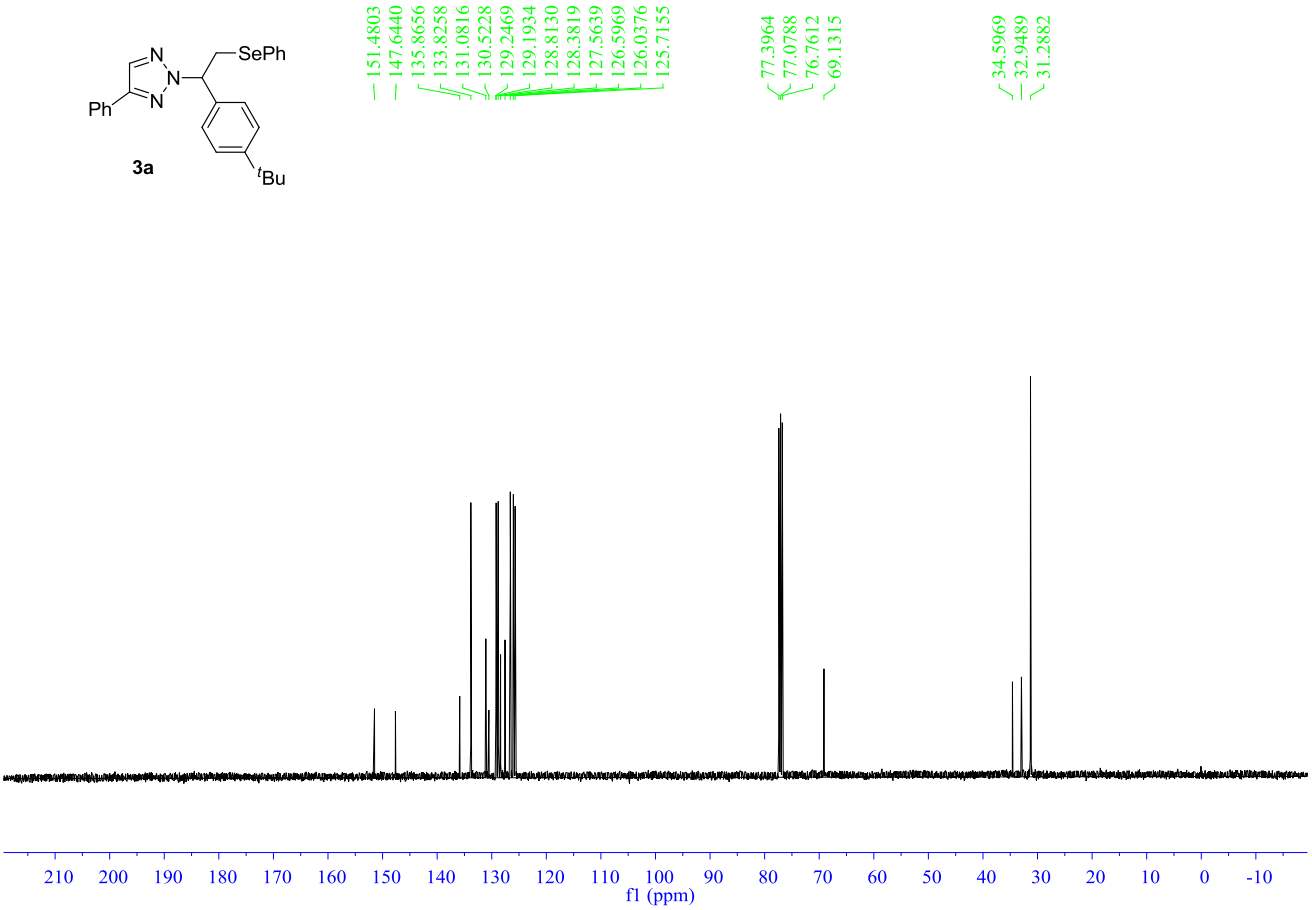
7.4079
7.3887
7.3355
7.3264
7.3201
7.3137
7.3023
7.2444
7.2372
7.2300
7.2282
7.2250
5.8383
5.8250
5.8132
5.8000
4.0800
4.0548
4.0474
4.0223
3.6322
3.6189
3.5996
3.5863
1.2664
-0.0000
SePh
Ph
N
N
N
3a
tBu
1.00
1.99
2.03
2.08
5.04
3.66
1.00
1.00
1.00
9.07
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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131.0816
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127.5639
126.5969
126.0376
125.7155
77.3964
77.0788
76.7612
69.1315
34.5969
32.9489
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Ph
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N
N
3a
tBu
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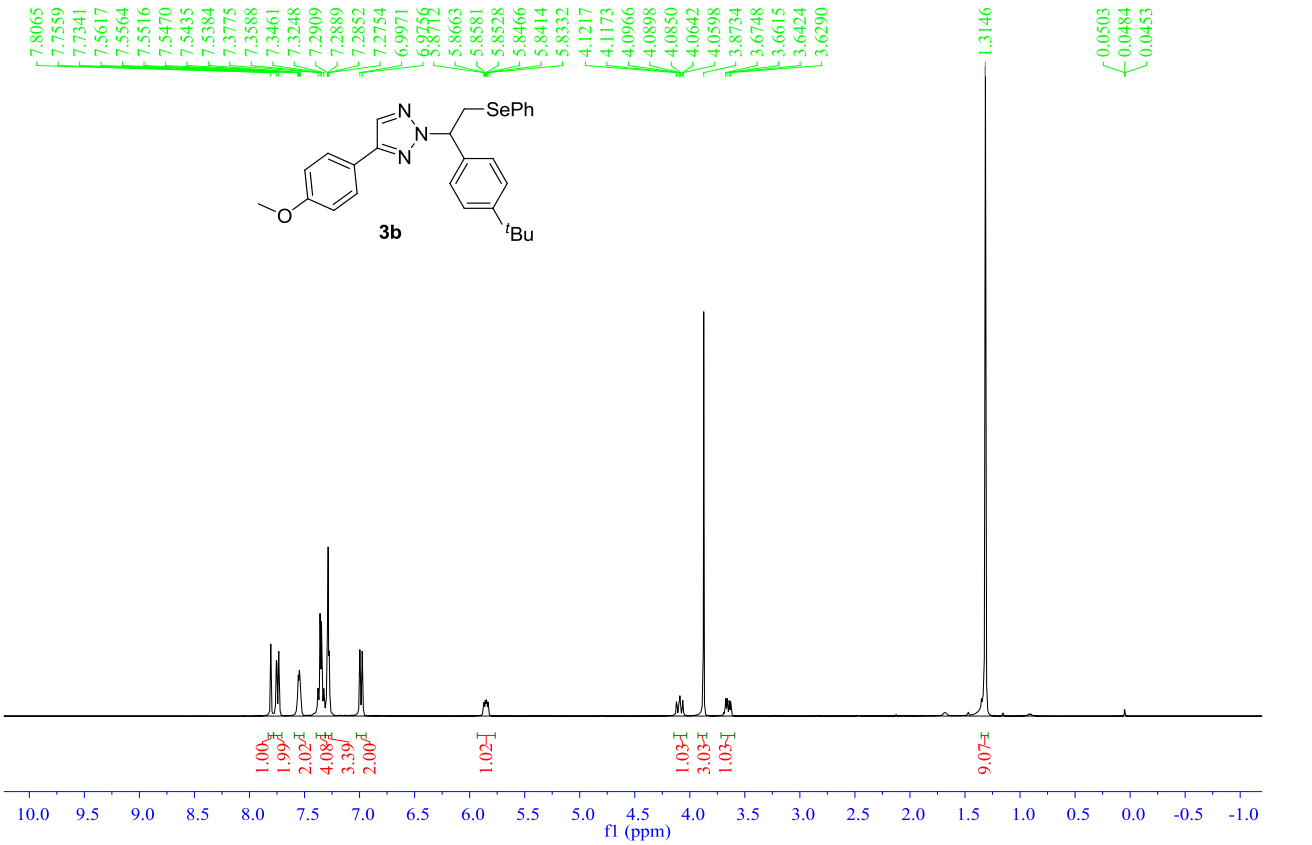
f1 (ppm)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7.2889
7.2852
7.2754
6.9971
6.9756
3.8712
5.8663
5.8581
5.8528
5.8466
5.8414
5.8332
4.1217
4.1173
4.0966
4.0898
4.0850
4.0642
4.0598
3.8734
3.6748
3.6615
3.6424
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tBu
1.00
1.99
2.02
4.08
3.39
2.00
1.02
1.03
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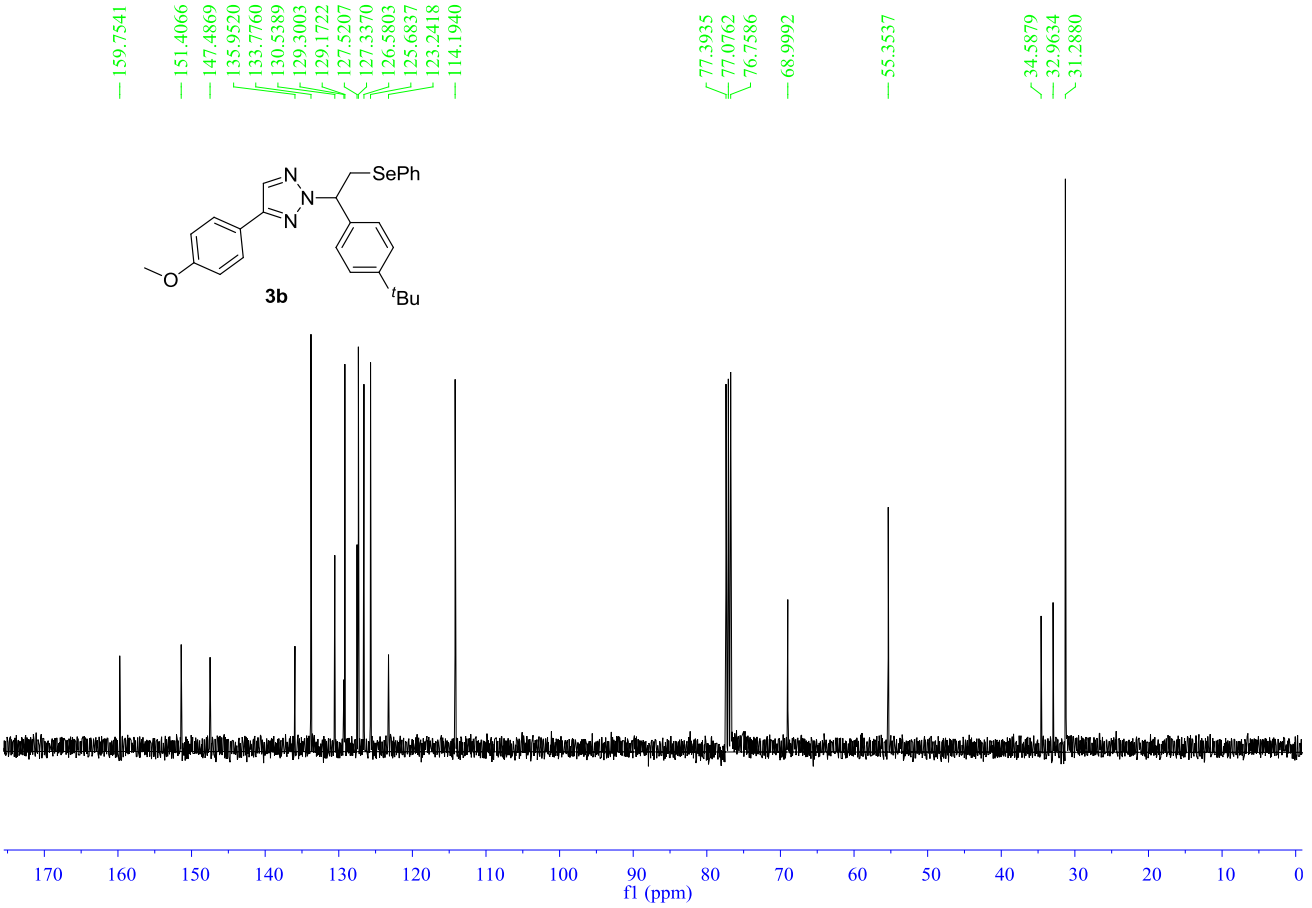
1.03
9.07
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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135.9520
133.7760
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127.3370
126.5803
125.6837
123.2418
114.1940
77.3935
77.0762
76.7586
68.9992
55.3537
34.5879
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N
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O
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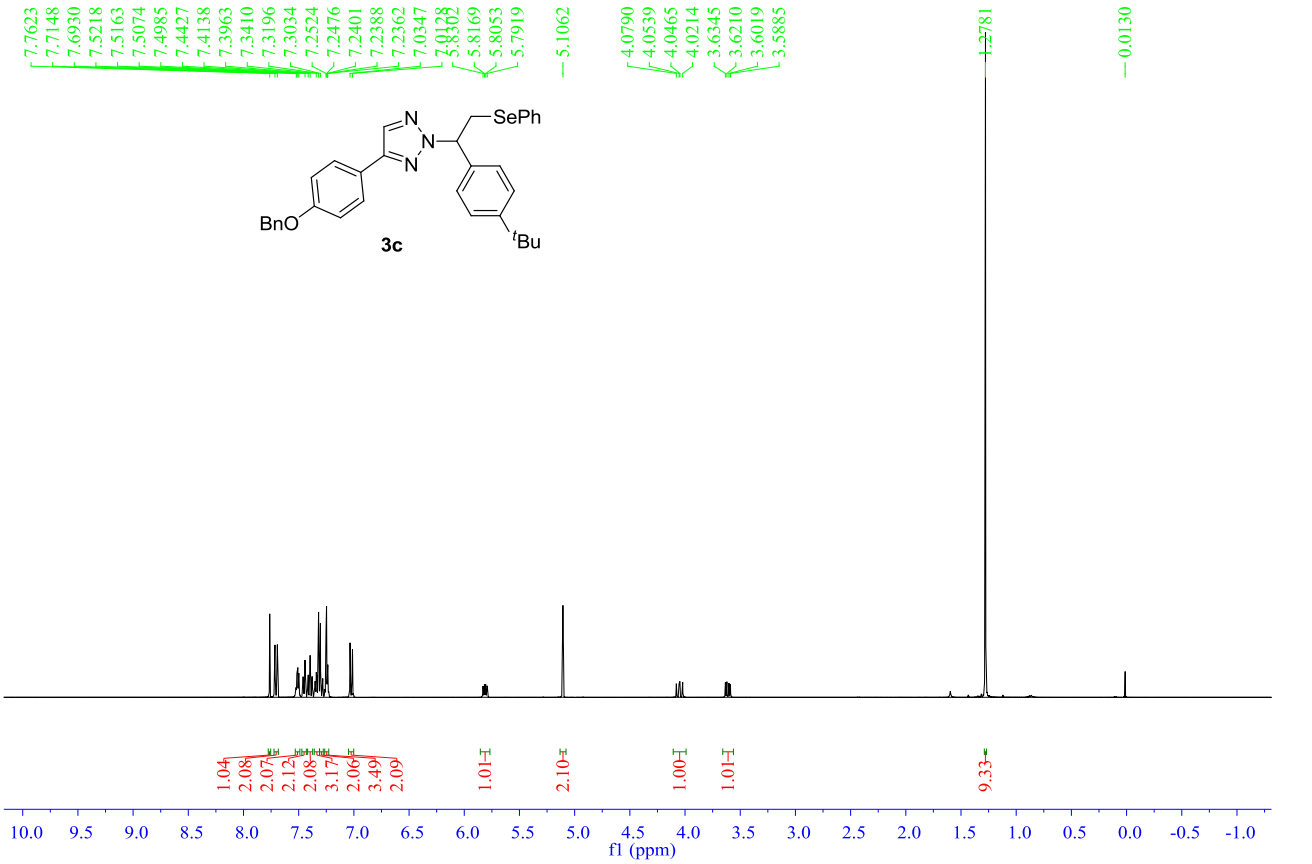
f1 (ppm)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5.1062
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3.6210
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BnO
tBu
3c
1.04
2.08
2.07
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2.08
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2.06
3.49
2.09
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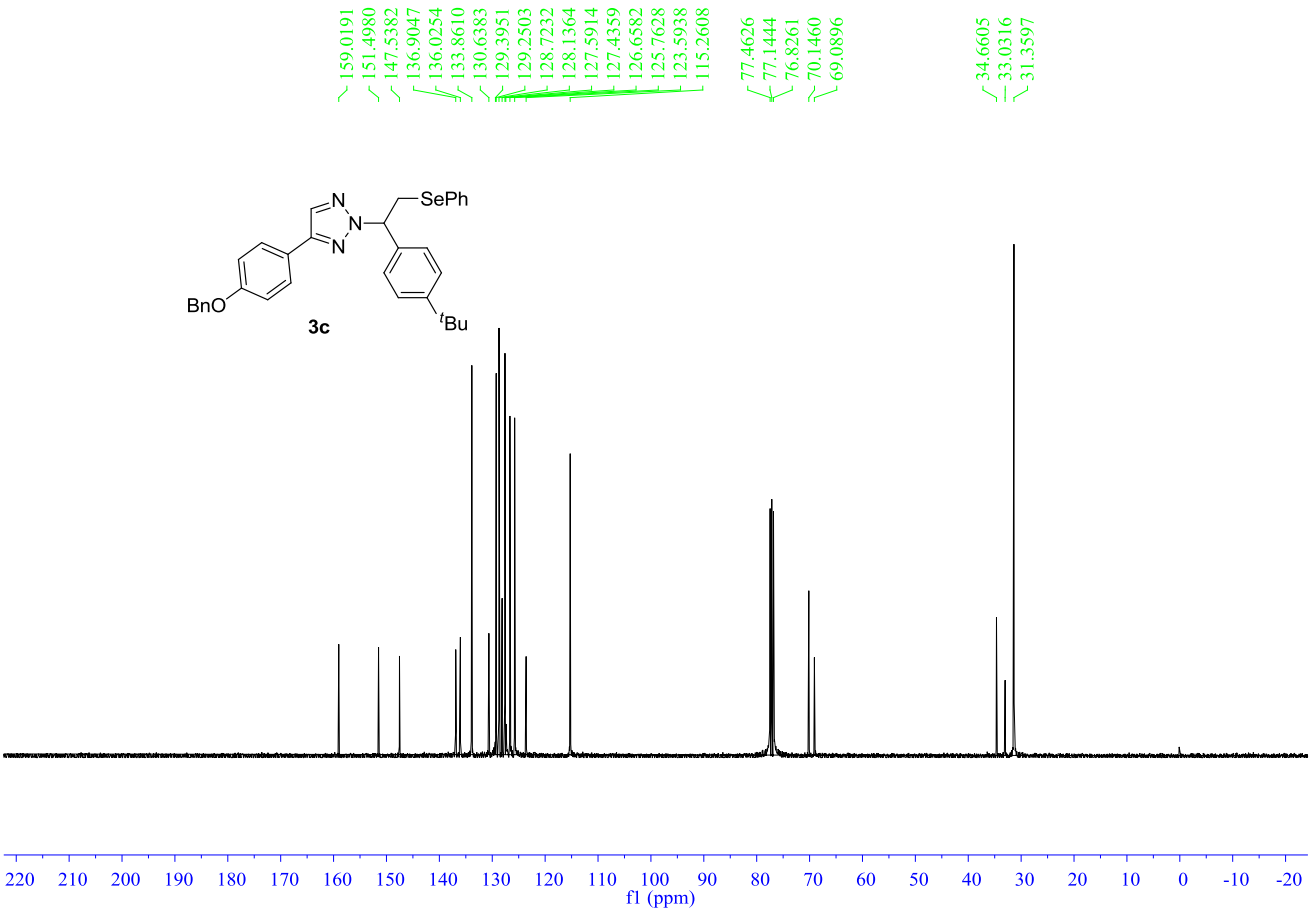
2.10
1.00
1.01
9.33
fl (ppm)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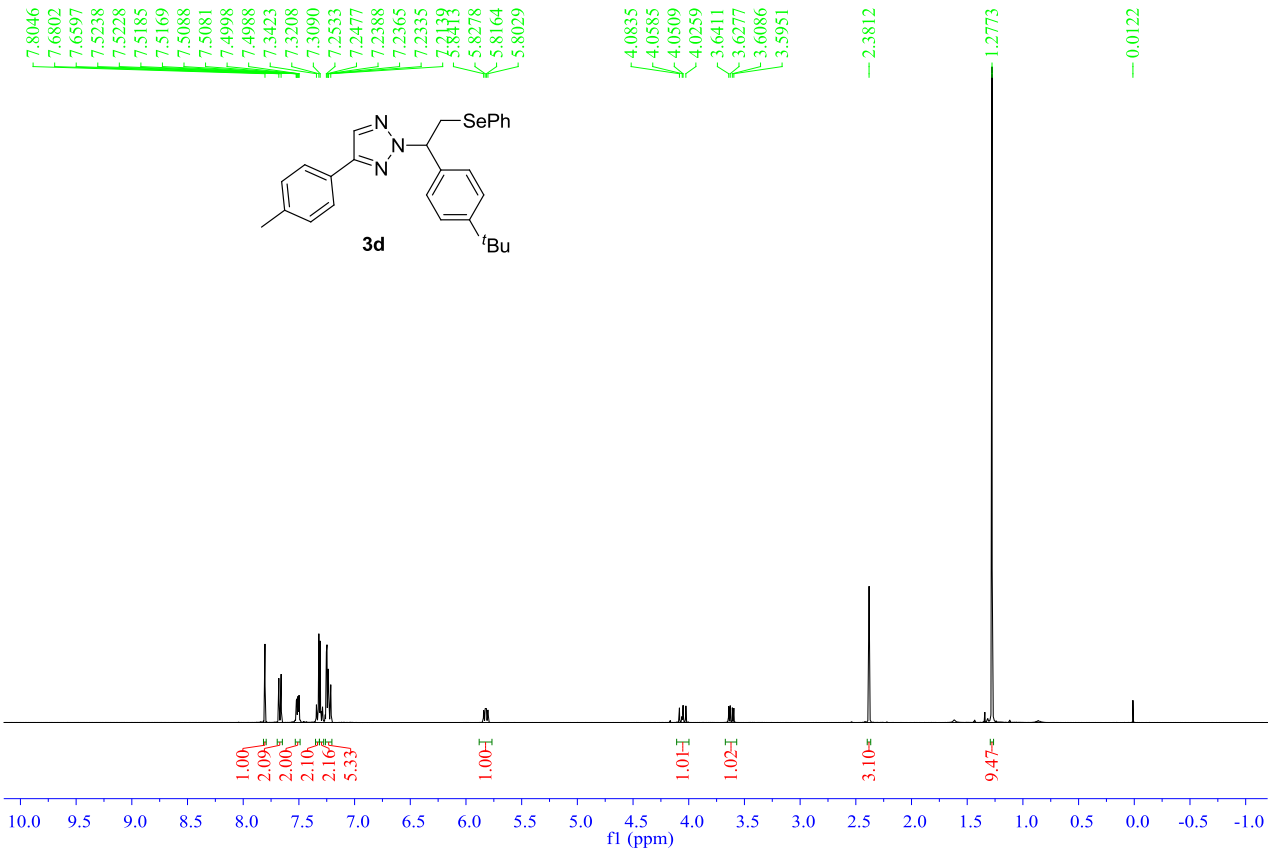
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4.0509
4.0259
3.6411
3.6277
3.6086
3.5951
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SePh
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tBu
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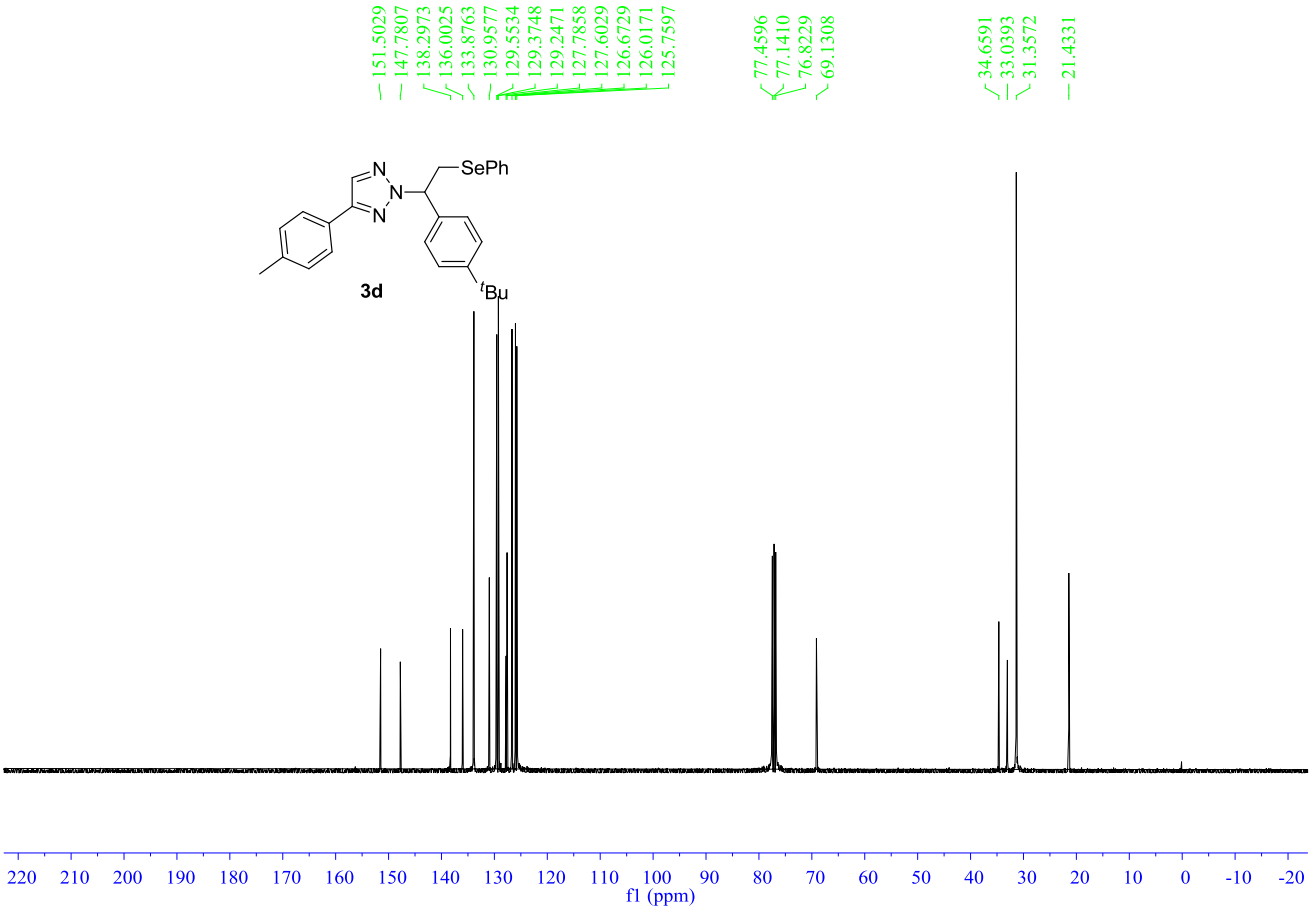
2.09
2.00
2.10
2.16
5.33
1.00
1.01
1.02
3.10
9.47
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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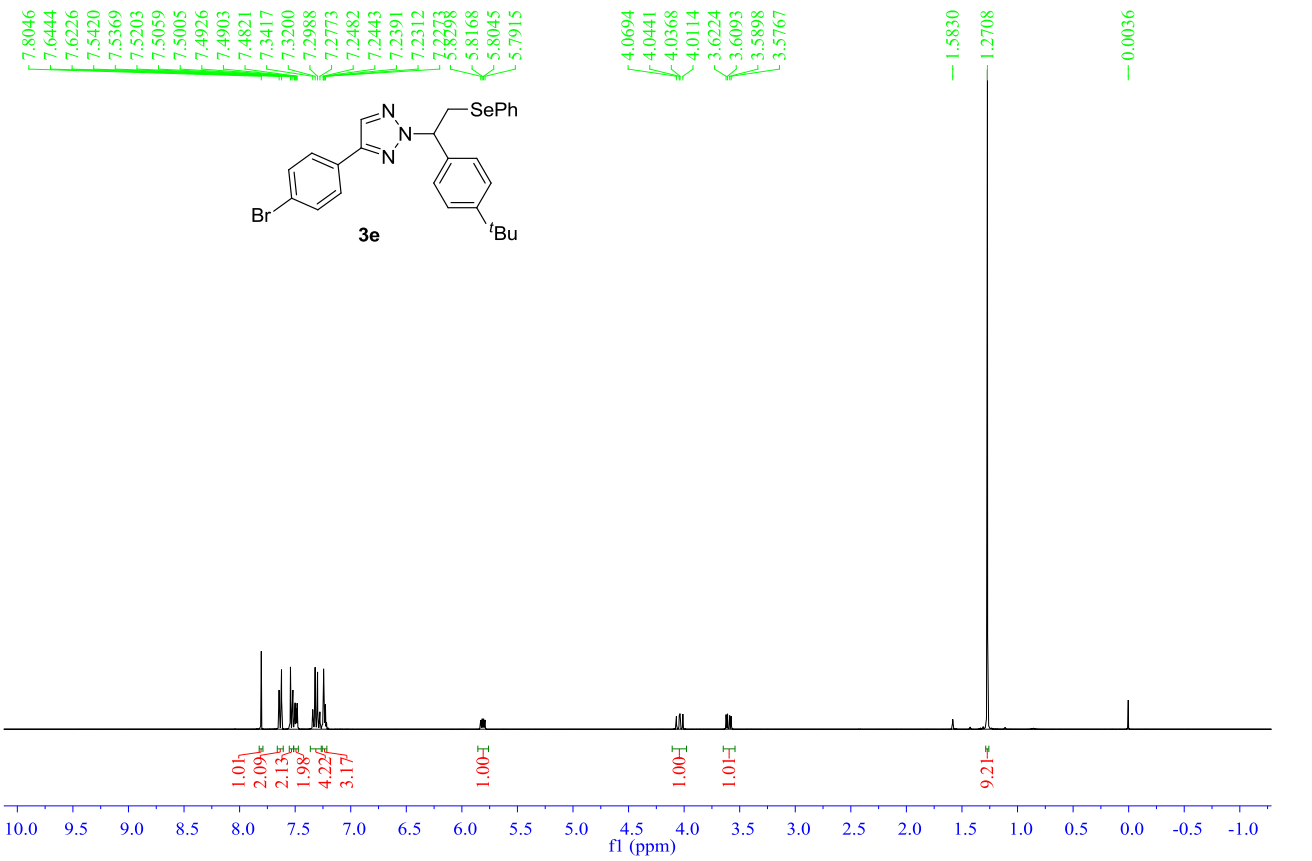
f1 (ppm)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SePh
Br
tBu
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1.00
1.00
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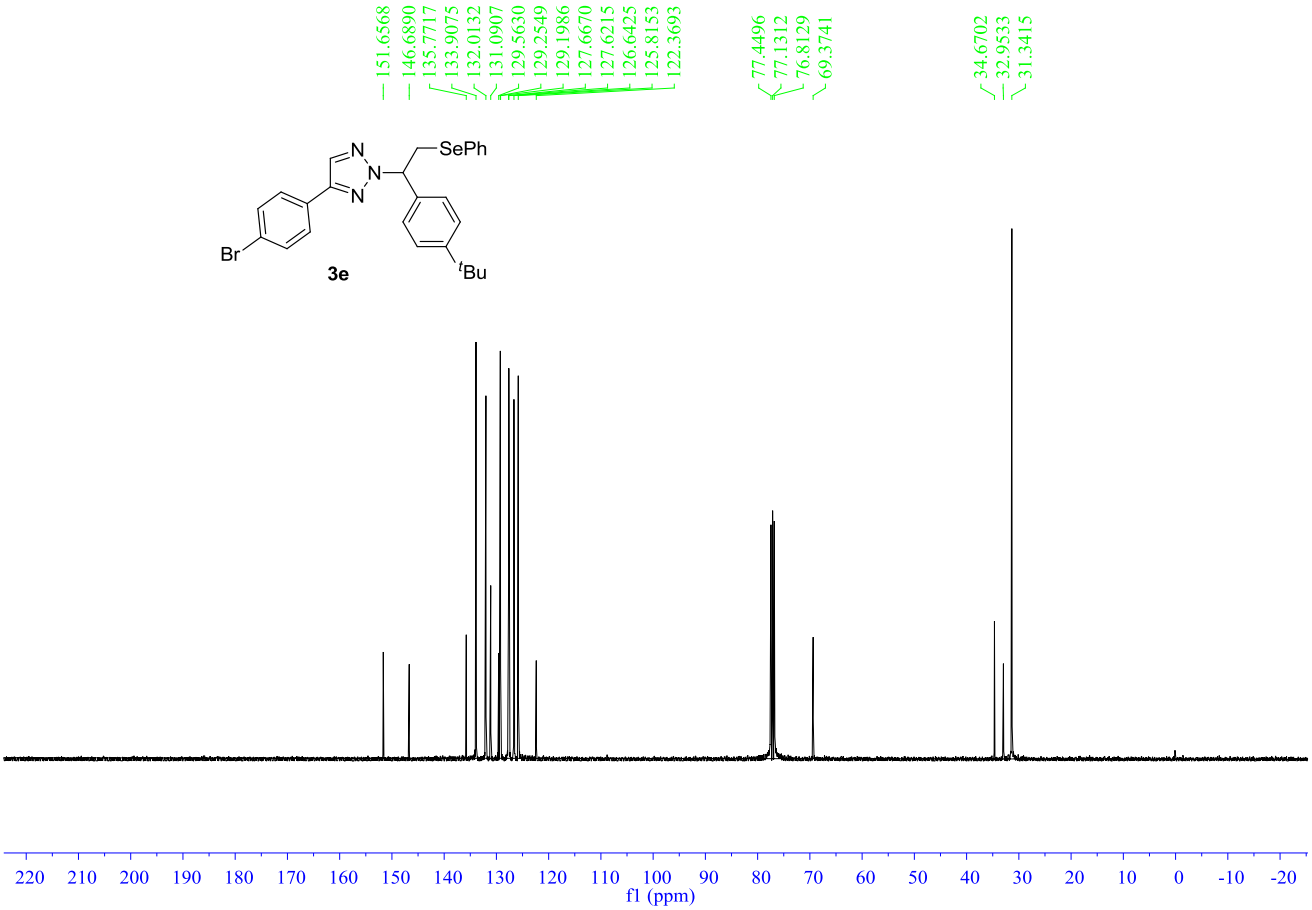
9.21
f1 (ppm)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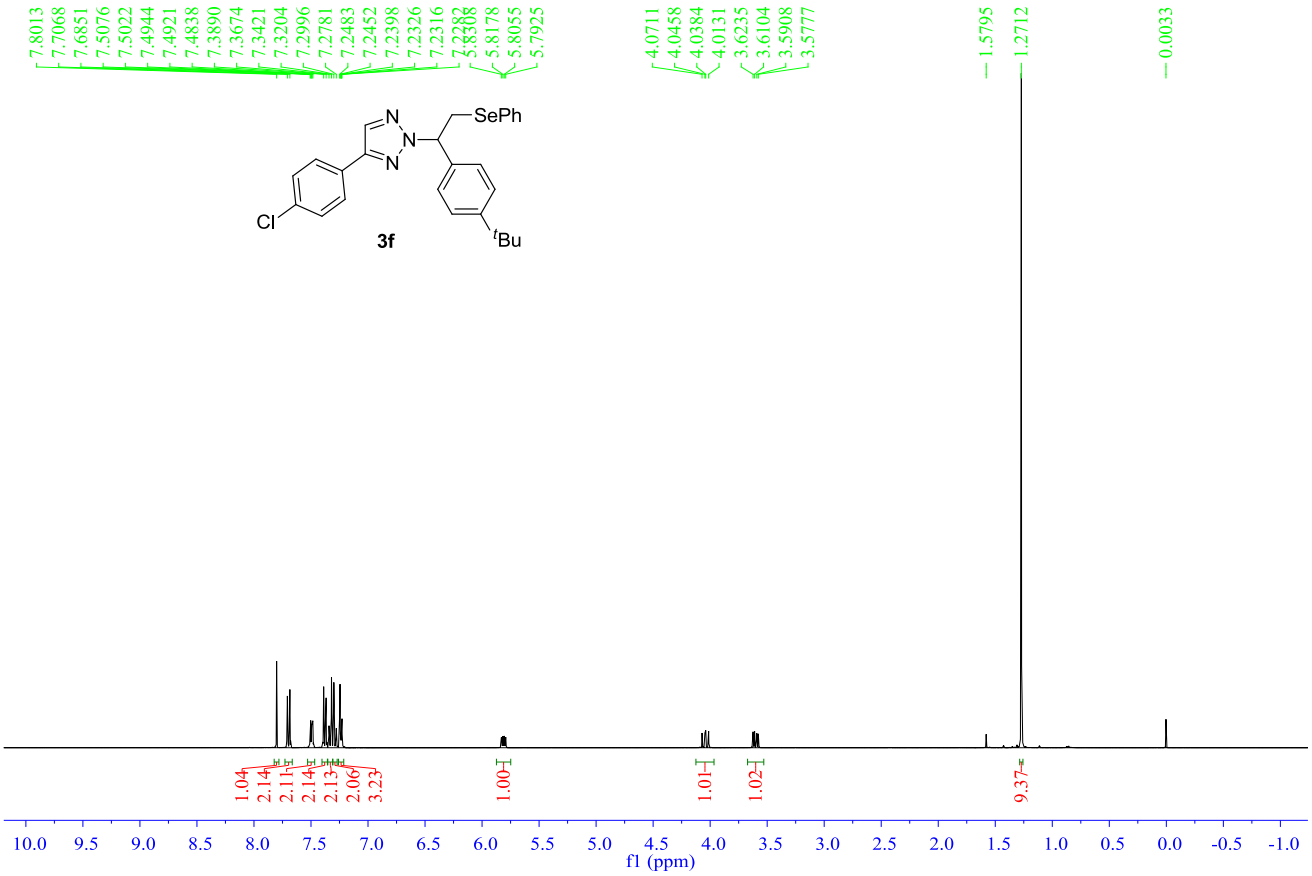
125.8153
122.3693
77.4496
77.1312
76.8129
69.3741
34.6702
32.9533
31.3415
SePh
Br
tBu
3e
f1 (ppm)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7.4921
7.4838
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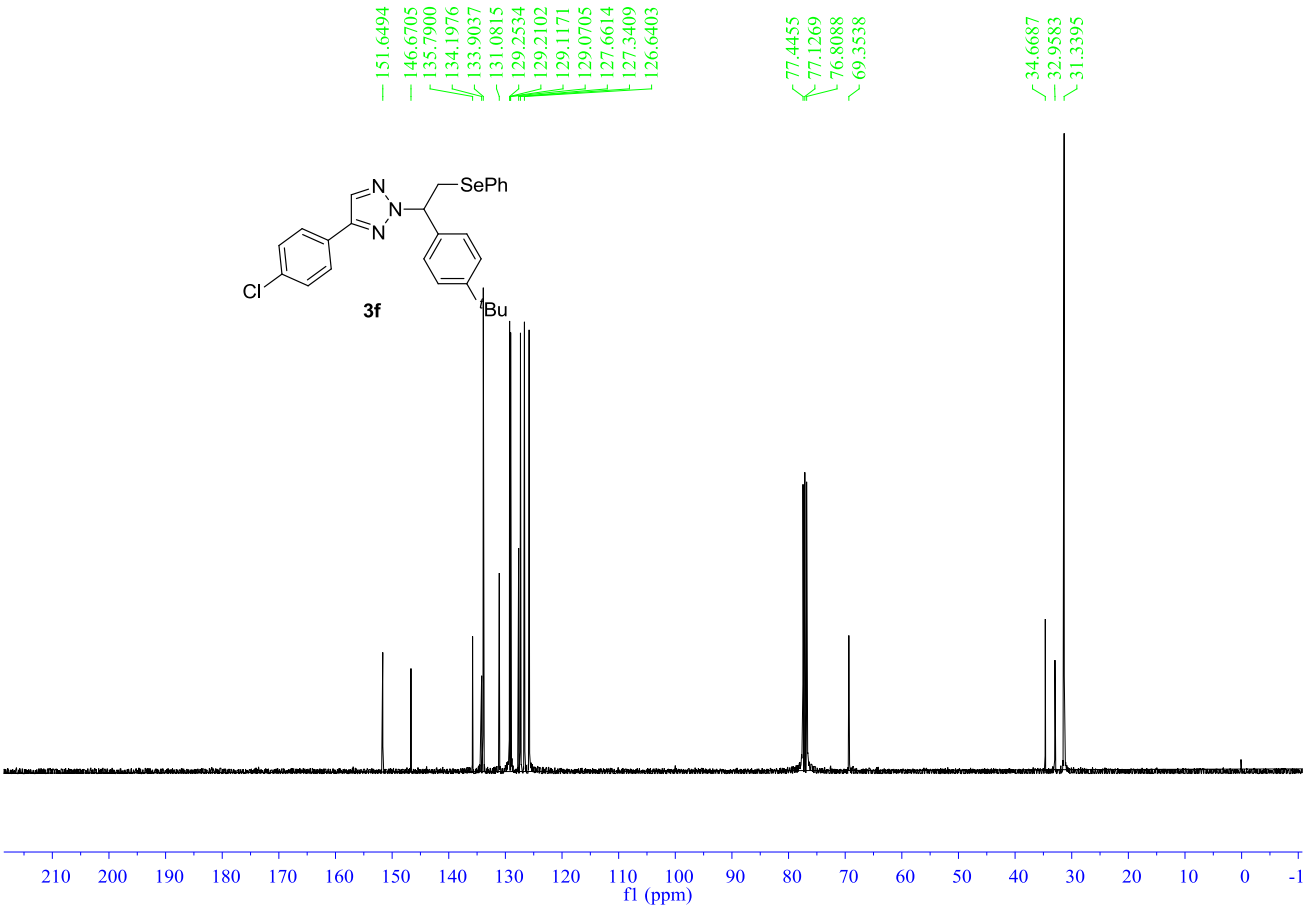
7.3421
7.3204
7.2996
7.2781
7.2483
7.2452
7.2398
7.2326
7.2316
7.2282
5.8308
5.8178
5.8055
5.7925
4.0711
4.0458
4.0384
4.0131
3.6235
3.6104
3.5908
3.5777
1.5795
1.2712
0.0033
SePh
Cl
3f
tBu
1.04
2.14
2.11
2.14
2.13
2.06
3.23
1.00
1.01
1.02
9.37
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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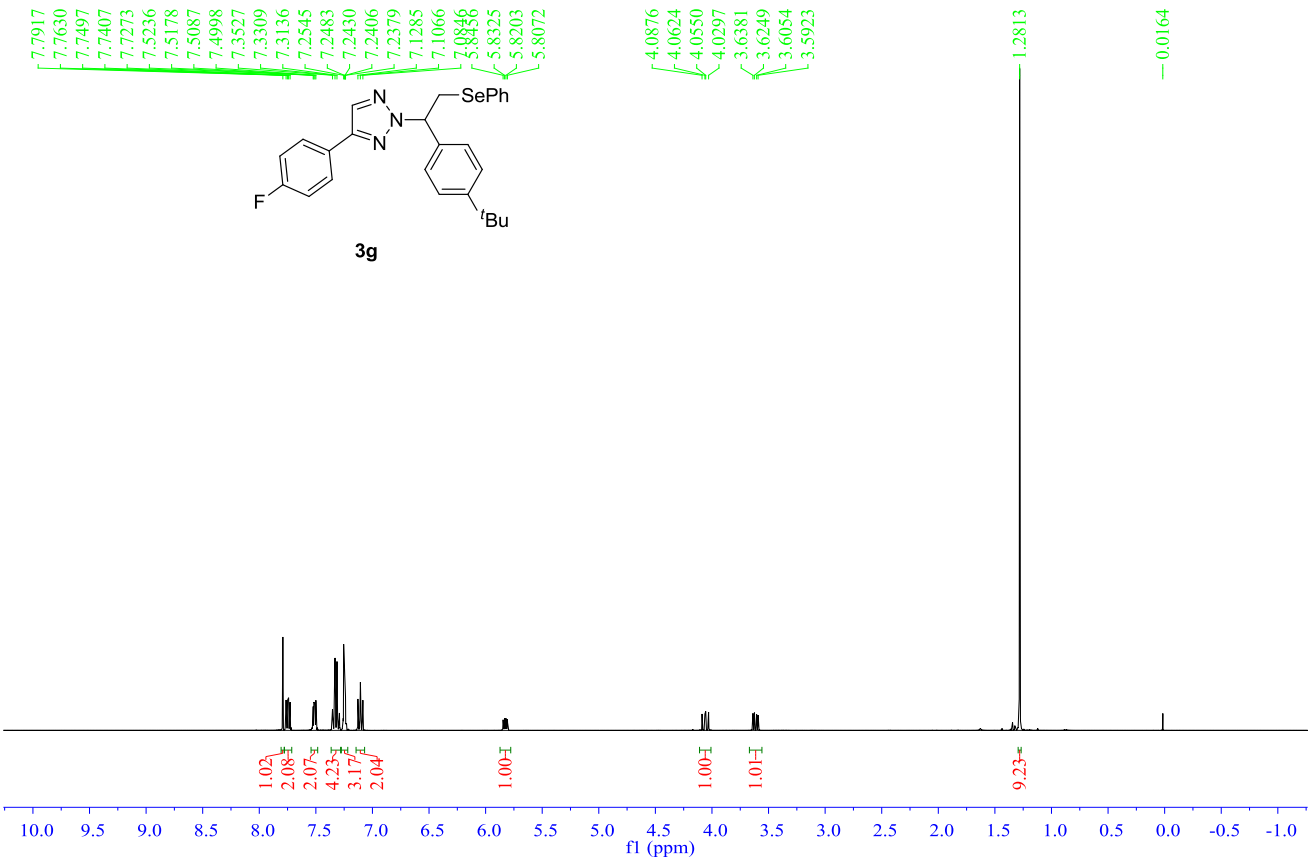
126.6403
77.4455
77.1269
76.8088
69.3538
34.6687
32.9583
31.3395
SePh
Cl
3f
tBu
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -1
f1 (ppm)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7.5178
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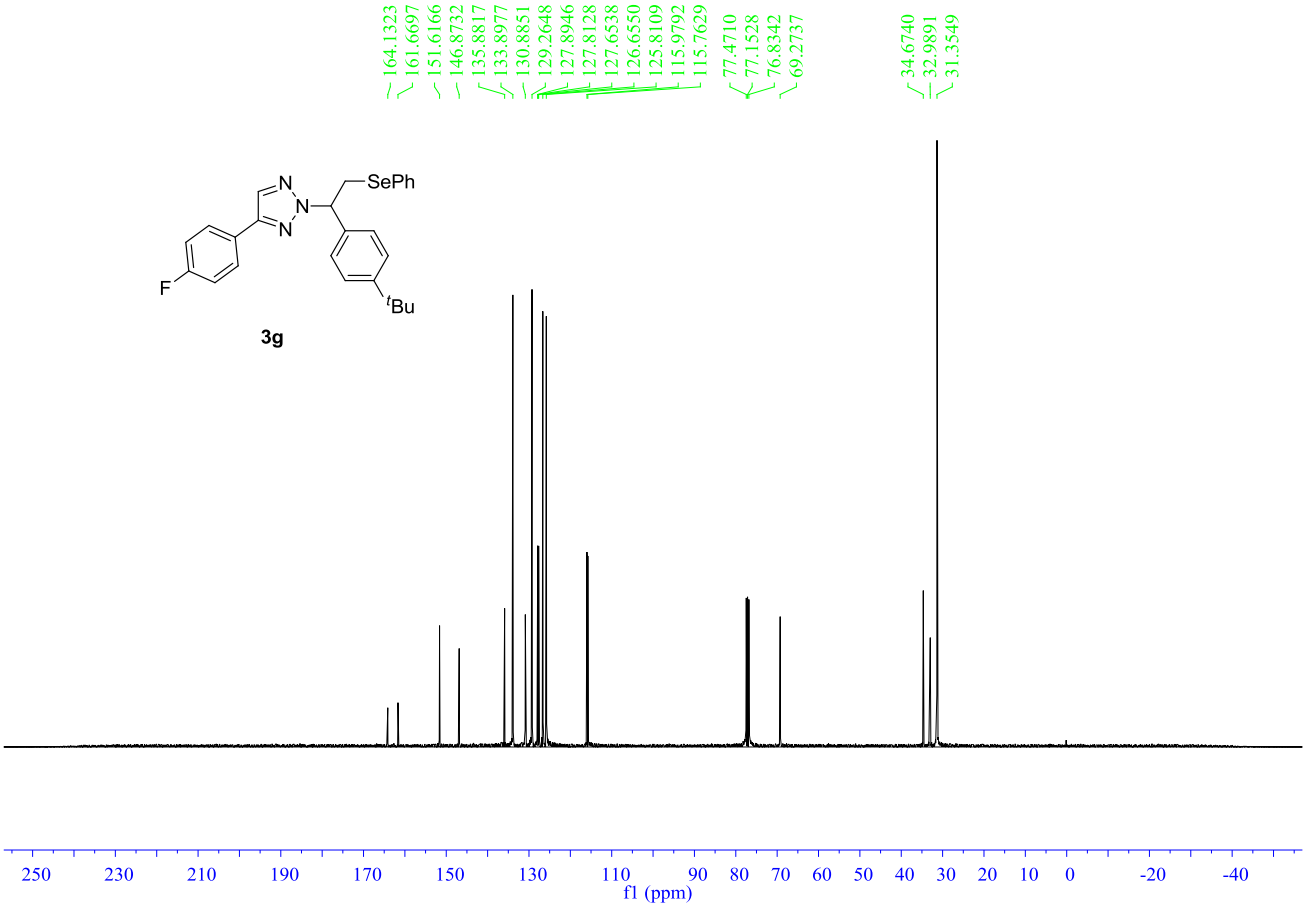
7.4998
7.3527
7.3309
7.3136
7.2545
7.2483
7.2430
7.2406
7.2379
7.1285
7.1066
7.0846
5.8456
5.8325
5.8203
5.8072
4.0876
4.0624
4.0550
4.0297
3.6381
3.6249
3.6054
3.5923
1.2813
0.0164
SePh
N
N
N
F
tBu
3g
1.02
2.08
2.07
4.23
3.17
2.04
1.00
1.00
1.01
9.23
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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125.8109
115.9792
115.7629
77.4710
77.1528
76.8342
69.2737
34.6740
32.9891
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SePh
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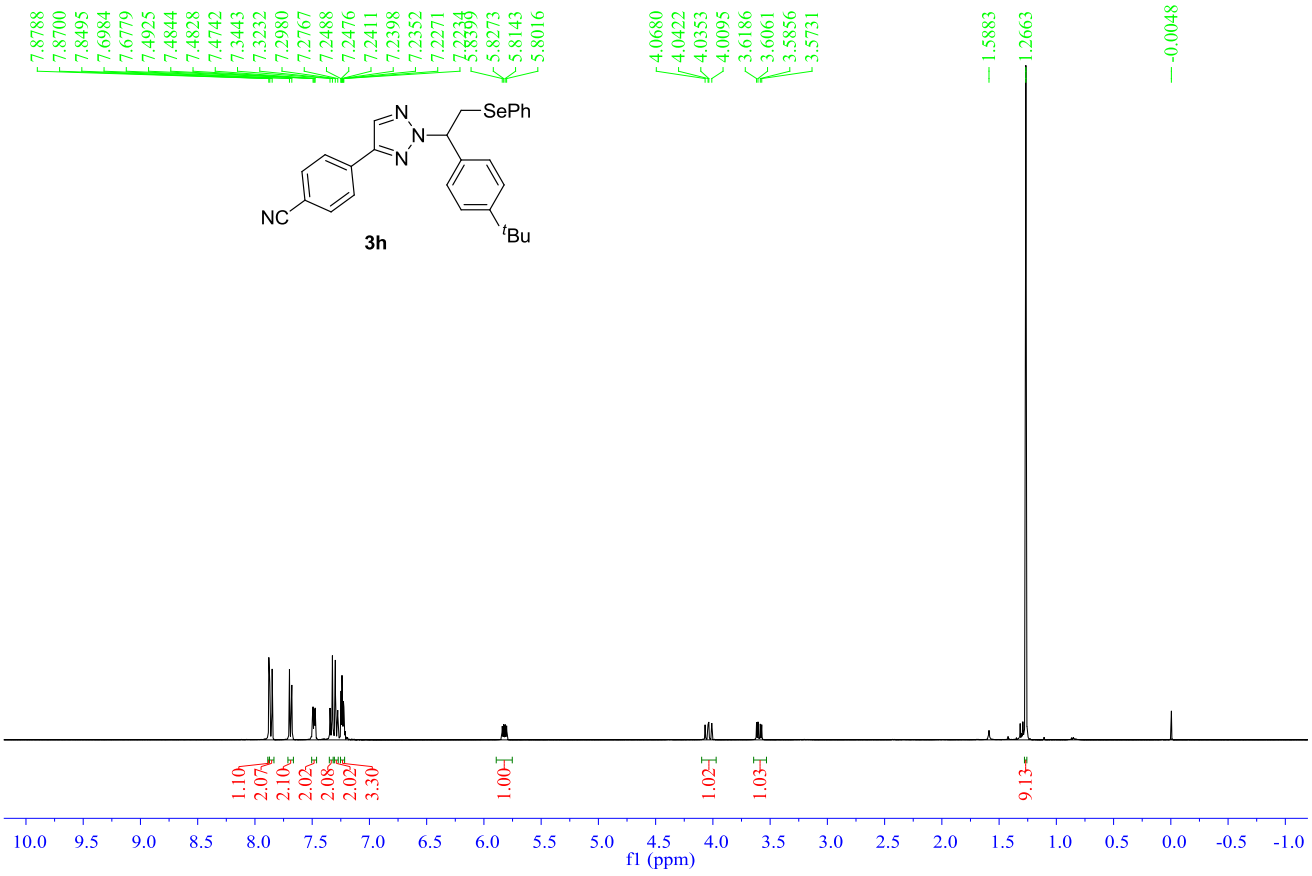
N
N
F
tBu
3g
250 230 210 190 170 150 130 110 90 80 70 60 50 40 30 20 10 0 -20 -40
f1 (ppm)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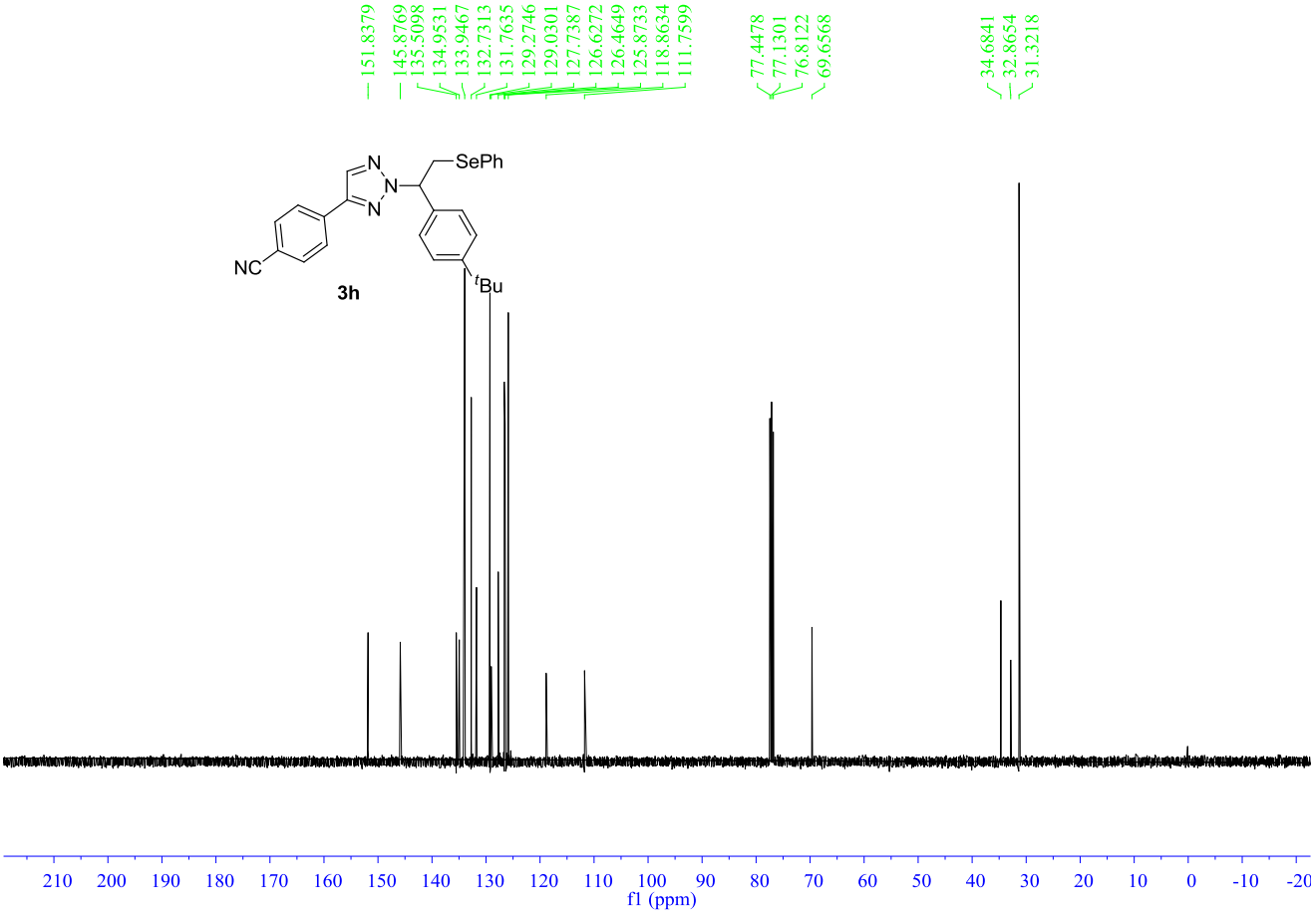
7.4844
7.4828
7.4742
7.3443
7.3232
7.2980
7.2767
7.2488
7.2476
7.2411
7.2398
7.2352
7.2271
7.2234
5.8399
5.8273
5.8143
5.8016
4.0680
4.0422
4.0353
4.0095
3.6186
3.6061
3.5856
3.5731
1.5883
1.2663
-0.0048
SePh
NC
tBu
3h
1.10
2.07
2.10
2.02
2.08
2.02
3.30
1.00
1.02
1.03
9.13
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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132.7313
131.7635
129.2746
129.0301
127.7387
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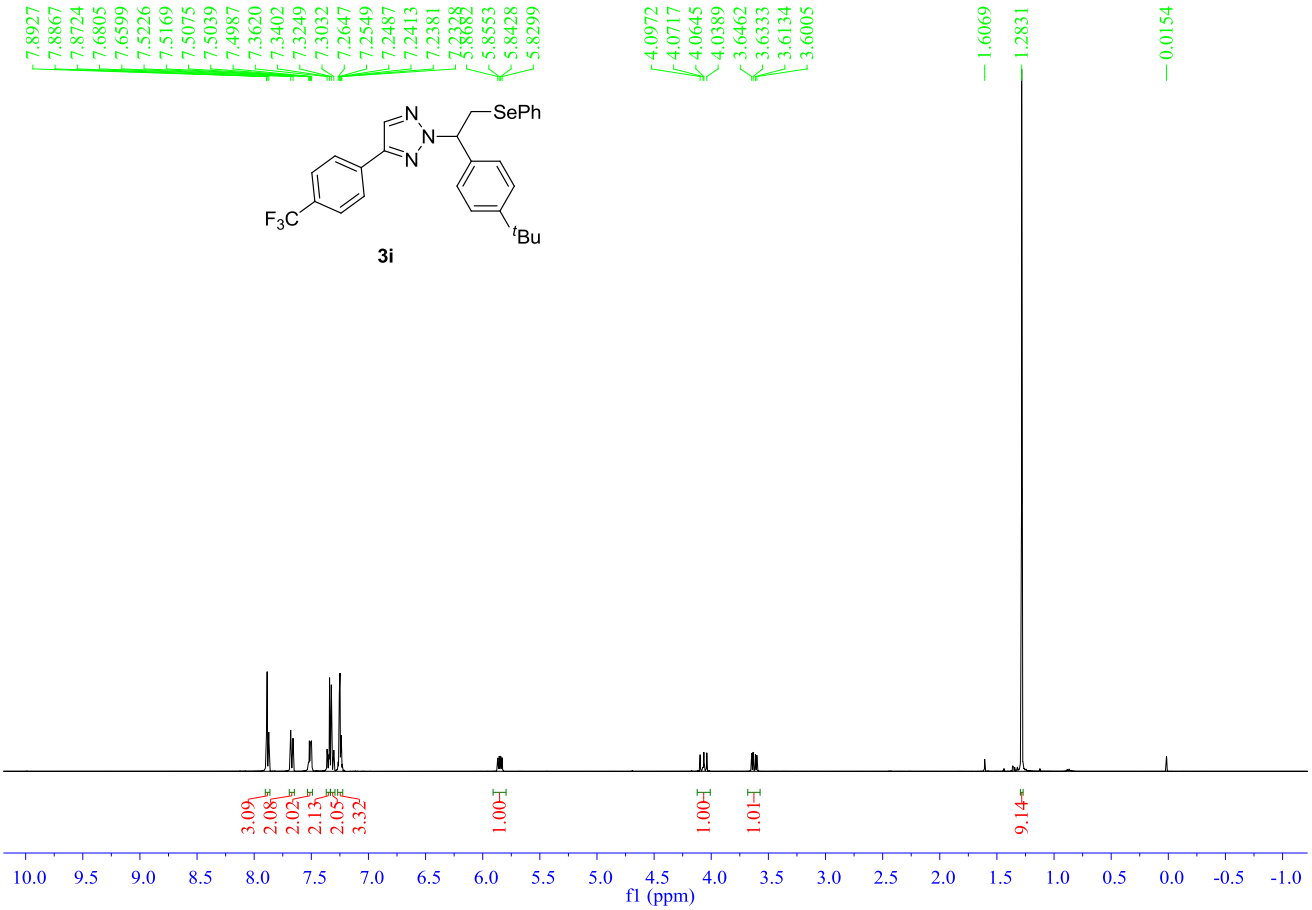
126.4649
125.8733
118.8634
111.7599
77.4478
77.1301
76.8122
69.6568
34.6841
32.8654
31.3218
SePh
NC
tBu
3h
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20
f1 (ppm)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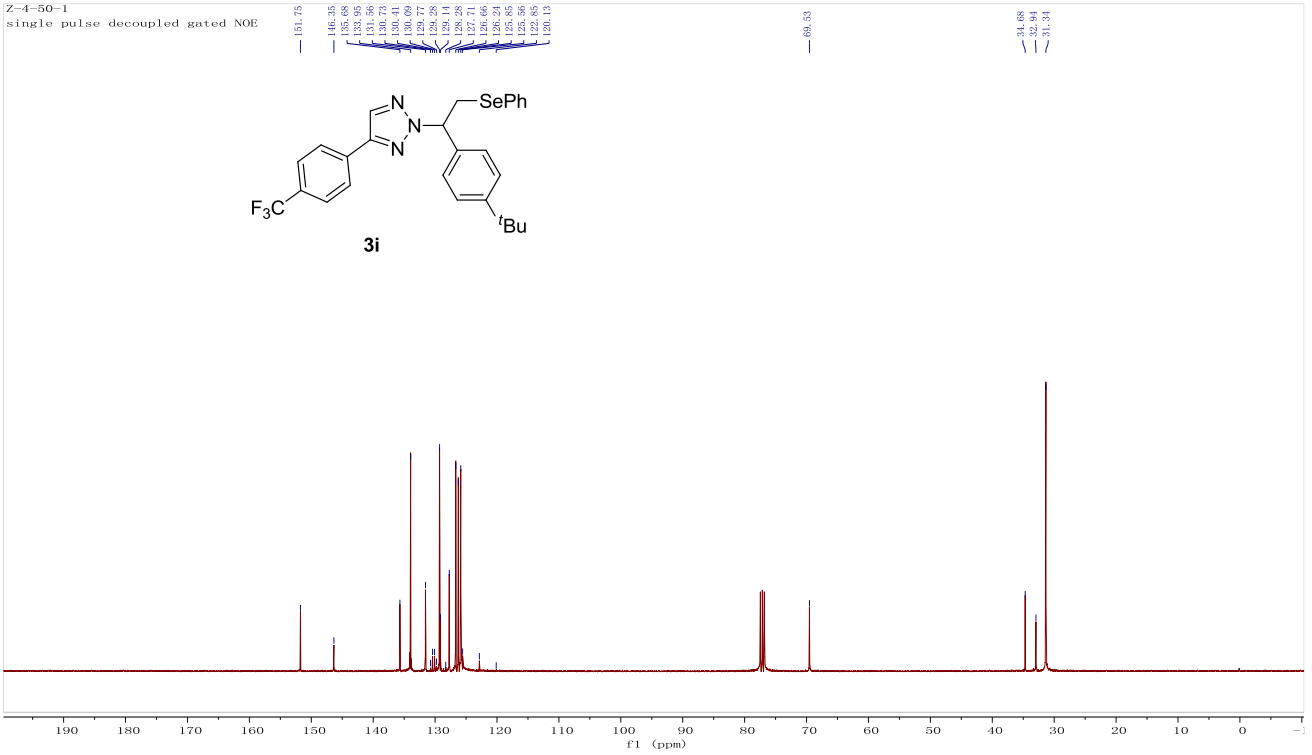
7.6599
7.5226
7.5169
7.5075
7.5039
7.4987
7.3620
7.3402
7.3249
7.3032
7.2647
7.2549
7.2487
7.2413
7.2381
5.8682
5.8553
5.8428
5.8299
4.0972
4.0717
4.0645
4.0389
3.6462
3.6333
3.6134
3.6005
1.6069
1.2831
0.0154
SePh
N
N
N
F3C
tBu
3i
3.09
2.08
2.02
2.13
2.05
3.32
1.00
1.00
1.01
9.14
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)


Z-4-50-1
single pulse decoupled gated NOE
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130.41
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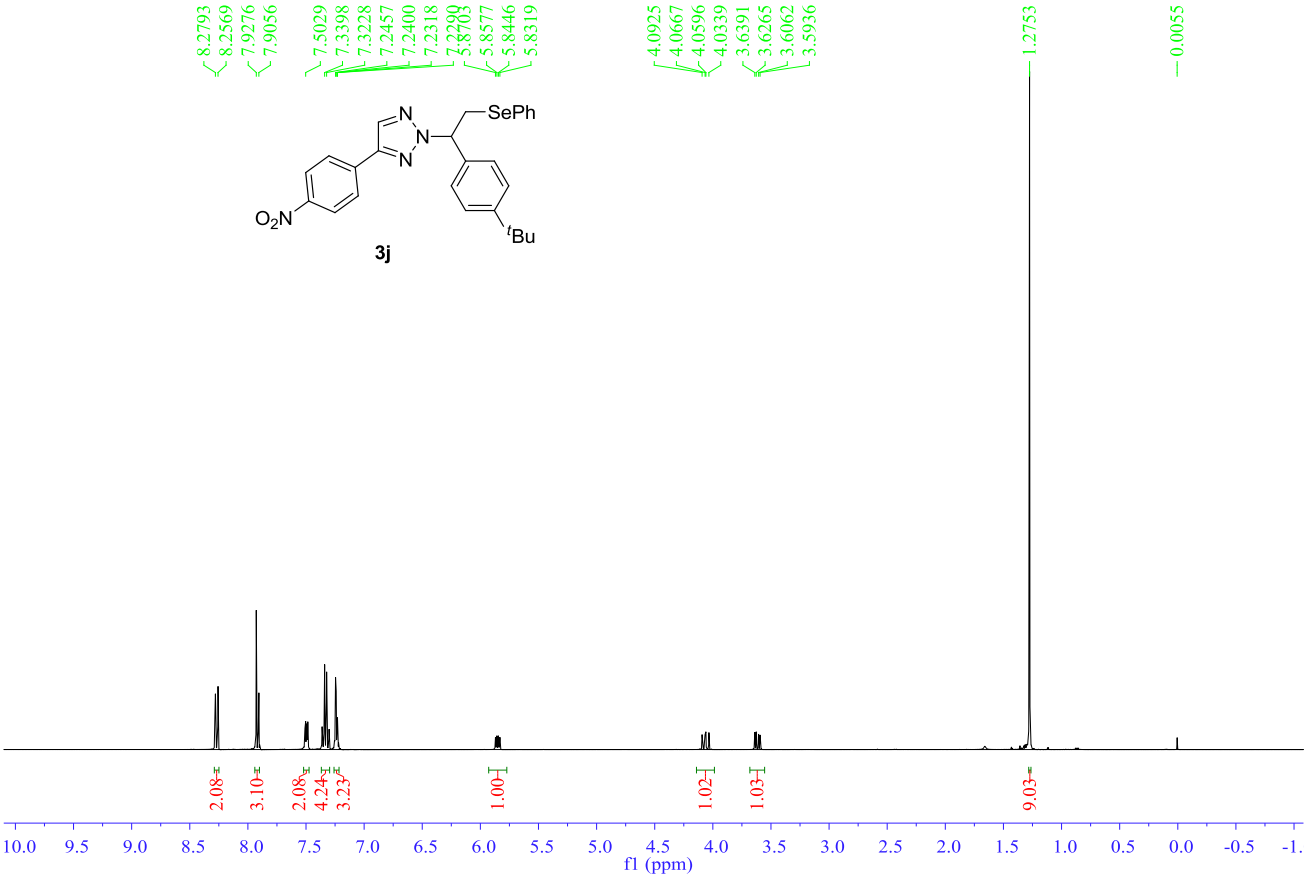
129.77
129.28
129.14
128.28
127.71
126.66
126.24
125.85
125.56
122.85
120.13
69.53
34.68
32.94
31.34
SePh
N
N
N
F3C
tBu
3i
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)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7.5029
7.3398
7.3228
7.2457
7.2400
7.2318
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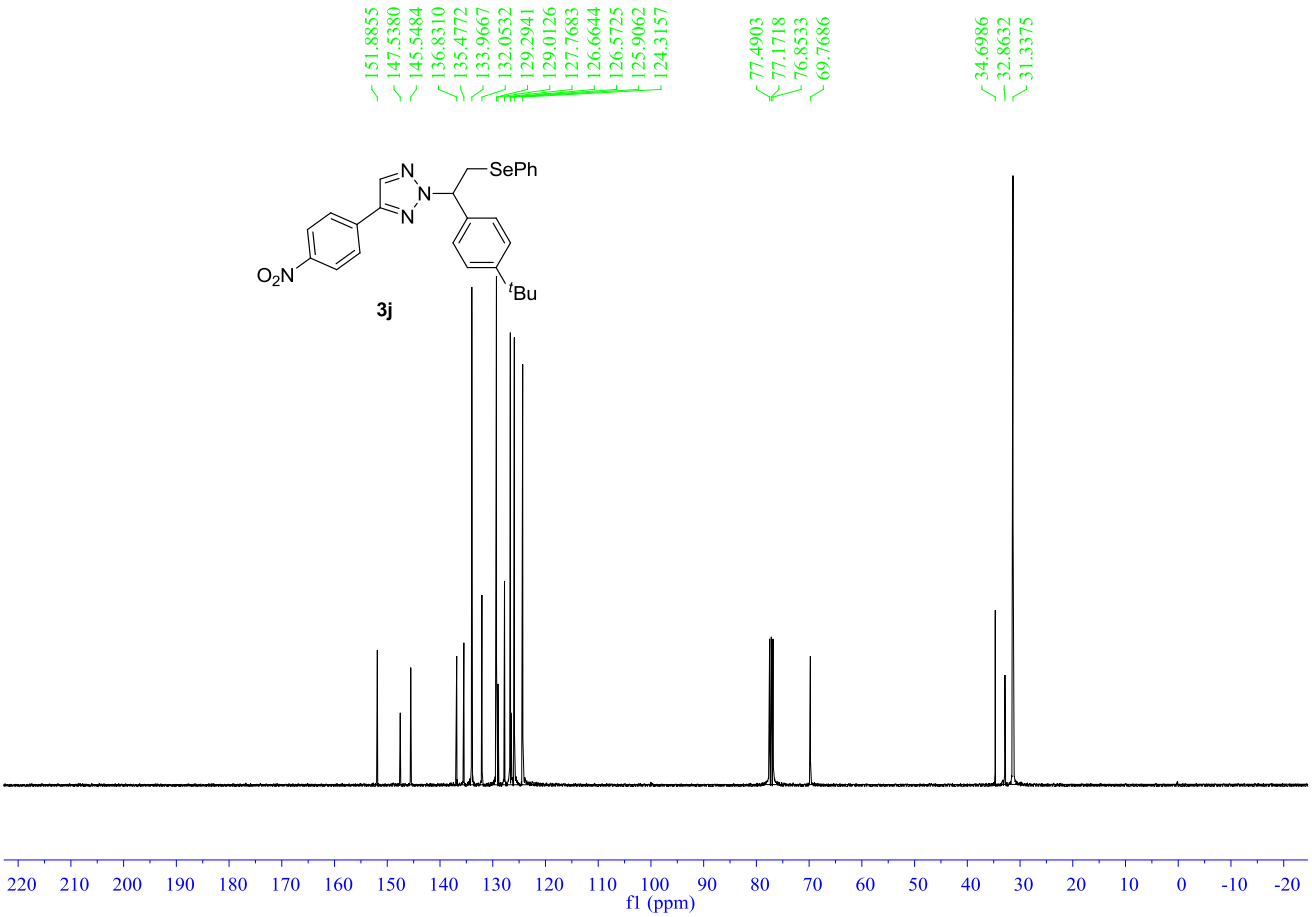
5.8703
5.8577
5.8446
5.8319
4.0925
4.0667
4.0596
4.0339
3.6391
3.6265
3.6062
3.5936
1.2753
0.0055
SePh
N
N
N
O2N
tBu
3j
2.08
3.10
2.08
4.24
3.23
1.00
1.02
1.03
9.03
f1 (ppm)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132.0532
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126.5725
125.9062
124.3157
77.4903
77.1718
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69.7686
34.6986
32.8632
31.3375
SePh
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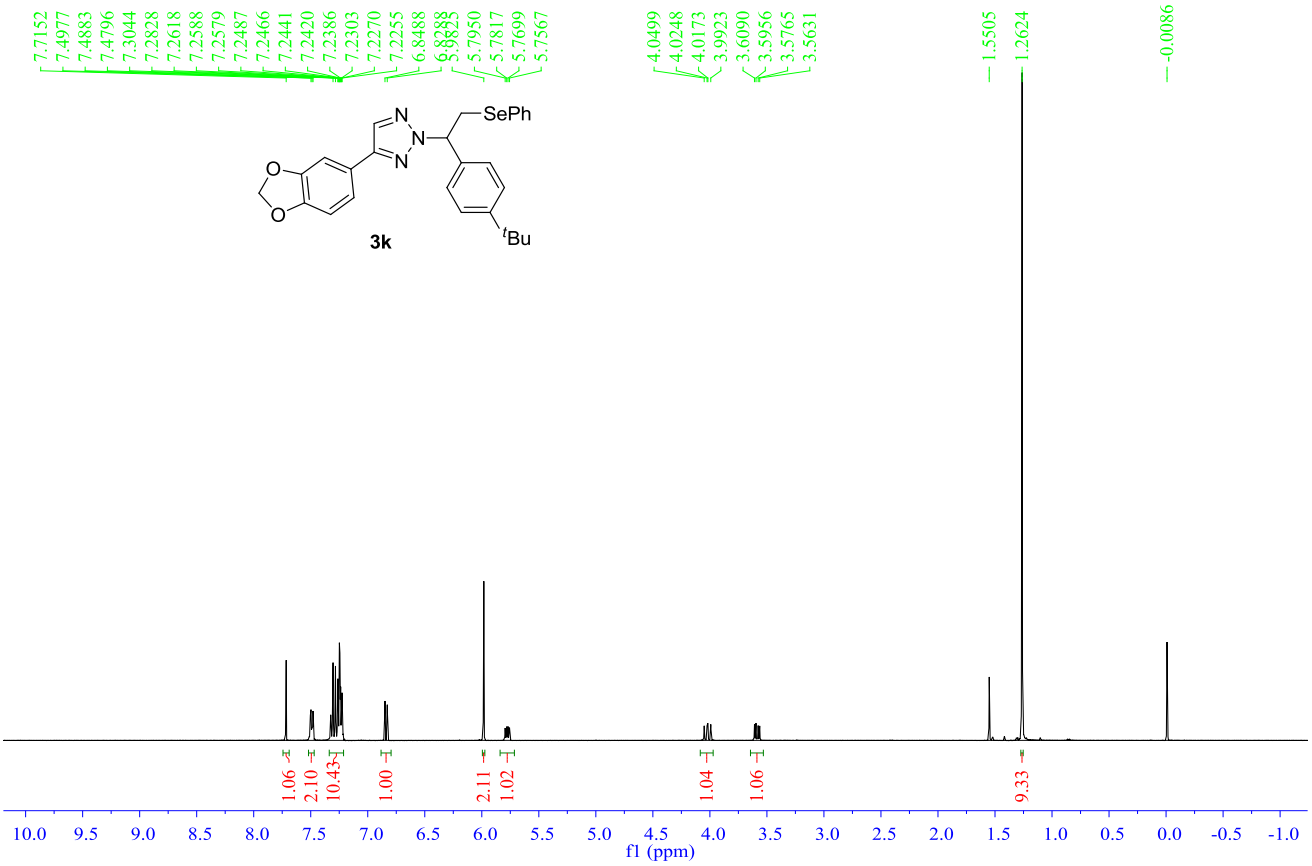
N
N
O2N
tBu
3j
f1 (ppm)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7.4796
7.3044
7.2828
7.2618
7.2588
7.2579
7.2487
7.2466
7.2441
7.2420
7.2386
7.2303
7.2270
7.2255
6.8488
5.7950
5.7817
5.7699
5.7567
4.0499
4.0248
4.0173
3.9923
3.6090
3.5956
3.5765
3.5631
1.5505
1.2624
-0.0086
SePh
tBu
3k
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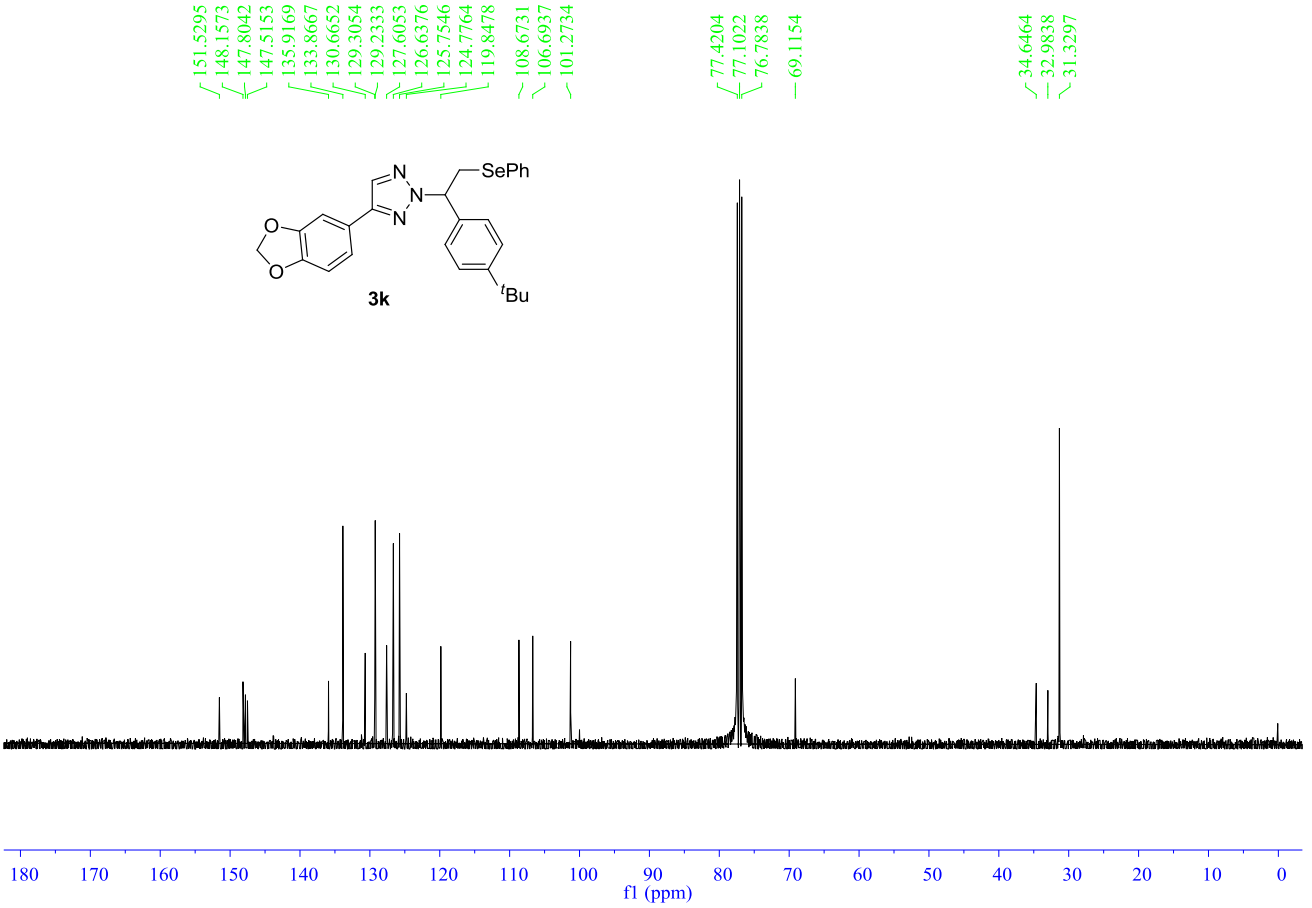
2.10
10.43
1.00
2.11
1.02
1.04
1.06
9.33
fl (ppm)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130.6652
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125.7546
124.7764
119.8478
108.6731
106.6937
101.2734
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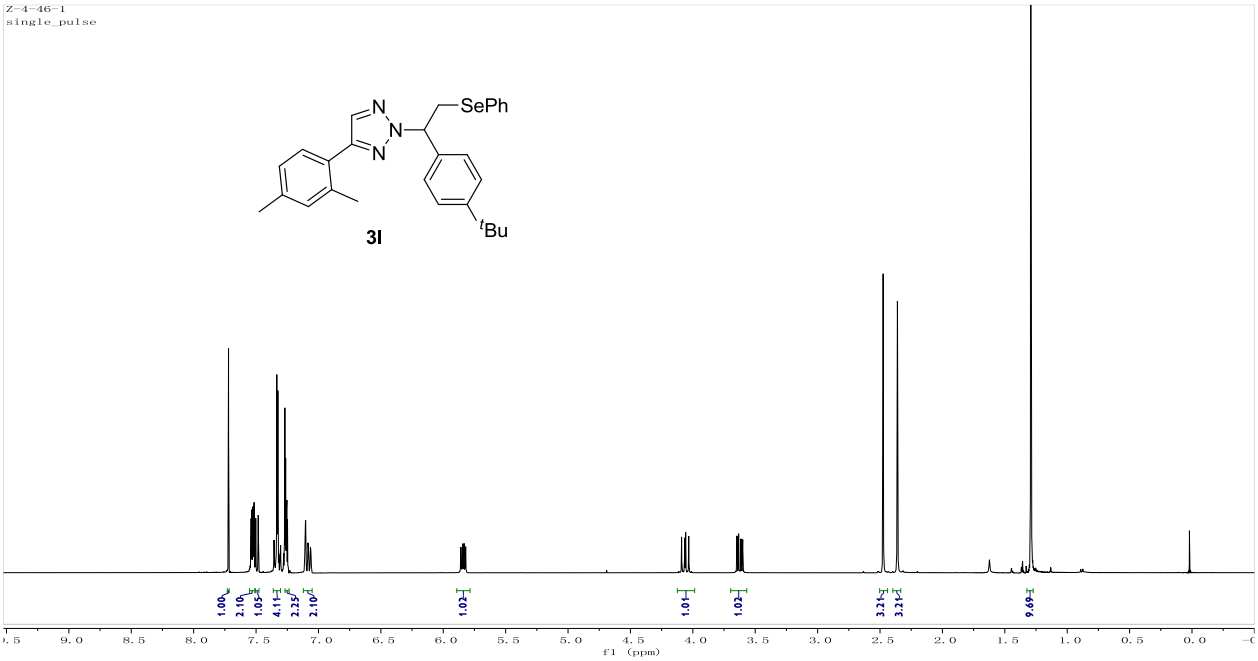
77.1022
76.7838
69.1154
34.6464
32.9838
31.3297
SePh
tBu
3k
fl (ppm)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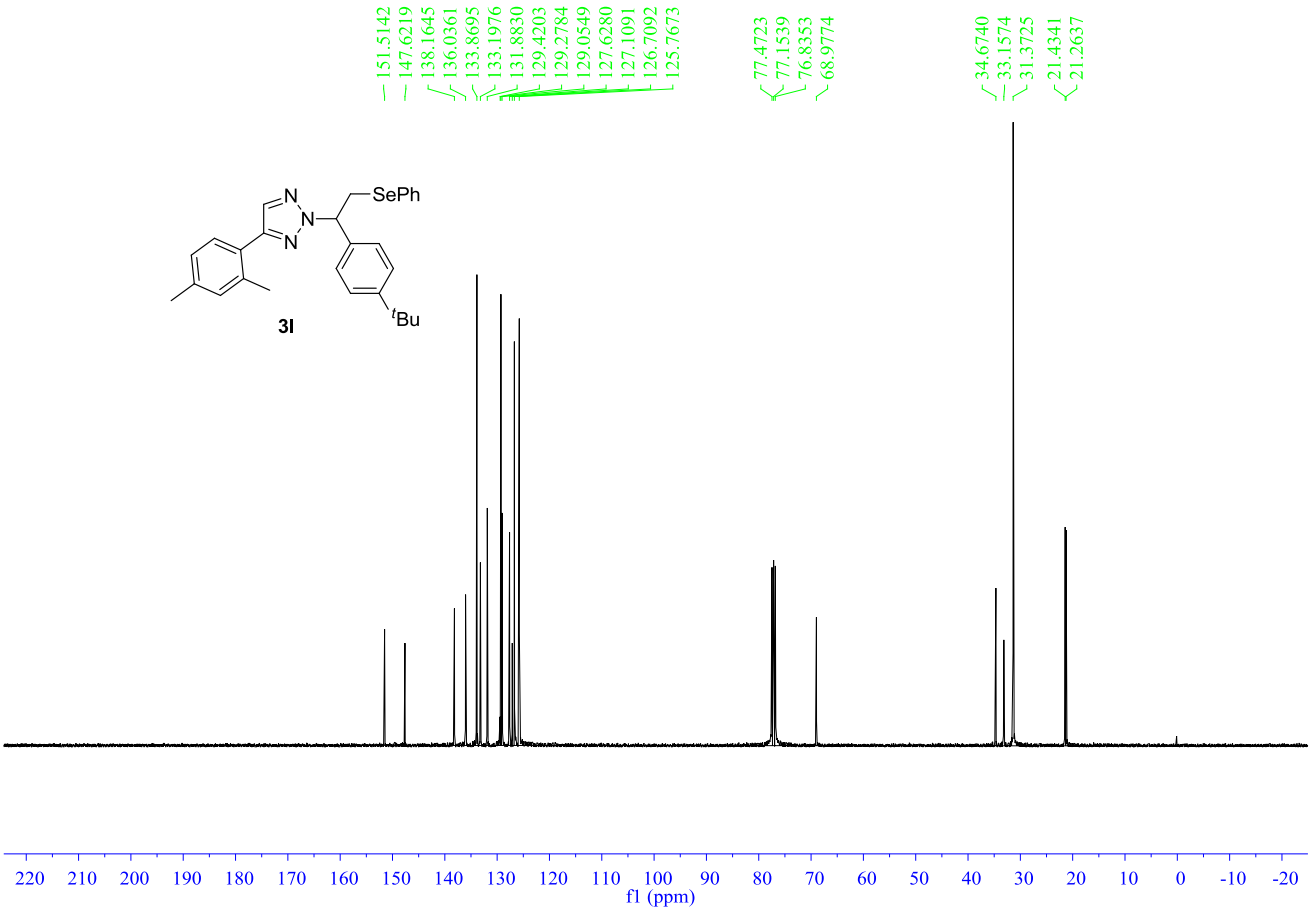
1.02
1.01
1.02
3.21
3.21
9.69
f1 (ppm)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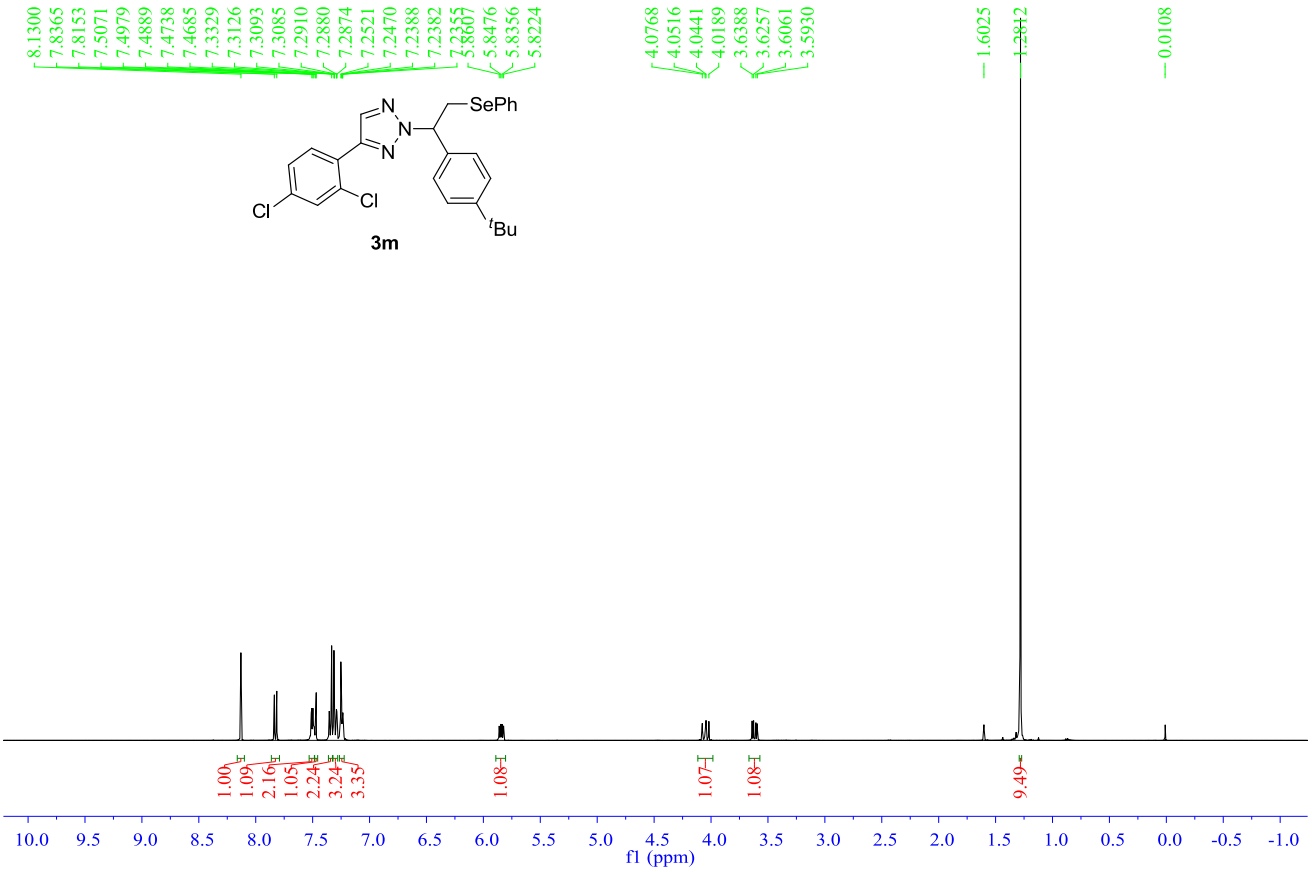
126.7092
125.7673
77.4723
77.1539
76.8353
68.9774
34.6740
33.1574
31.3725
21.4341
21.2637
SePh
tBu
3l
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20
f1 (ppm)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7.3329
7.3126
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7.3085
7.2910
7.2880
7.2874
7.2521
7.2470
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7.2382
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5.8224
4.0768
4.0516
4.0441
4.0189
3.6388
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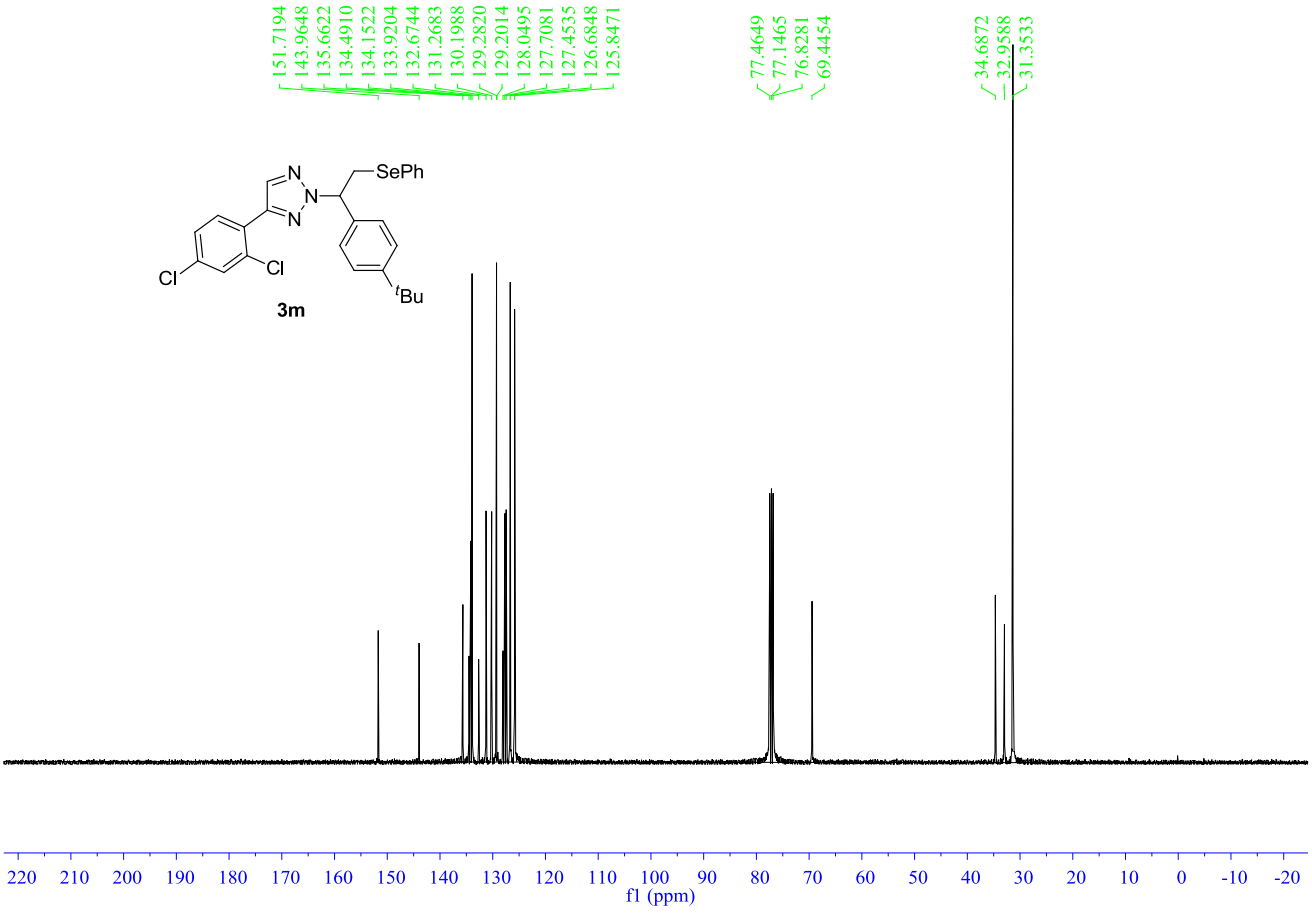
3.6061
3.5930
1.6025
1.2812
0.0108
SePh
N
N
N
Cl
Cl
tBu
3m
1.00
1.09
2.16
1.05
2.24
3.24
3.35
1.08
1.07
1.08
9.49
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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129.2820
129.2014
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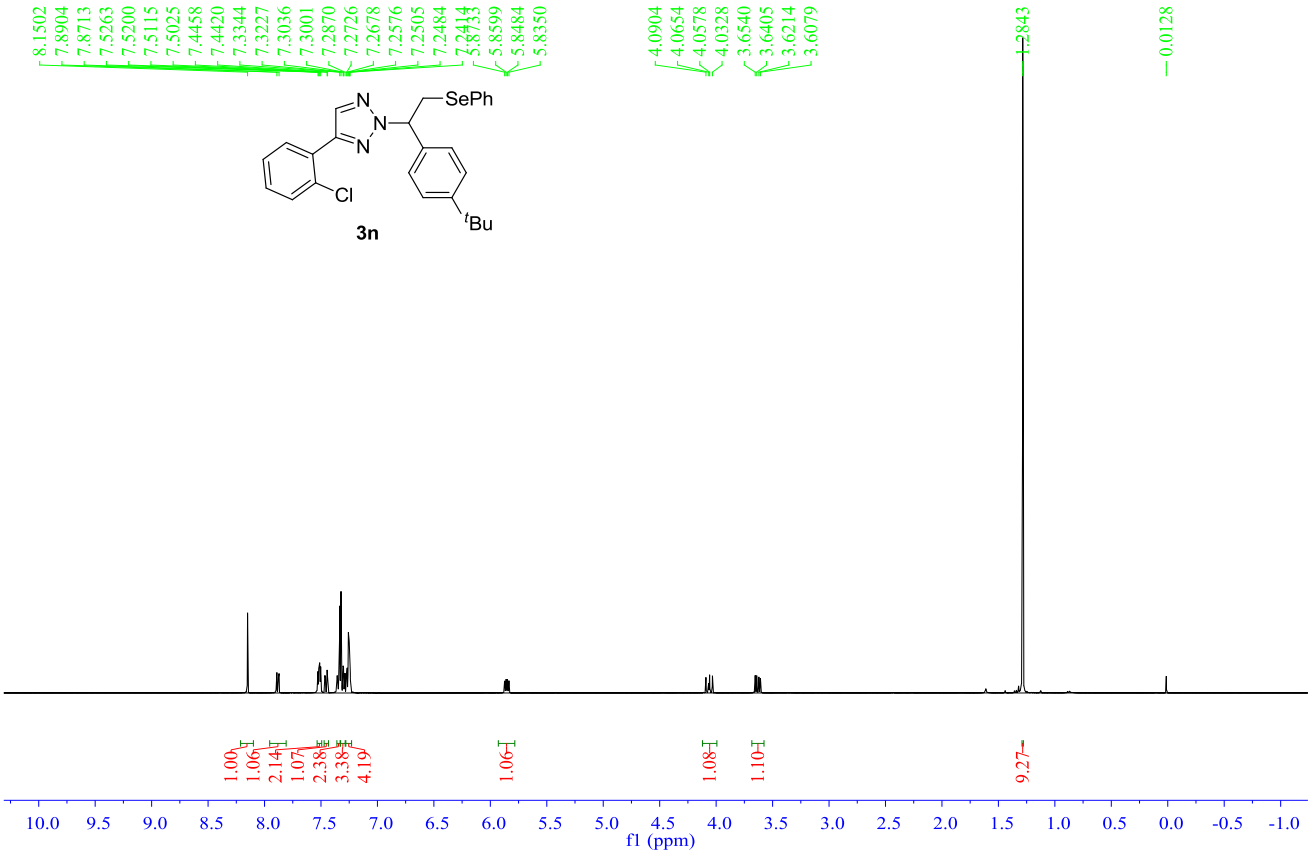
127.7081
127.4535
126.6848
125.8471
77.4649
77.1465
76.8281
69.4454
34.6872
32.9588
31.3533
SePh
N
N
N
Cl
Cl
tBu
3m
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20
f1 (ppm)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7.3036
7.3001
7.2870
7.2726
7.2678
7.2576
7.2505
7.2484
7.2414
5.8733
5.8599
5.8484
5.8350
4.0904
4.0654
4.0578
4.0328
3.6540
3.6405
3.6214
3.6079
1.2843
0.0128
SePh
N
N
N
Cl
tBu
3n
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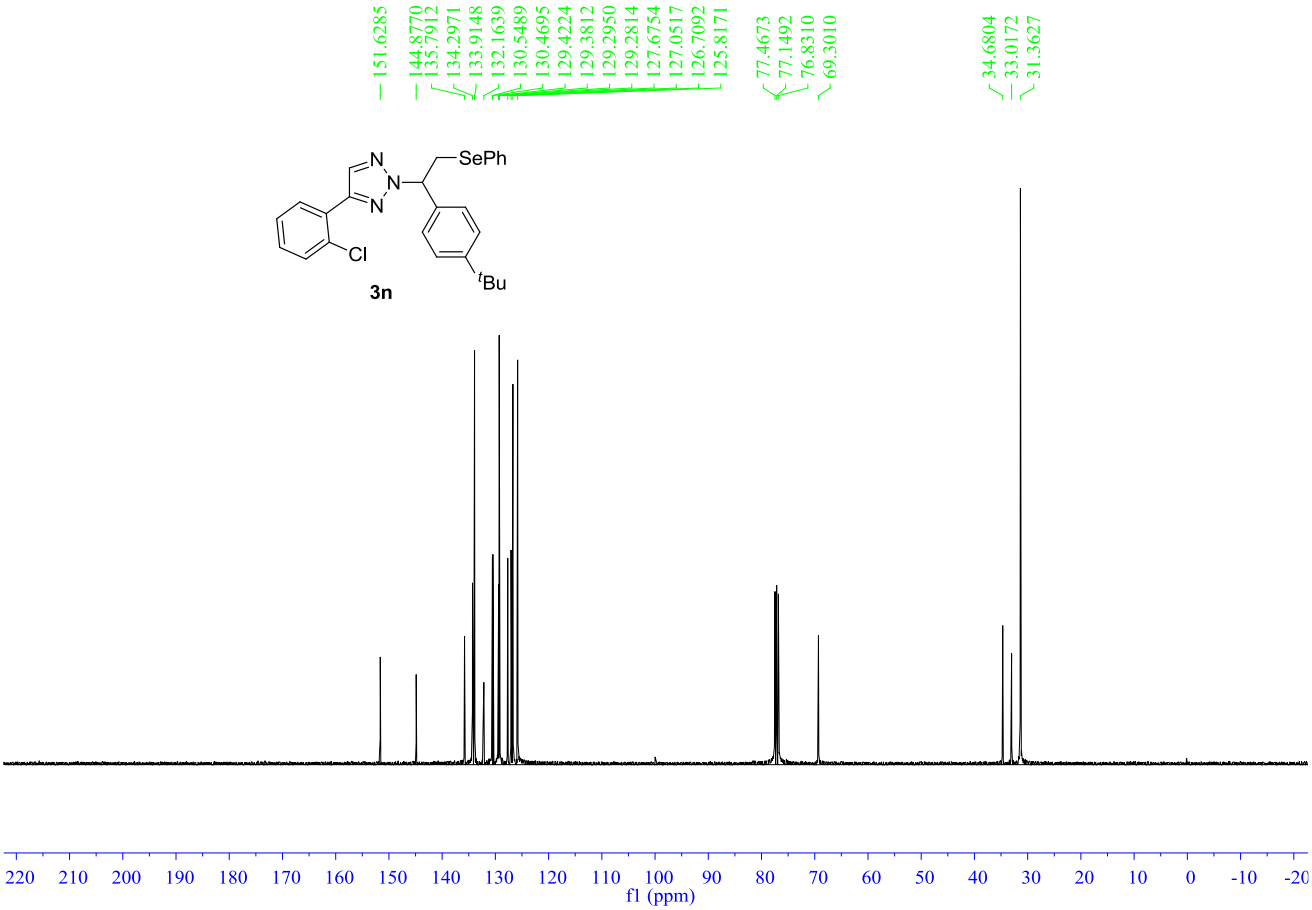
1.06
2.14
1.07
2.38
3.38
4.19
1.06
1.08
1.10
9.27
f1 (ppm)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125.8171
77.4673
77.1492
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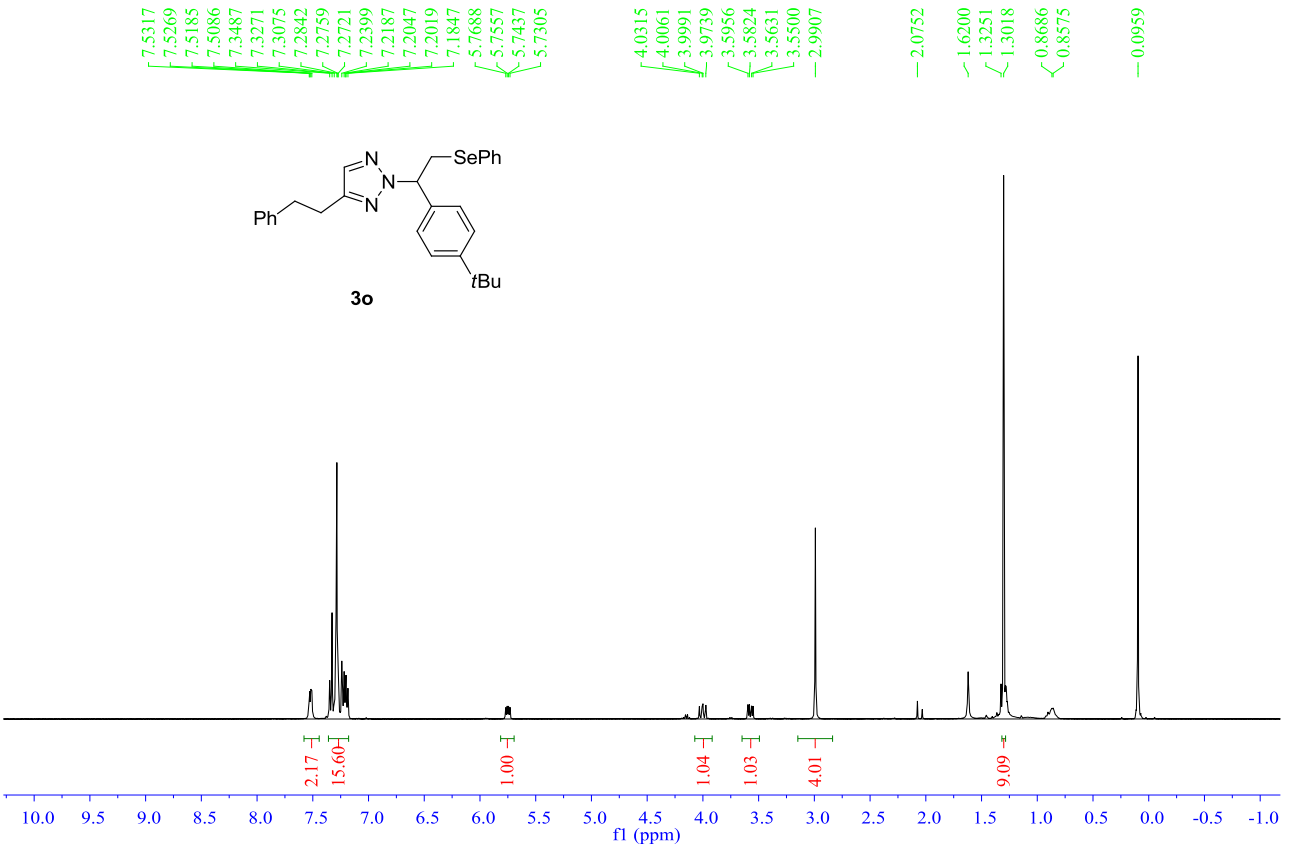
33.0172
31.3627
SePh
N
N
N
Cl
tBu
3n
f1 (ppm)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7.2759
7.2721
7.2399
7.2187
7.2047
7.2019
7.1847
5.7688
5.7557
5.7437
5.7305
4.0315
4.0061
3.9991
3.9739
3.5956
3.5824
3.5631
3.5500
2.9907
2.0752
1.6200
1.3251
1.3018
0.8686
0.8575
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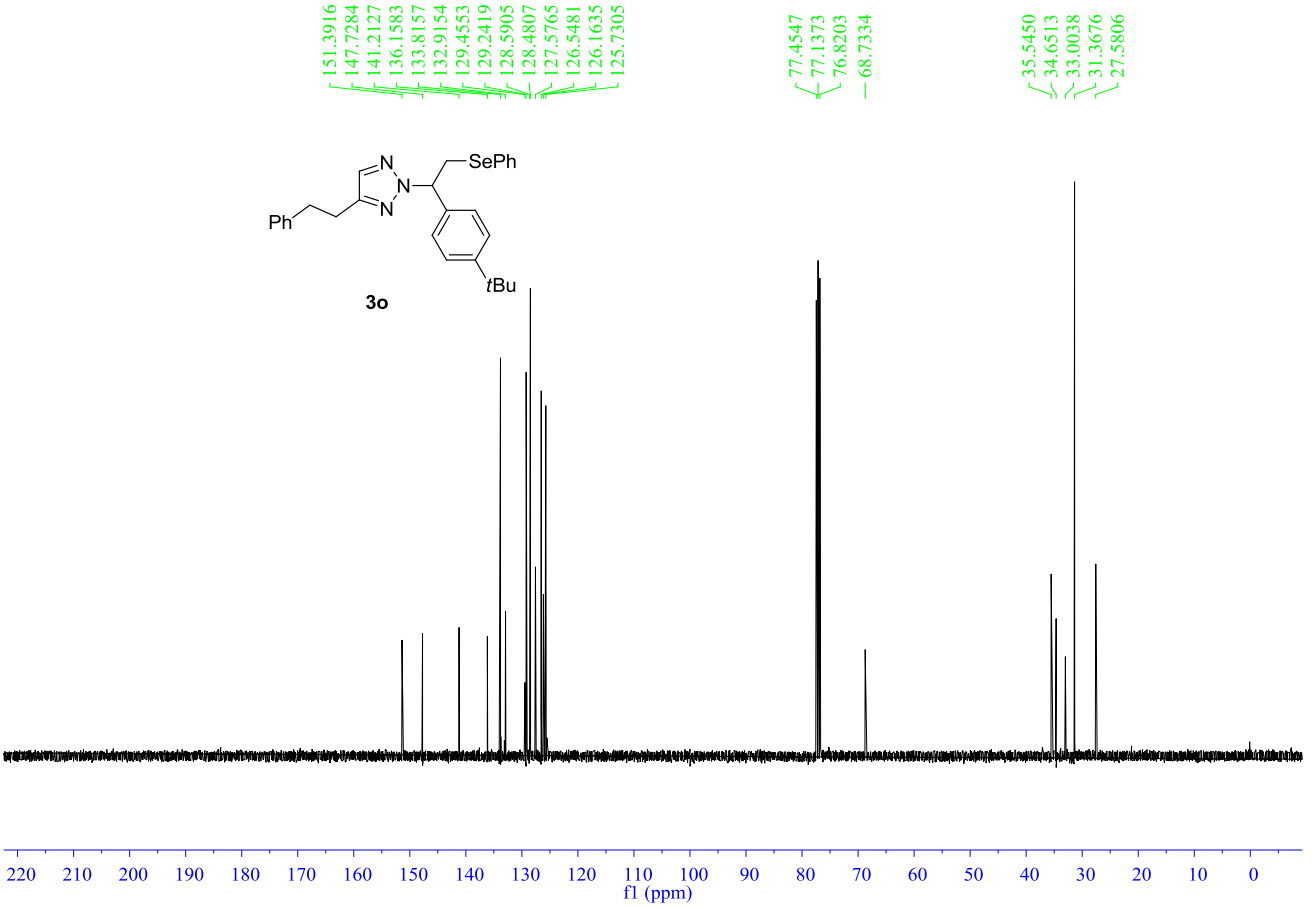
1.00
1.04
1.03
4.01
9.09
f1 (ppm)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77.4547
77.1373
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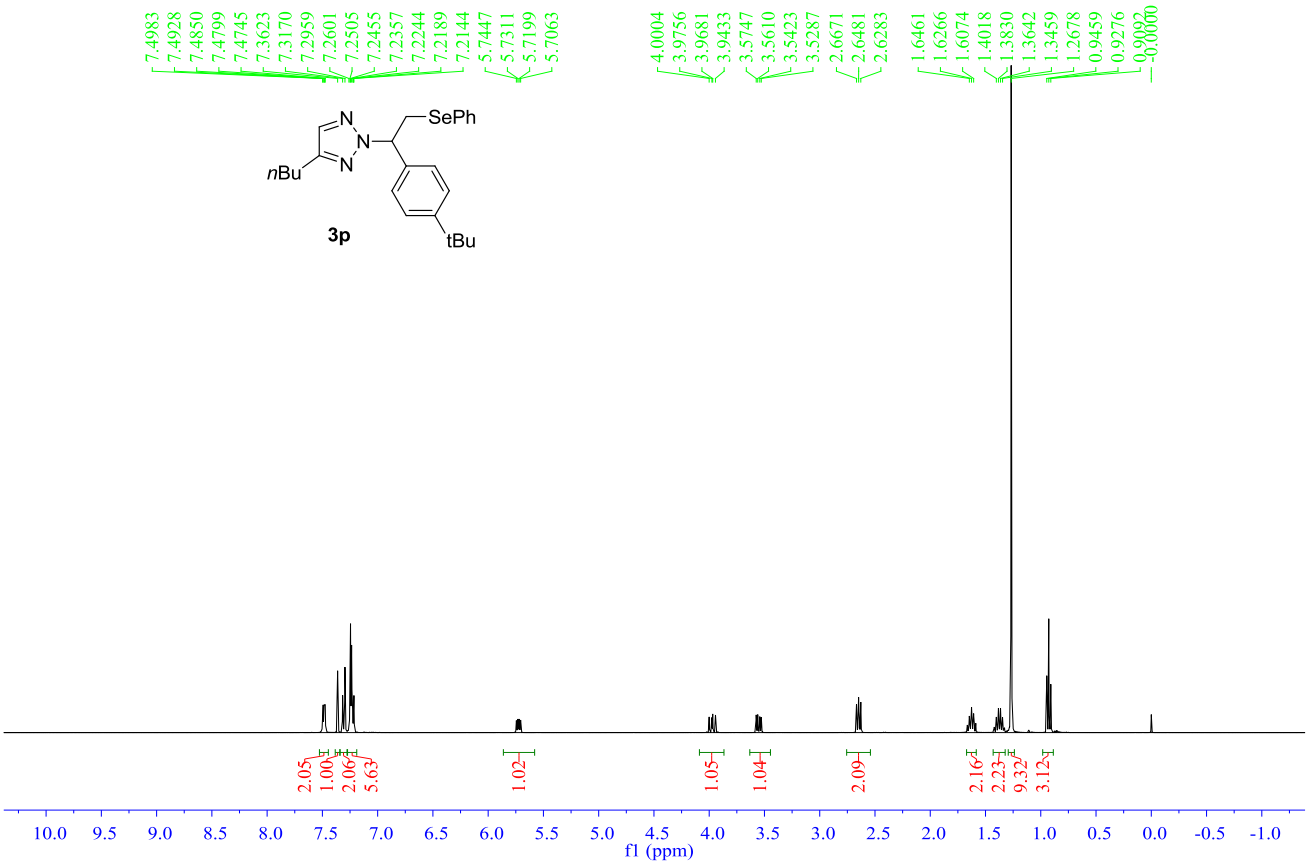
33.0038
31.3676
27.5806
SePh
Ph
tBu
3o
f1 (ppm)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7.2455
7.2357
7.2244
7.2189
7.2144
5.7447
5.7311
5.7199
5.7063
4.0004
3.9756
3.9681
3.9433
3.5747
3.5610
3.5423
3.5287
2.6671
2.6481
2.6283
1.6461
1.6266
1.6074
1.4018
1.3830
1.3642
1.3459
1.2678
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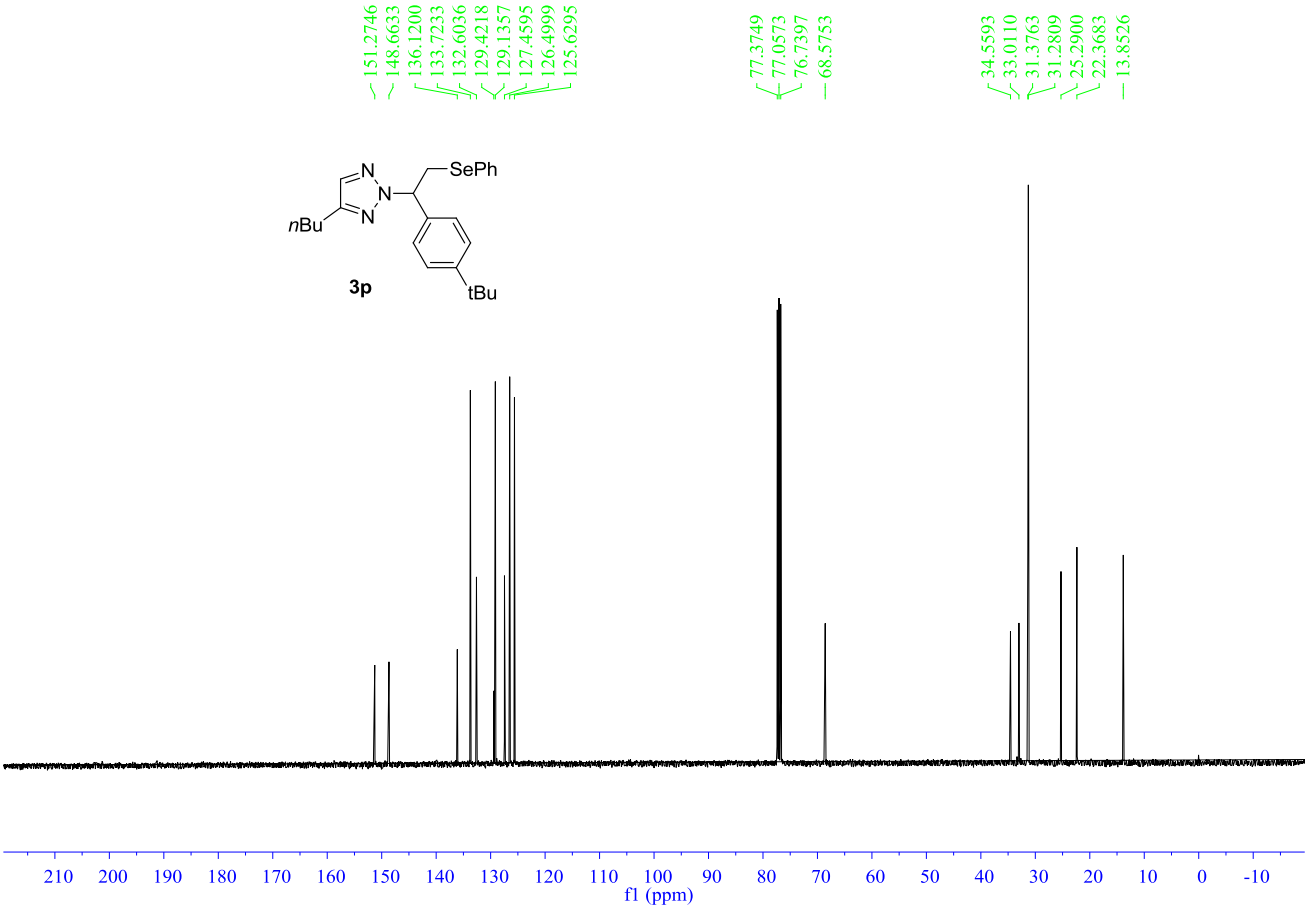
0.9276
0.9092
0.0000
SePh
nBu
N
N
N
3p
tBu
2.05
1.00
2.06
5.63
1.02
1.05
1.04
2.09
2.16
2.23
9.32
3.12
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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3p
tBu
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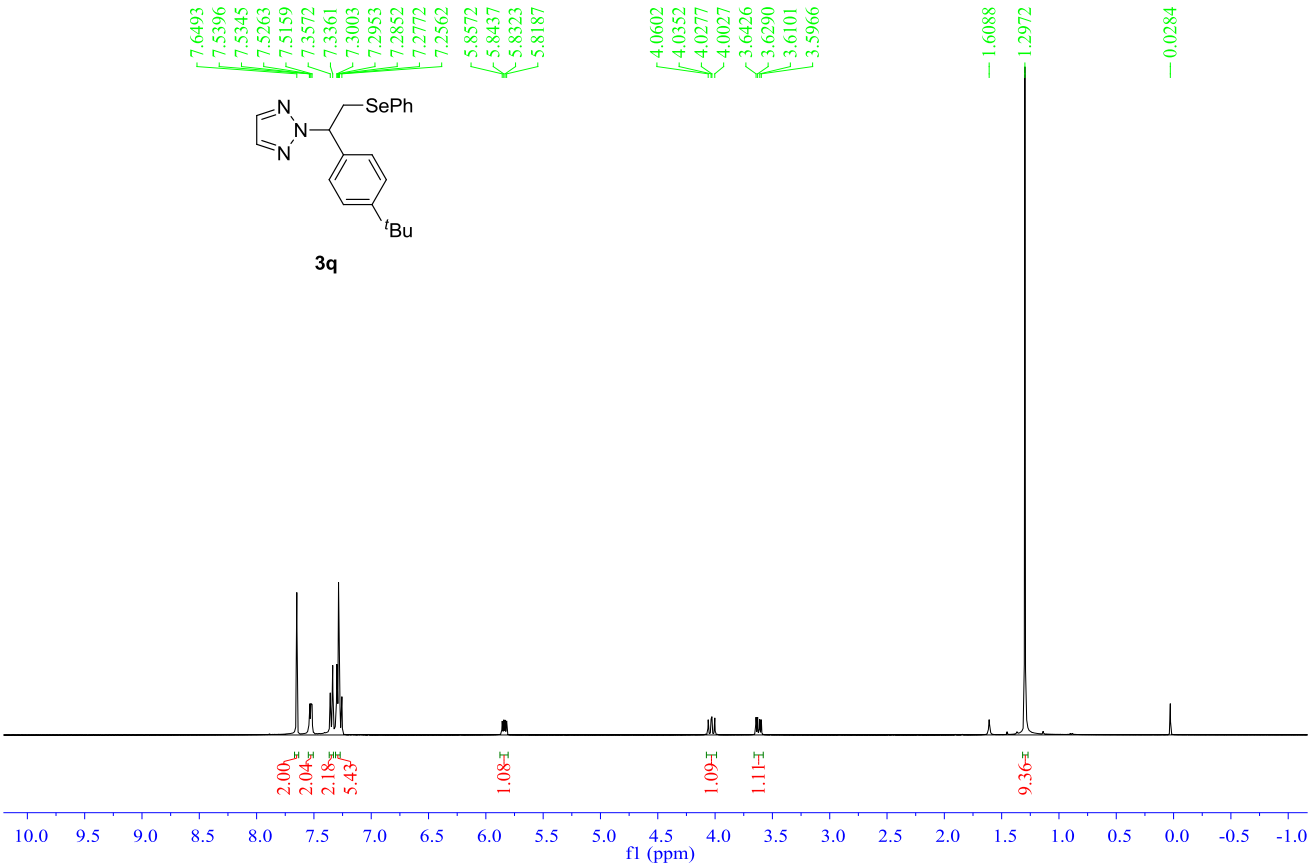
f1 (ppm)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3.5966
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1.2972
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1.09
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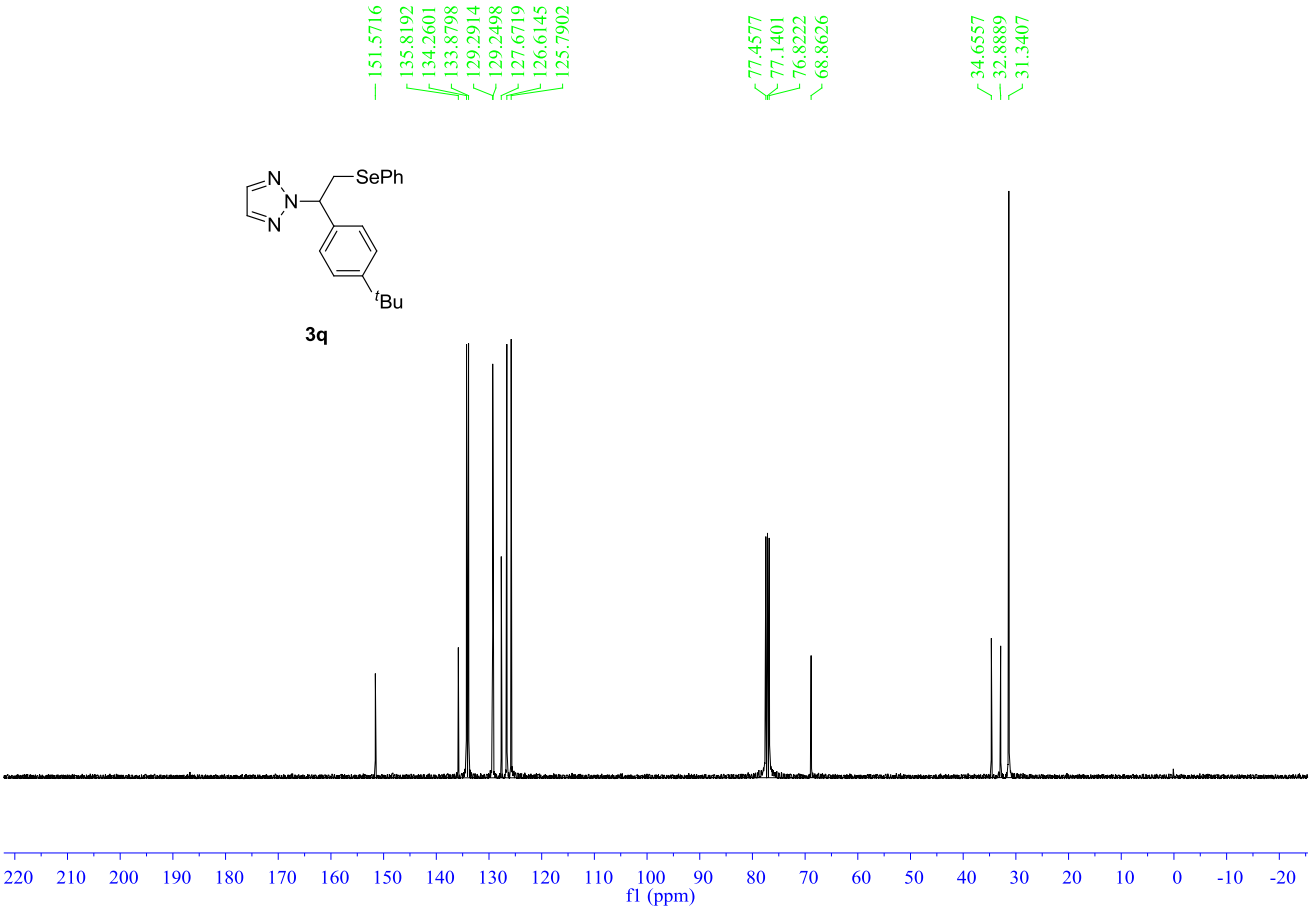
fl (ppm)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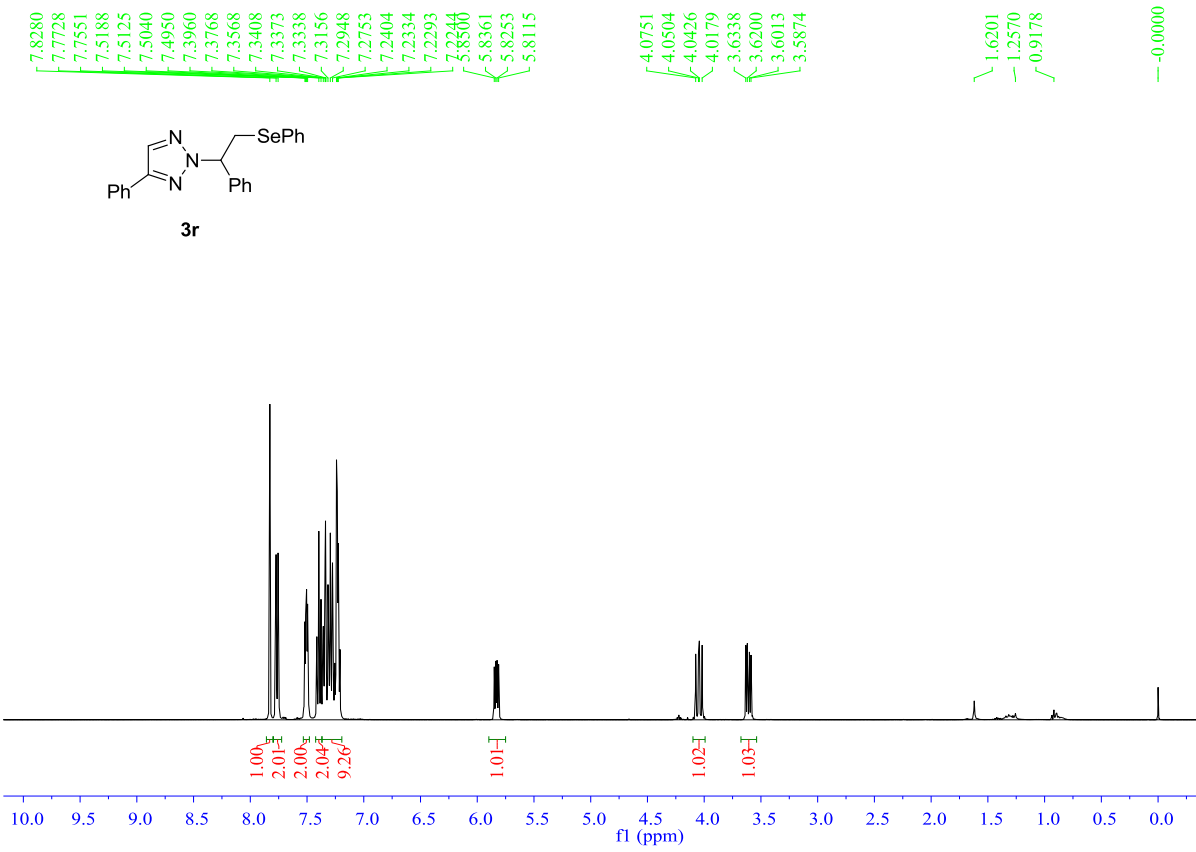
SePh
tBu
3q
fl (ppm)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7.2948
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7.2404
7.2334
7.2293
7.2244
5.8500
5.8361
5.8253
5.8115
4.0751
4.0504
4.0426
4.0179
3.6338
3.6200
3.6013
3.5874
1.6201
1.2570
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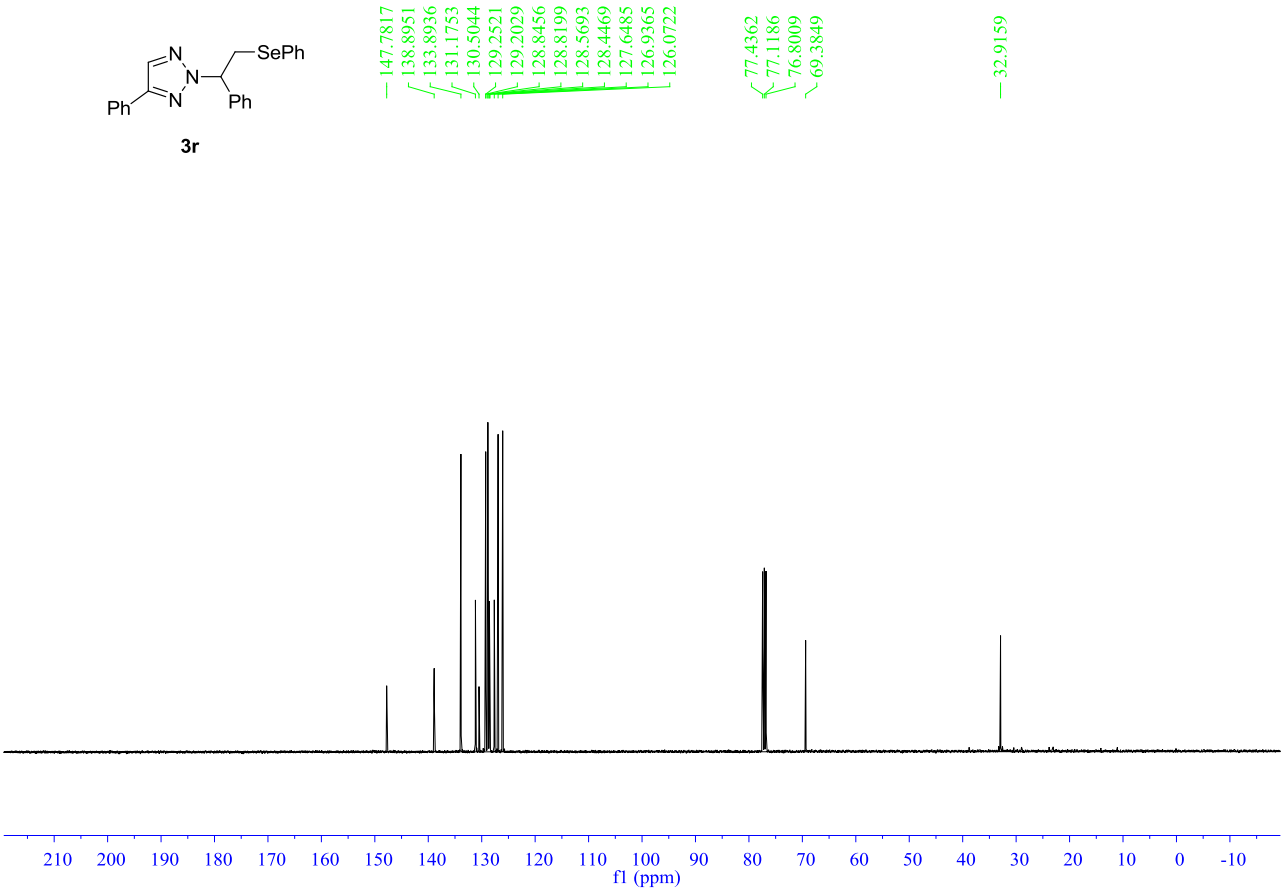
-0.0000
SePh
Ph
Ph
3r
1.00
2.01
2.00
2.04
9.26
1.01
1.02
1.03
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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126.0722
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77.1186
76.8009
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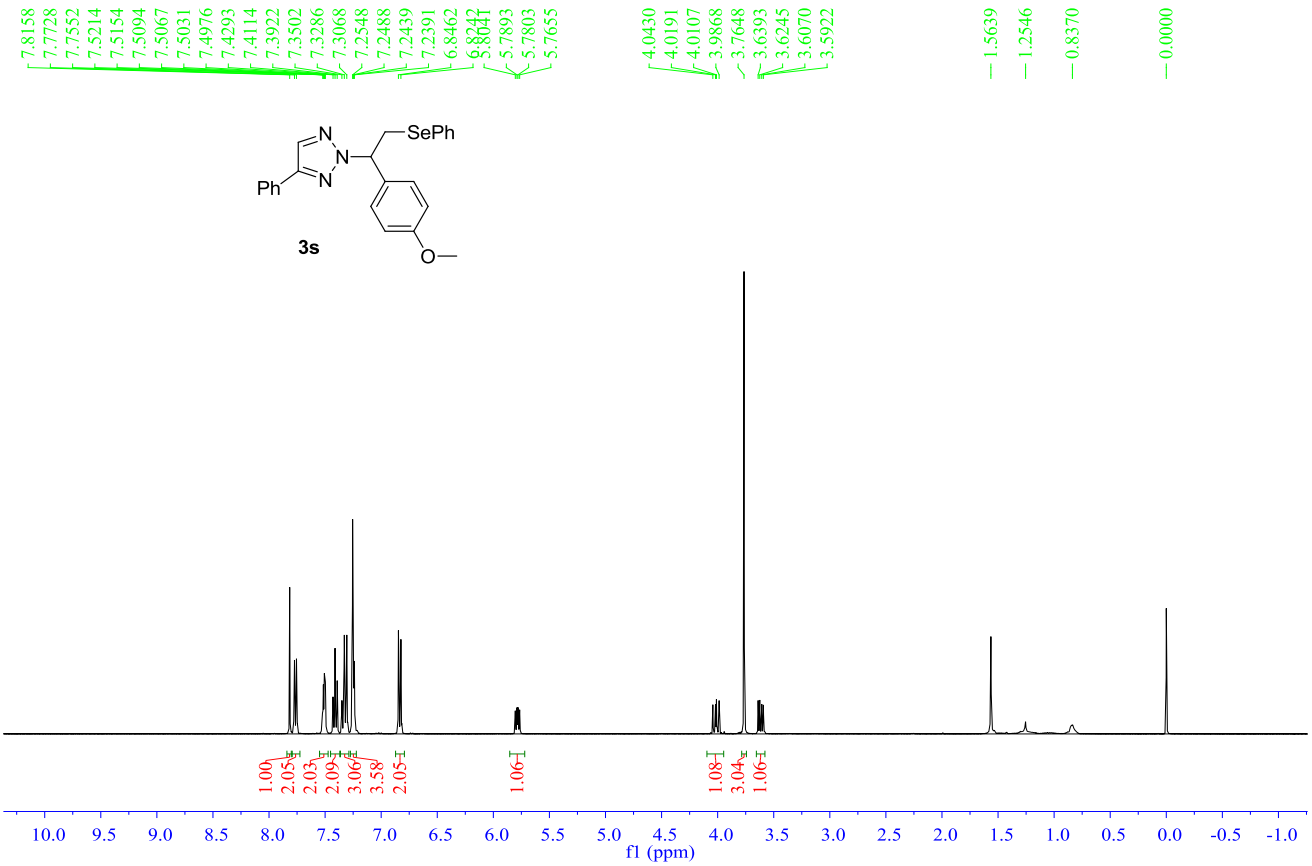
SePh
Ph
Ph
3r
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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7.3286
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7.2439
7.2391
6.8462
6.8242
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Ph
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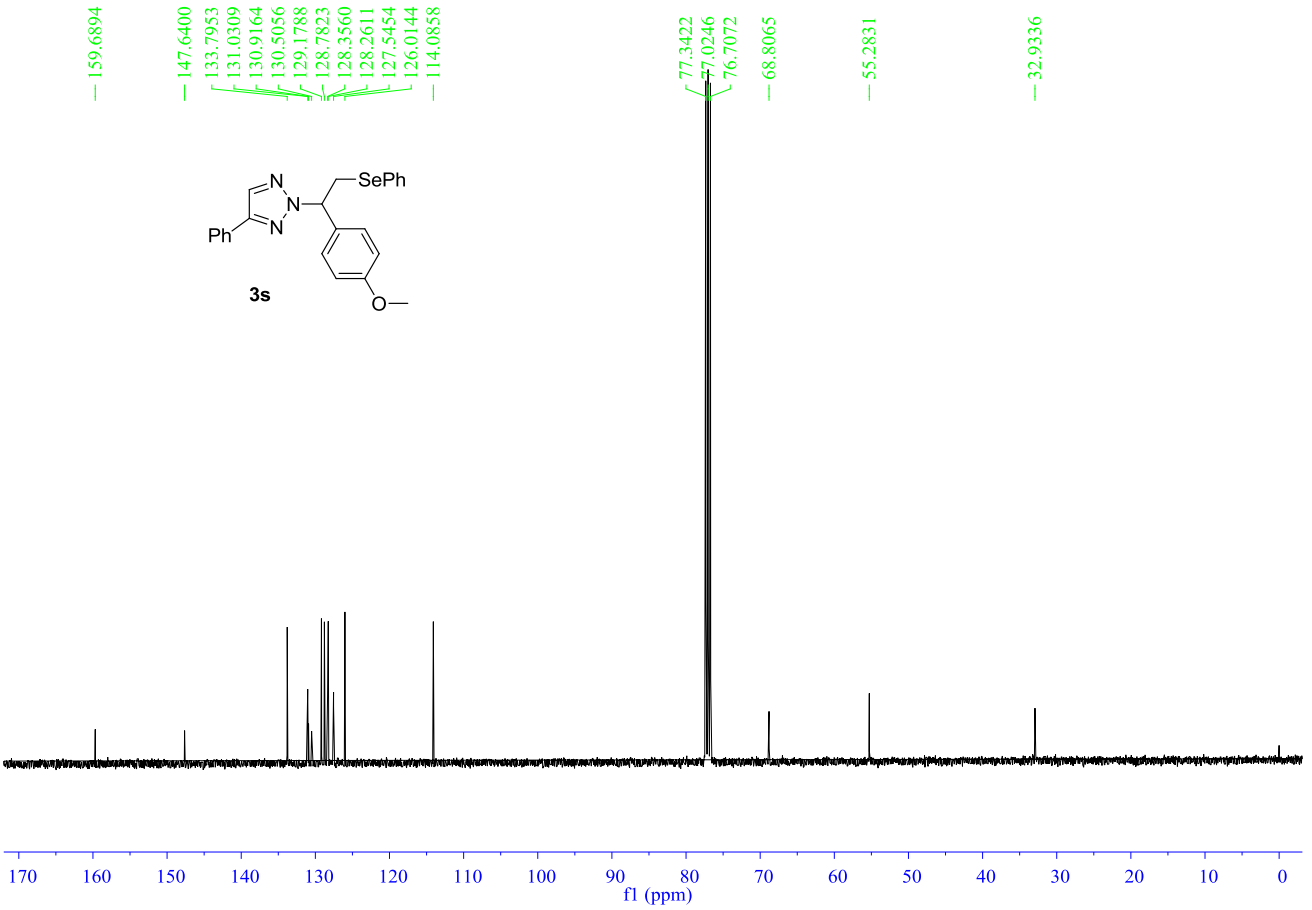
N
N
O
3s
1.00
2.05
2.03
2.09
3.06
3.58
2.05
1.06
1.08
3.04
1.06
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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77.0246
76.7072
68.8065
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N
O
3s
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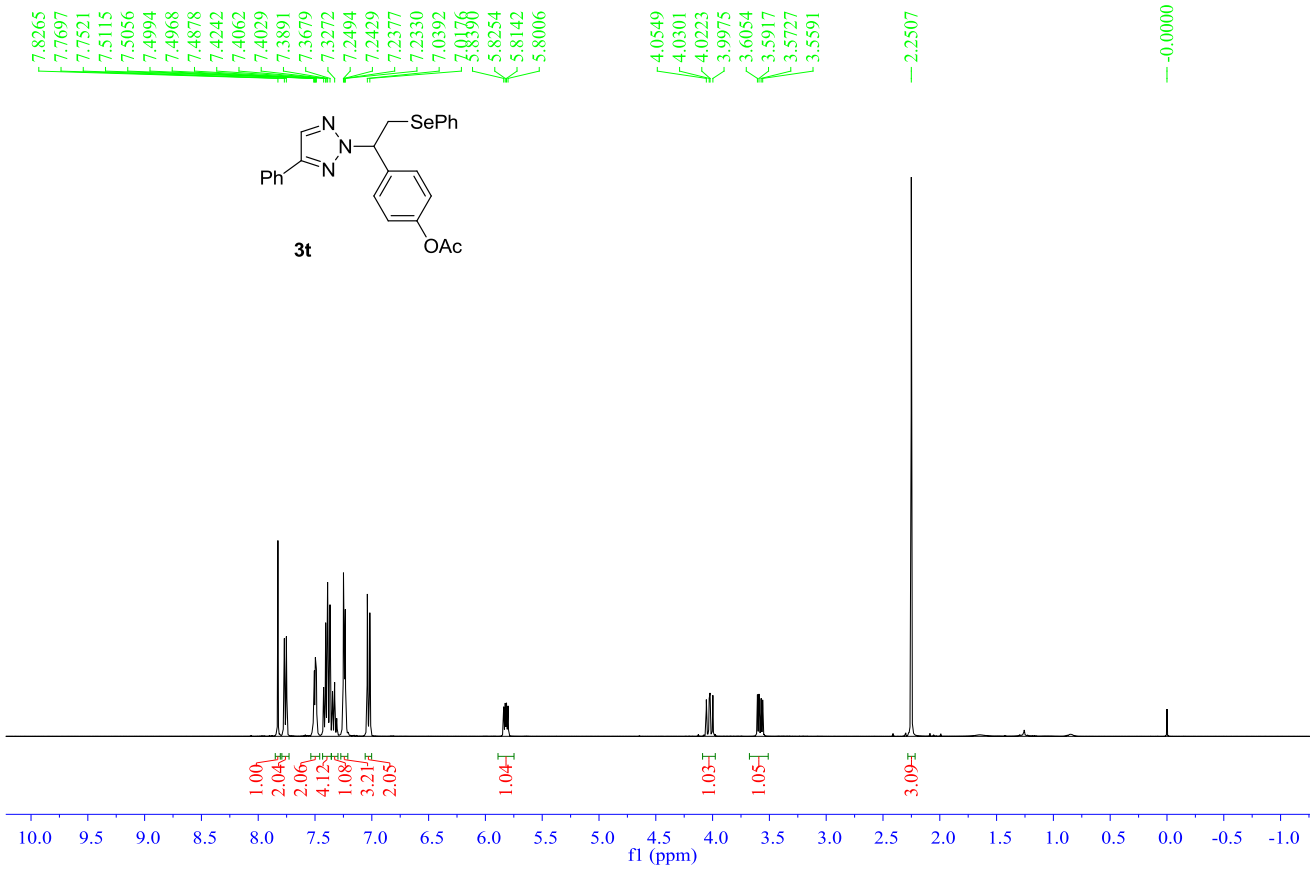
f1 (ppm)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7.3679
7.3272
7.2494
7.2429
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7.2330
7.0392
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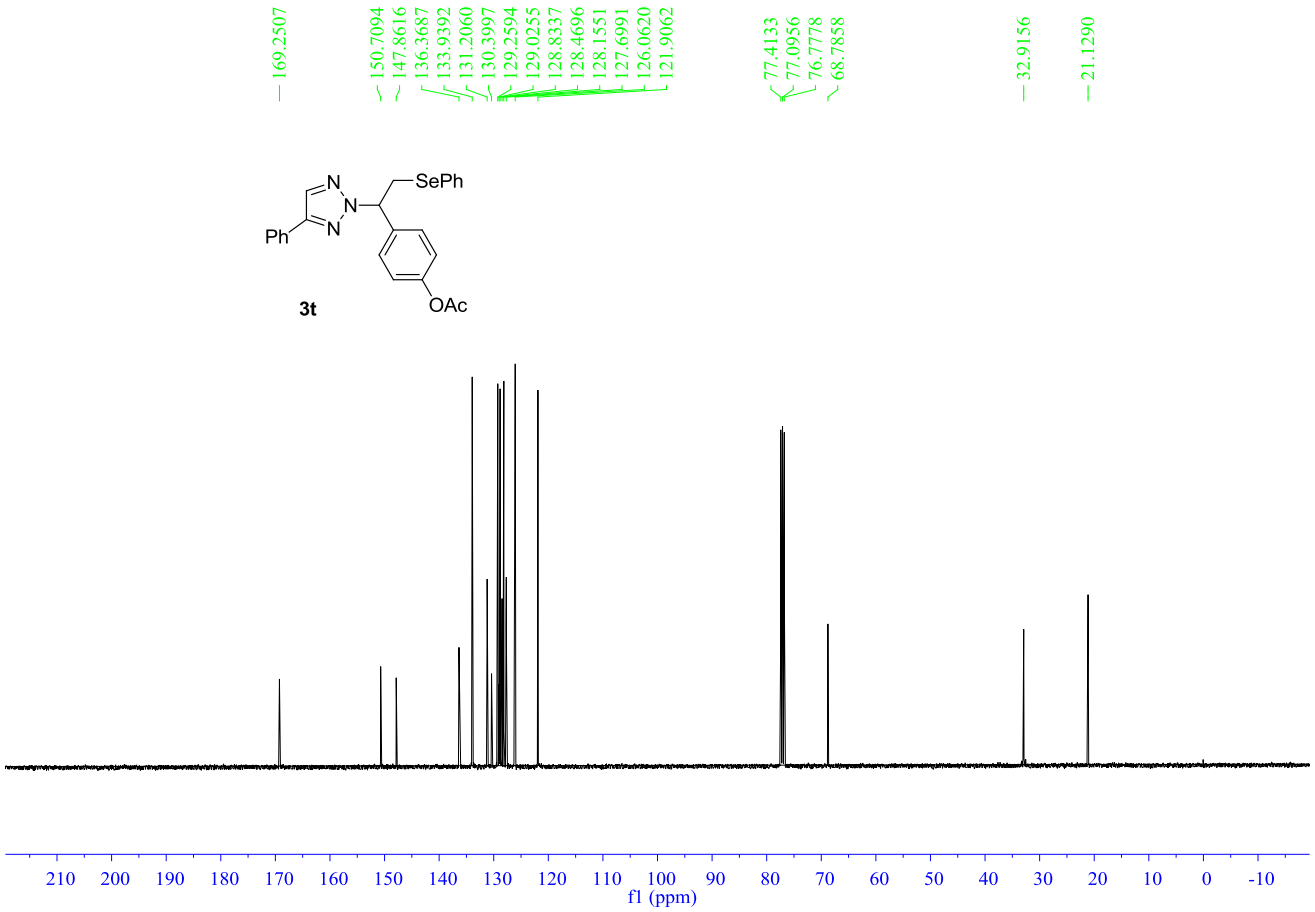
5.8254
5.8142
5.8006
4.0549
4.0301
4.0223
3.9975
3.6054
3.5917
3.5727
3.5591
2.2507
-0.0000
SePh
N
N
N
Ph
OAc
3t
1.00
2.04
2.06
4.12
1.08
3.21
2.05
1.04
1.03
1.05
3.09
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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77.0956
76.7778
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32.9156
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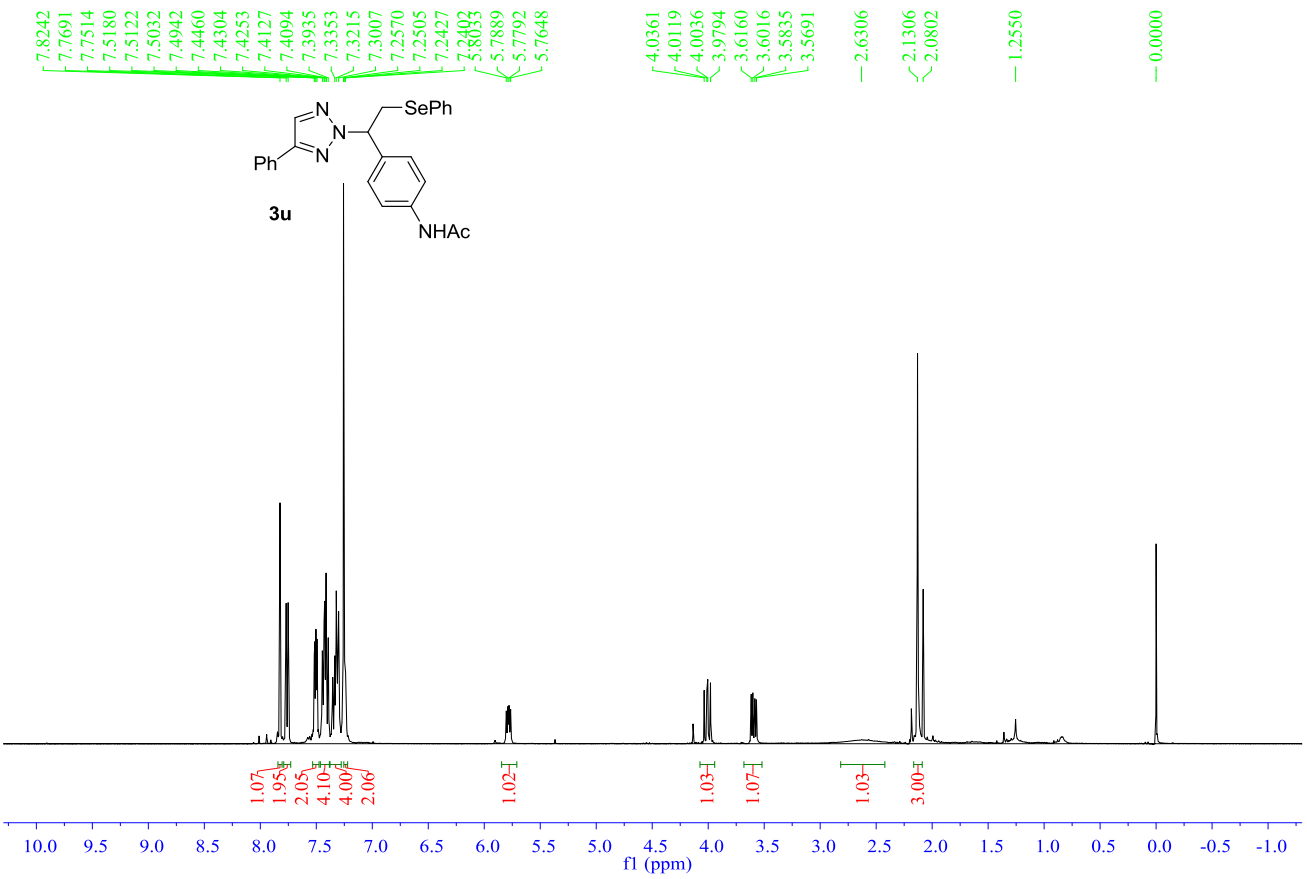
N
N
Ph
OAc
3t
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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4.0036
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3.6016
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Ph
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N
N
NHAc
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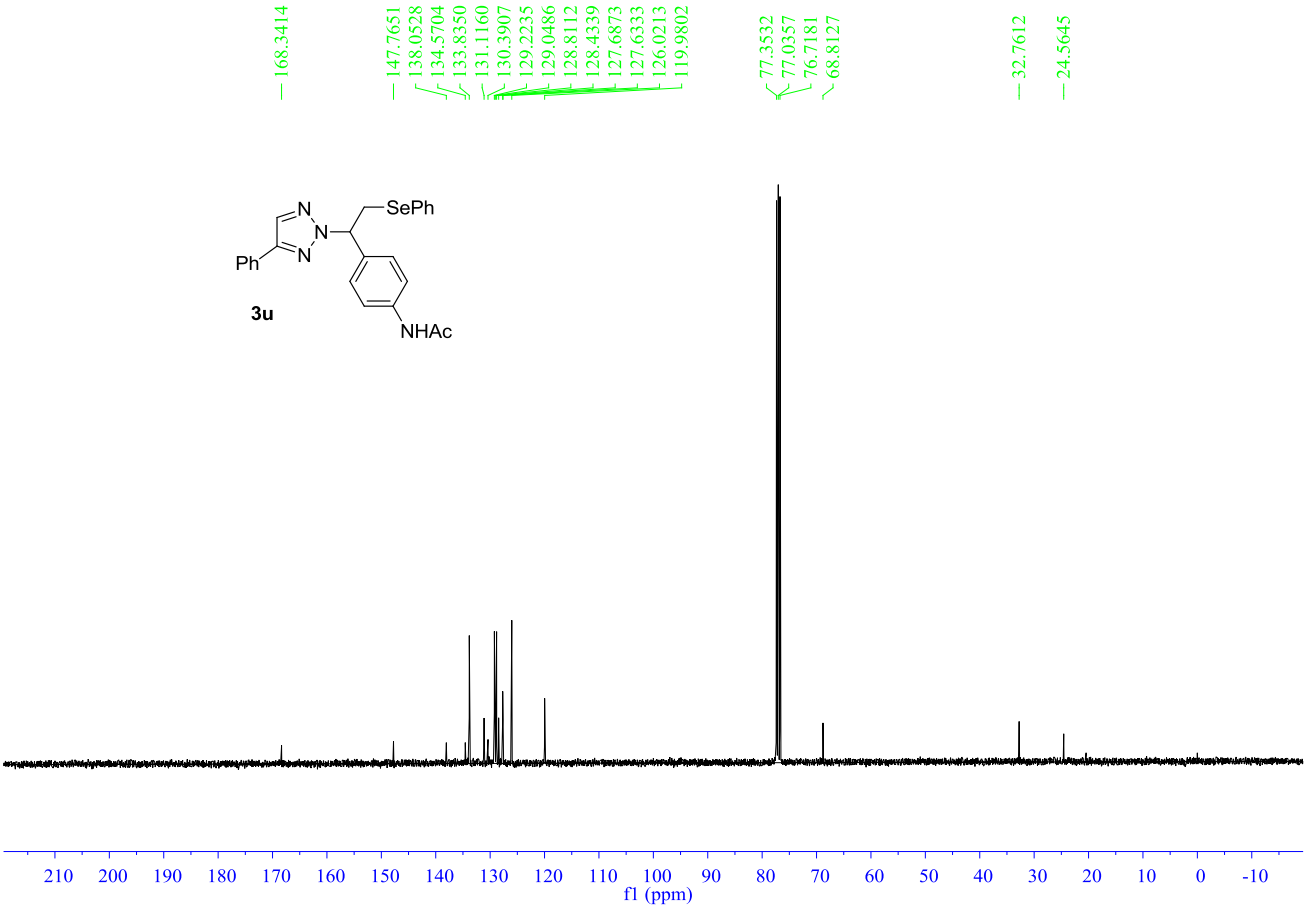
1.95
2.05
4.10
4.00
2.06
1.02
1.03
1.07
1.03
3.00
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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76.7181
68.8127
32.7612
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N
N
NHAc
3u
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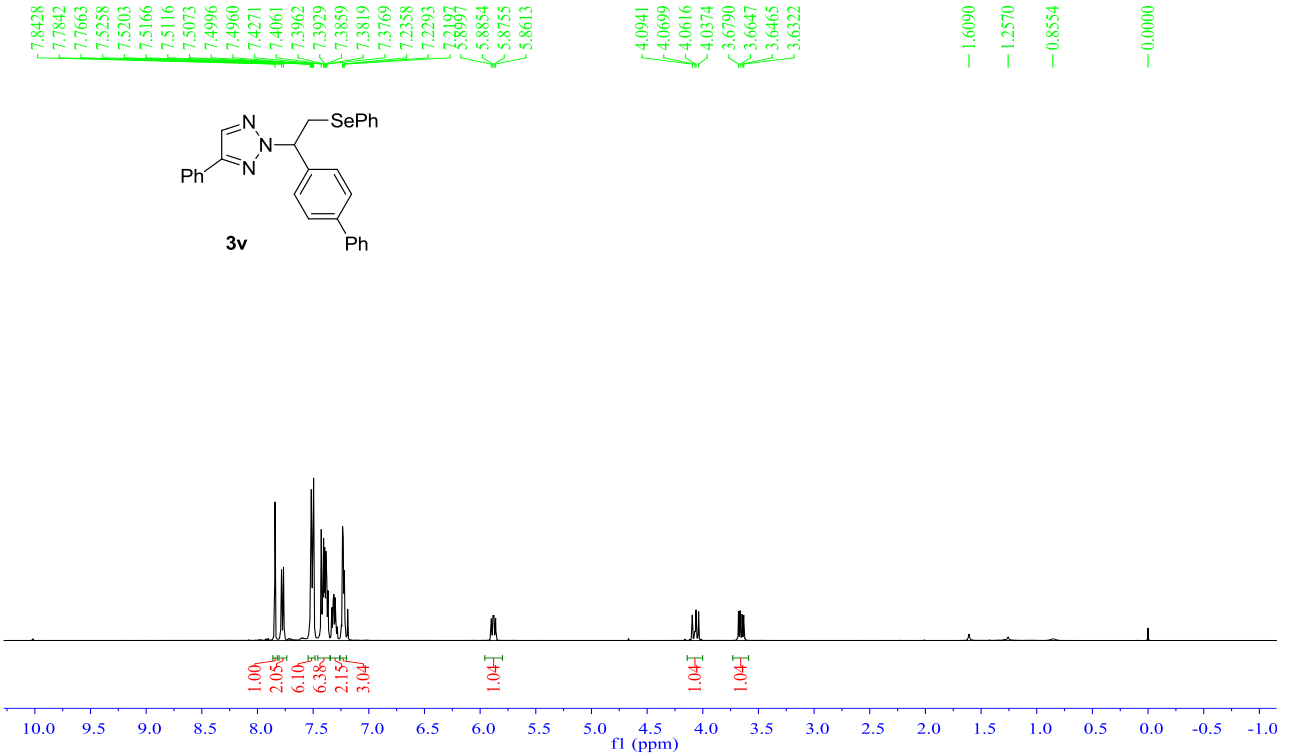
f1 (ppm)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N
N
Ph
3v
Ph
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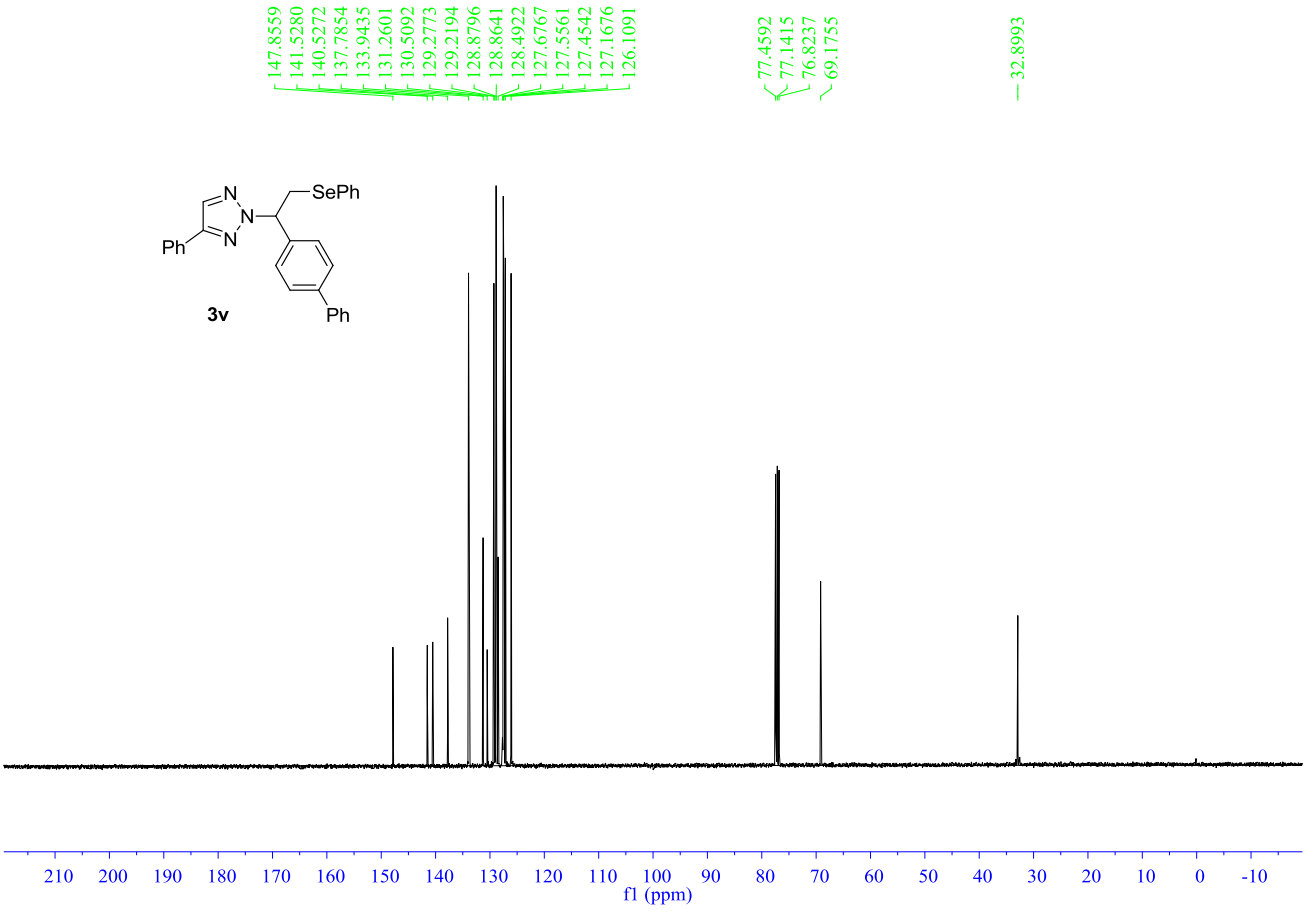
2.05
6.10
6.38
2.15
3.04
1.04
1.04
1.04
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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77.1415
76.8237
69.1755
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N
Ph
3v
Ph
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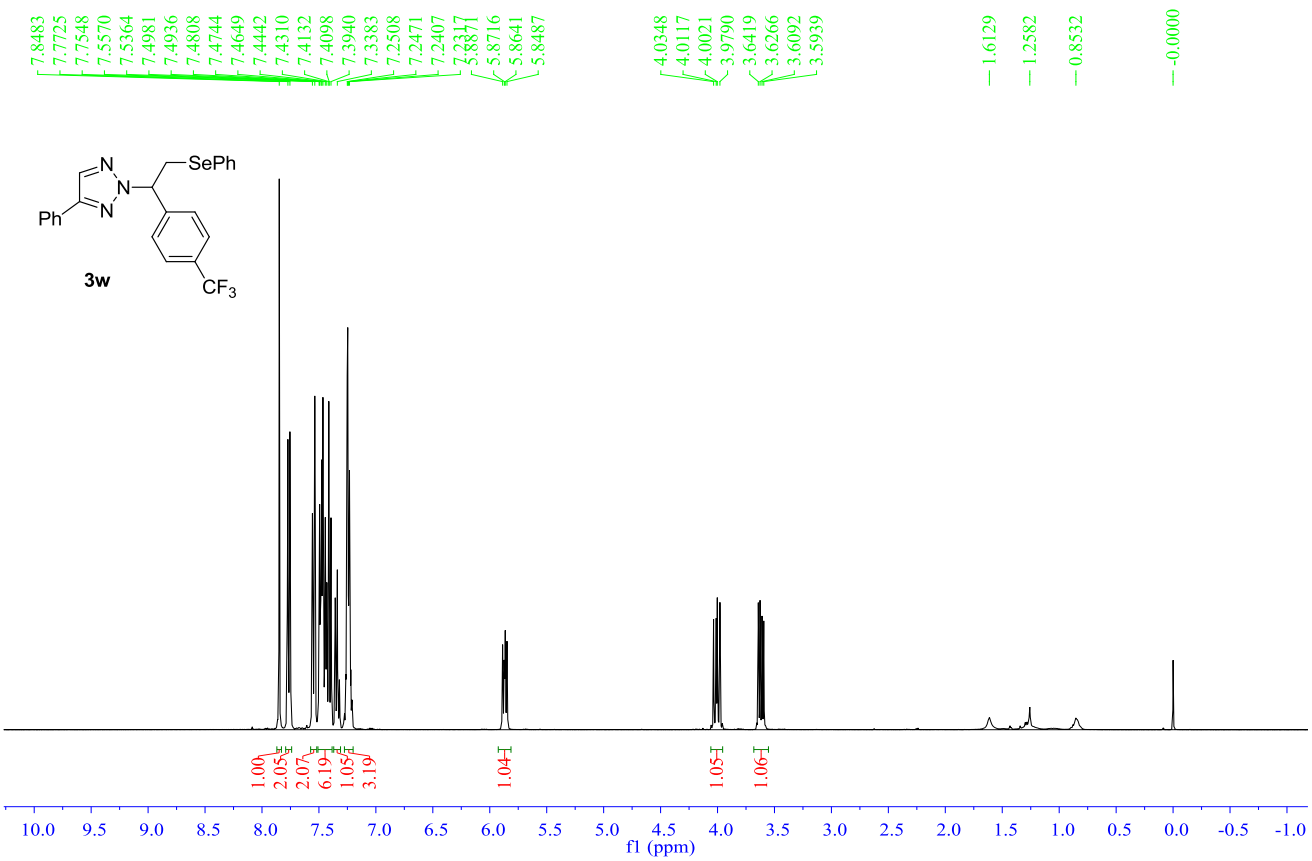
f1 (ppm)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Ph
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3.19
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1.05
1.06
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4.5
4.0
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0.0
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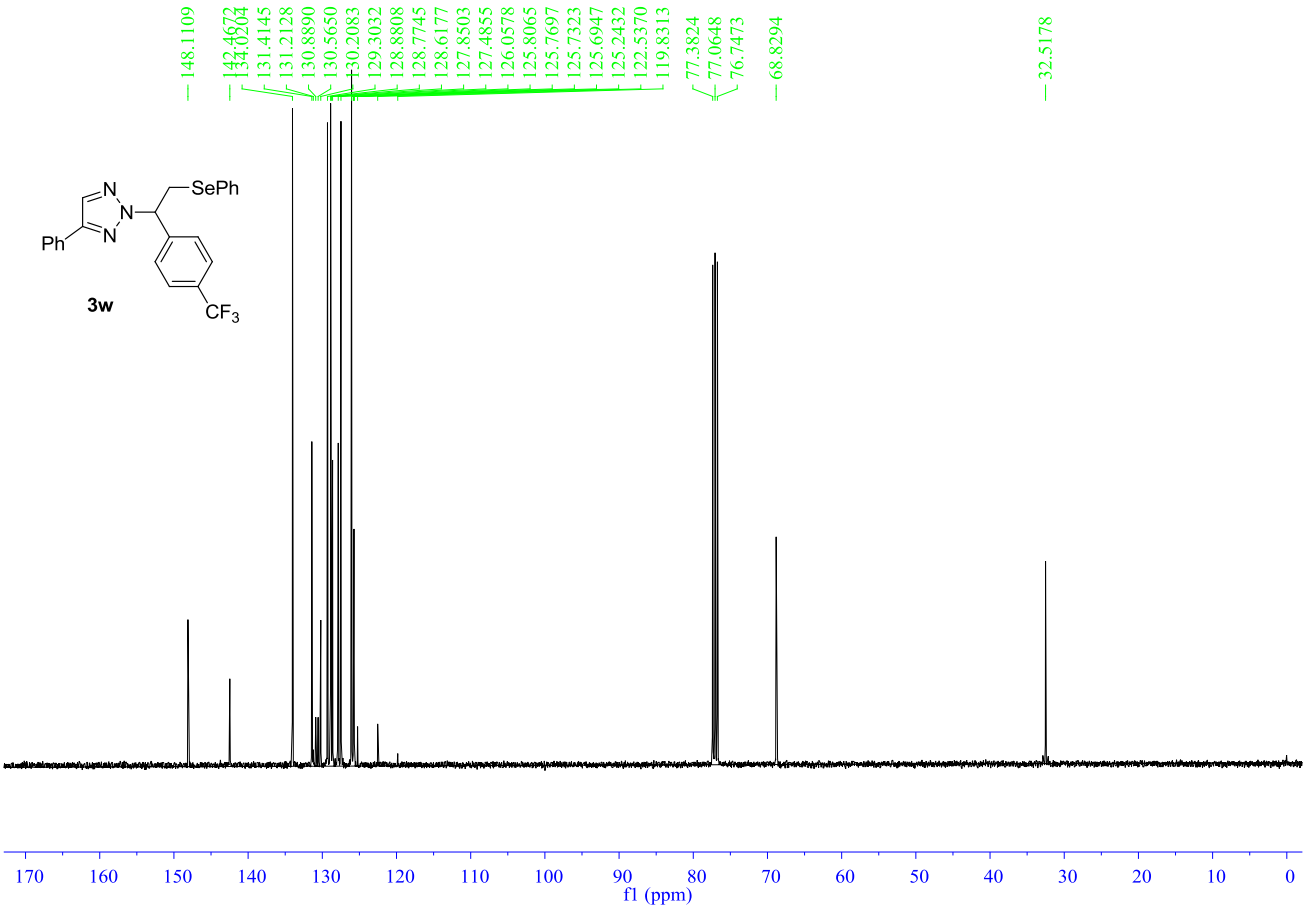
f1 (ppm)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Ph
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N
N
3w
CF3
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90
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70
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50
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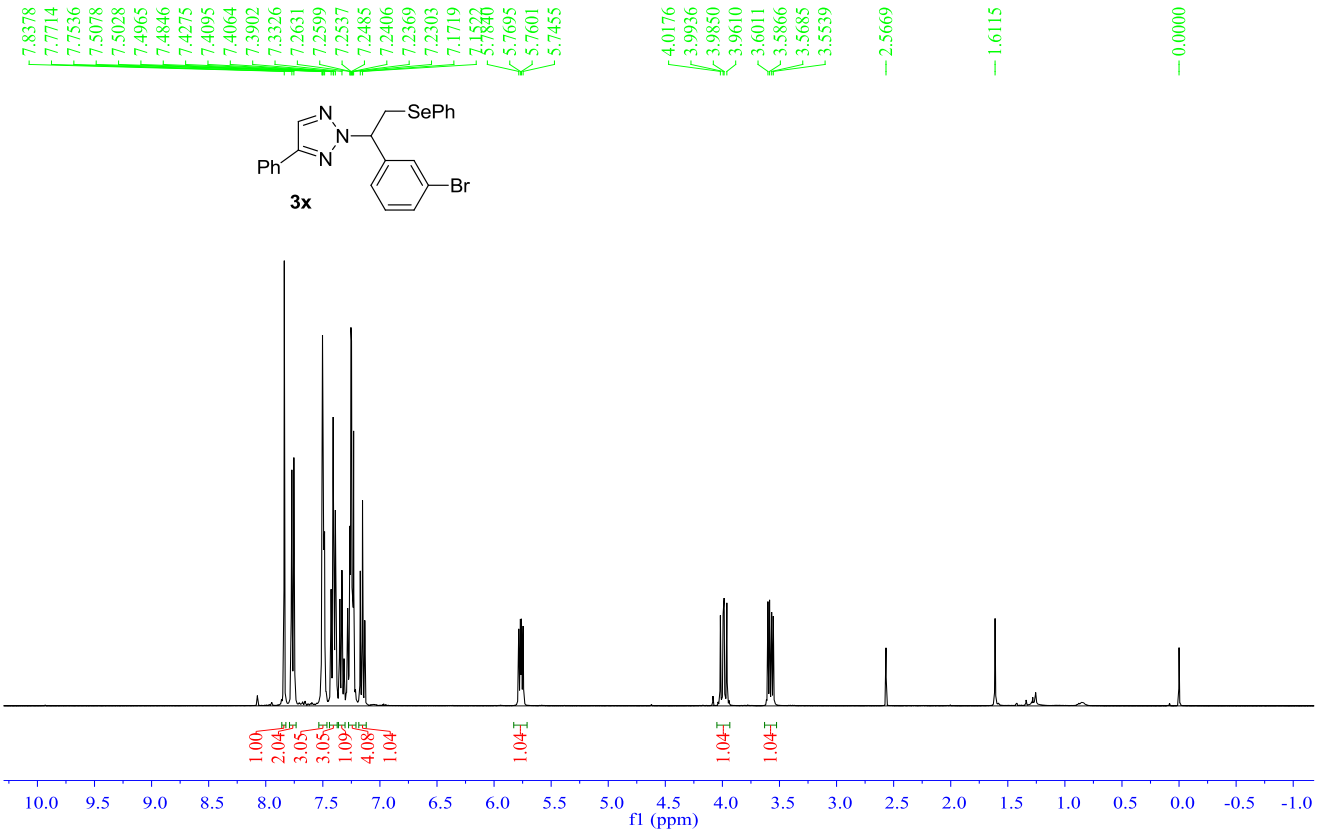
f1 (ppm)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Ph
Br
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2.04
3.05
3.05
1.09
4.08
1.04
1.04
1.04
1.04
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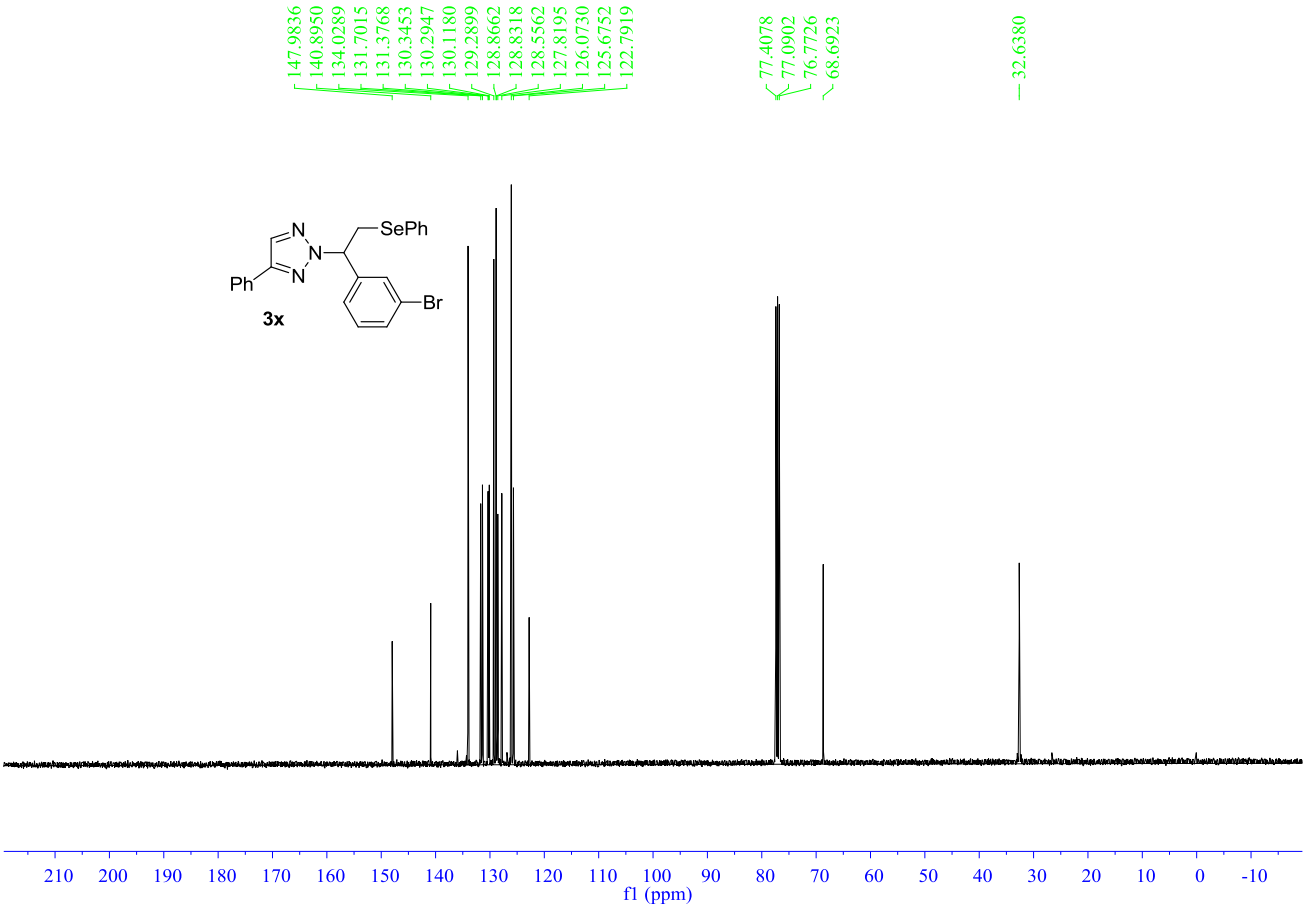
f1 (ppm)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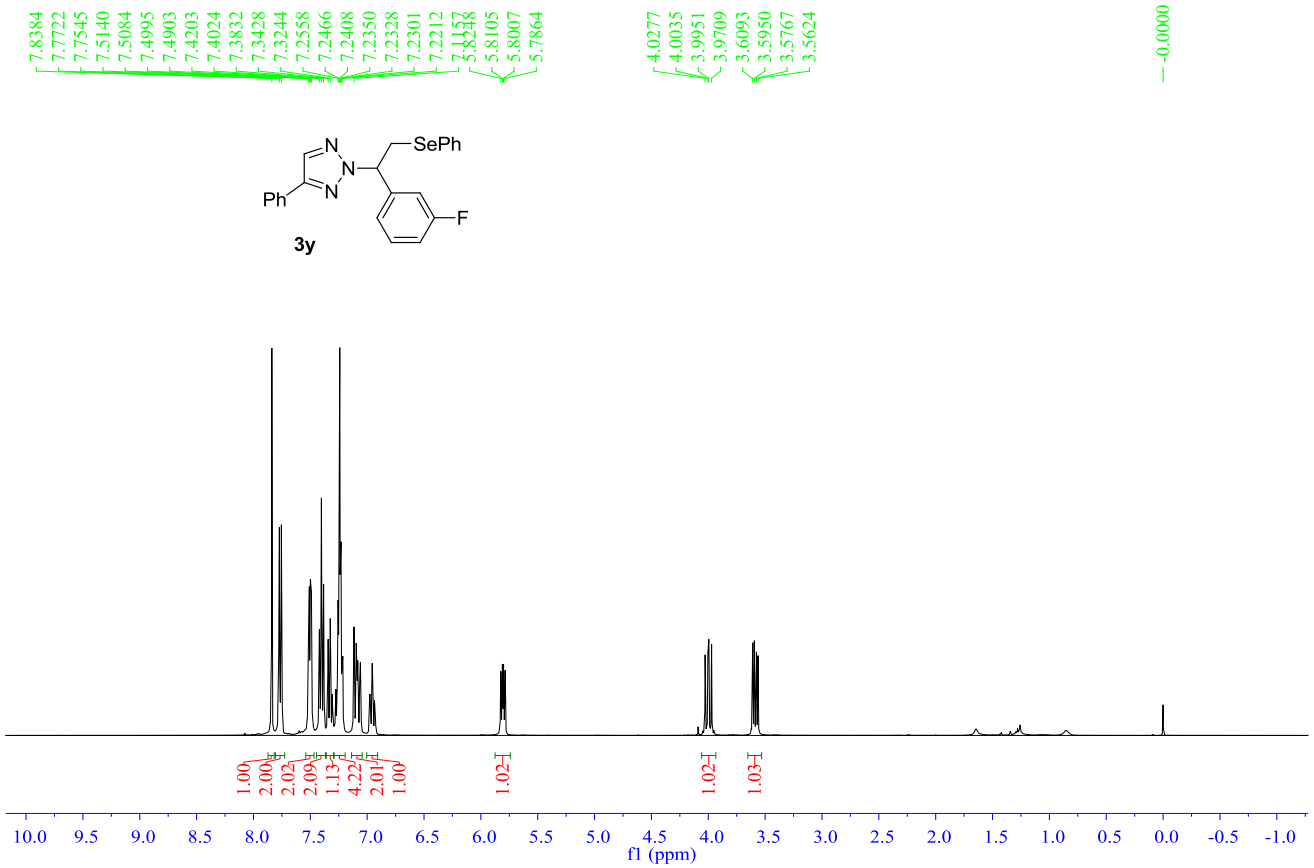
f1 (ppm)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1.02
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9.0
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7.0
6.5
6.0
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4.5
4.0
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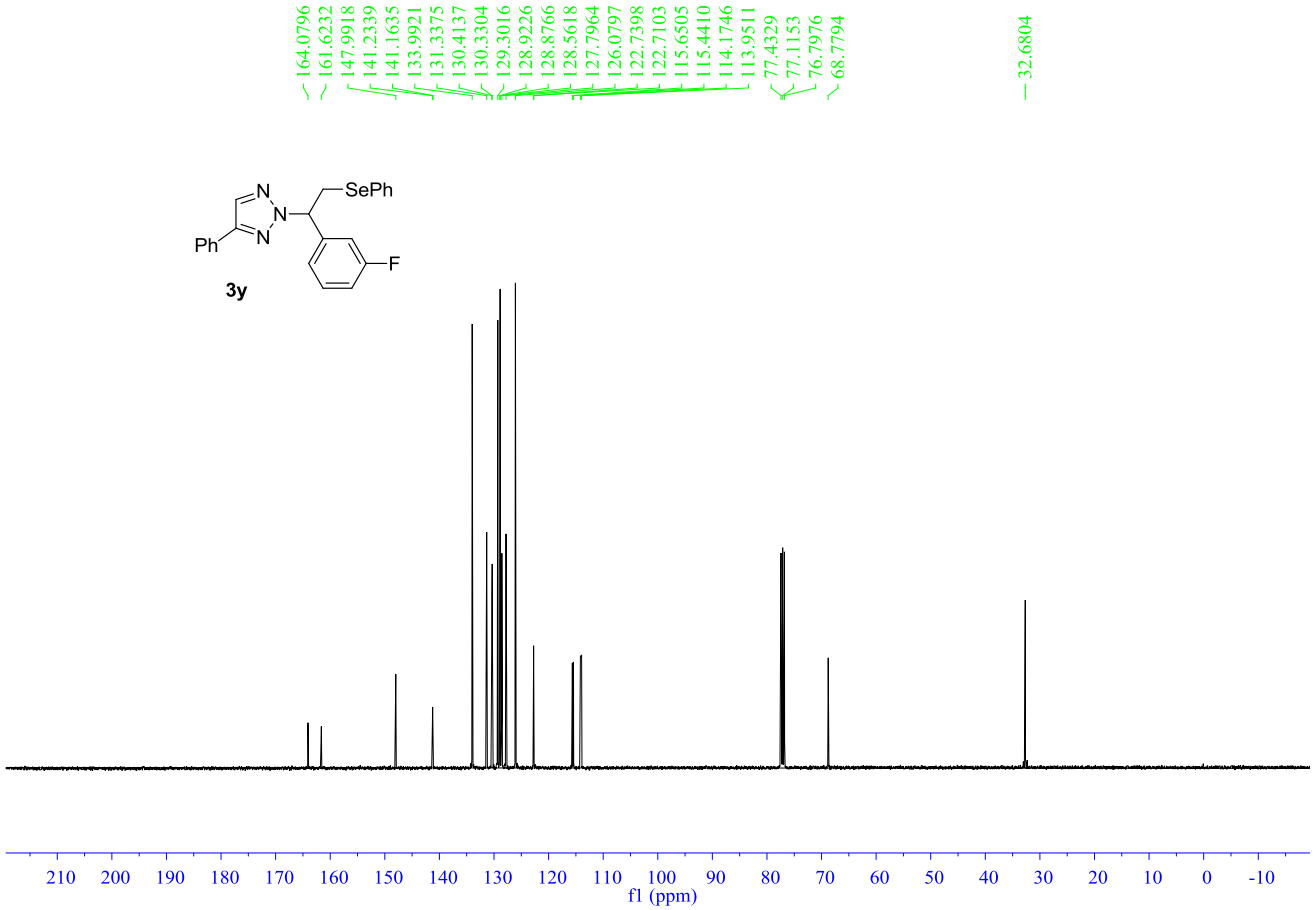
-1.0
f1 (ppm)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SePh
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N
N
Ph
F
3y
210
200
190
180
170
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100
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80
70
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40
30
20
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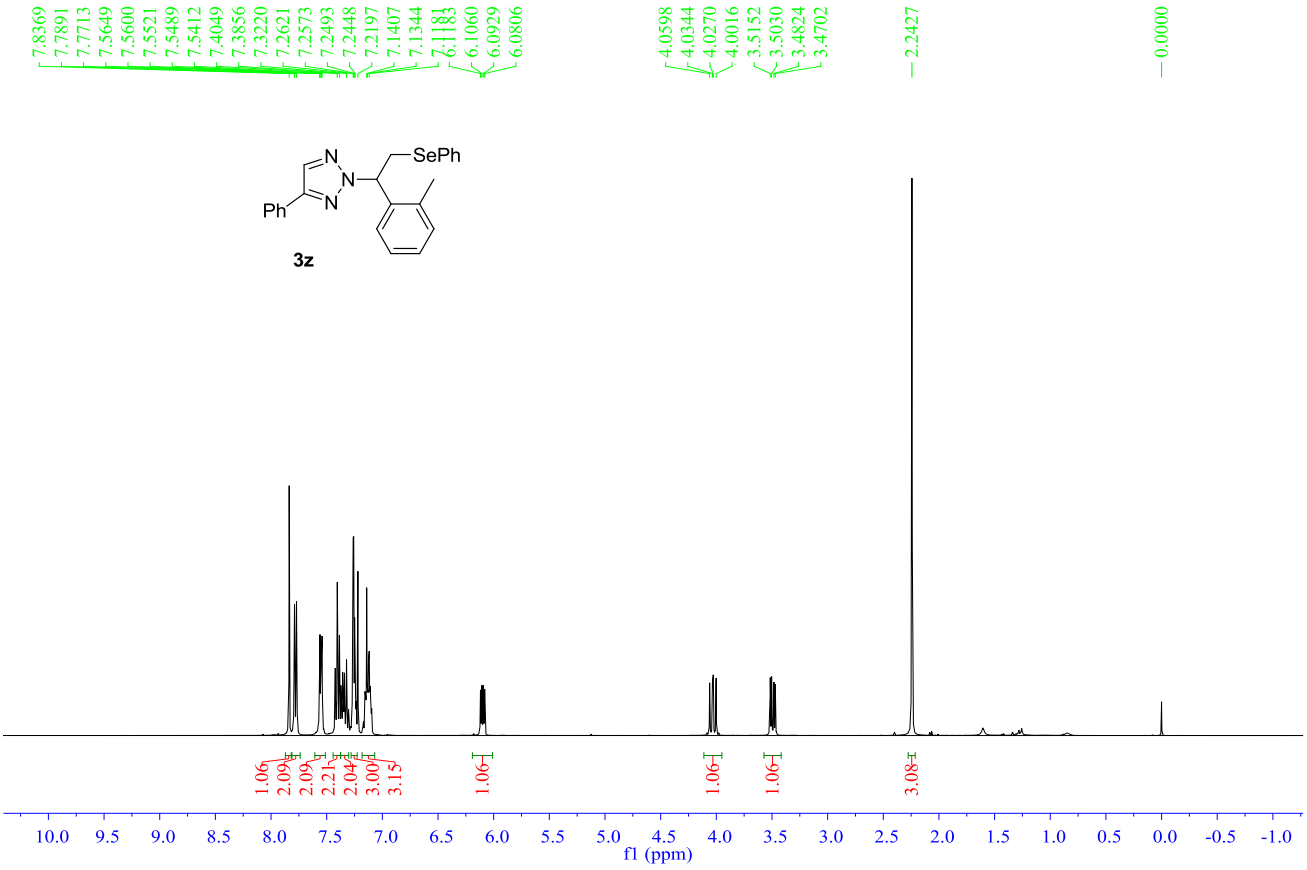
0
-10
f1 (ppm)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Ph
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2.09
2.21
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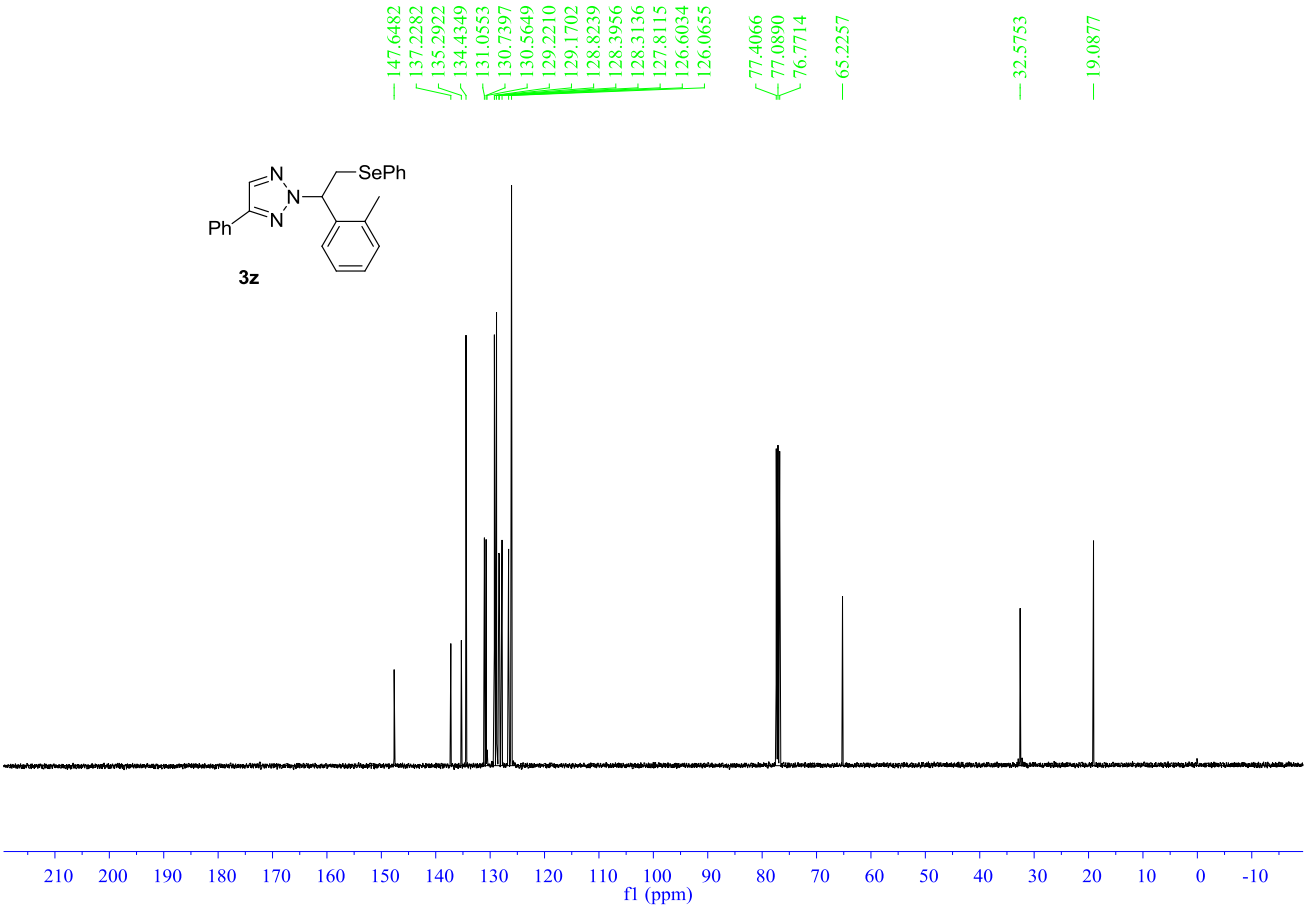
3.15
1.06
1.06
1.06
3.08
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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19.0877
SePh
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N
N
Ph
3z
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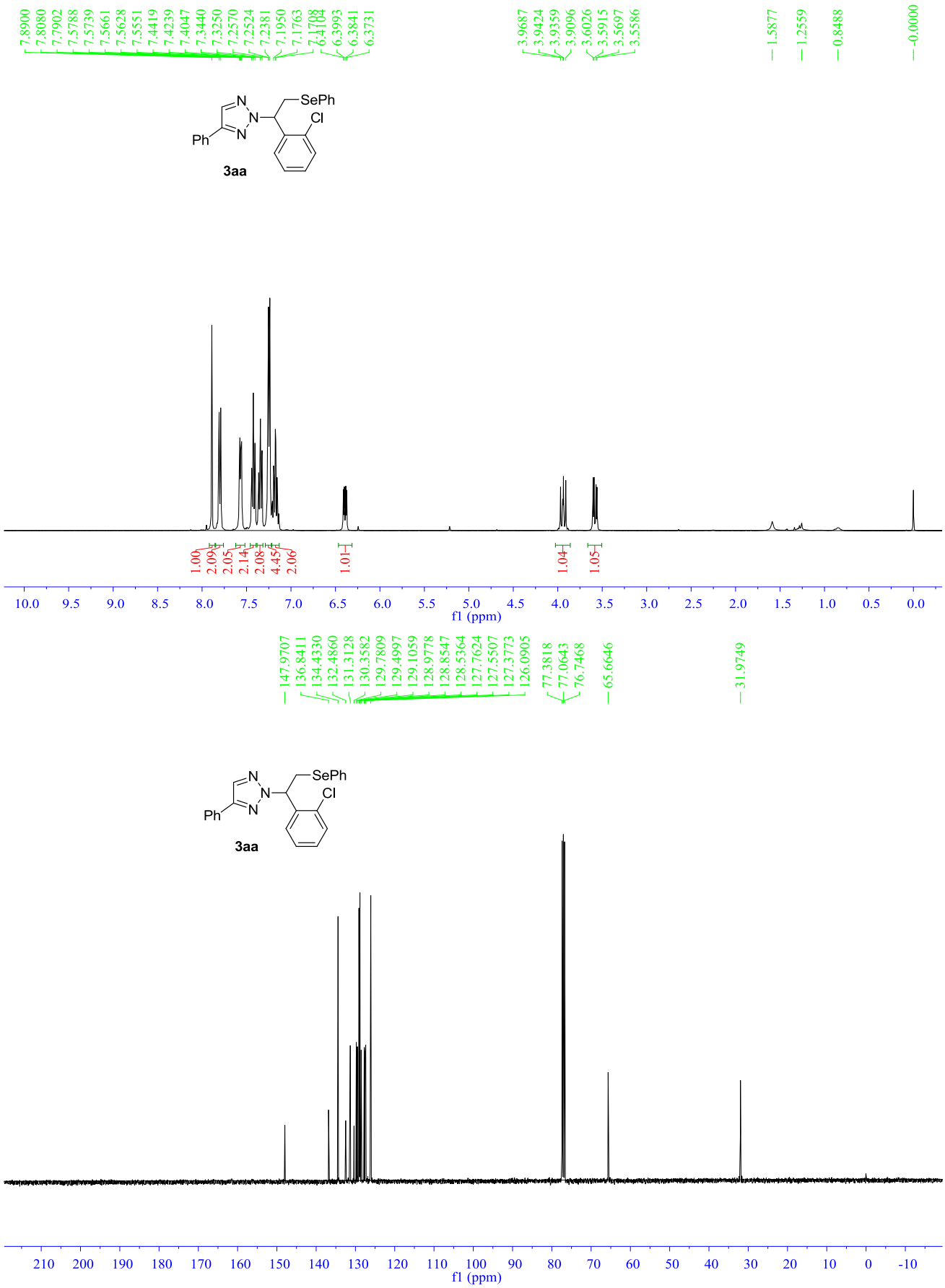
f1 (ppm)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7.1950
7.1763
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7.1104
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6.3841
6.3731
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3.9424
3.9359
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3.6026
3.5915
3.5697
3.5586
1.5877
1.2559
0.8488
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N
N
Ph
SePh
Cl
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2.09
2.05
2.14
2.08
4.45
2.06
1.01
1.04
1.05
10.0
9.5
9.0
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8.0
7.5
7.0
6.5
6.0
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4.0
3.5
3.0
2.5
2.0
1.5
1.0
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f1 (ppm)
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134.4330
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127.3773
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76.7468
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N
Ph
SePh
Cl
3aa
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200
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180
170
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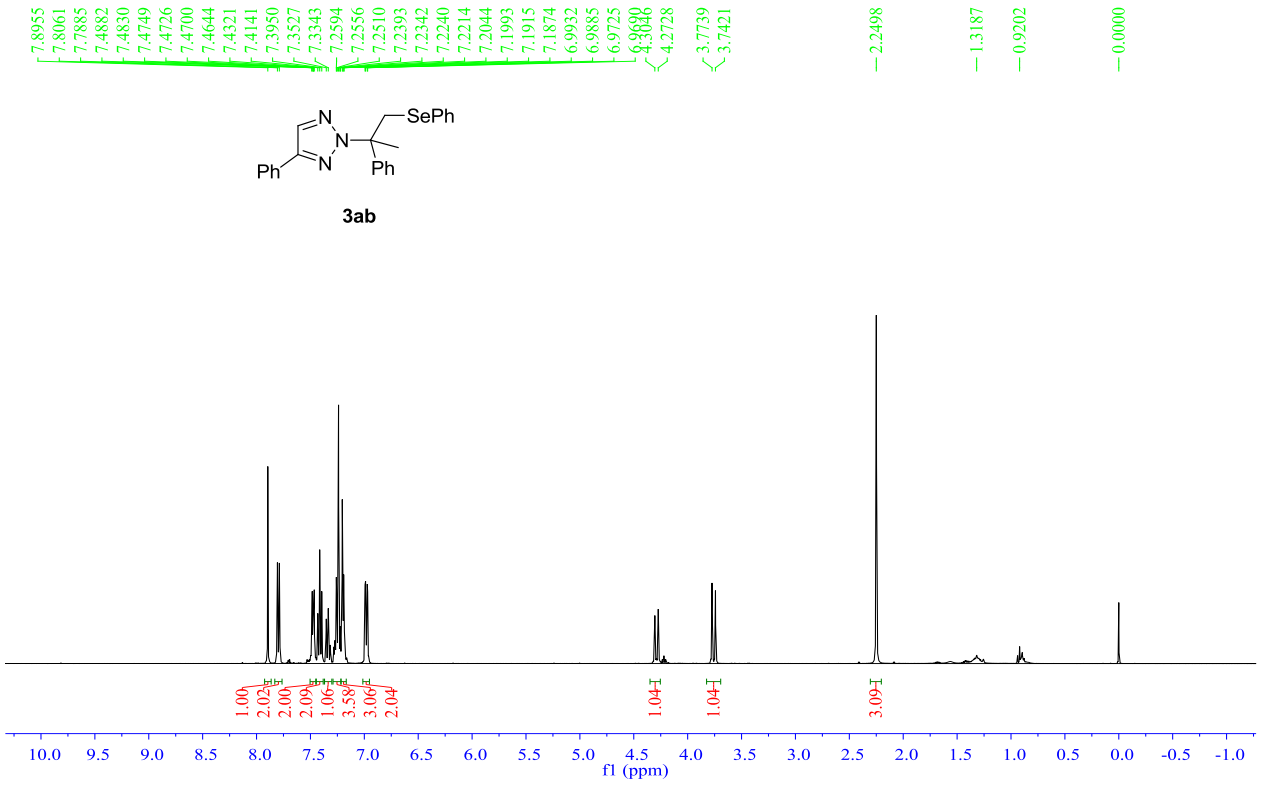
f1 (ppm)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7.2556
7.2510
7.2393
7.2342
7.2240
7.2214
7.2044
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7.1915
7.1874
6.9932
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4.2728
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2.2498
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0.9202
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SePh
Ph
Ph
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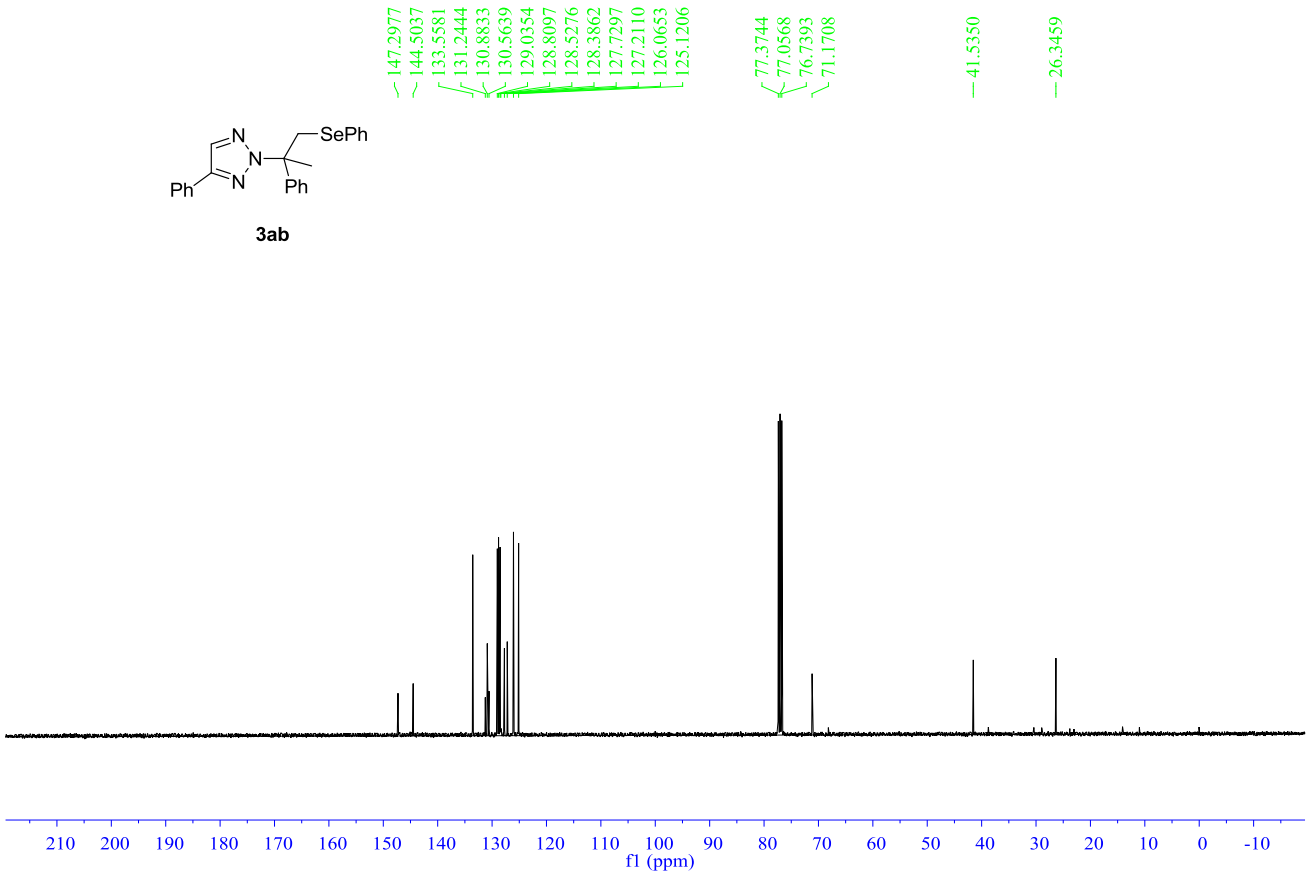
2.02
2.00
2.09
1.06
3.58
3.06
2.04
1.04
1.04
3.09
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)

3ab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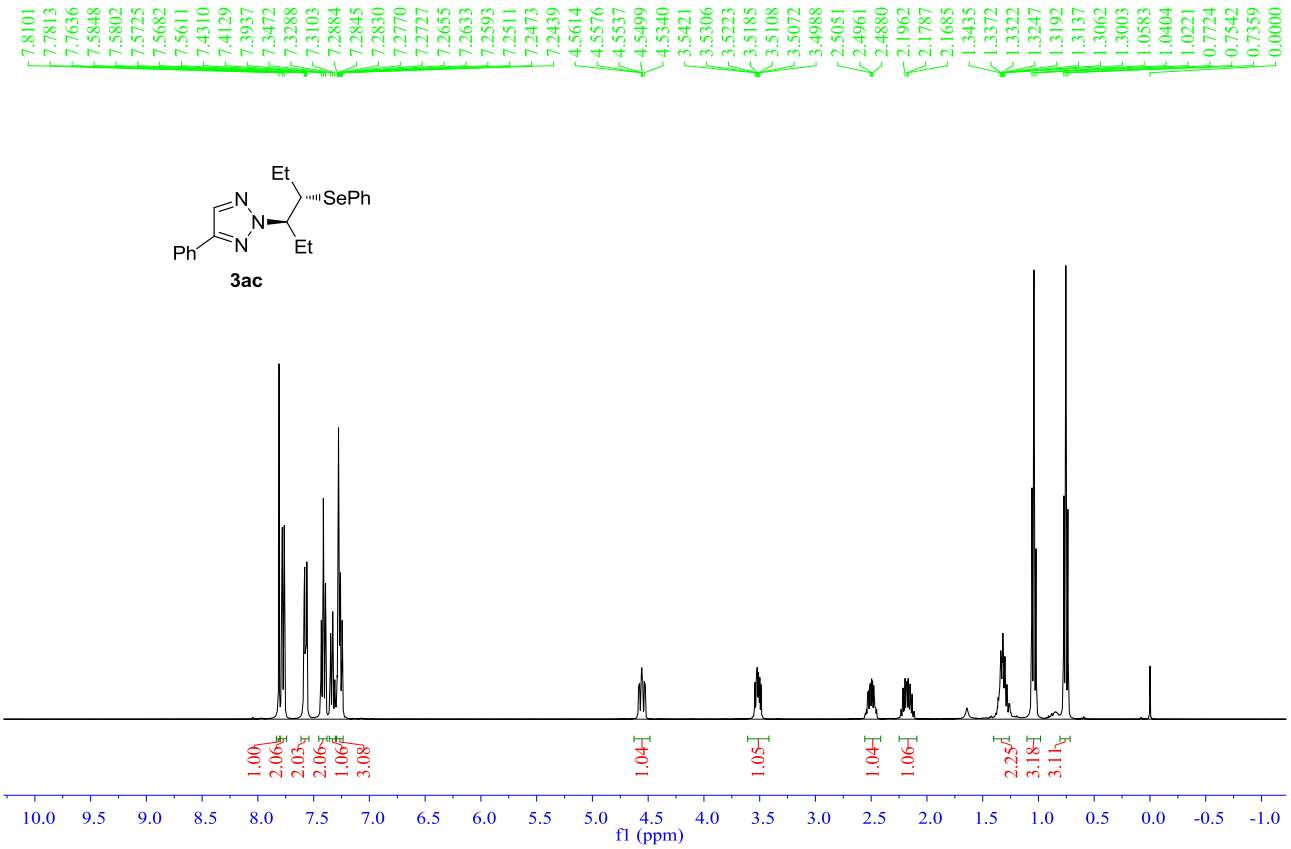
126.0653
125.1206
77.3744
77.0568
76.7393
71.1708
41.5350
26.3459
SePh
Ph
Ph
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

3ab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7.2884
7.2845
7.2830
7.2770
7.2727
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7.2633
7.2593
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7.2473
7.2439
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4.5576
4.5537
4.5499
4.5340
3.5421
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3.5185
3.5108
3.5072
3.4988
2.5051
2.4961
2.4880
2.1962
2.1787
2.1685
1.3435
1.3372
1.3322
1.3247
1.3192
1.3137
1.3062
1.3003
1.0583
1.0404
1.0221
0.7724
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0.7359
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SePh
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N
N
Ph
Et
3ac
1.00
2.06
2.03
2.06
1.06
3.08
1.04
1.05
1.04
1.06
2.25
3.18
3.11
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
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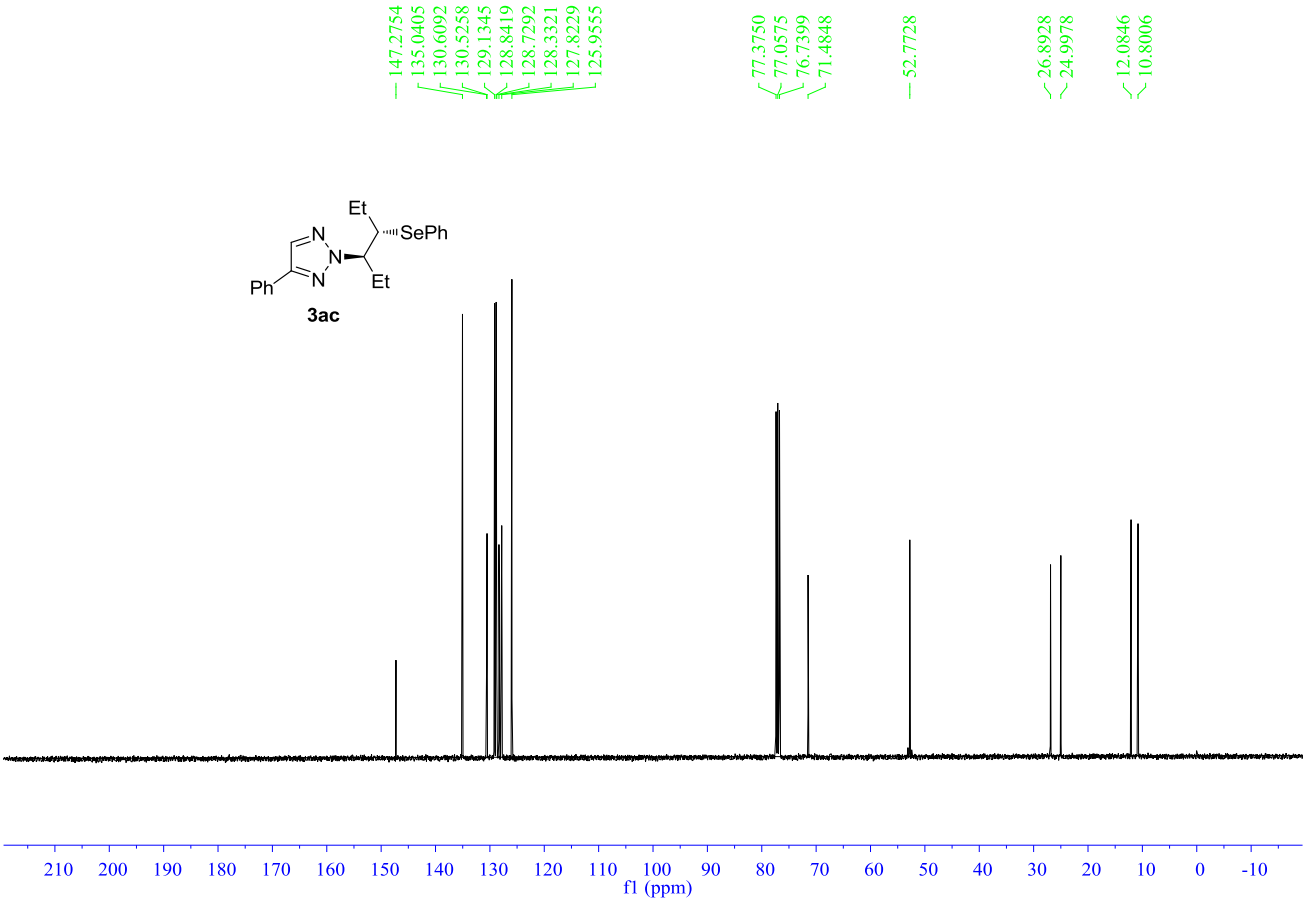
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77.0575
76.7399
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52.7728
26.8928
24.9978
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10.8006
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SePh
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N
N
Ph
Et
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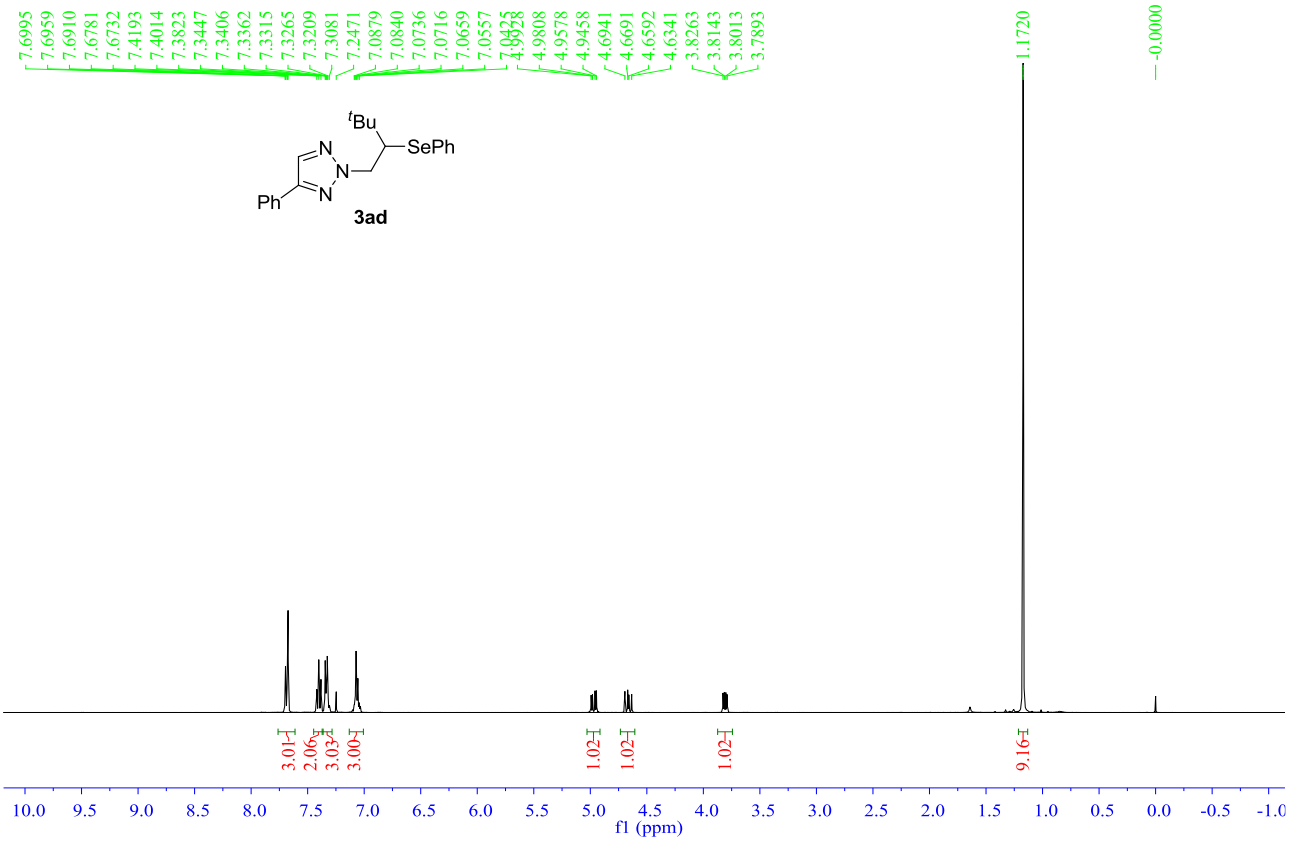
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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7.3315
7.3265
7.3209
7.3081
7.2471
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7.0736
7.0716
7.0659
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4.9578
4.9458
4.6941
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4.6592
4.6341
3.8263
3.8143
3.8013
3.7893
1.1720
-0.0000
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SePh
Ph
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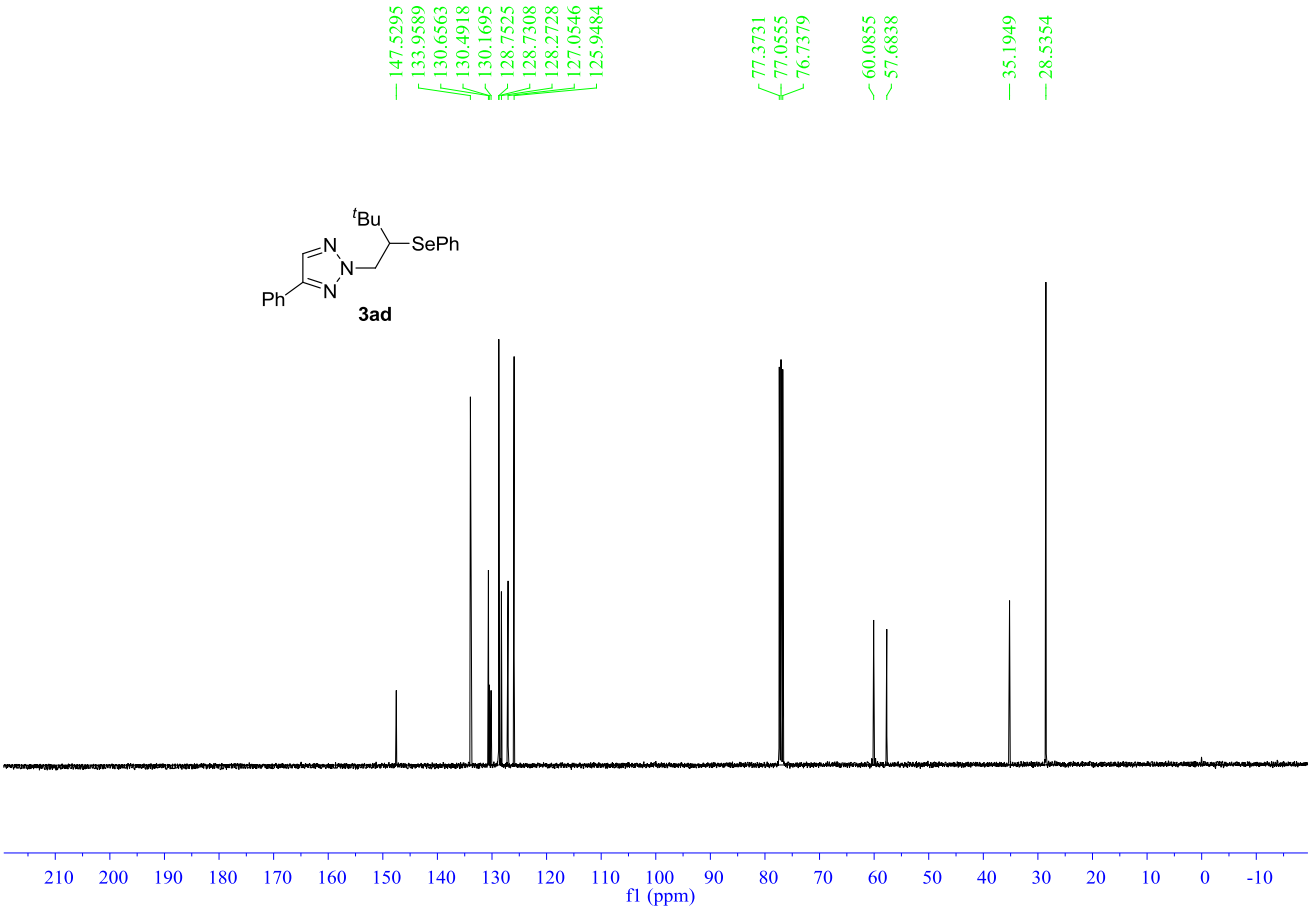
2.06
3.03
3.00
1.02
1.02
1.02
9.16
f1 (ppm)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125.9484
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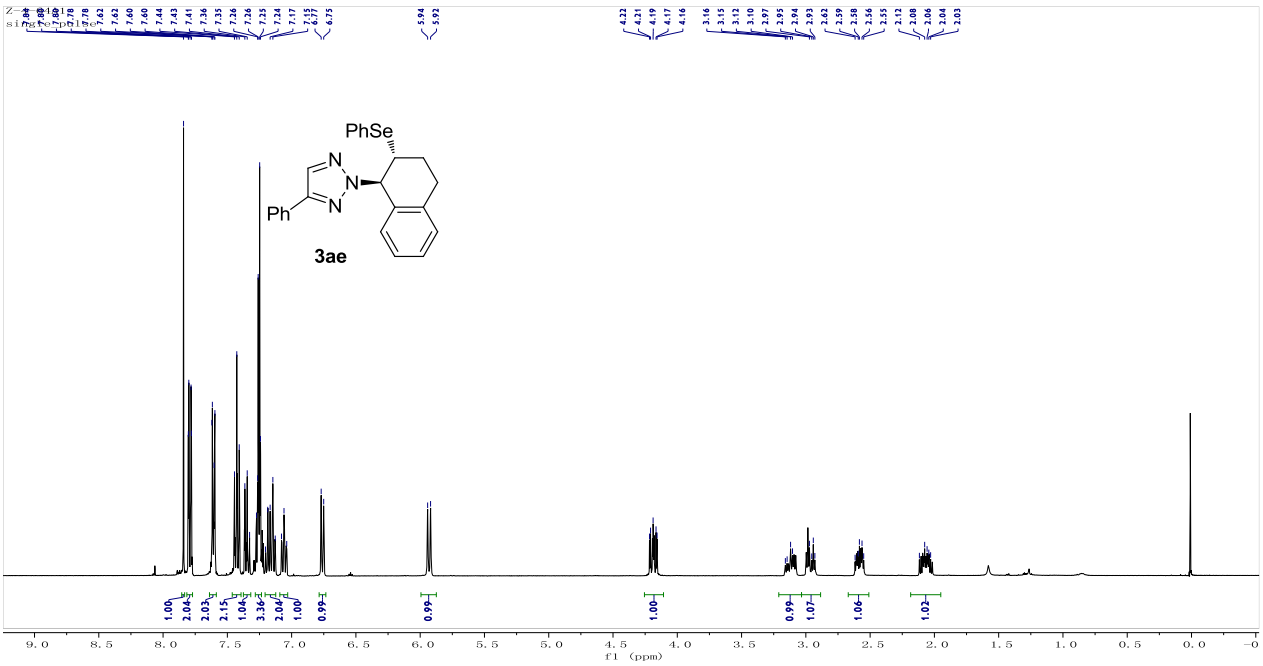
76.7379
60.0855
57.6838
35.1949
28.5354
tBu
SePh
Ph
3ad
f1 (ppm)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N
Ph
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2.03
2.15
1.04
3.36
2.04
1.00
0.99
0.99
1.00
0.99
1.07
1.06
1.02
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
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4.5
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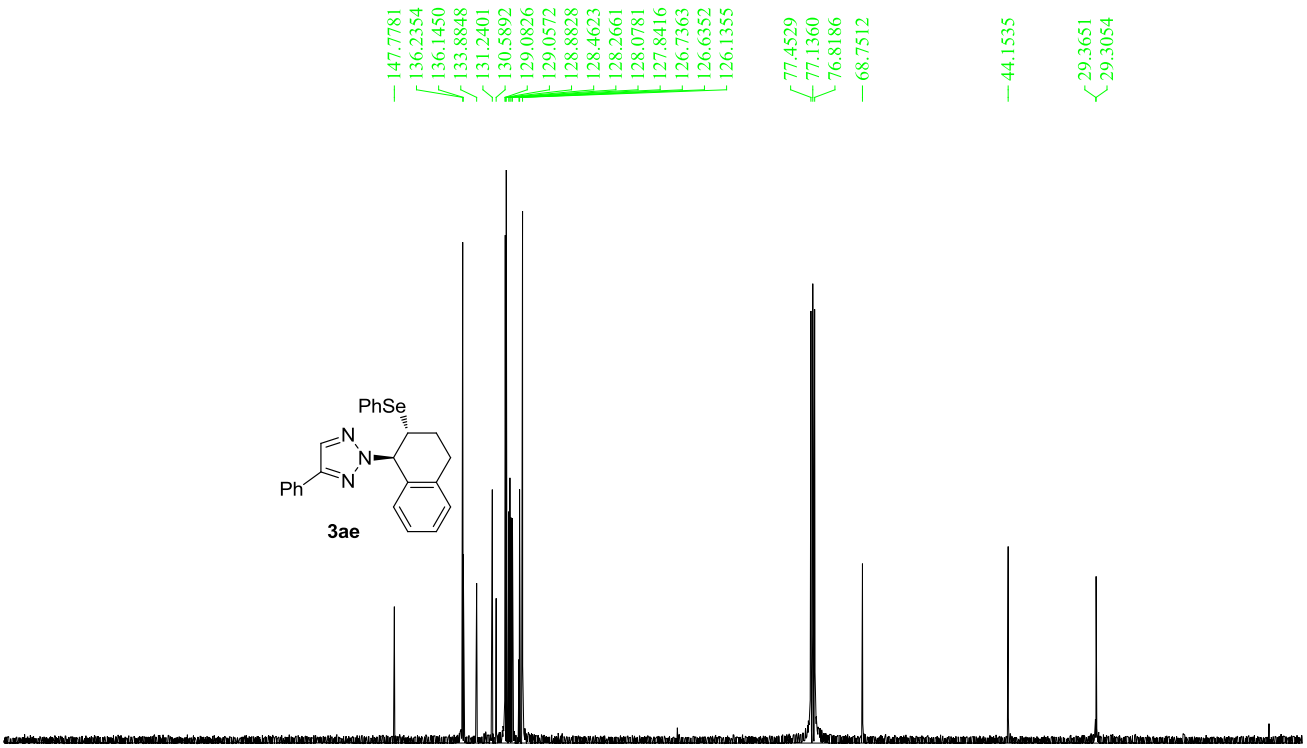
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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126.6352
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76.8186
68.7512
44.1535
29.3651
29.3054
PhSe
N
N
N
Ph
3ae
210
200
190
180
170
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150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
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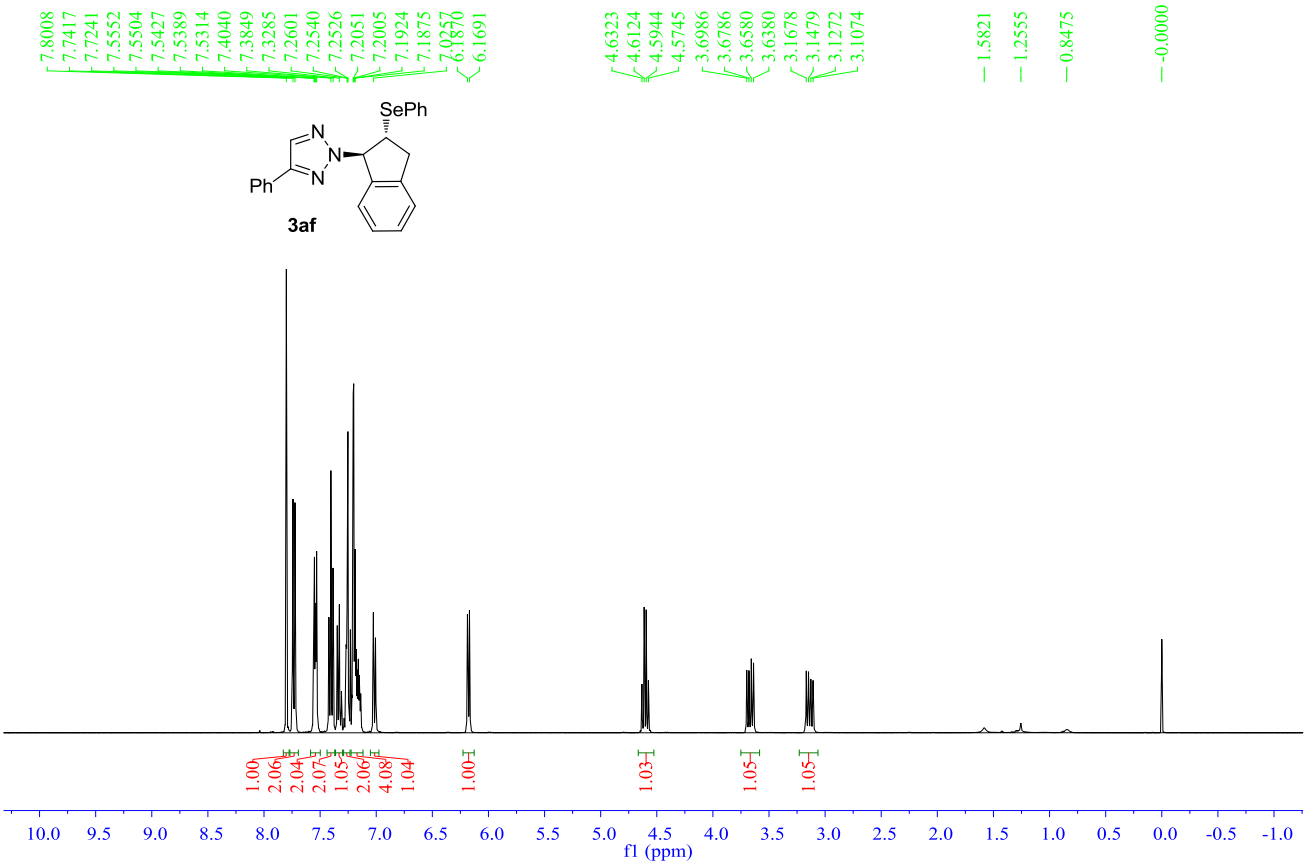
f1 (ppm)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7.2601
7.2540
7.2526
7.2051
7.2005
7.1924
7.1875
7.0257
6.1870
6.1691
4.6323
4.6124
4.5944
4.5745
3.6986
3.6786
3.6580
3.6380
3.1678
3.1479
3.1272
3.1074
1.5821
1.2555
0.8475
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SePh
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N
N
Ph
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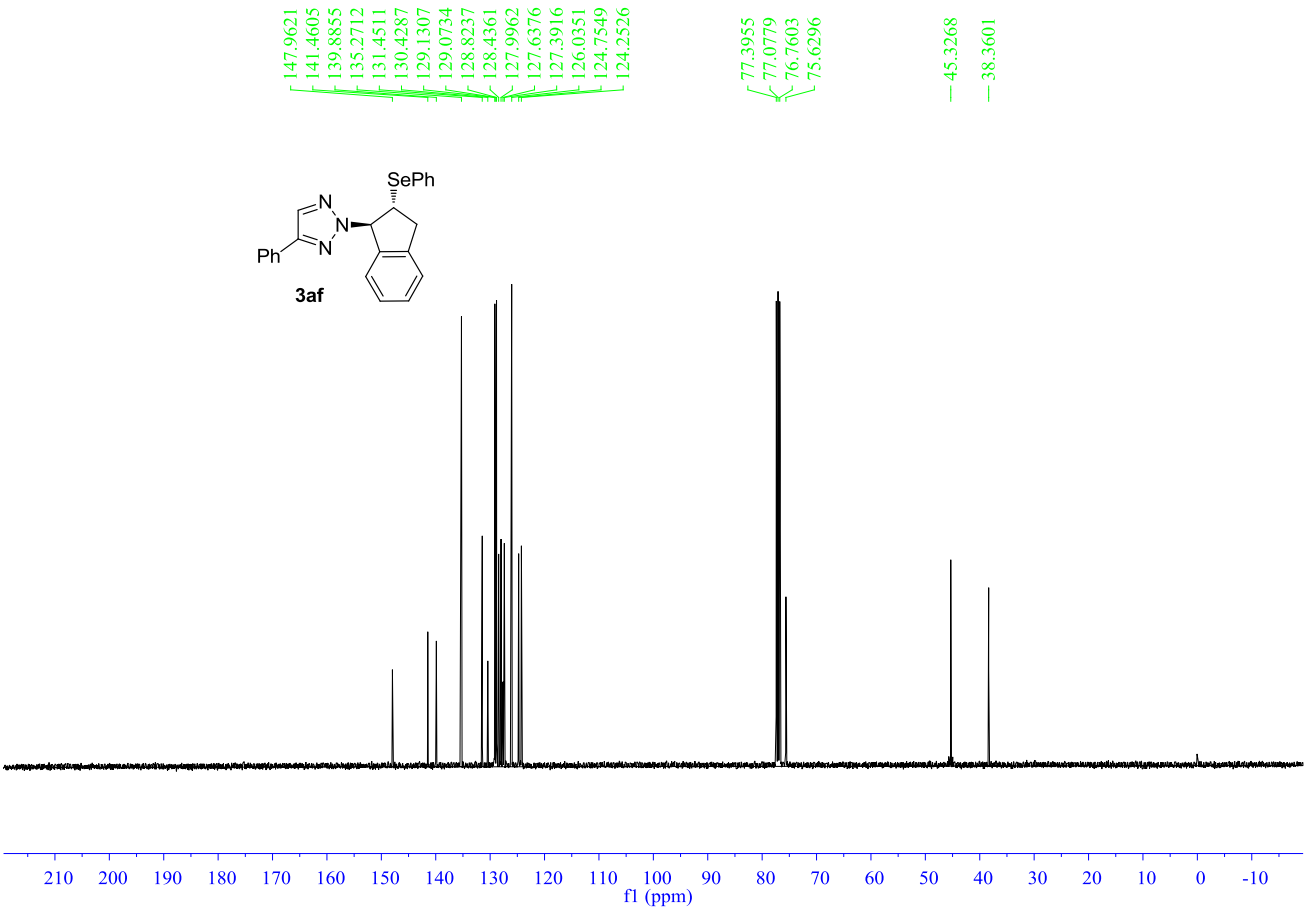
1.00
2.06
2.04
2.07
1.05
2.06
4.08
1.04
1.00
1.03
1.05
1.05
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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124.7549
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76.7603
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45.3268
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N
N
Ph
3af
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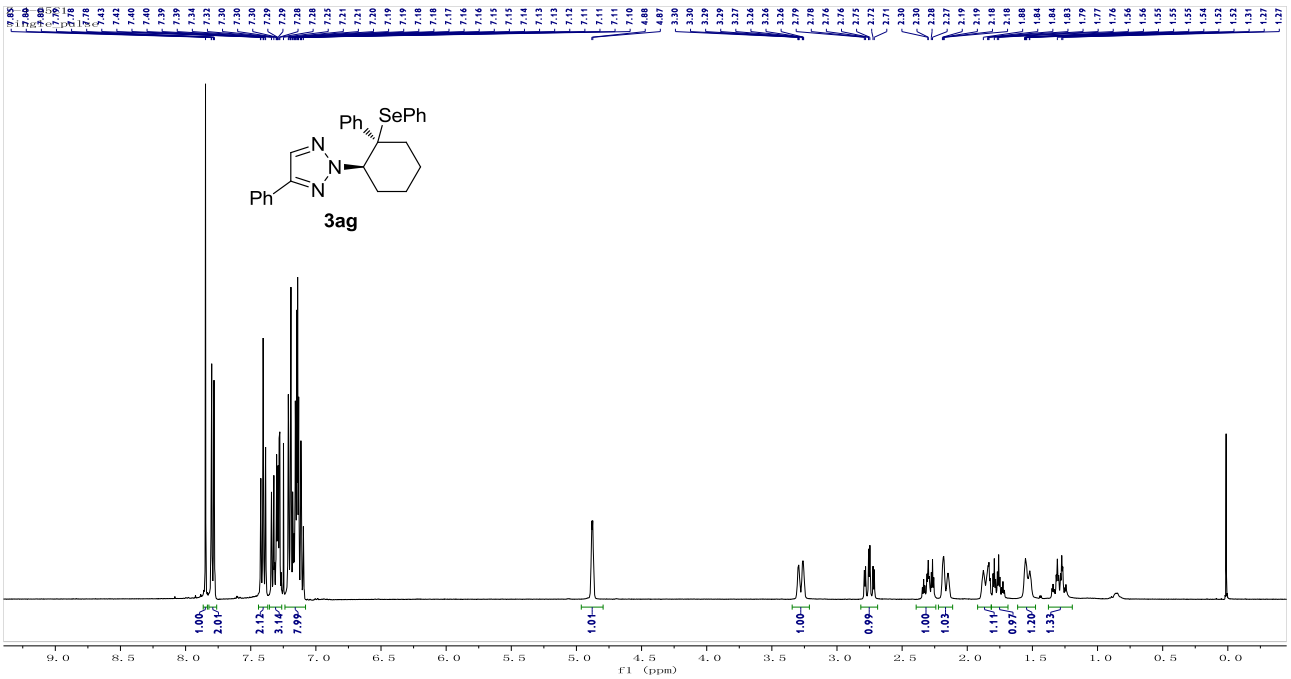
f1 (ppm)



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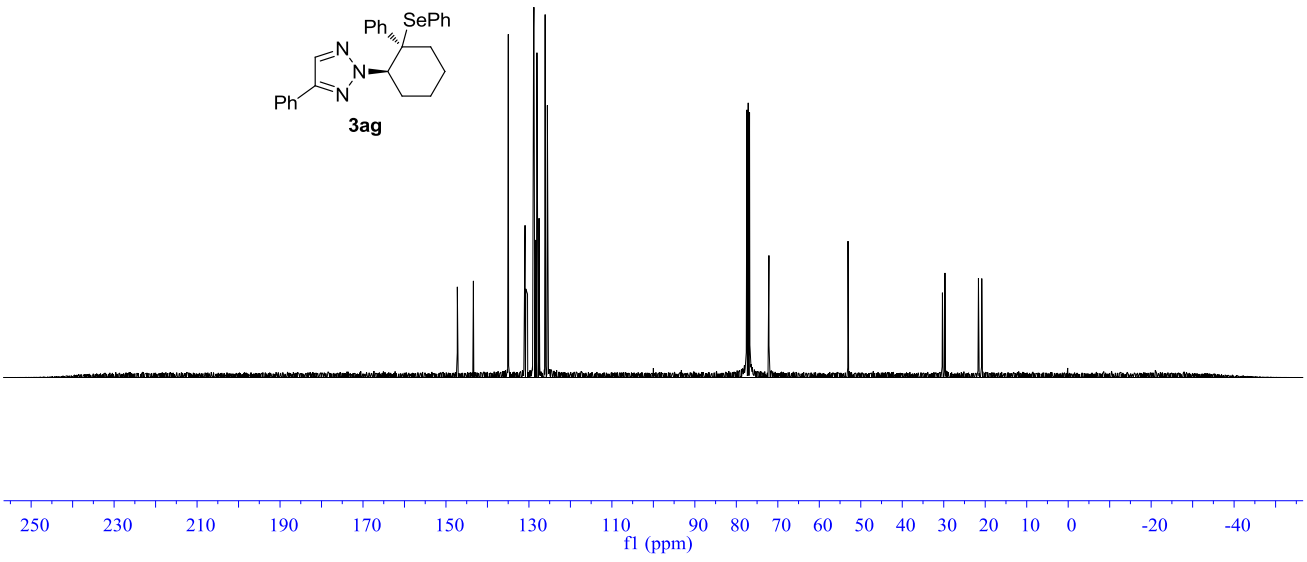

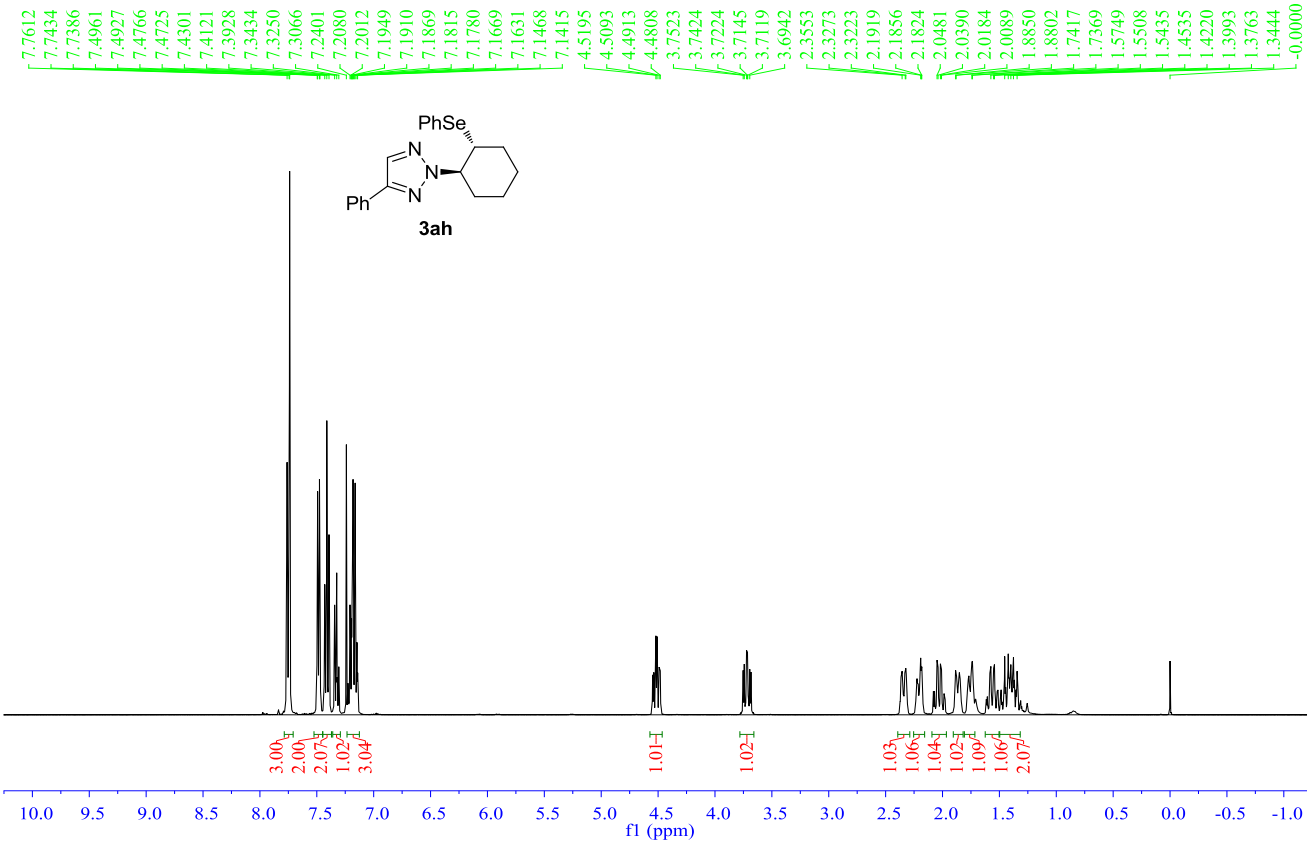
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7.3066
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7.2080
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7.1949
7.1910
7.1869
7.1815
7.1780
7.1669
7.1631
7.1468
7.1415
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3.7424
3.7224
3.7145
3.7119
3.6942
2.3553
2.3273
2.3223
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2.1856
2.1824
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2.0390
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1.5508
1.5435
1.4535
1.4220
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1.3763
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Ph
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2.00
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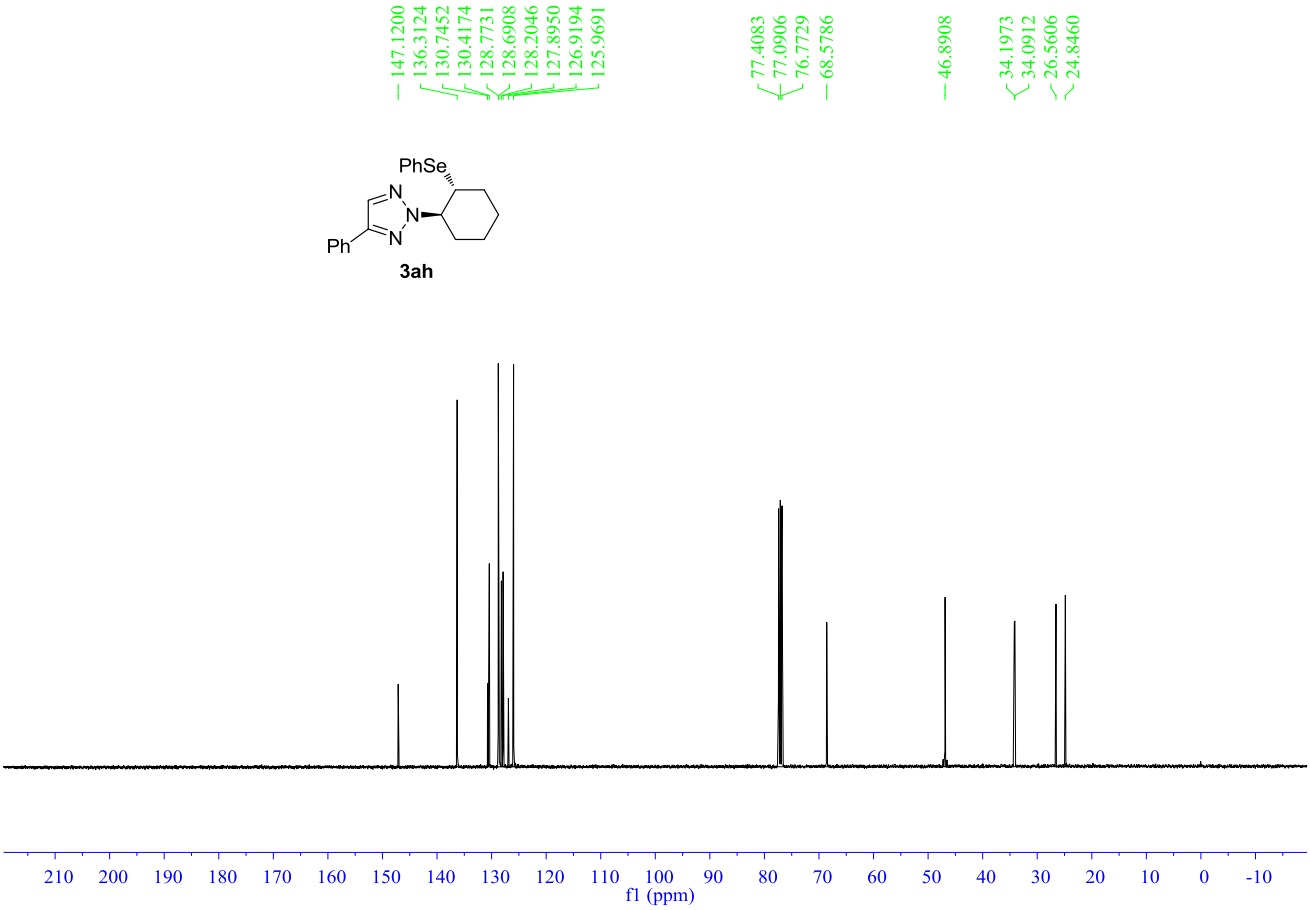
3.04
1.01
1.02
1.03
1.06
1.04
1.02
1.09
1.06
2.07
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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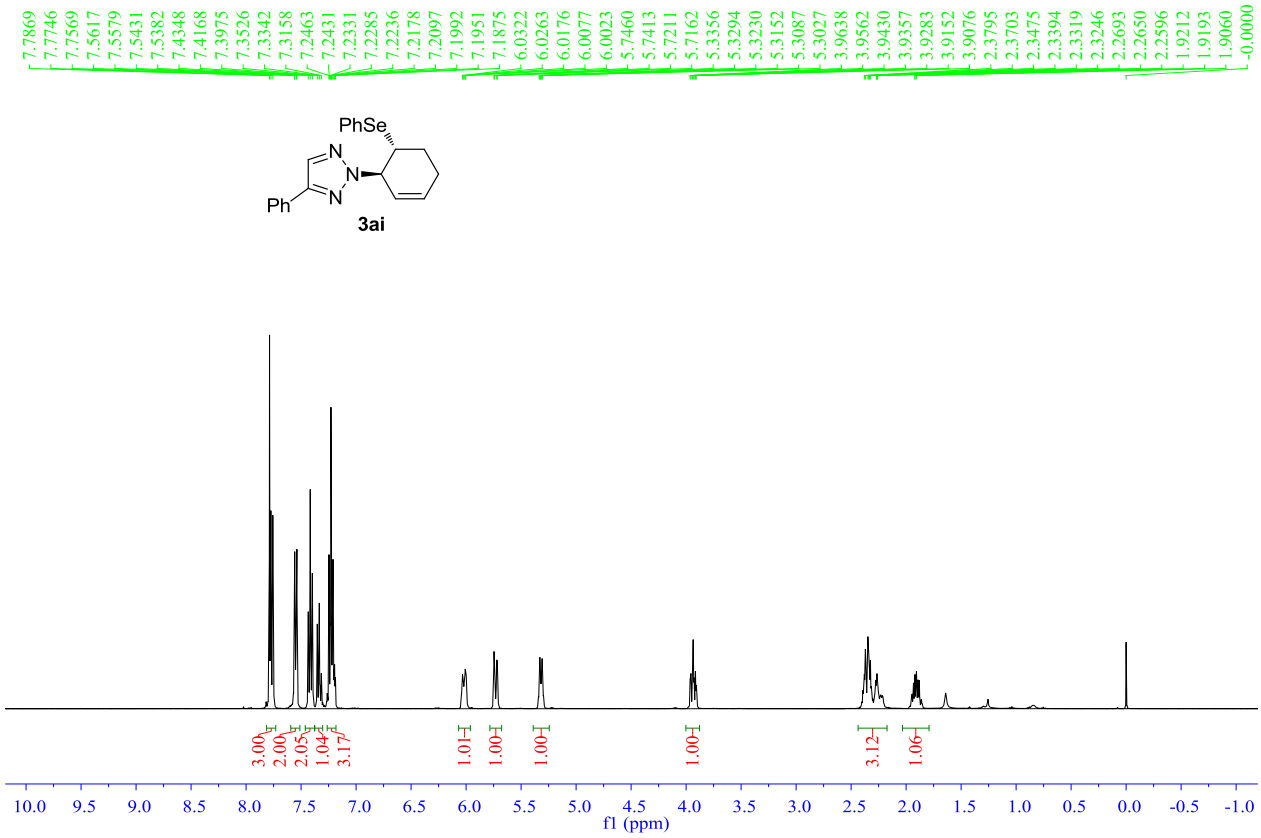
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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7.1951
7.1875
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Ph
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2.00
2.05
1.04
3.17
1.01
1.00
1.00
1.00
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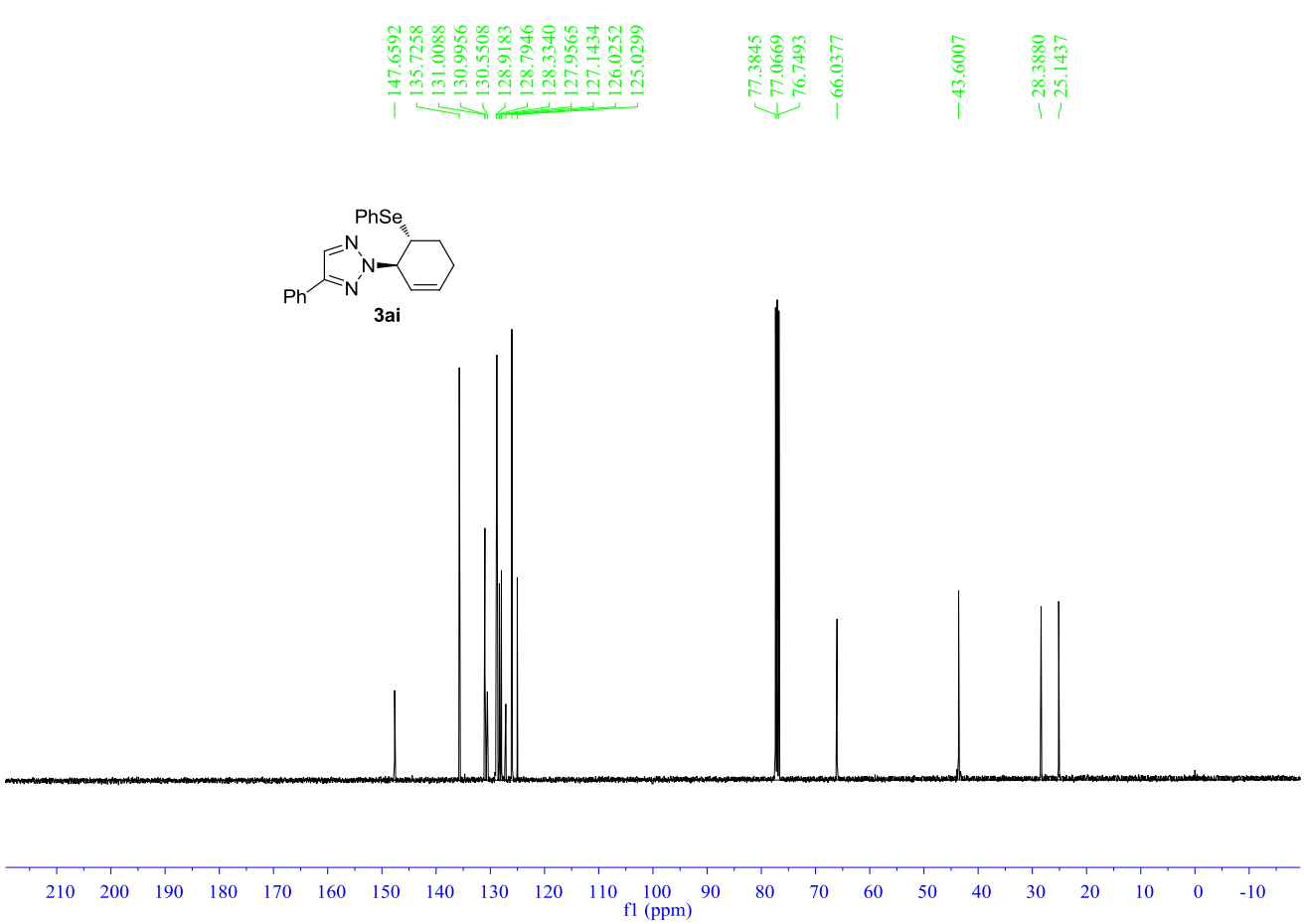
1.06
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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43.6007
28.3880
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N
N
Ph
3ai
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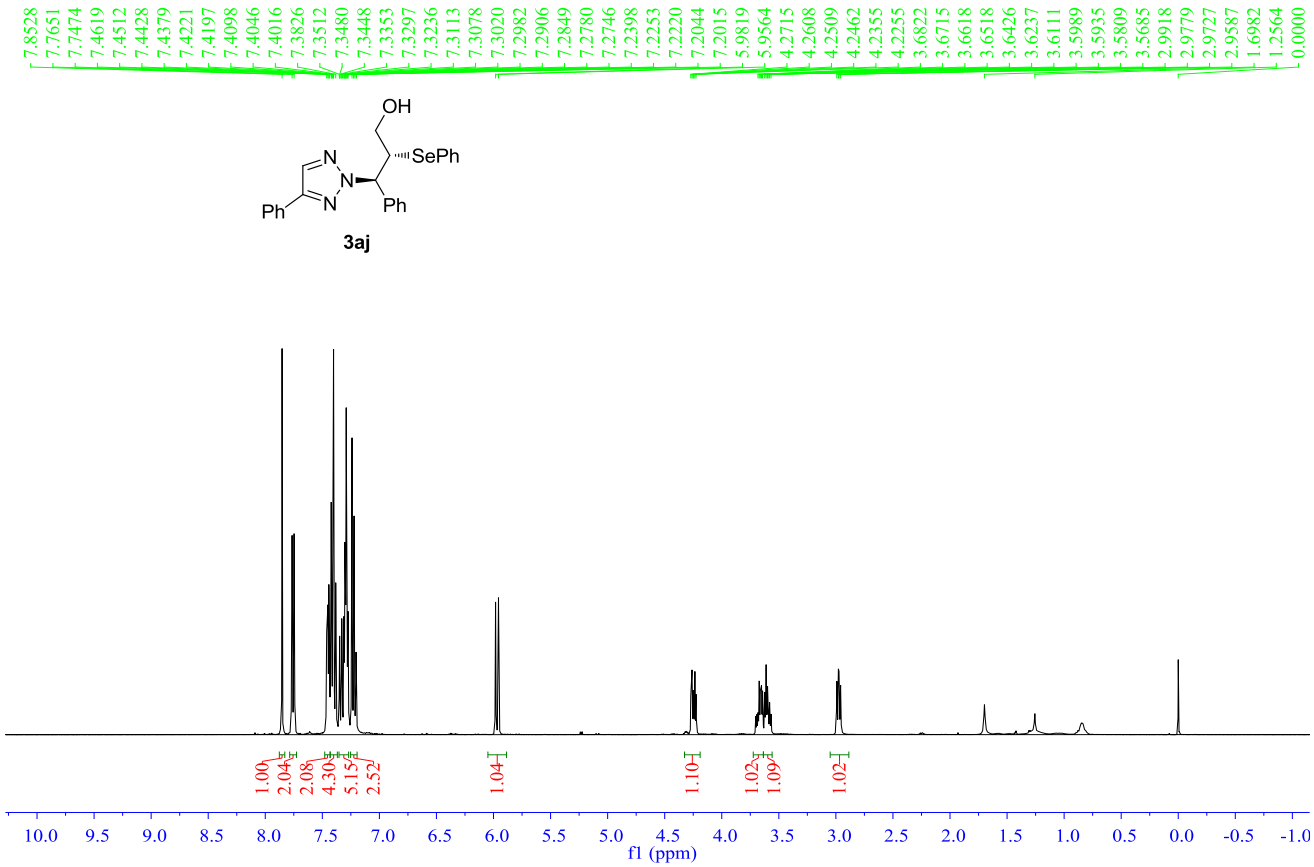
f1 (ppm)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Ph
Ph
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1.02
1.09
1.02
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9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)
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Ph
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3aj
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200
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180
170
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100
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80
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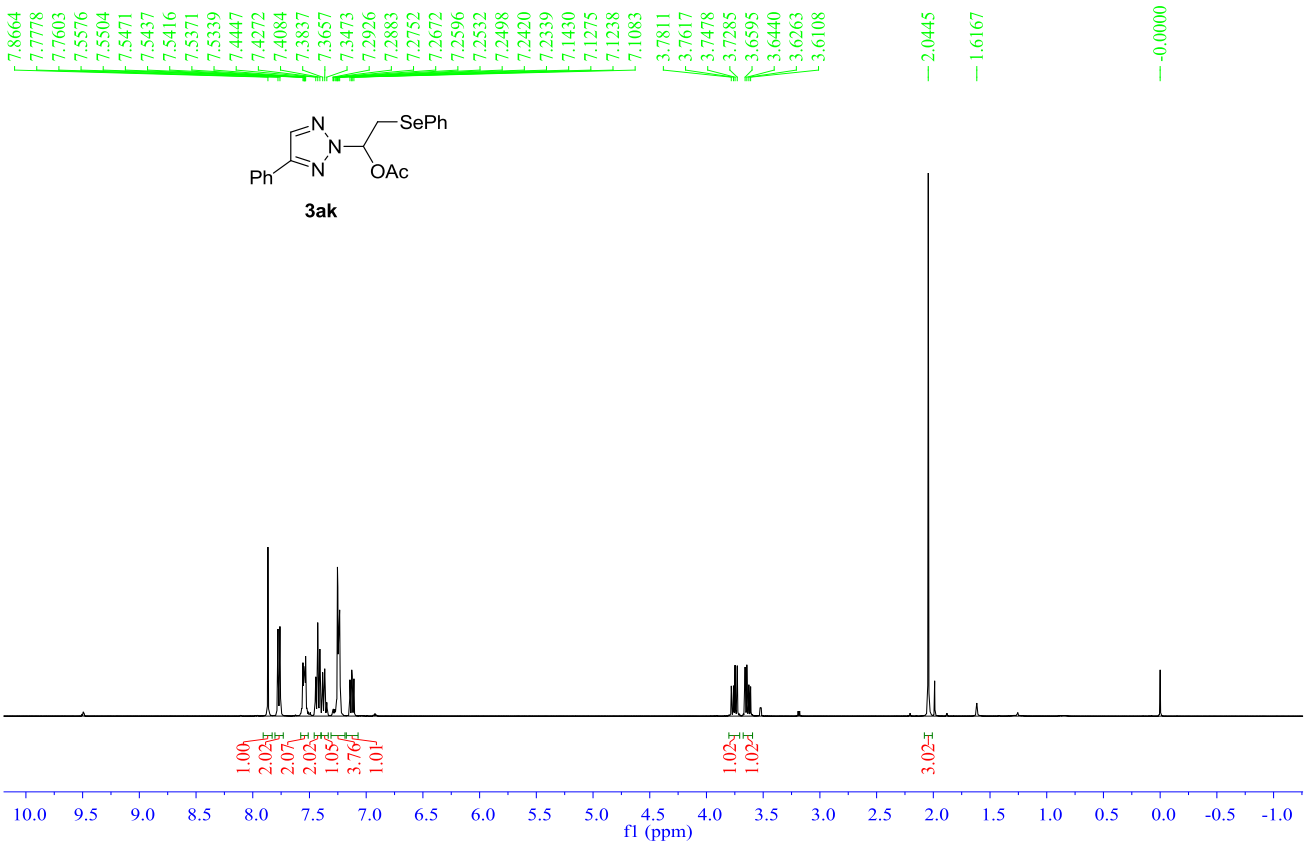
30
20
10
0
-10
f1 (ppm)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7.2339
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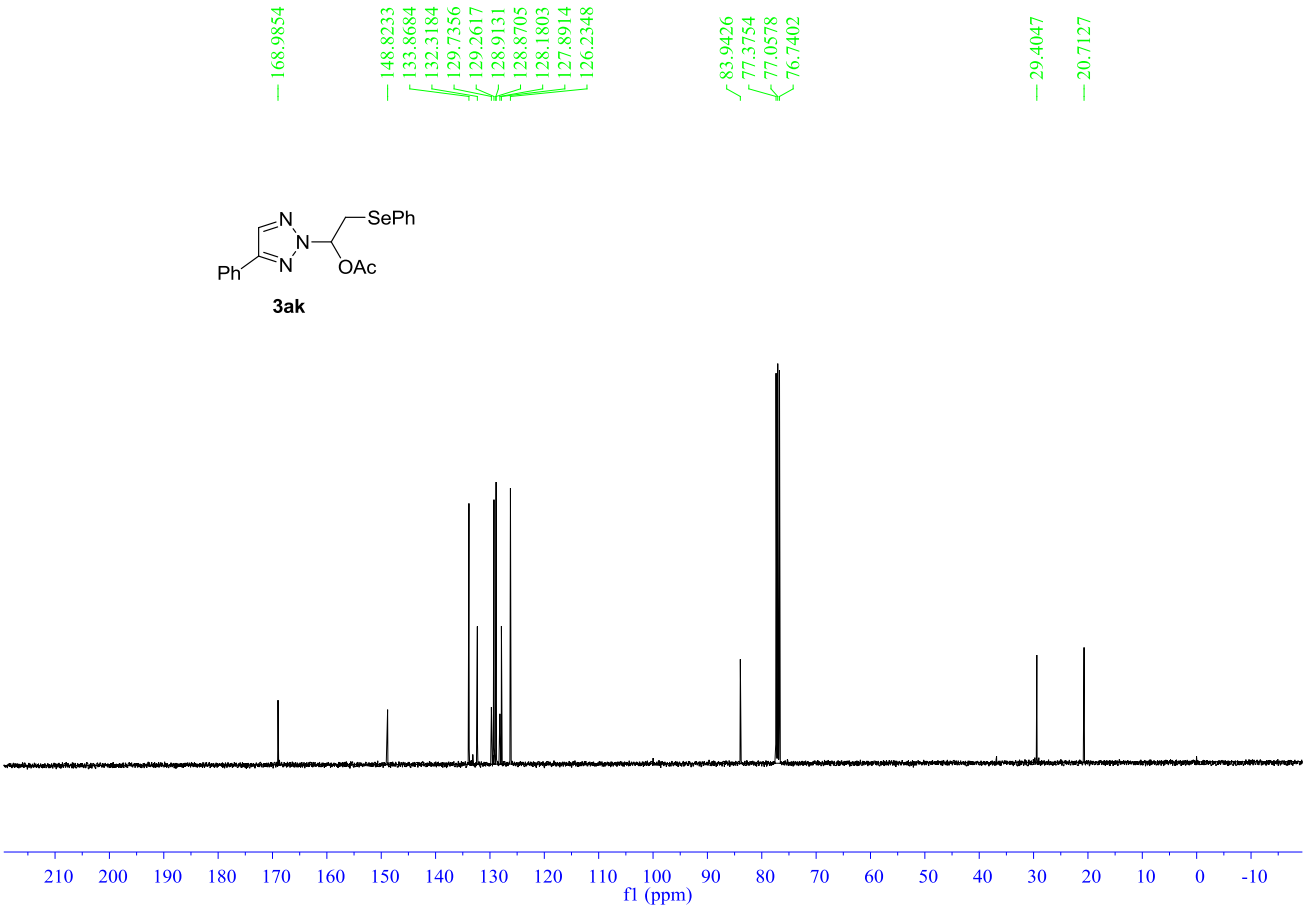
7.1275
7.1238
7.1083
3.7811
3.7617
3.7478
3.7285
3.6595
3.6440
3.6263
3.6108
2.0445
1.6167
-0.0000
SePh
OAc
Ph
3ak
1.00
2.02
2.07
2.02
1.05
3.76
1.01
1.02
1.02
3.02
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)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128.1803
127.8914
126.2348
83.9426
77.3754
77.0578
76.7402
29.4047
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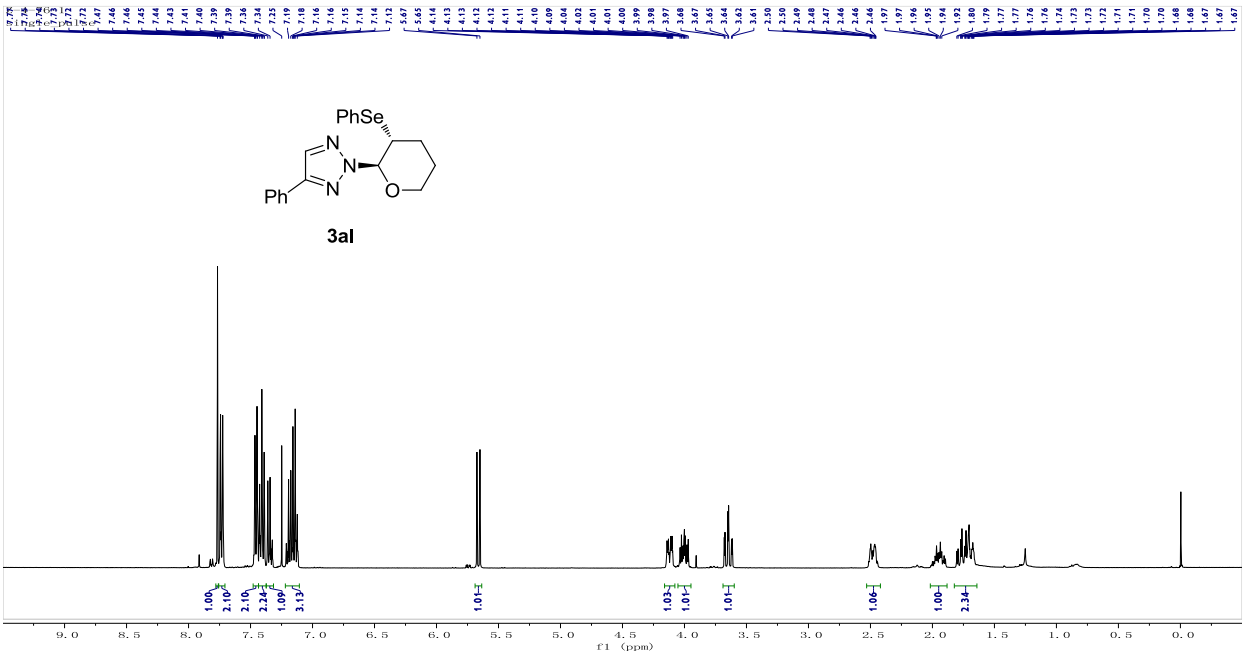
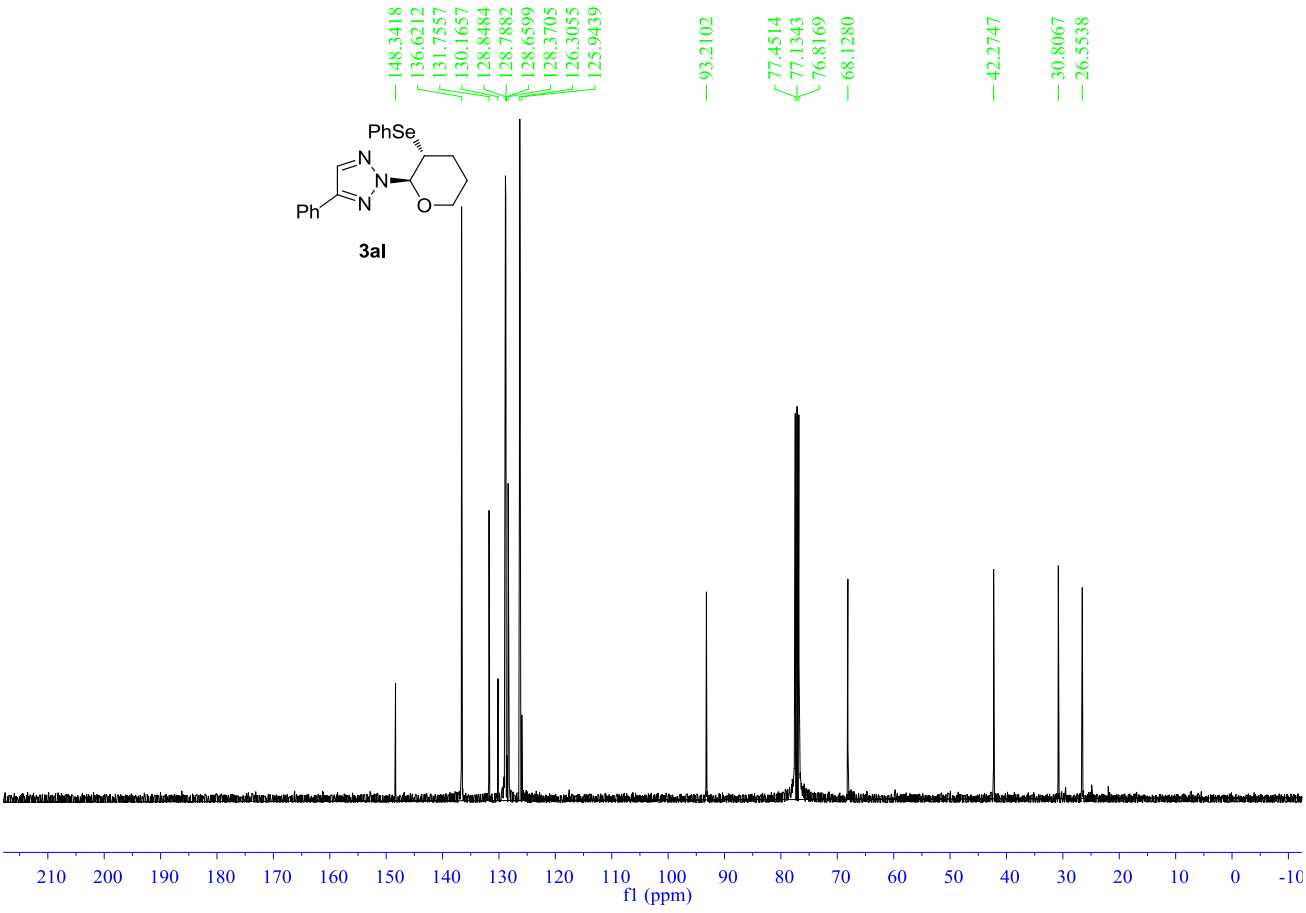
SePh
OAc
Ph
3ak
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)


PhSe
N
N
N
O
Ph
3al
f1 (ppm)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128.8484
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128.6599
128.3705
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93.2102
77.4514
77.1343
76.8169
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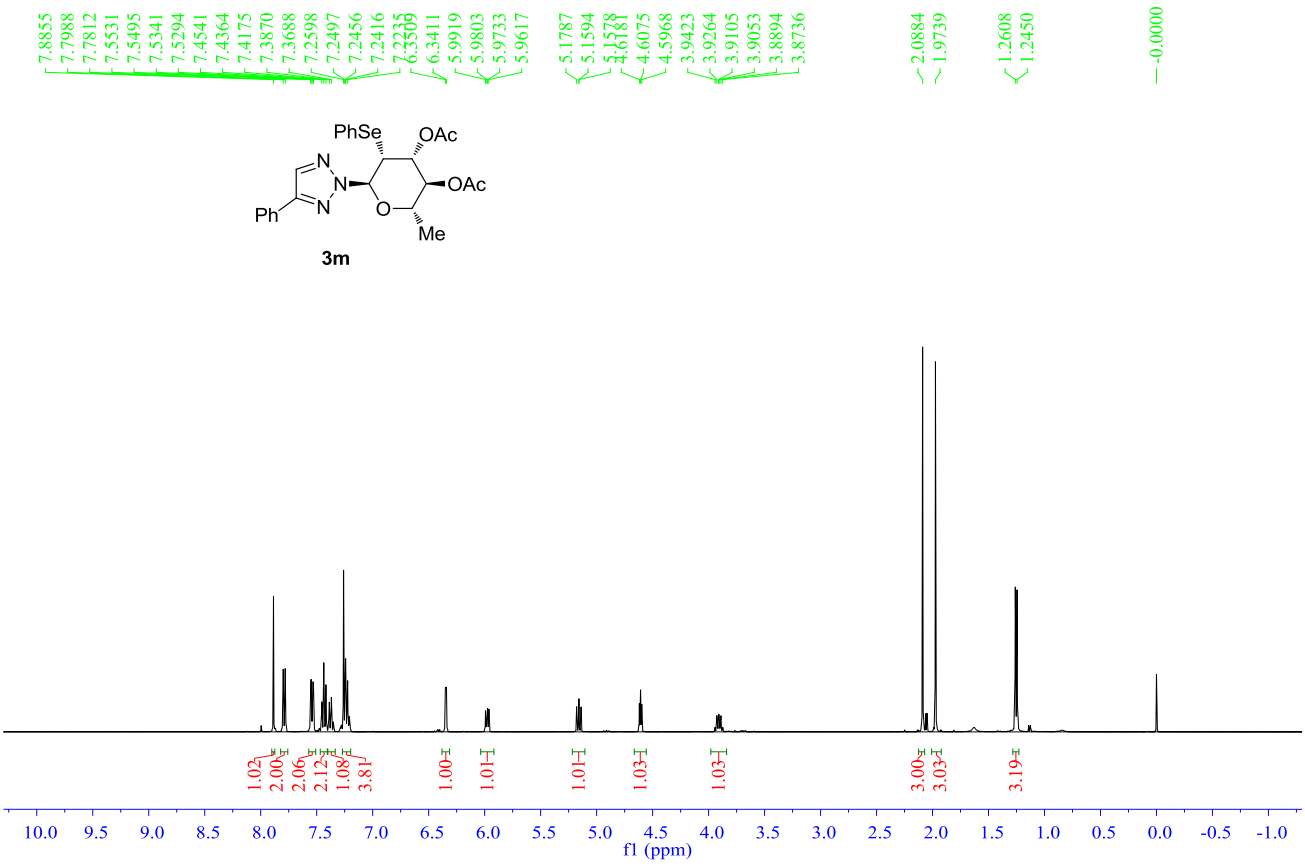
42.2747
30.8067
26.5538
PhSe
N
N
N
O
Ph
3al
f1 (ppm)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7.7812
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7.4364
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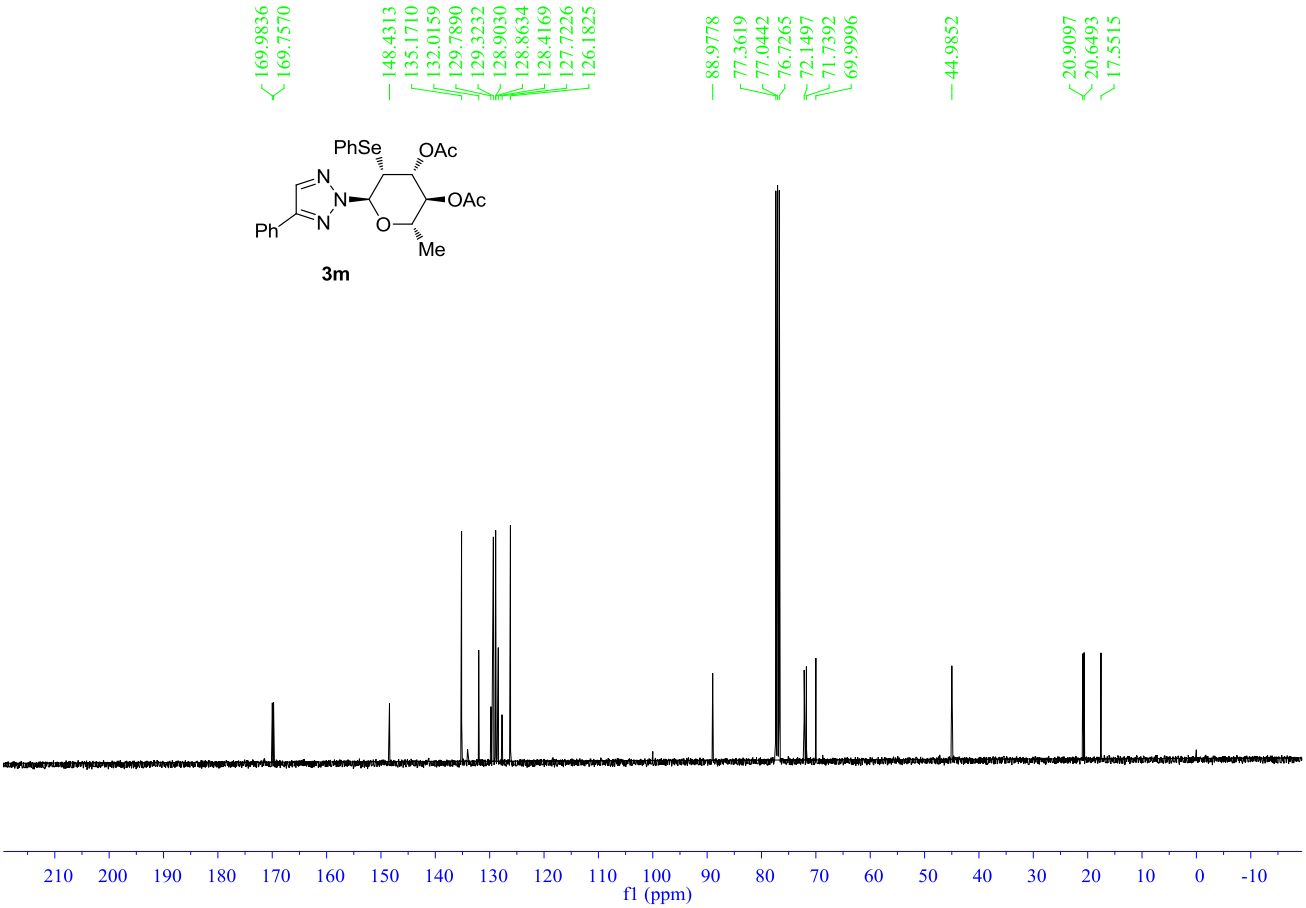
7.3870
7.3688
7.2598
7.2497
7.2456
7.2416
6.3411
5.9919
5.9803
5.9733
5.9617
5.1787
5.1594
4.6075
4.5968
3.9423
3.9264
3.9105
3.9053
3.8894
3.8736
2.0884
1.9739
1.2608
1.2450
-0.0000
PhSe
OAc
OAc
Ph
Me
3m
1.02
2.00
2.06
2.12
1.08
3.81
1.00
1.01
1.01
1.03
1.03
3.00
3.03
3.19
f1 (ppm)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126.1825
88.9778
77.3619
77.0442
76.7265
72.1497
71.7392
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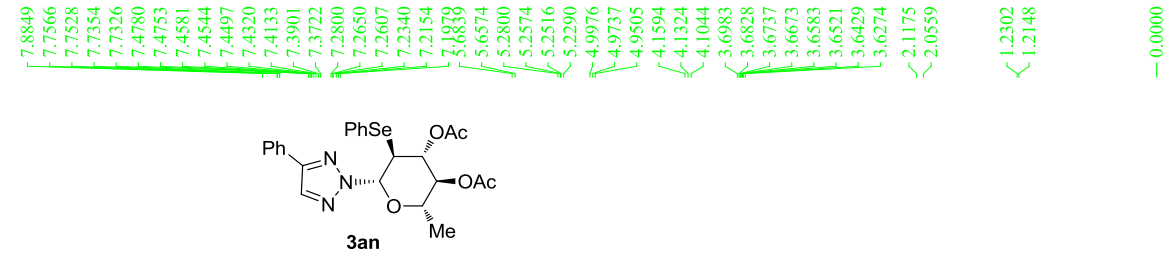
20.9097
20.6493
17.5515
PhSe
OAc
OAc
Ph
Me
3m
f1 (ppm)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7.4133
7.3901
7.3722
7.2800
7.2650
7.2607
7.2340
7.2154
7.1979
5.6839
5.6574
5.2800
5.2574
5.2516
5.2290
4.9976
4.9737
4.9505
4.1594
4.1324
4.1044
3.6983
3.6828
3.6737
3.6673
3.6583
3.6521
3.6429
3.6274
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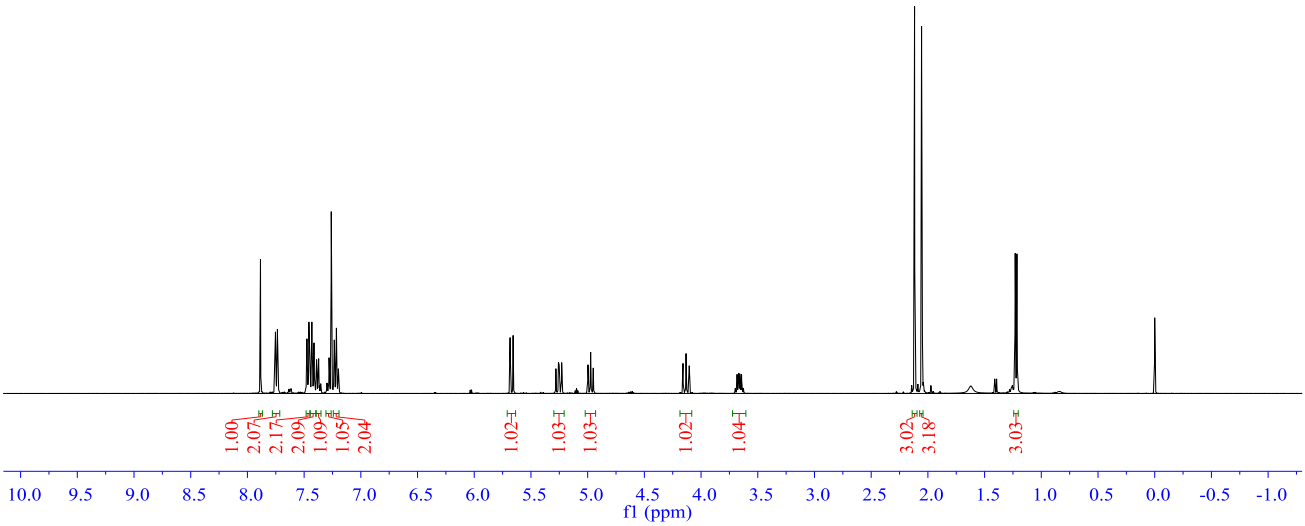
0.0000

PhSe
OAc
Ph
N
N
N
O
OAc
Me

3an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2.07
2.17
2.09
1.09
1.05
2.04
1.02
1.03
1.03
1.02
1.04
3.02
3.18
3.03
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)


170.1732
169.8681
148.6773
136.8740
132.1941
129.8154
129.0953
128.9315
128.8364
128.8111
126.2326
124.5629
90.1538
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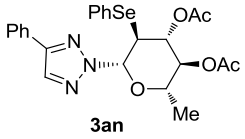
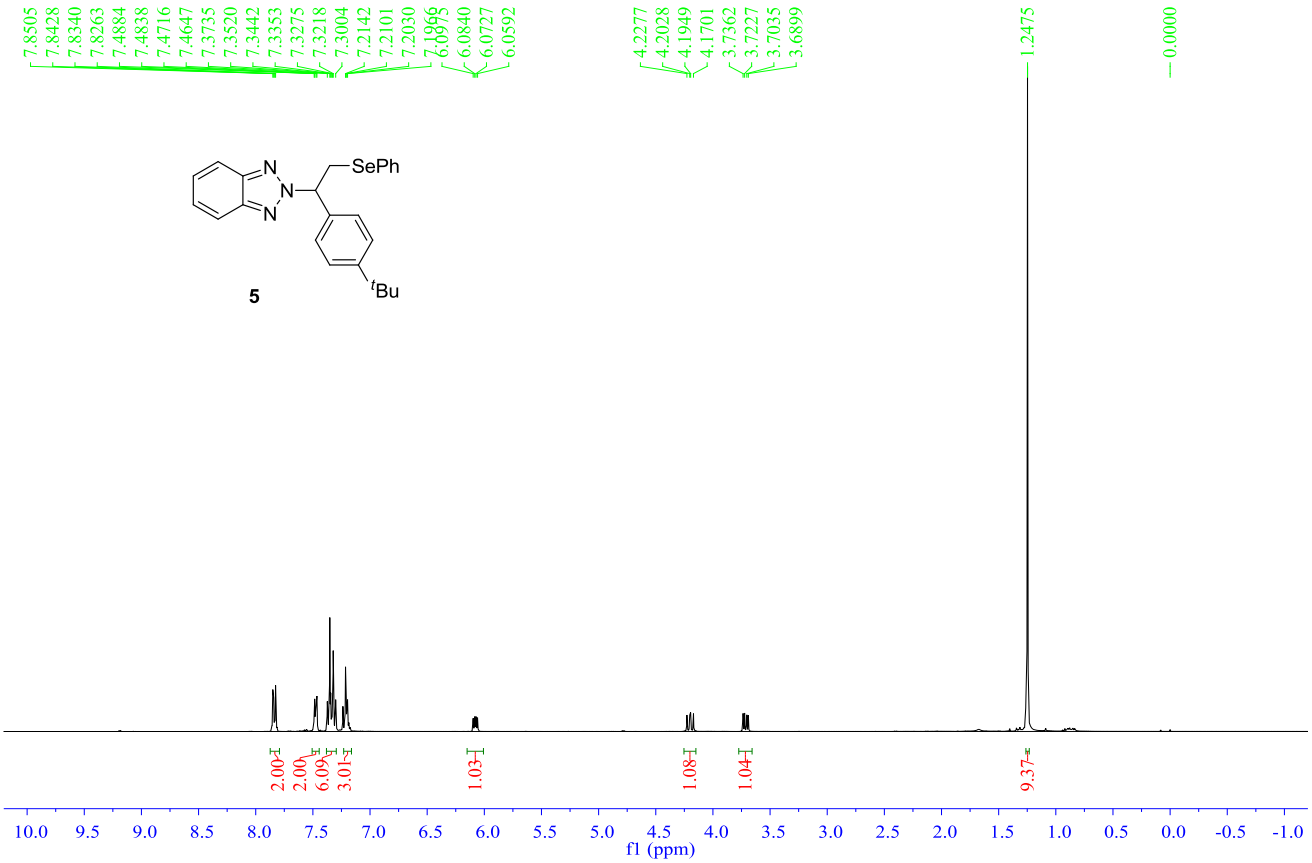
74.2841
72.6551
72.3893
46.1436
20.8573
20.7534
17.3076


PhSe
OAc
Ph
N
N
N
O
OAc
Me

3an

210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)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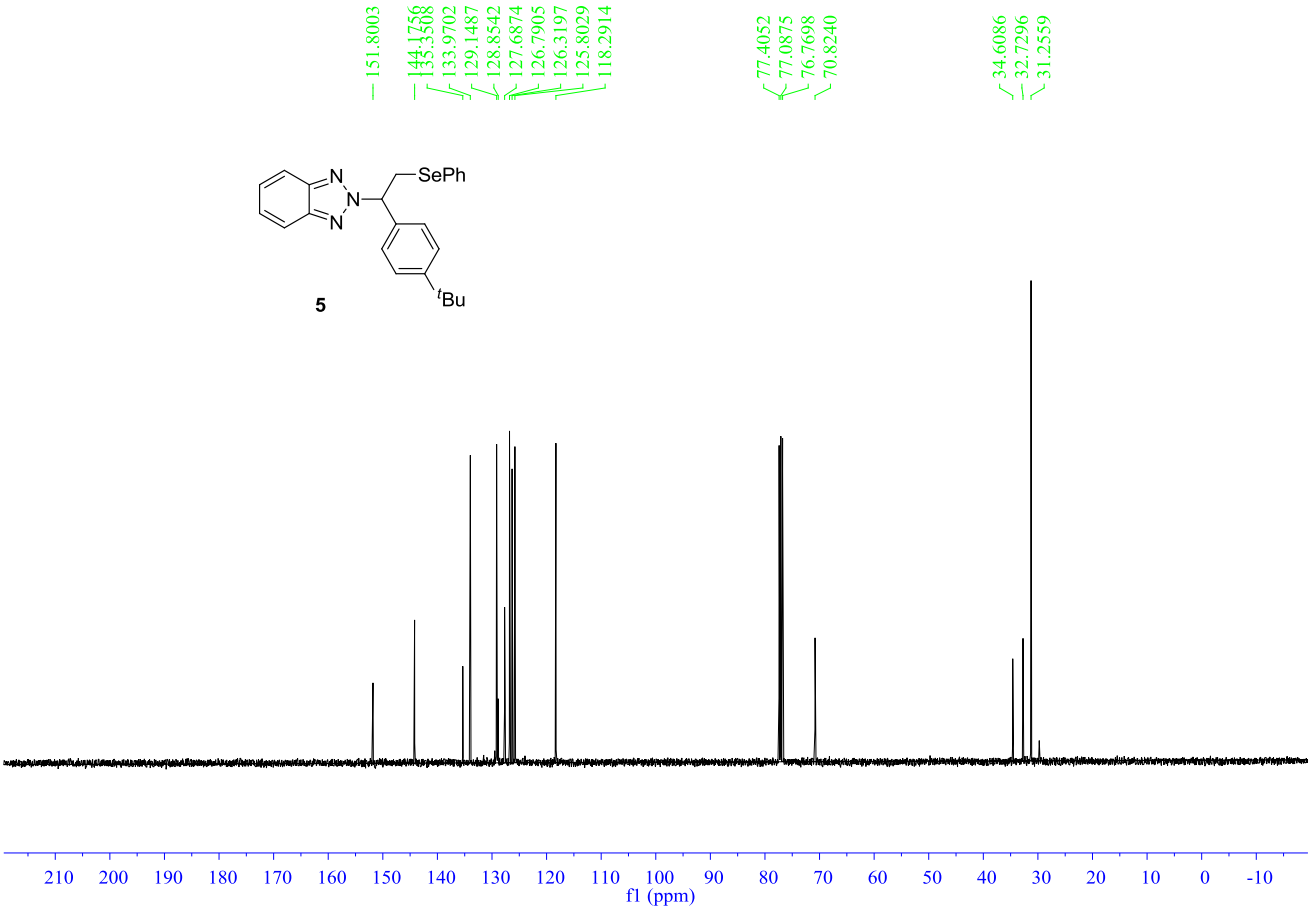
7.3735
7.3520
7.3442
7.3353
7.3275
7.3218
7.3004
7.2142
7.2101
7.2030
7.1966
6.0975
6.0840
6.0727
6.0592
4.2277
4.2028
4.1949
4.1701
3.7362
3.7227
3.7035
3.6899
1.2475
0.0000
SePh
tBu
5
2.00
2.00
6.09
3.01
1.03
1.08
1.04
9.37
f1 (ppm)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135.3508
133.9702
129.1487
128.8542
127.6874
126.7905
126.3197
125.8029
118.2914
77.4052
77.0875
76.7698
70.8240
34.6086
32.7296
31.2559
SePh
tBu
5
f1 (ppm)