Electronic Supplementary Material (ESI) for ChemComm.

Supporting information

Chemo- and regioselective reductive deoxygenation of 1-en-4-yn-ols into 1,4-enynes through FeF_3 and TfOH co-catalysis

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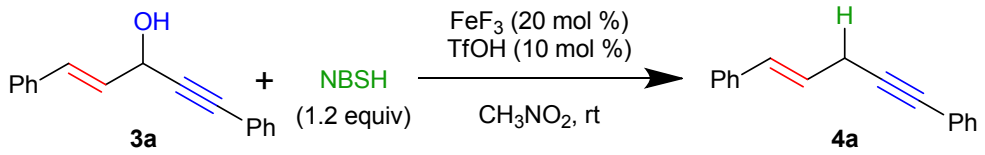
1. General information

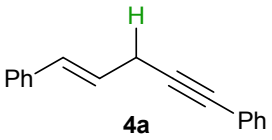
All reagents were purchased from commercial sources and used without treatment, unless otherwise indicated. The products were purified by column chromatography over silica gel. ^{1}H-NMR and ^{13}C-NMR spectra were recorded at 25 °C on a Varian 500 MHz and 125 MHz, or on a Varian 400 MHz and 100 MHz, respectively, and TMS was used as internal standard.

2. Synthesis and analytical data of compounds 4a-l, 6a-f and 8

The synthesis of compounds **4a-l**, **6a-f** and **8** is performed according to the below given procedure for the synthesis of compound **4a**.

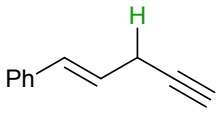


NBSH (130.2 mg, 0.60 mmol) was added at room temperature to a solution of **3a** (117.1 mg, 0.5 mmol) in CH_3NO_2 (3.0 mL). The resulting mixture was stirred until NBSH fully dissolved, then FeF_3 (11.2 mg, 20 mol %) was added, followed by adding TfOH (4.4 µL, 10 mol %). The reaction mixture was stirred at room temperature for 1.0 h under N_2 and the reaction was monitored by TLC. Upon completing the reaction, the mixture was quenched with saturated aqueous $NaHCO_3$, extracted with diethyl ether (3 x 30 mL). The combined organic solvents were washed with brine, dried with $MgSO_4$, filtered, and concentrated under reduced pressure at room temperature. The residue was finally purified by silica gel column chromatography to give product **4a** as a colorless oil (103.5 mg, 95%).



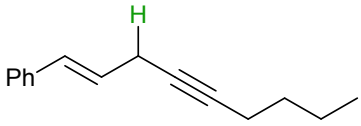
(*E*)-Pent-1-en-4-yne-1,5-diyldibenzene (**4a**):[1] Colorless liquid; Yield = 103.5 mg, 95%; ^{1}H-NMR (400 MHz, $CDCl_3$): δ = 3.35 (d, *J* = 5.6 Hz, 2H), 6.24 (dt, *J* = 5.6 Hz, *J* = 15.5 Hz, 1H), 6.70 (d, *J* = 15.5 Hz, 1H), 7.21 (t, *J* = 7.2 Hz, 1H), 7.25-7.35 (m, 5H), 7.38 (d, *J* = 7.6 Hz, 2H); 7.44-7.47 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz): δ = 23.0, 82.8, 86.7, 123.6, 124.2, 126.2, 127.3, 127.8, 128.2, 128.5, 131.4, 131.6, 137.1. FT-IR (neat): ν = 3080, 3057, 3028, 2968,

2878, 2810, 2231, 1948, 1879, 1802, 1750, 1653, 1598, 1574, 1490, 1444, 1414, 1341, 1310, 1269, 1206, 1177, 1156, 1070, 1027, 964, 913, 840, 795, 755, 731, 690, 554, 524, 493, 416 cm-1.



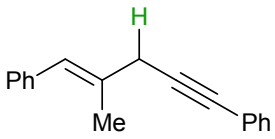
4b

(*E*)-pent-1-en-4-yn-1-ylbenzene (**4b**): Colorless liquid; Yield = 65.5 mg, 92%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 2.17 (t, *J* = 5.0 Hz, 1H), 3.12-3.14 (m, 2H), 6.135 (dt, *J* = 5.6 Hz, *J* = 15.5 Hz, 1H), 6.66 (dt, *J* = 2.0 Hz, *J* = 15.5 Hz, 1H), 7.20-7.24 (m, 1H), 7.30 (t, *J* = 7.5 Hz, 2H), 7.36 (d, *J* = 7.5 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 22.0, 70.6, 81.2, 123.5, 126.2, 127.4, 128.5, 131.5, 136.9. FT-IR (neat): ν = 3297, 3081, 3059, 3027, 2965, 2885, 2815, 2362, 2119, 1948, 1877, 1803, 1749, 1653, 1599, 1577, 1494, 1448, 1417, 1309, 1293, 1264, 1208, 1156, 1074, 1058, 1026, 965, 910, 841, 797, 732, 692, 641, 544, 493 cm-1.

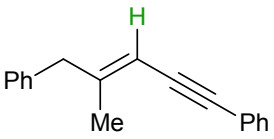


4c

(*E*)-non-1-en-4-yn-1-ylbenzene (**4c**): Colorless liquid; Yield = 69.7 mg, 70%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 0.92 (t, *J* = 7.0 Hz, 3H), 1.40-1.53 (m, 4H), 2.22 (t, *J* = 7.0 Hz, 2H), 3.06-3.12 (m, 2H), 6.17(dt, *J* = 5.6 Hz, *J* = 15.5 Hz, 1H), 6.63 (d, *J* = 15.5 Hz, 1H), 7.20 (t, *J* = 7.5 Hz, 1H), 7.29 (t, *J* = 7.5 Hz, 2H), 7.35 (d, *J* = 7.5 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 13.6, 18.5, 21.9, 22.4, 31.1, 76.6, 82.9, 125.2, 126.1, 127.1, 128.4, 130.7, 137.2. FT-IR (neat): ν = 3647, 3081, 3059, 3027, 2957, 2931, 2872, 1943, 1871, 1800, 1747, 1699, 1655, 1599, 1577, 1495, 1464, 1448, 1431, 1419, 1378, 1339, 1328, 1265, 1205, 1156, 1103, 1073, 1029, 964, 908, 795, 730, 691, 543, 494 cm-1.

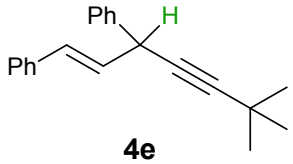


4d



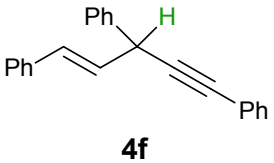
4d'

(*E*)-(2-Methylpent-1-en-4-yne-1,5-diyl)dibenzene (**4d**)[2] and **(*E*)-(4-methylpent-3-en-1-yne-1,5-diyl)dibenzene** (**4d'**): Colorless liquid; Yield = 106.8 mg, 92%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 1.97 (d, *J* = 1.0 Hz, 3H, **4d**, 83%), 2.07 (d, *J* = 1.5 Hz, 3H, **4d'**, 17%), 3.28-3.31 (m, 2H), 6.40 (s, 1H, **4d'**, 17%), 6.64 (s, 1H, **4d**, 83%), 7.18-7.22 (m, 1H), 7.26-7.31 (m, 5H), 7.31-7.35 (m, 2H), 7.42-7.47 (m, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 17.8, 23.5, 23.9, 30.3, 81.1, 83.3, 87.0, 87.7, 123.7, 123.8, 126.1, 126.2, 126.4, 126.8, 127.7, 127.8, 128.0, 128.18, 128.21, 128.24, 128.6, 128.8, 131.6, 133.5, 133.9, 137.6, 138.0.



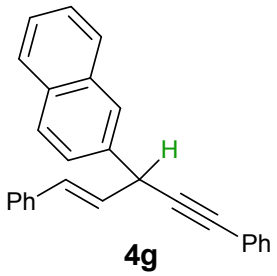
4e

(*E*)-(6,6-dimethylhept-1-en-4-yne-1,3-diyl)dibenzene (**4e**): Colorless liquid; Yield = 115.0 mg, 85%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 1.33 (s, 9H), 4.52 (d, *J* = 6.5 Hz, 1H), 6.27 (dd, *J* = 6.5 Hz, *J* = 15.5 Hz, 1H), 6.72 (d, *J* = 15.5 Hz, 1H), 7.22-7.28 (m, 2H), 7.28-7.41 (m, 7H), 7.46 (d, *J* = 7.5 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 27.6, 31.3, 40.6, 77.5, 94.3, 126.4, 126.7, 127.3, 127.6, 128.46, 128.49, 129.6, 130.8, 137.1, 141.0.



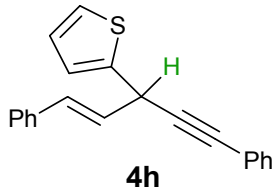
4f

(*E*)-Pent-1-en-4-yne-1,3,5-triyltribenzene (**4f**):[3] Colorless liquid; Yield = 130.8 mg, 89%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 4.75 (d, *J* = 6.5 Hz, 1H), 6.33 (dd, *J* = 6.5 Hz, *J* = 15.5 Hz, 1H), 6.77 (d, *J* = 15.5 Hz, 1H), 7.19-7.22 (m, 1H), 7.25-7.32 (m, 6H), 7.34-7.39 (m, 4H), 7.48-7.50 (m, 4H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 41.2, 85.4, 88.8, 123.4, 126.5, 127.1, 127.5, 127.7, 128.0, 128.2, 128.5, 128.7, 129.6, 130.4, 131.7, 136.8, 140.2.



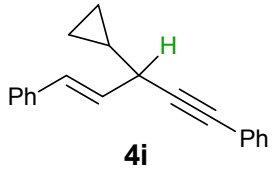
4g

(*E*)-2-(1,5-diphenylpent-1-en-4-yn-3-yl)naphthalene (**4g**): Colorless liquid; Yield = 107.2 mg, 62%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 4.89 (d, *J* = 6.5 Hz, 1H), 6.39 (dd, *J* = 6.5 Hz, *J* = 16.0 Hz, 1H), 6.82 (d, *J* = 16 Hz, 1H), 7.15-7.21 (m, 1H), 7.26-7.31 (m, 5H), 7.38 (d, *J* = 7.5 Hz, 2H), 7.41-7.46 (m, 2H), 7.50-7.52 (m, 2H), 7.57 (dd, *J* = 1.5 Hz, J = 8.5 Hz, 1H), 7.80 (t, *J* = 8.5 Hz, 3H), 7.92 (s, 1H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 41.3, 85.6, 88.8, 123.4, 125.8, 126.1, 126.2, 126.5, 127.5, 127.6, 127.8, 128.0, 128.2, 128.4, 128.5, 129.4, 130.7, 131.7, 132.6, 133.5, 136.7, 137.6.



4h

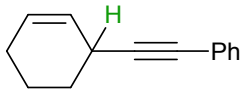
(*E*)-2-(1,5-diphenylpent-1-en-4-yn-3-yl)thiophene (**4h**):[4] Colorless liquid; Yield = 86.0 mg, 57%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 4.99 (d, *J* = 7.0 Hz, 1H), 6.39 (dd, *J* = 7.0 Hz, *J* = 15.5 Hz, 1H), 6.78 (d, *J* = 15.5 Hz, 1H), 6.98 (dd, *J* = 3.5 Hz, *J* = 5 Hz, 1H), 7.09-7.11 (m, 1H), 7.22-7.25 (m, 2H), 7.30-7.33 (m, 5H), 7.42 (d, *J* = 7.5 Hz, 2H), 7.48-7.51 (m, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 36.5, 84.7, 88.1, 123.1, 124.7, 124.8, 126.6, 126.9, 127.7, 128.17, 128.24, 128.5, 128.7, 130.9, 131.7, 136.5, 144.2.



4i

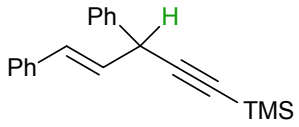
(*E*)-(3-cyclopropylpent-1-en-4-yne-1,5-diyl)dibenzene (**4i**): Colorless liquid; Yield = 96.8 mg, 75%; ^{1}H-NMR (500

MHz, $CDCl_3$): δ = 0.44-0.54 (m, 2H), 0.55-0.58 (m, 2H), 1.07-1.13 (m, 1H), 3.20 (t, *J* = 6.0 Hz, 1H), 6.30 (dd, *J* = 6.5 Hz, *J* = 16.0 Hz, 1H), 6.71(d, *J* = 16.0 Hz, 1H), 7.22 (t, *J* = 7.5 Hz, 1H), 7.28-7.33 (m, 5H), 7.41 (d, *J* = 7.0 Hz, 2H), 7.43-7.46 (m, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 2.8, 3.5, 15.5, 38.8, 83.7, 88.7, 123.6, 126.4, 127.3, 127.8, 128.2, 128.5, 129.3, 130.1, 131.7, 137.2.



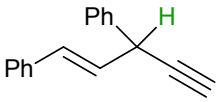
4j

3-(Phenylethynyl)cyclohexene (**4j**):[1b,5] Colorless liquid; Yield = 77.7 mg, 85%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 1.58-1.65 (m, 1H), 1.77-1.90 (m, 2H), 1.96-2.07 (m, 3H), 3.28-3.31 (m, 1H), 5.71-5.80 (m, 2H), 7.26-7.29 (m, 3H), 7.39-7.41 (m, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz): δ = 20.6, 24.7, 28.0, 29.4, 80.3, 92.8, 123.8, 127.0, 127.5, 128.0, 128.1, 131.6.



4k

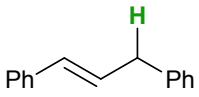
(*E*)-(3,5-Diphenylpent-4-en-1-ynyl)trimethylsilane (**4k**):[3e] Colorless liquid; Yield = 126.6 mg, 87%; ^{1}H-NMR (400 MHz, $CDCl_3$): δ = 0.22 (s, 9H), 4.55 (d, *J* = 6.5 Hz, 1H), 6.24 (dd, *J* = 6.5 Hz, *J* = 16.0 Hz, 1H), 6.68 (d, *J* = 16.0 Hz, 1H), 7.19-7.37 (m, 8H), 7.42 (d, *J* = 7.2 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 0.1, 41.6, 89.7, 105.3, 126.5, 127.0, 127.5, 127.7, 128.5, 128.6, 129.5, 130.4, 136.8, 139.9.



4l

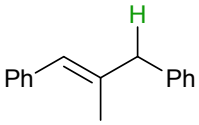
(*E*)-pent-1-en-4-yne-1,3-diyldibenzene (**4l**):[3e,6] Colorless liquid; Yield = 103.5 mg, 95%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 2.49 (d, *J* = 2.5 Hz, 1H), 4.53 (d, *J* = 6.5 Hz, 1H), 6.25 (dd, *J* = 6.5 Hz, *J* = 15.5 Hz, 1H), 6.74 (d, *J* = 15.5

Hz, 1H), 7.21(t, *J* = 7.5 Hz, 1H), 7.25-7.31 (m,3H), 7.33-7.37 (m, 4H), 7.42 (d, *J* = 7.5 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 40.3, 73.3, 83.3, 126.5, 127.2, 127.56, 127.60, 128.5, 128.7, 128.9, 130.6, 136.6, 139.7.



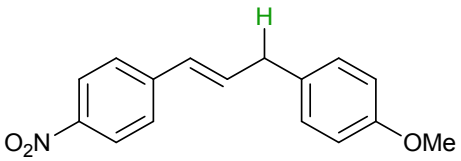
6a

(*E*)-1,3-Diphenylpropene (**6a**):[7] Colorless liquid; Yield = 76.5 mg, 79%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 3.54 (d, *J* = 6.5 Hz, 2H), 6.35 (dt, *J* = 6.5 Hz, *J* = 16.0 Hz, 1H), 6.45 (d, *J* = 16.0 Hz, 1H), 7.16-7.25 (m, 4H), 7.26-7.32 (m, 4H), 7.35 (d, *J* = 7.5 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 39.3, 126.1, 126.2, 127.1, 128.46, 128.47, 128.6, 129.2, 131.0, 137.4, 140.1.

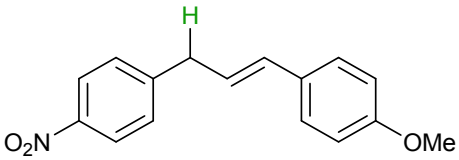


6b

(*E*)-(2-Methylprop-1-ene-1,3-diyl)dibenzene (**6b**):[7c,8] Colorless liquid; Yield = 91.4 mg, 88%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 1.79 (s, 3H), 3.46 (s, 2H), 6.37 (s, 1H), 7.16-7.22 (m, 2H), 7.23-7.25 (m, 4H), 7.28-7.31 (m, 4H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 17.6, 47.1, 126.0, 126.1, 126.7, 128.0, 128.3, 128.8, 129.0, 138.0, 138.3, 139.8.



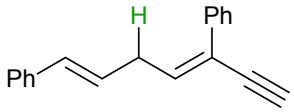
6c



6c'

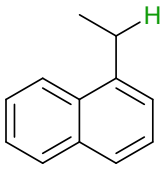
(*E*)-1-methoxy-4-(3-(4-nitrophenyl)allyl)benzene (**6c**)[9] and **(*E*)-1-methoxy-4-(3-(4-nitrophenyl)prop-1-en-1-yl)benzene** (**6c'**):[9,10] Colorless liquid; Yield = 77.0 mg, 57%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 3.53 (d, *J* = 6.3 Hz, 2H, **6c**), 3.61 (d, *J* = 7.0 Hz, 2H, **6c'**), 3.80 (s, 3H, **6c + 6c'**), 6.12-6.20 (m, 1H, **6c'**), 6.40-6.48 (m, 1H, **6c + 6c'**), 6.51-6.56 (m, 1H, **6c**), 6.82-6.89 (m, 2H, **6c + 6c'**), 7.15 (d, *J* = 8.5 Hz, 2H, **6c**), 7.29 (d, *J* = 8.5 Hz, 2H, **6c'**), 7.39 (d, *J* =

8.5 Hz, 2H, **6c'**), 7.45 (d, *J* = 8.5 Hz, 2H, **6c**), 8.11-8.17 (m, 2H, **6c + 6c'**); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 38.5, 39.0, 55.3, 113.96, 114.01, 123.7, 123.9, 124.7, 126.5, 127.3, 127.6, 128.8, 129.4, 129.59, 129.64, 130.9, 131.9, 144.0, 146.5, 148.3, 158.2, 159.1.



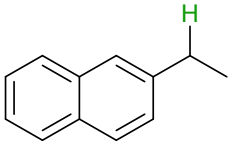
6d

(*1E*, *4Z*)-hepta-1,4-dien-6-yne-1,5-diyldibenzene (**6d**): Colorless liquid; Yield = 105.0 mg, 86%; ^{1}H-NMR (400 MHz, $CDCl_3$): δ = 3.37 (s, 1H), 3.42 (t, *J* = 7.2 Hz, 2H), 6.22-6.30 (m, 1H), 6.47-6.54 (m, 2H), 7.19 (t, *J* = 7.2 Hz, 1H), 7.27-7.36 (m, 7H), 7.62 (d, *J* = 7.6 Hz, 2H); ^{13}C-NMR ($CDCl_3$, 100 MHz): δ = 34.6, 80.7, 83.6, 123.6, 126.0, 126.1, 127.0, 127.1, 127.8, 128.4, 128.5, 131.3, 136.8, 137.4.



6e

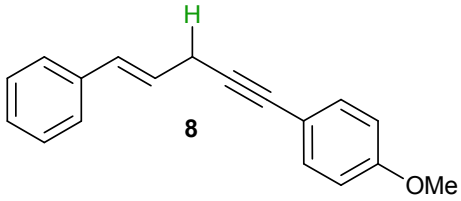
1-Ethylnaphthalene (**6e**):[11] Colorless liquid; Yield = 40.8 mg, 52%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 1.38 (t, *J* = 7.5 Hz, 3H), 3.10 (q, *J* = 7.5 Hz, 2H), 7.33 (d, *J* = 7.0 Hz, 1H), 7.38-7.41 (m, 1H), 7.44-7.51 (m, 2H), 7.69 (d, *J* = 8.0 Hz, 1H), 7.84 (d, *J* = 8.5 Hz, 1H), 8.05 (d, *J* = 8.5 Hz, 1H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 15.0, 25.9, 123.7, 124.8, 125.4, 125.6, 126.4, 128.7, 131.7, 133.8, 140.2.



6f

2-Ethylnaphthalene (**6f**):[12] Colorless liquid; Yield = 36.0 mg, 46%; ^{1}H-NMR (500 MHz, $CDCl_3$): δ = 1.30 (t, *J* = 7.5

Hz, 3H), 2.77 (q, *J* = 7.5 Hz, 2H), 7.31 (d, *J* = 7.5 Hz, 1H), 7.36-7.42 (m, 2H), 7.59 (s, 1H), 7.72-7.77 (m, 3H); ^{13}C-NMR ($CDCl_3$, 125 MHz): δ = 15.5, 29.0, 125.0, 125.5, 125.8, 127.0, 127.4, 127.6, 127.8, 131.9, 133.7, 141.7.



8

(*E*)-1-methoxy-4-(5-phenylpent-4-en-1-yn-1-yl)benzene (**8**):[1a] Colorless liquid; Yield = 109.6 mg, 88%; ^{1}H-NMR (400 MHz, $CDCl_3$): δ = 3.39 (dd, *J* = 1.5 Hz, *J* = 5.5 Hz, 2H), 3.83 (s, 3H), 6.29 (dd, *J* = 5.5 Hz, J = 16.0 Hz, 1H), 6.75 (d, *J* = 16.0 Hz, 1H), 6.88 (d, *J* = 8.5 Hz, 2H), 7.26 (t, *J* = 7.0 Hz, 1H), 7.35 (t, *J* = 7.5 Hz, 2H), 7.41-7.46 (m, 4H); ^{13}C-NMR ($CDCl_3$, 100 MHz): δ = 23.0, 55.2, 82.6, 85.1, 113.8, 115.7, 124.5, 126.2, 127.3, 128.5, 131.2, 132.9, 137.1, 159.2.

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3. References

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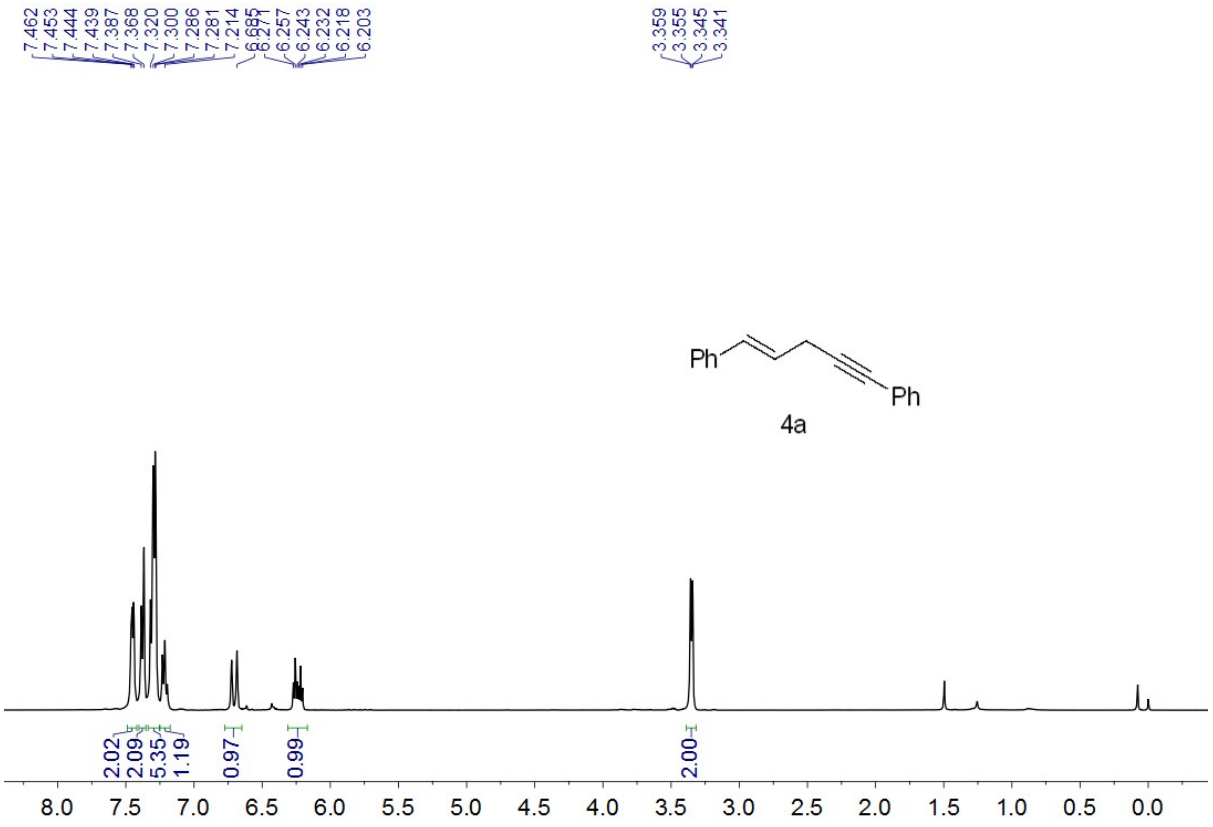
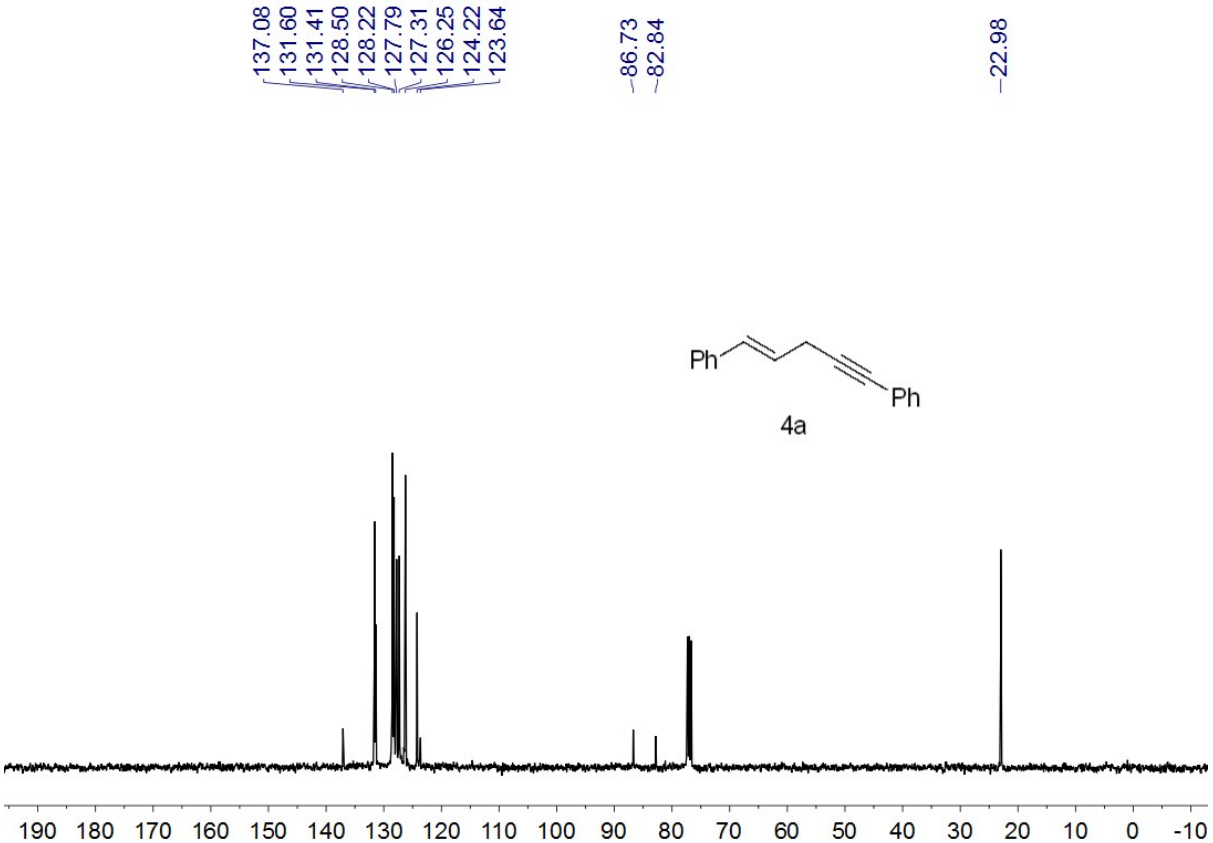
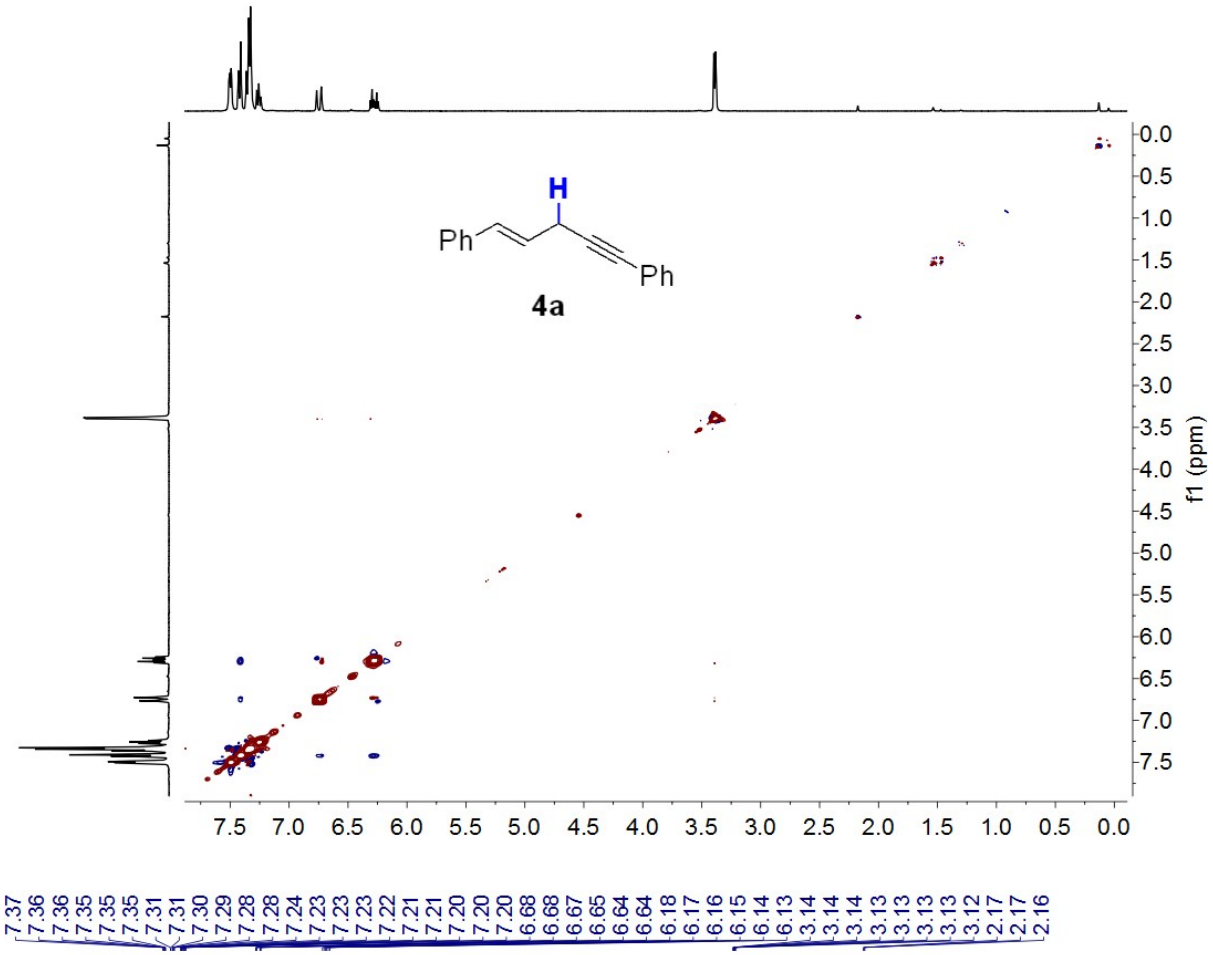
4. NMR spectral copies of 4a-l, 6a-f and 8



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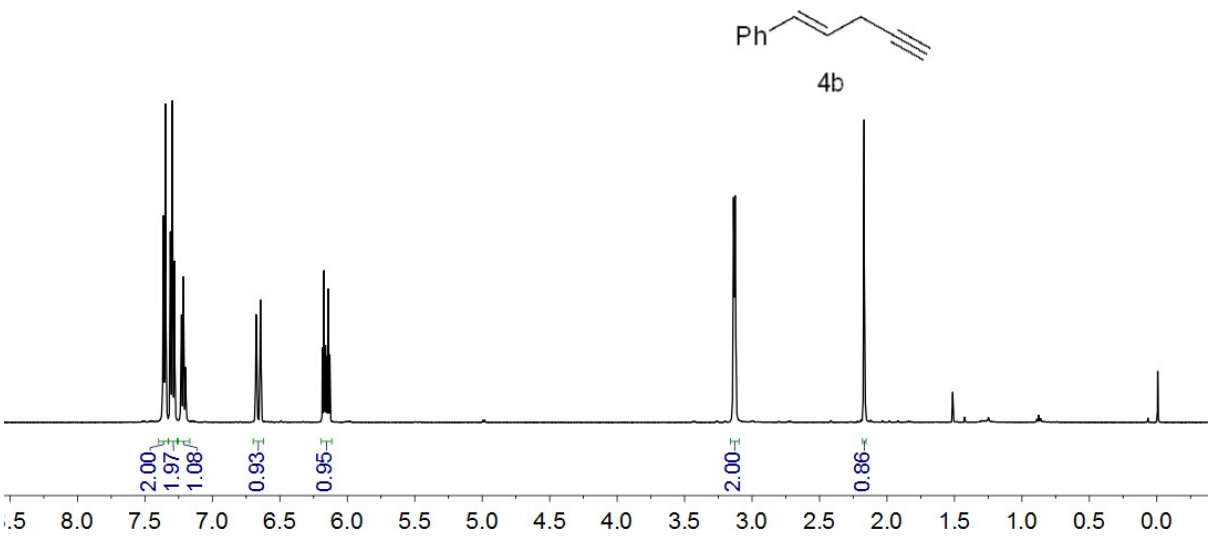
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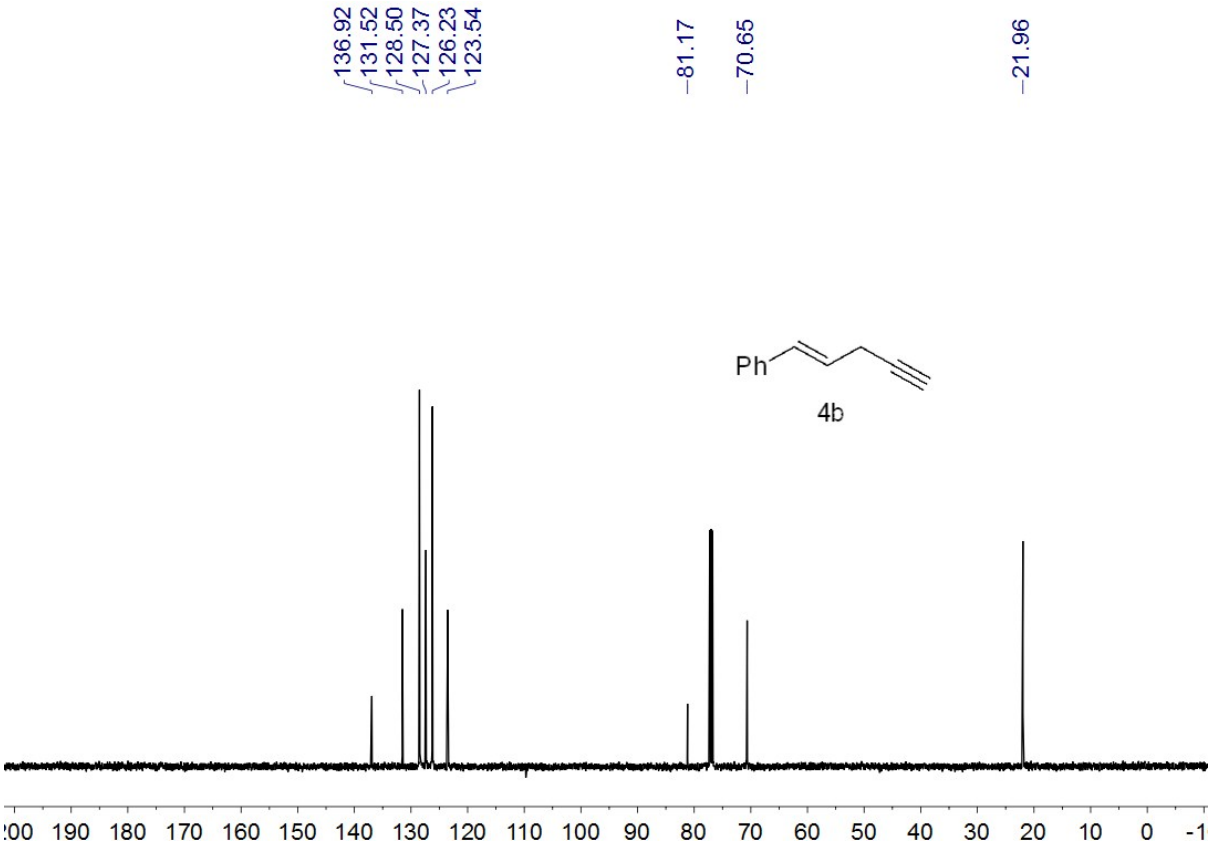
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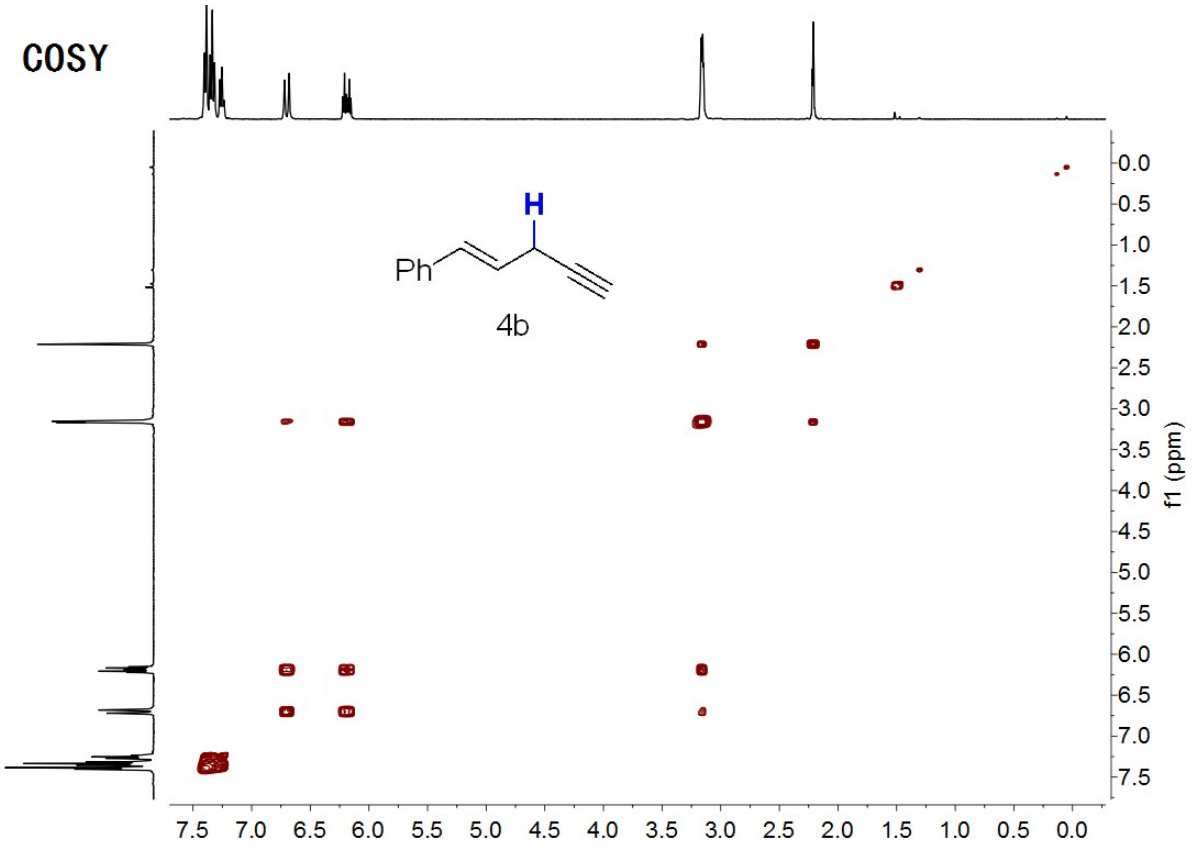
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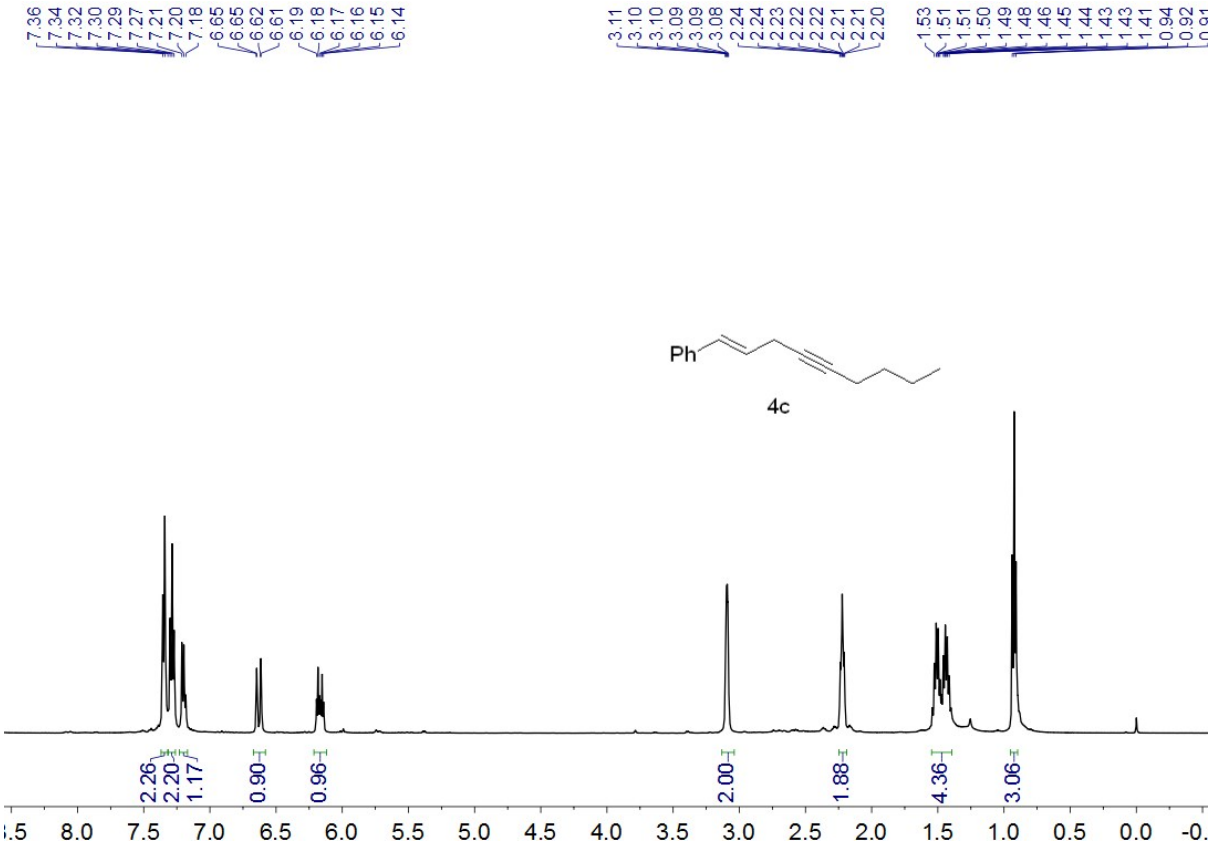
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3.09
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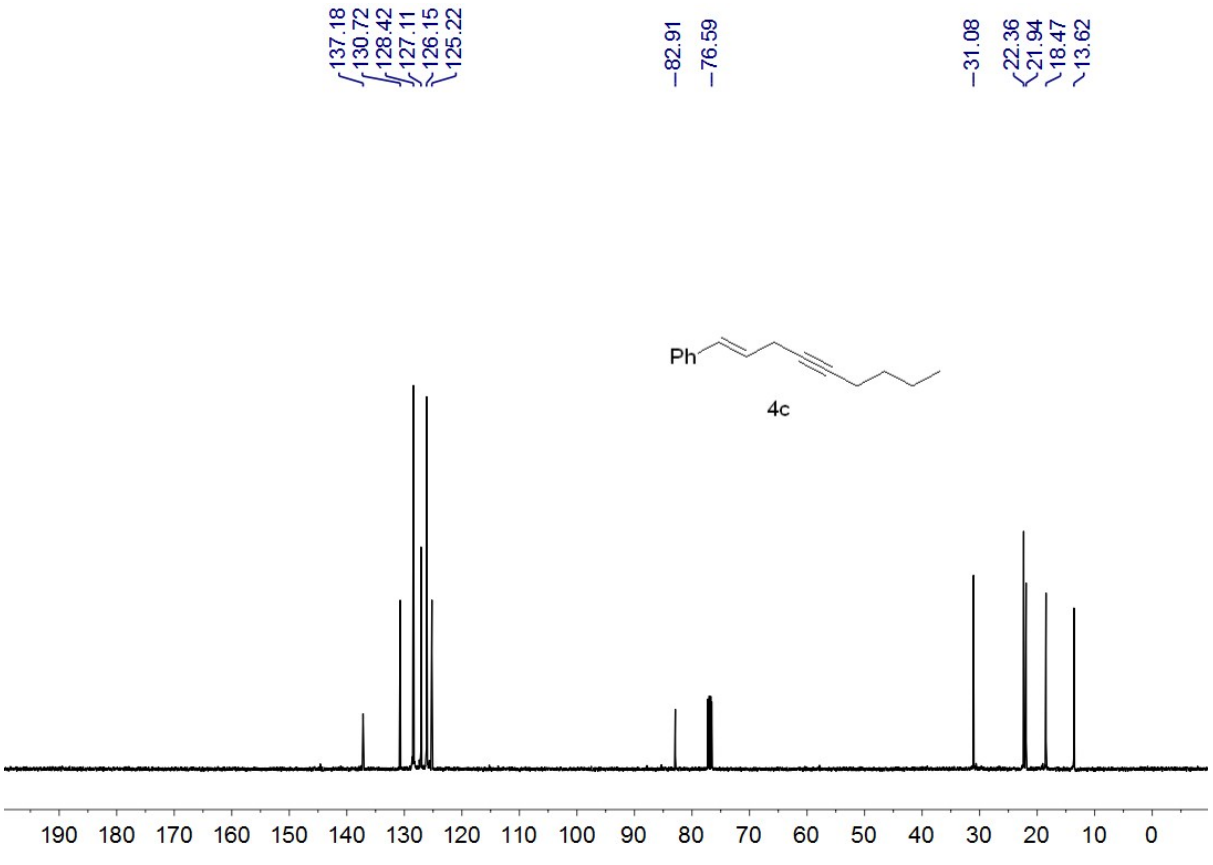
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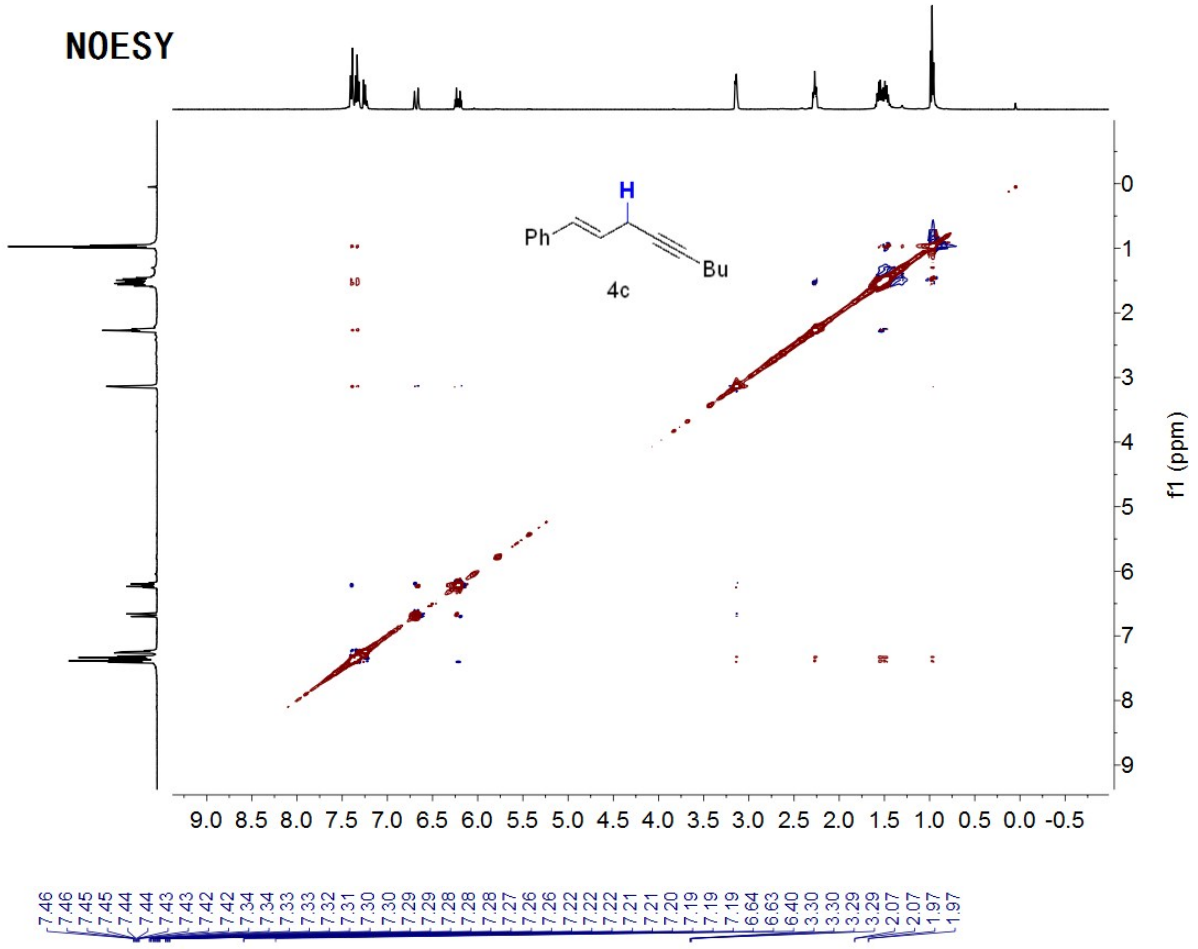
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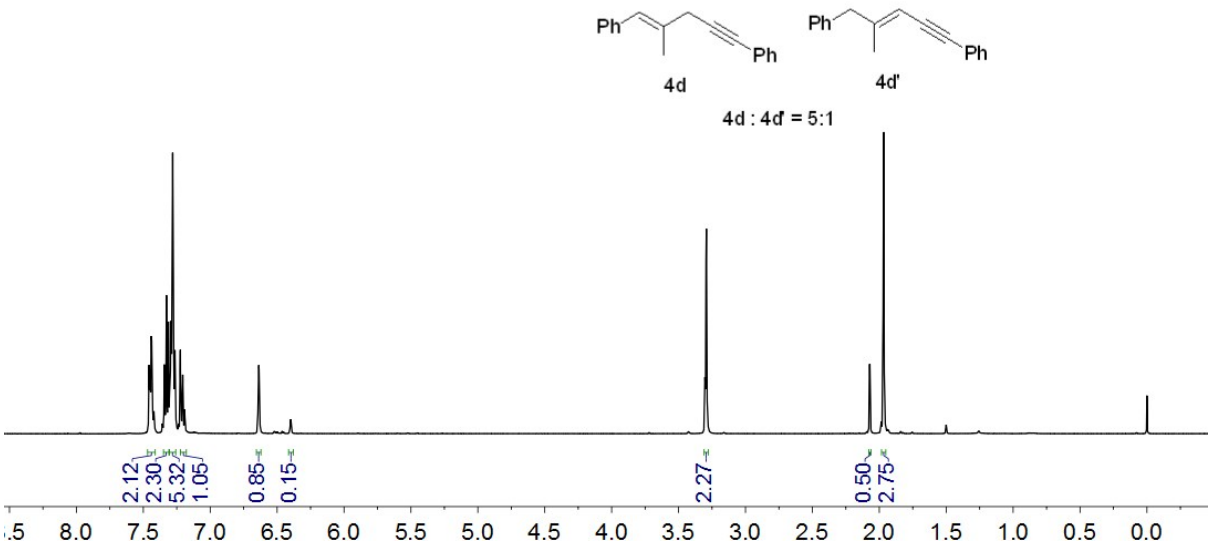
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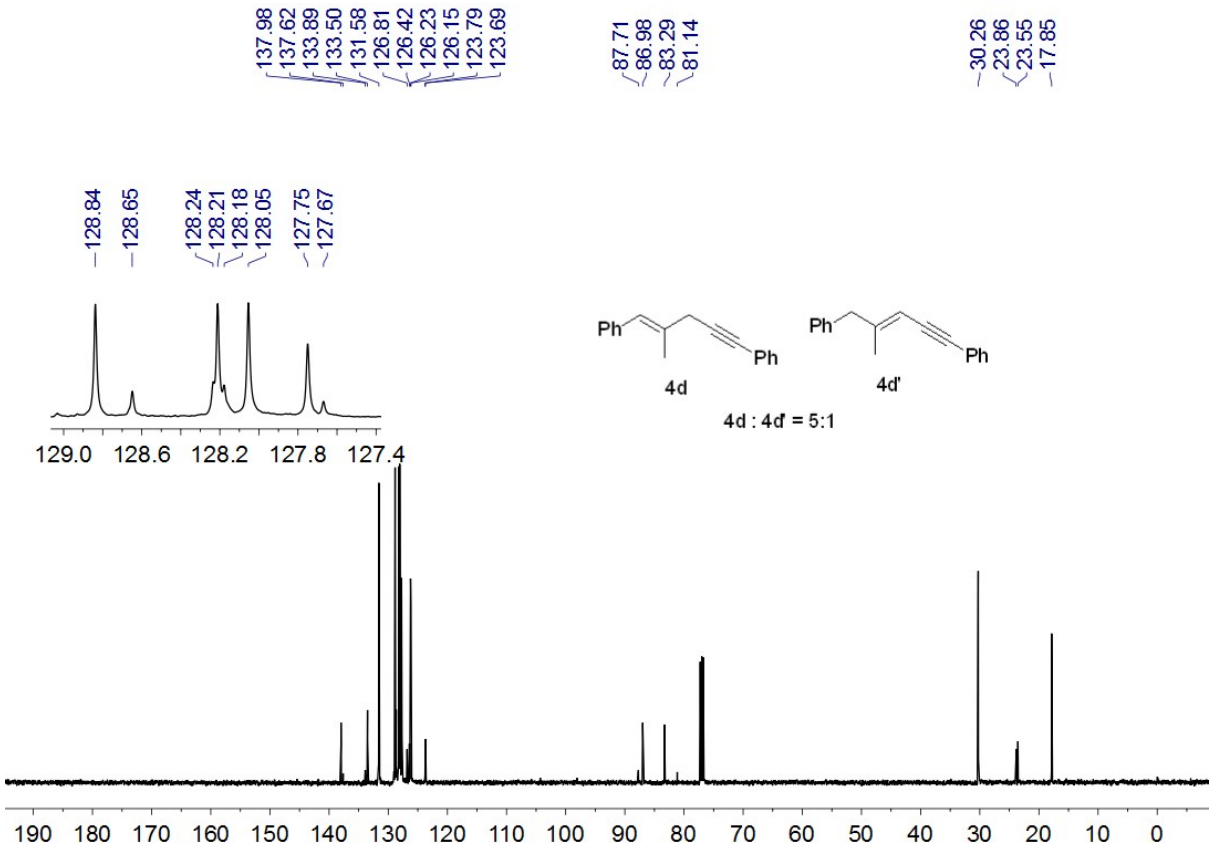
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4d
Ph
Ph
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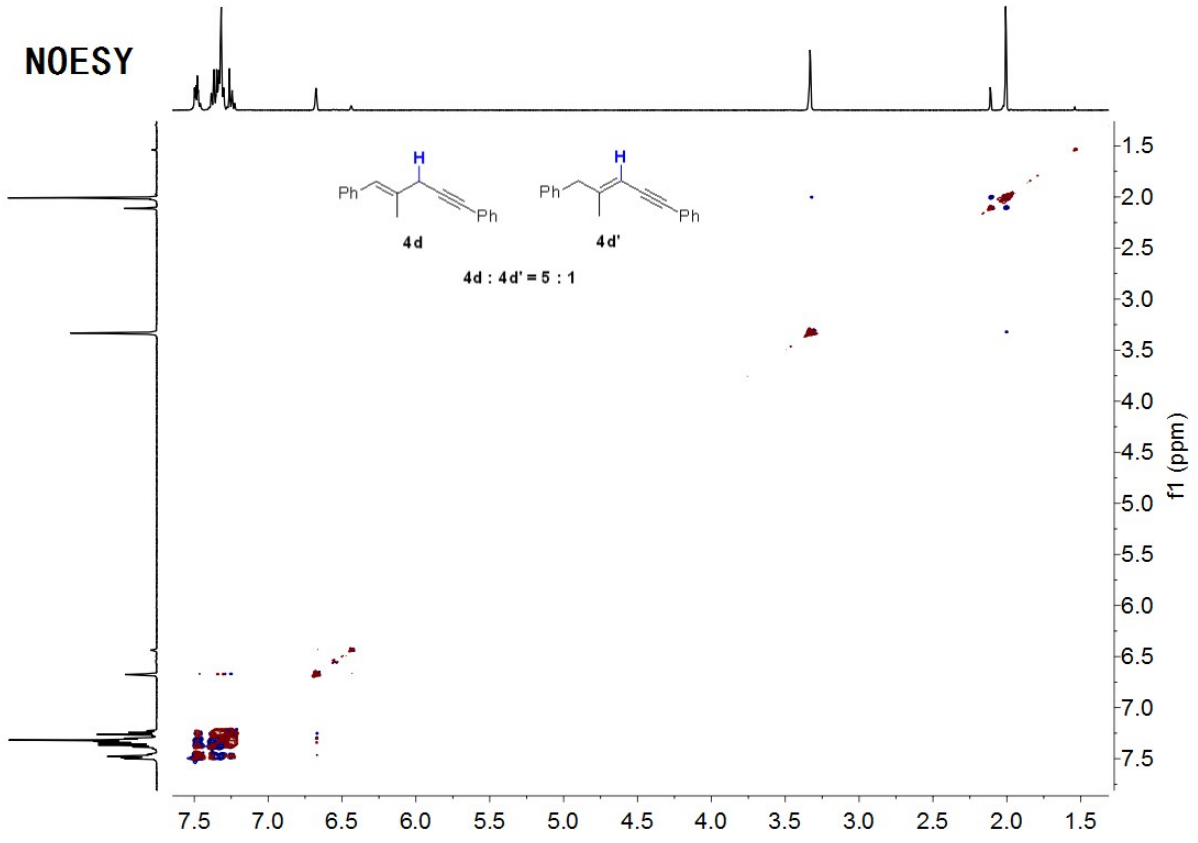
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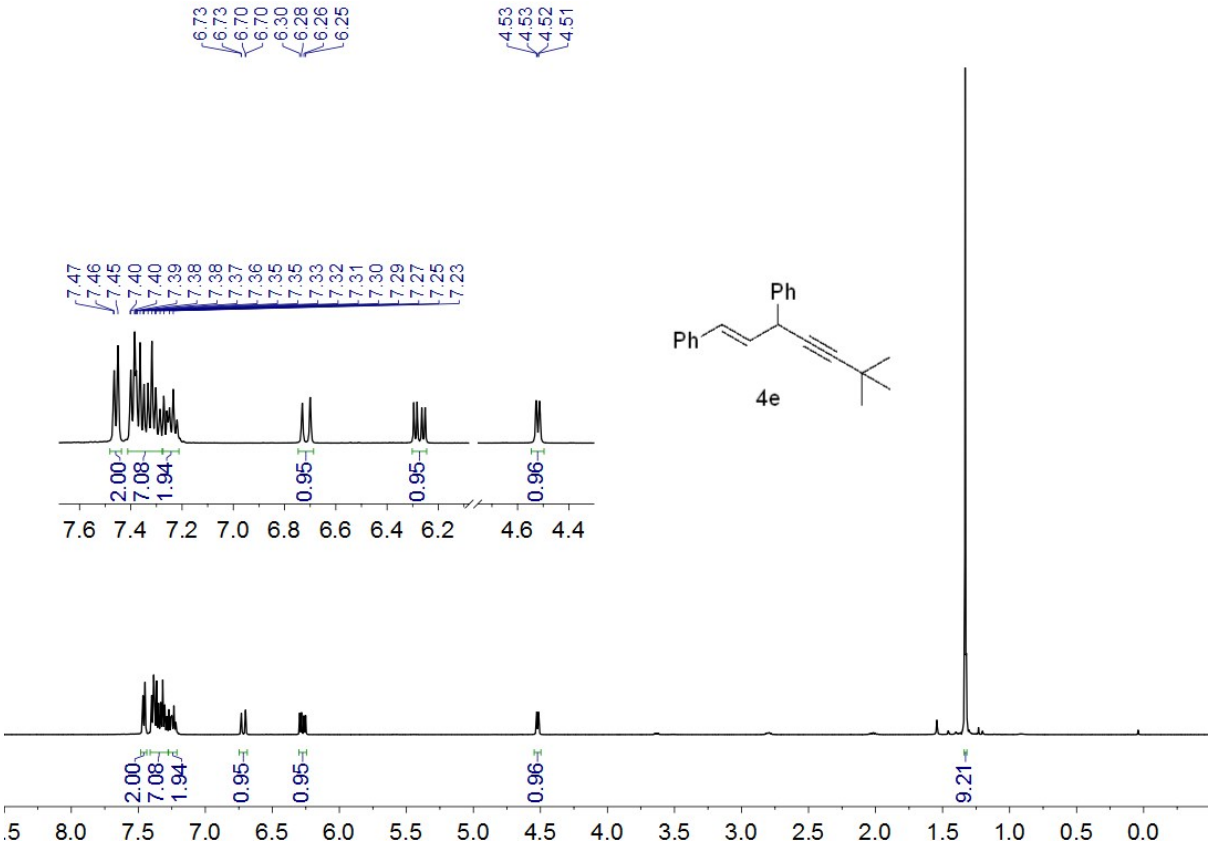
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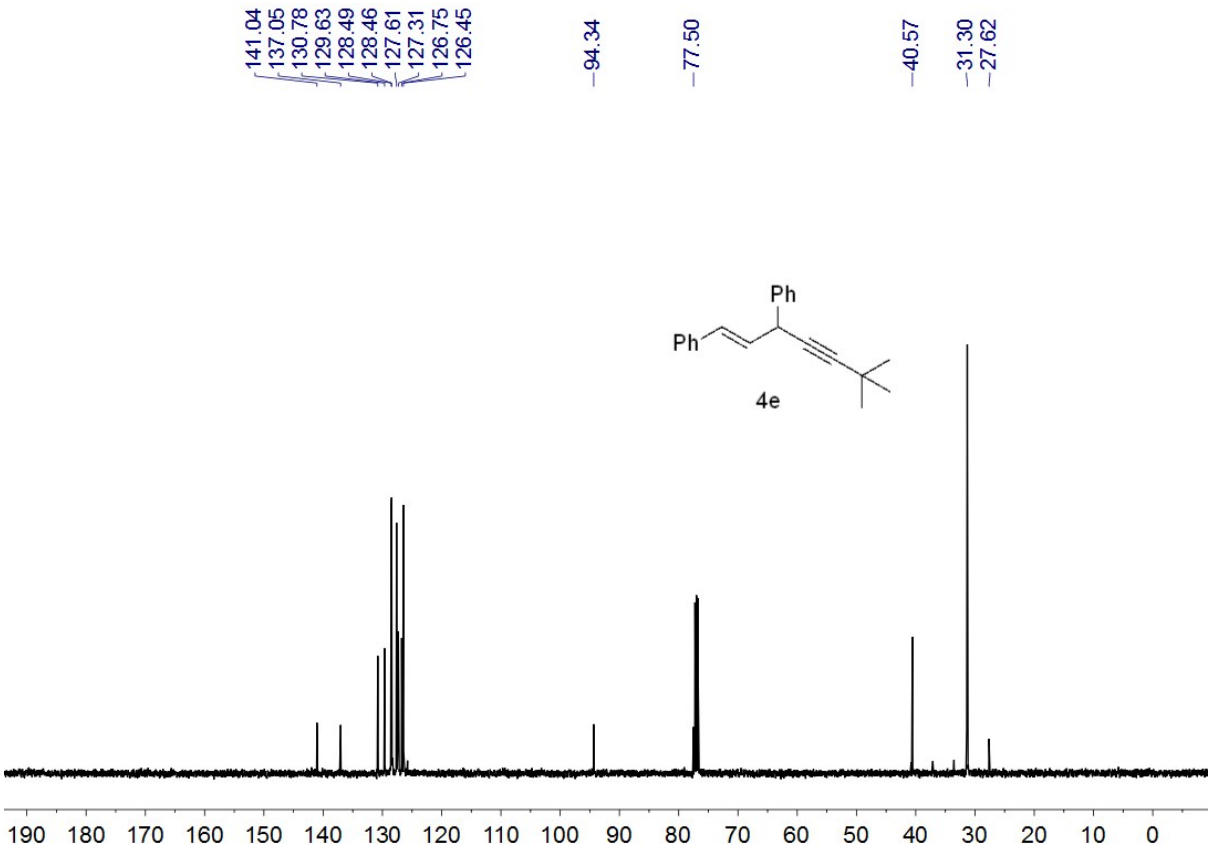
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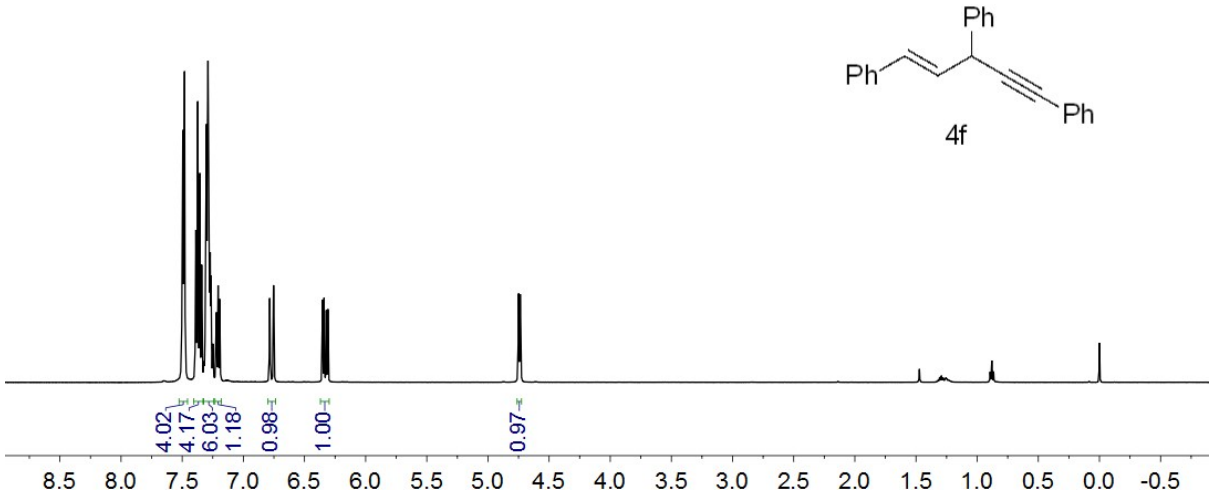
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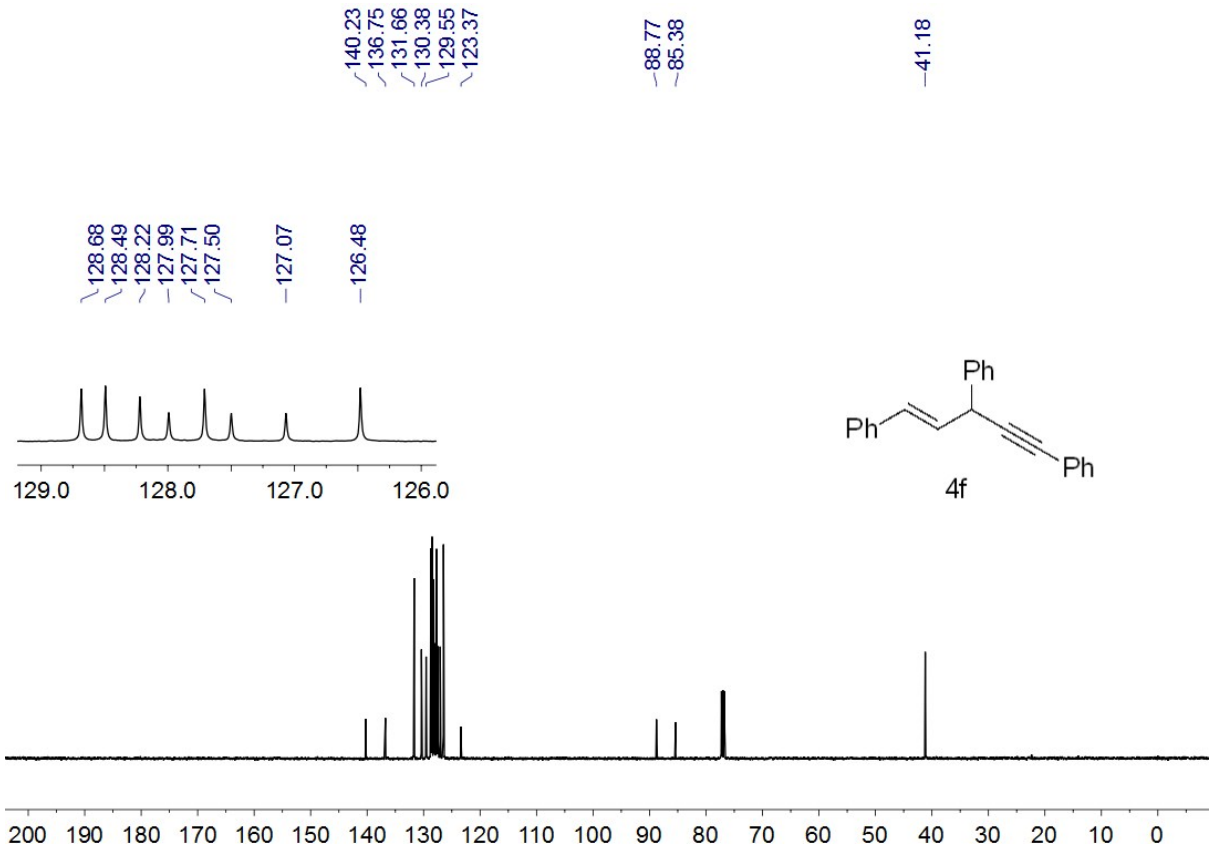
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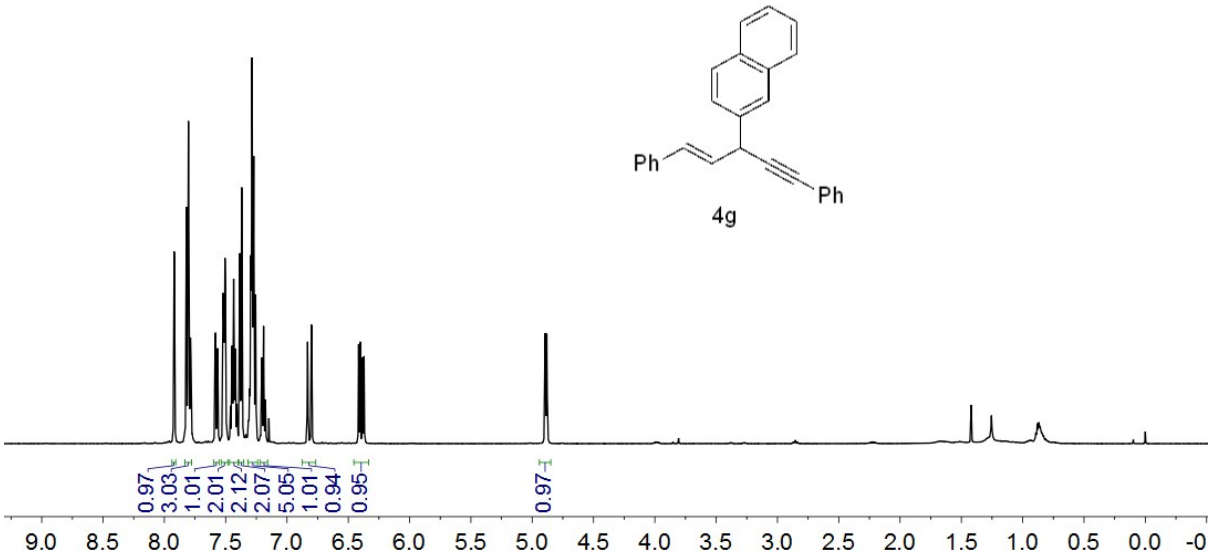
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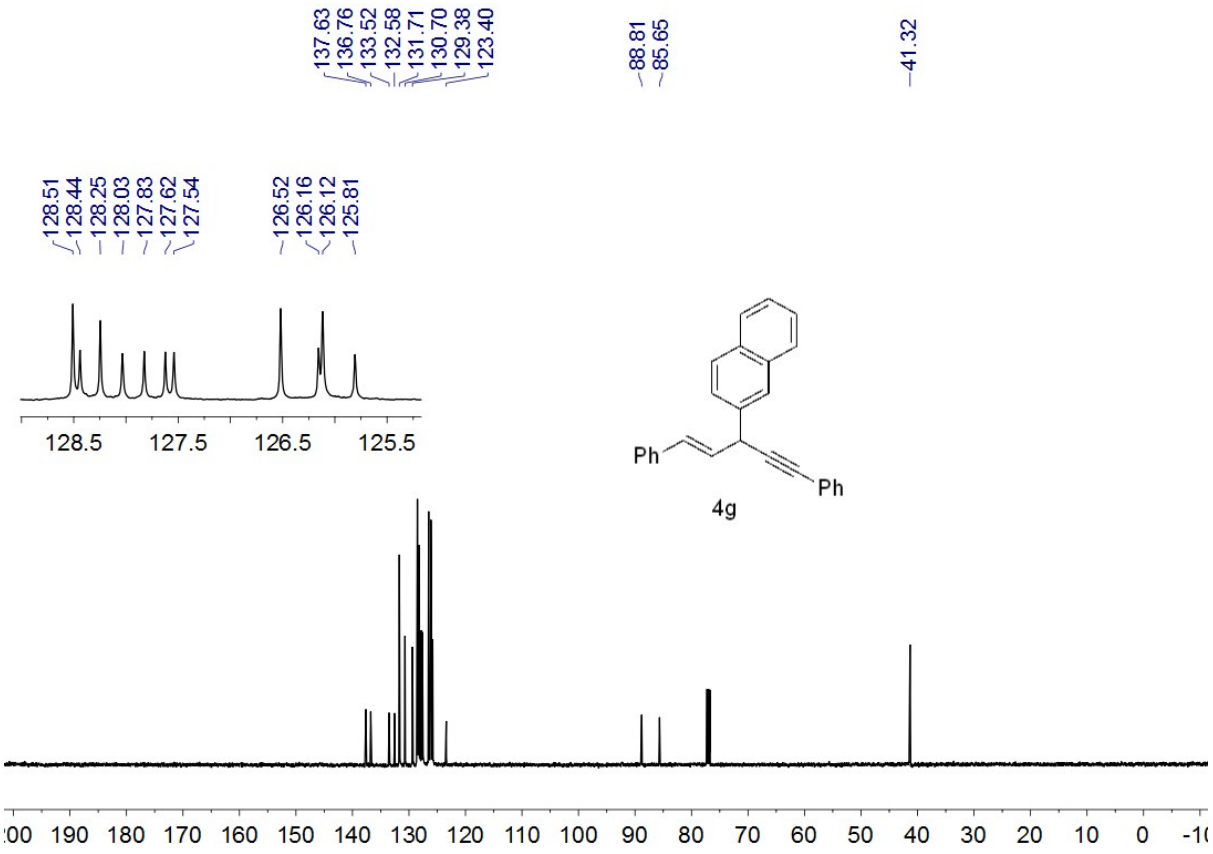
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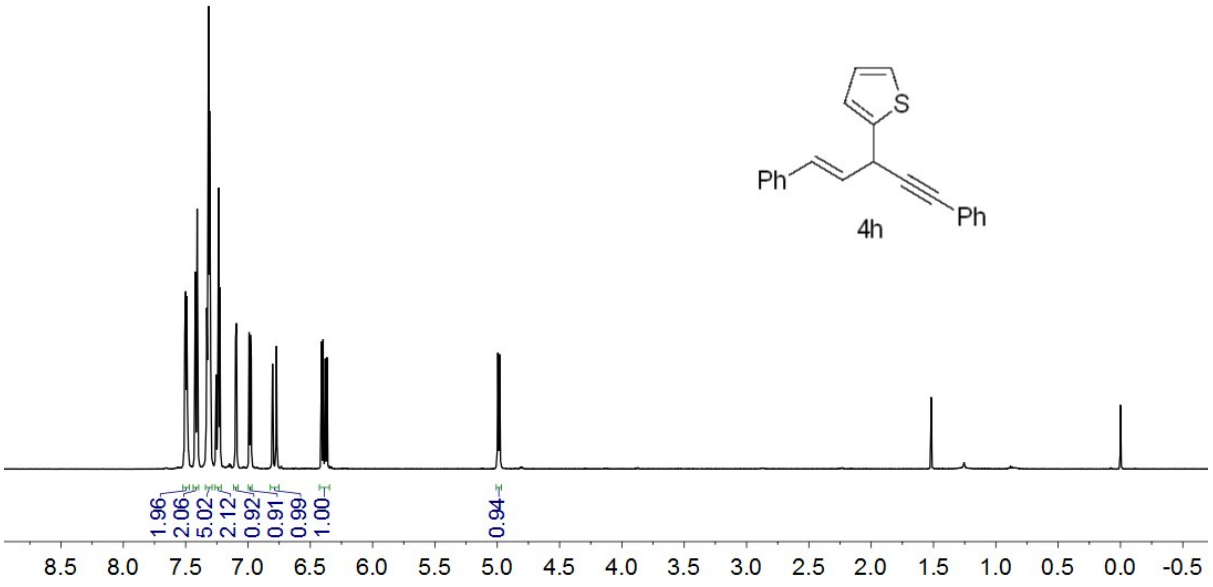
7.51 7.51 7.50 7.50 7.50 7.49 7.49 7.48 7.43 7.42 7.42 7.41 7.41 7.41 7.41 7.33 7.33 7.32 7.32 7.31 7.31 7.30 7.26 7.25 7.25 7.24 7.24 7.24 7.23 7.23 7.22 7.10 7.10 7.10 7.09 7.09 7.09 6.99 6.98 6.98 6.97 6.80 6.80 6.77 6.41 6.40 6.38 6.37 5.00 5.00 4.99 4.98 4.98 4.98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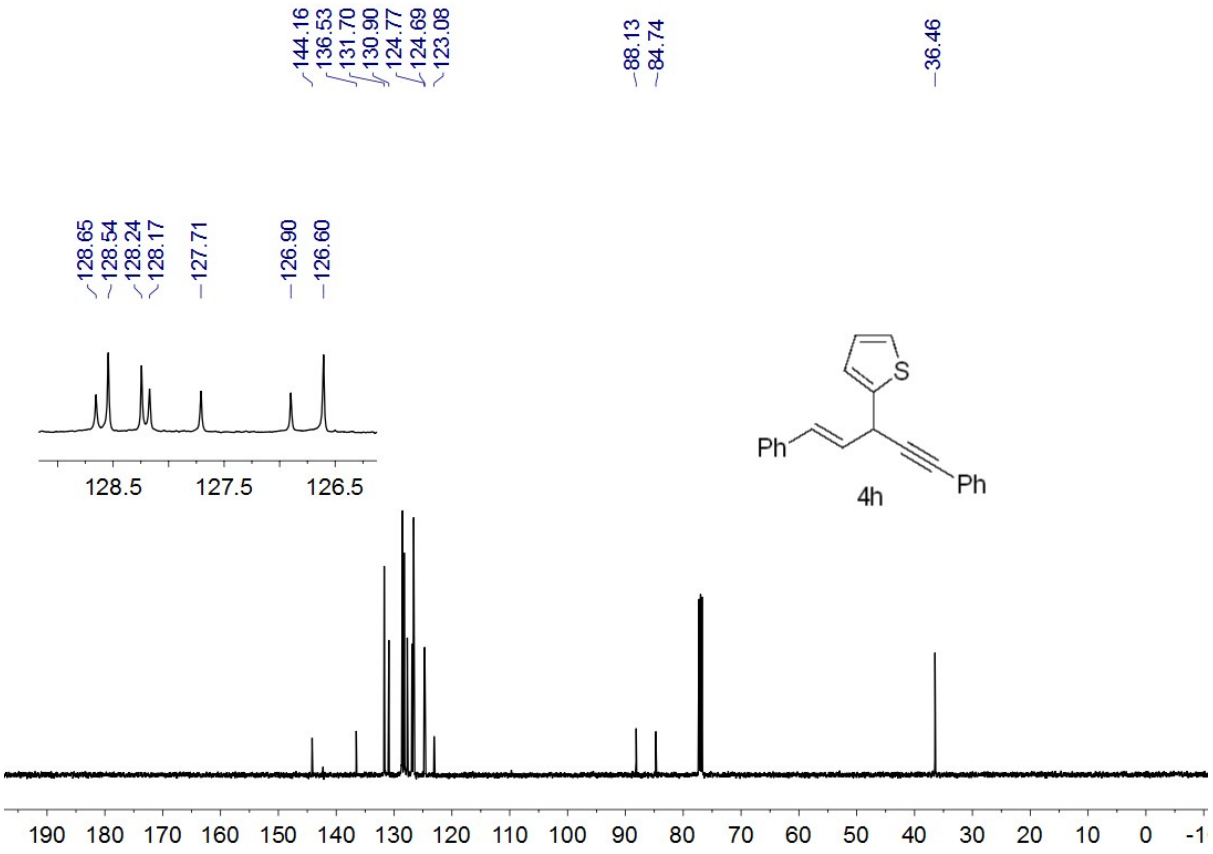
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Ph
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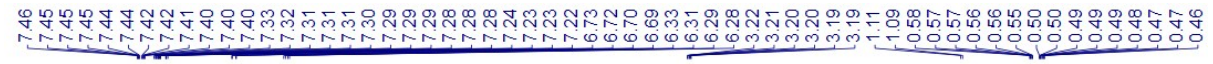
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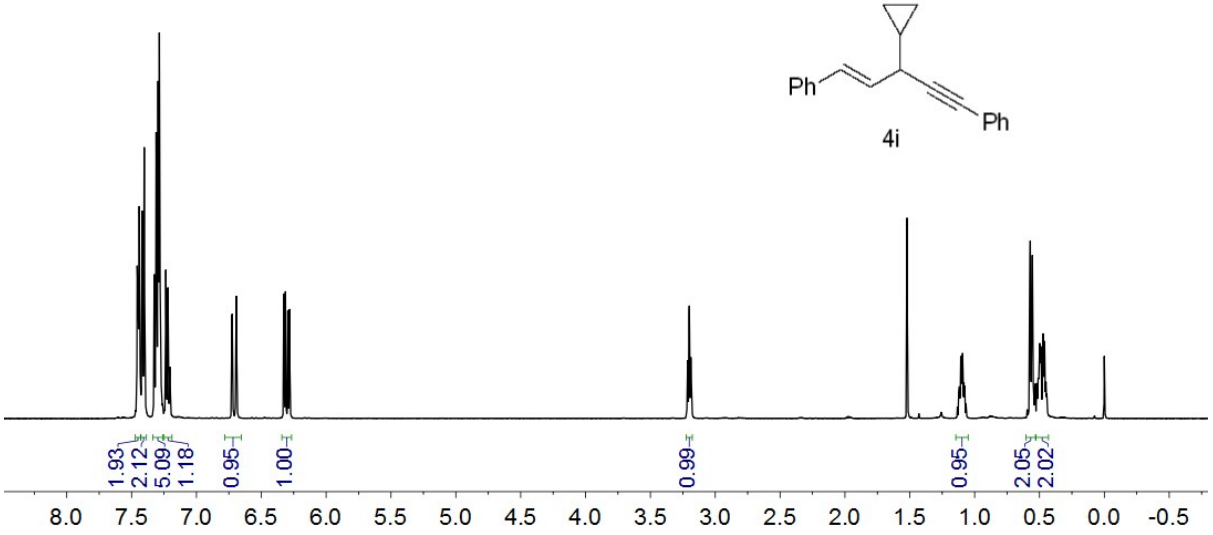
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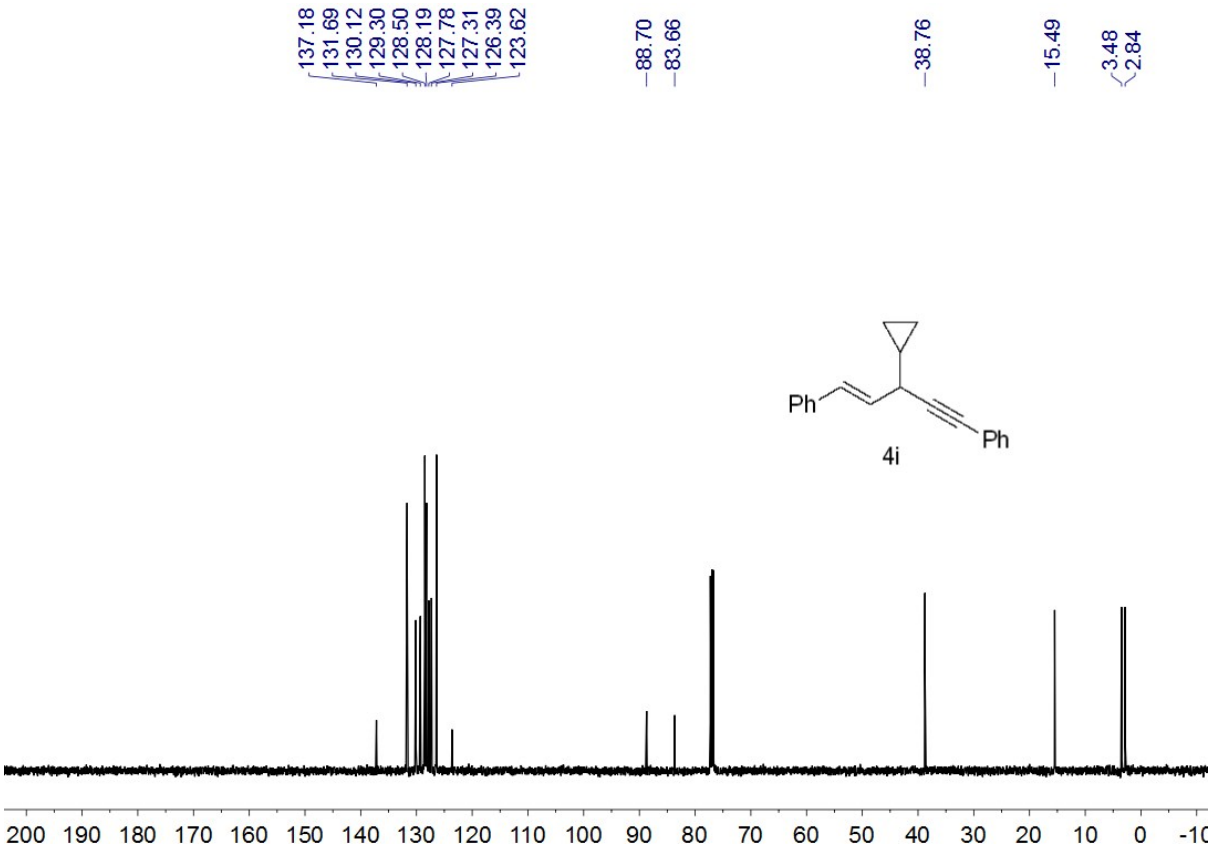
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Ph
4i
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10


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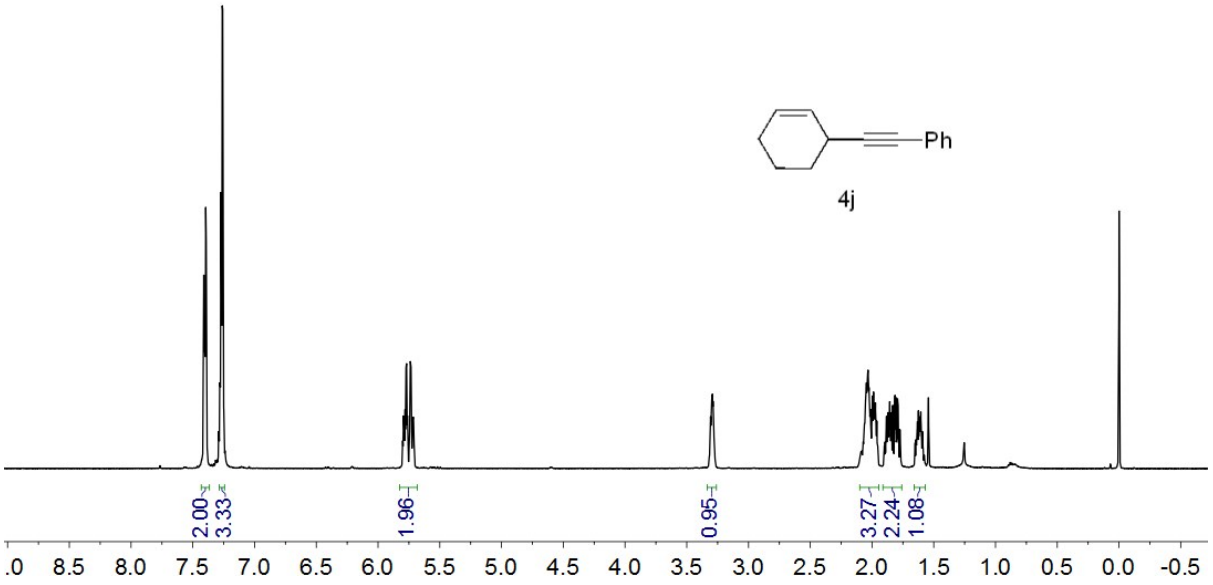
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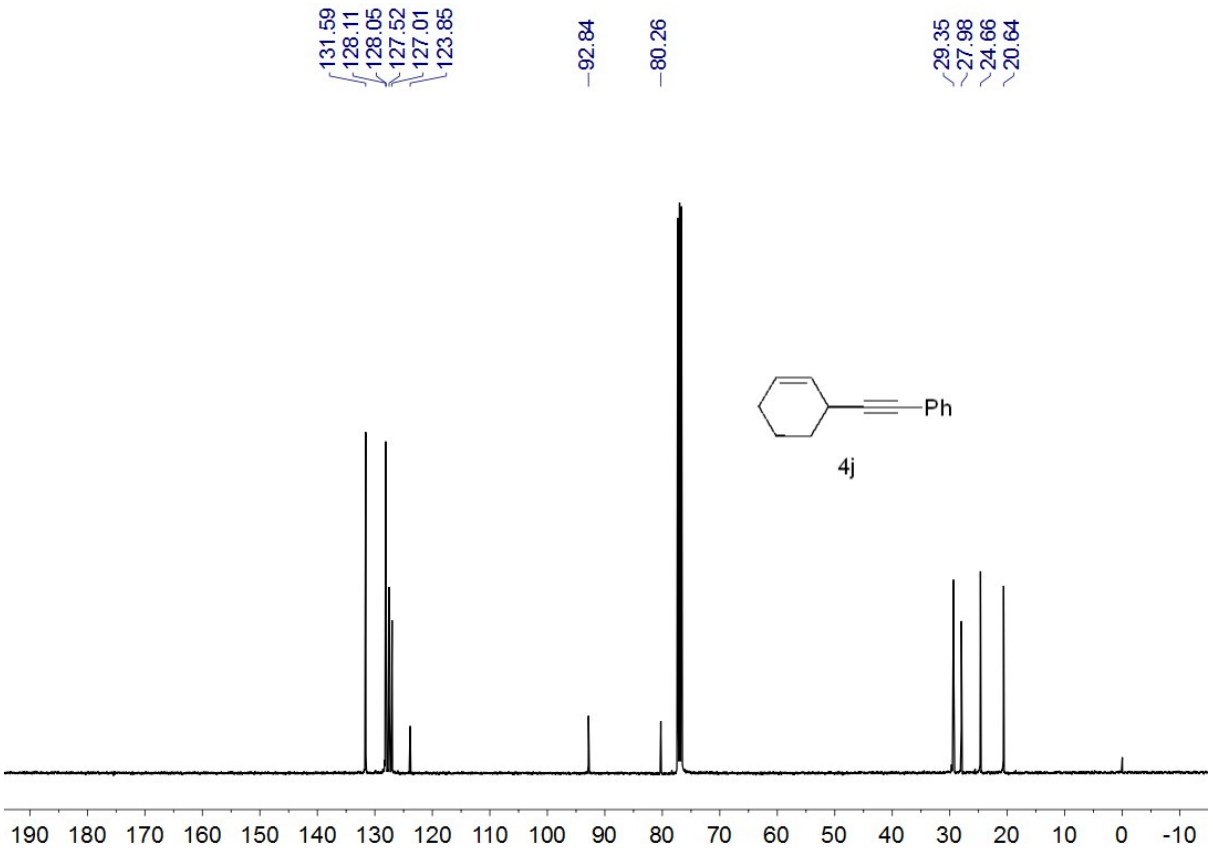
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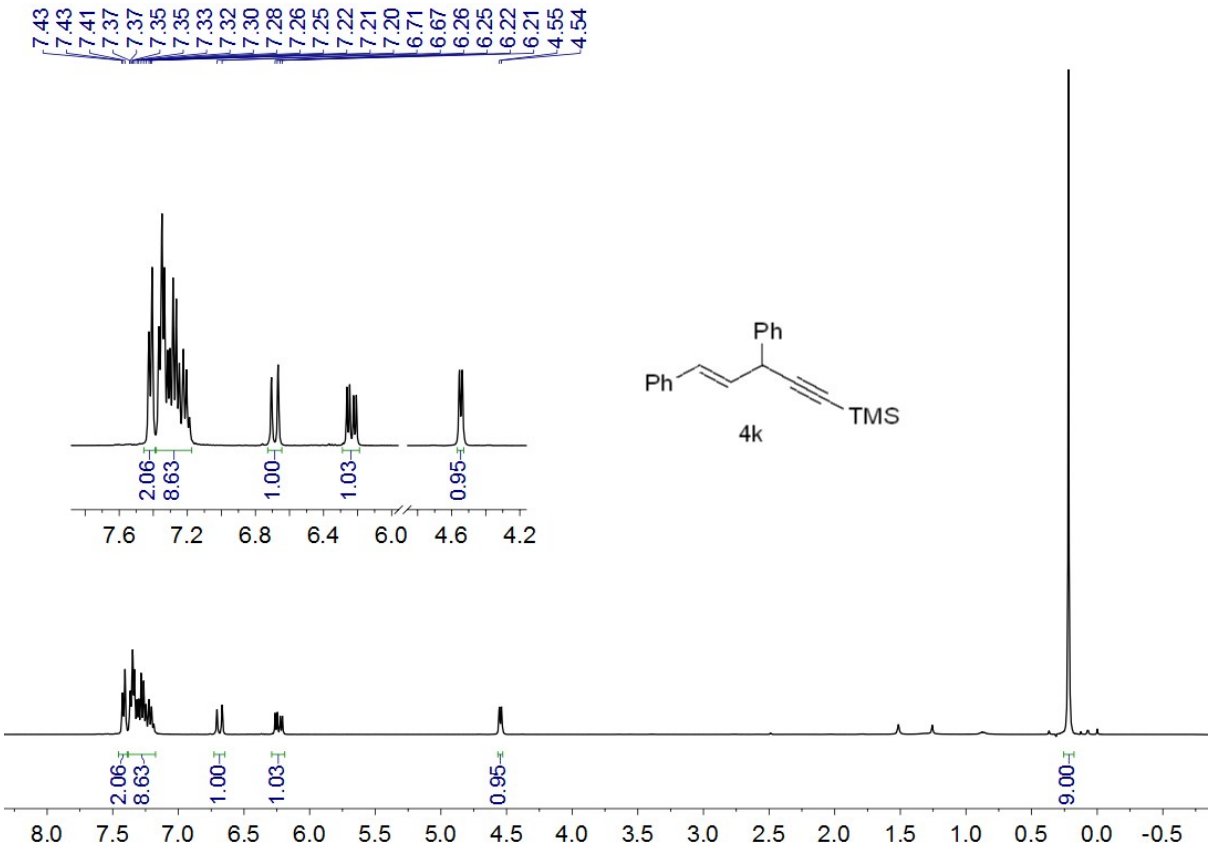
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Ph
Ph
TMS
4k
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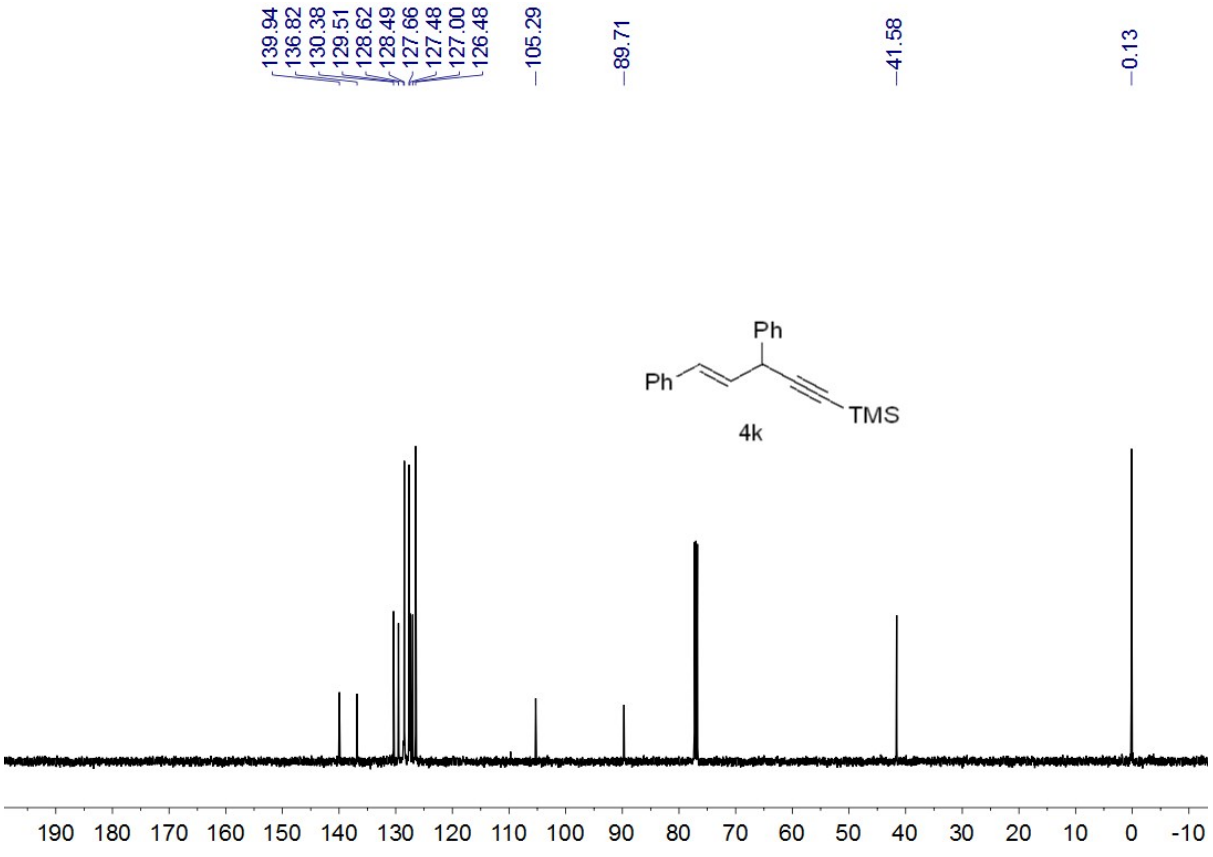
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Ph
Ph
TMS
4k
190
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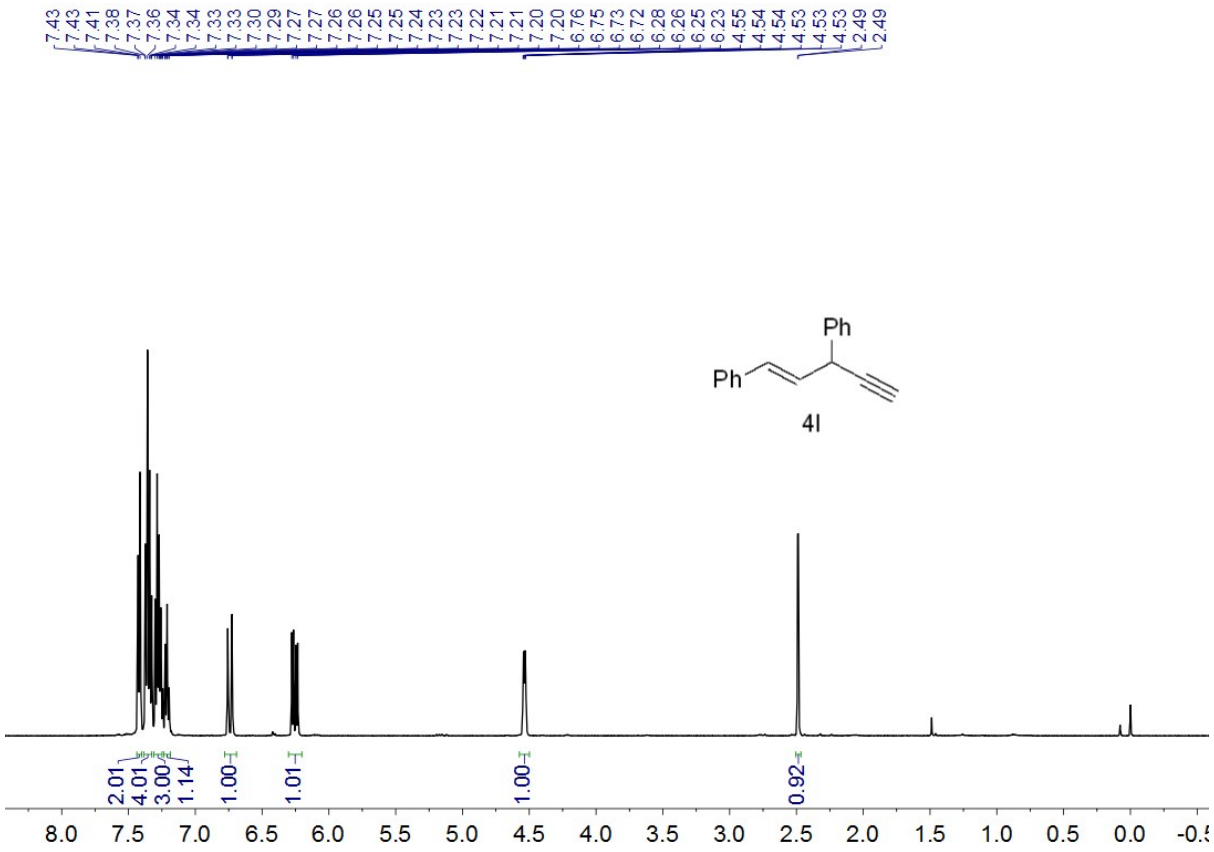
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Ph
4l
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-10


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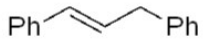
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Ph

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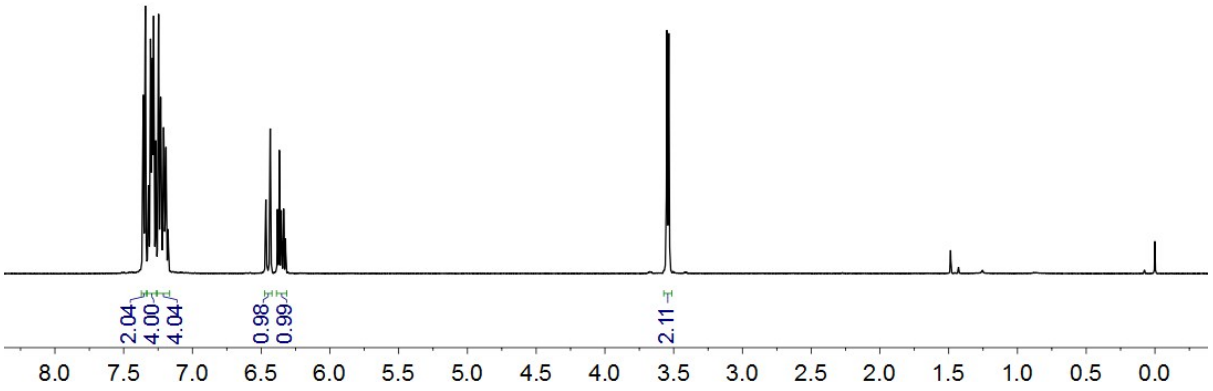
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1.0
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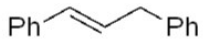
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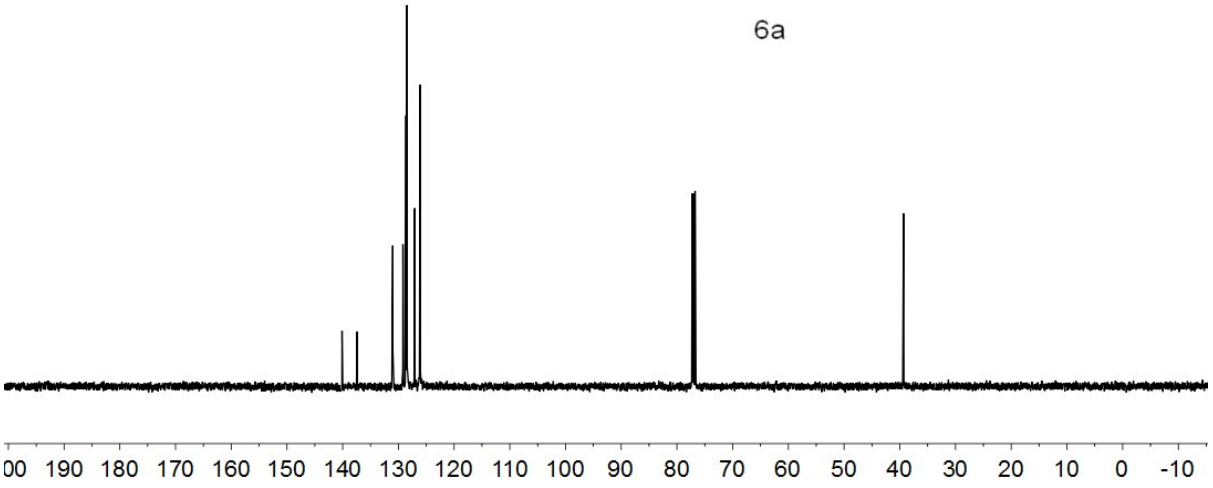
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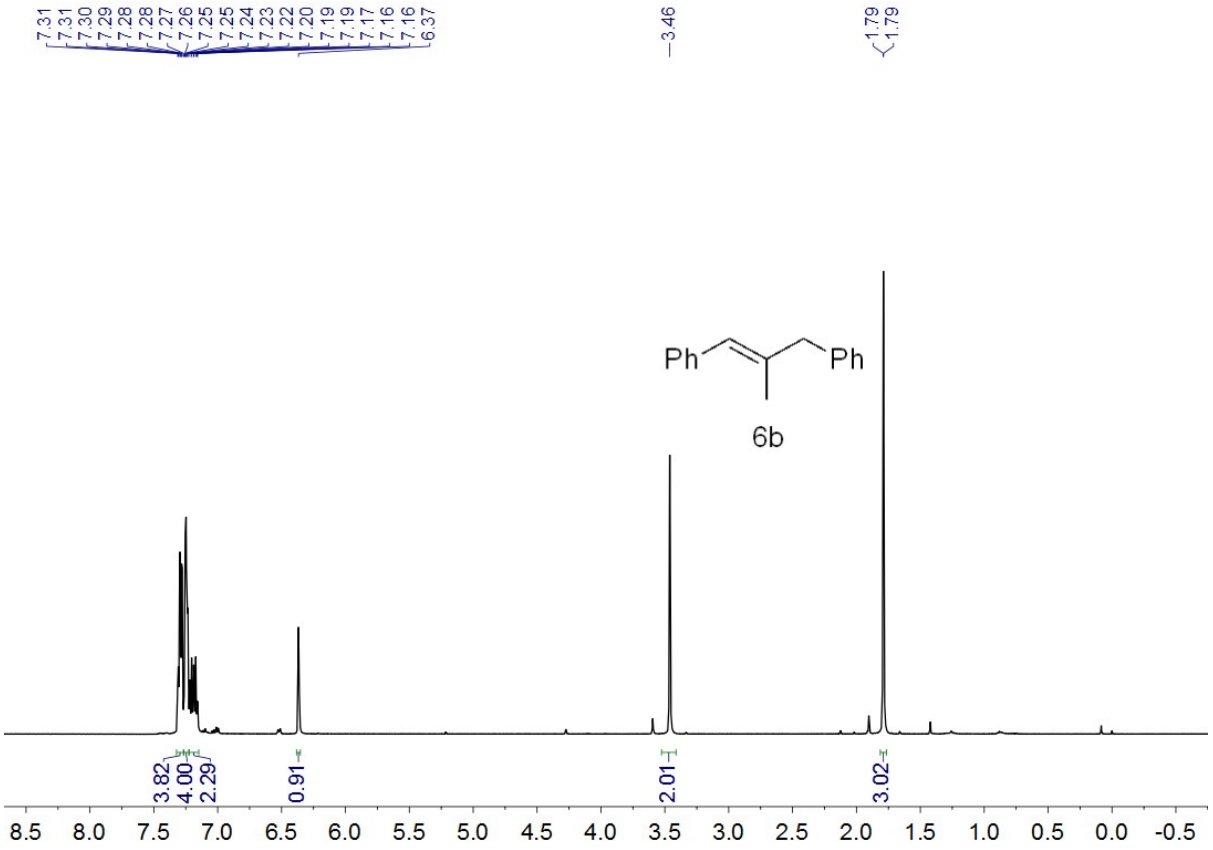
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7.19
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1.79
Ph
Ph
6b
3.82
4.00
2.29
0.91
2.01
3.02
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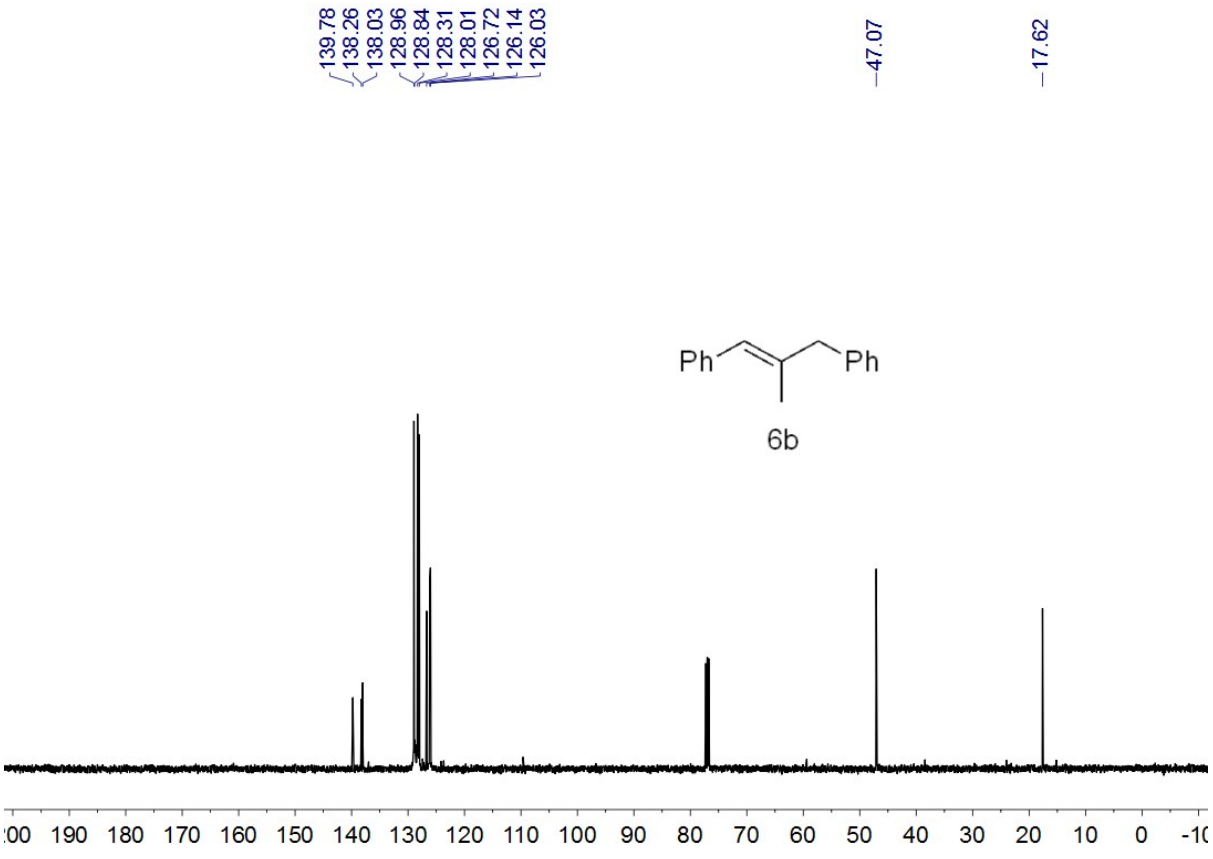
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Ph
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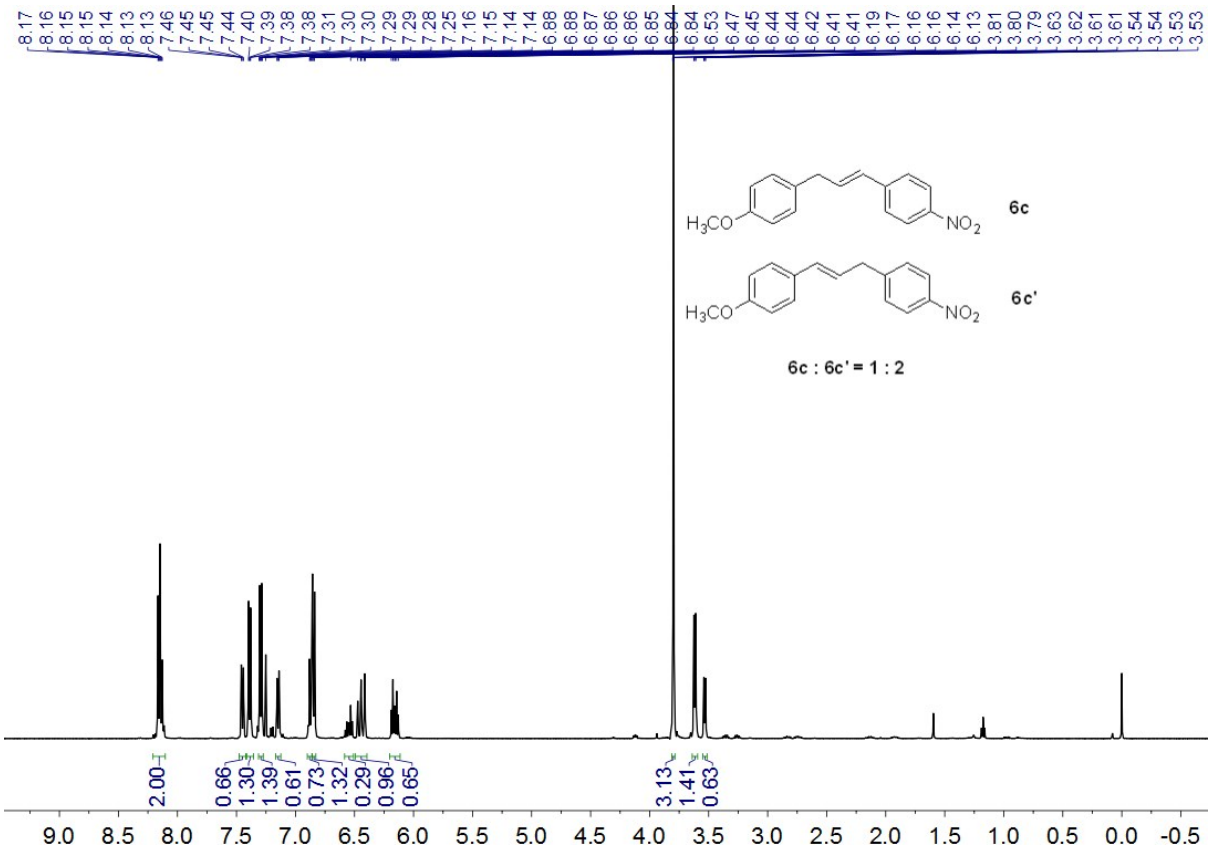
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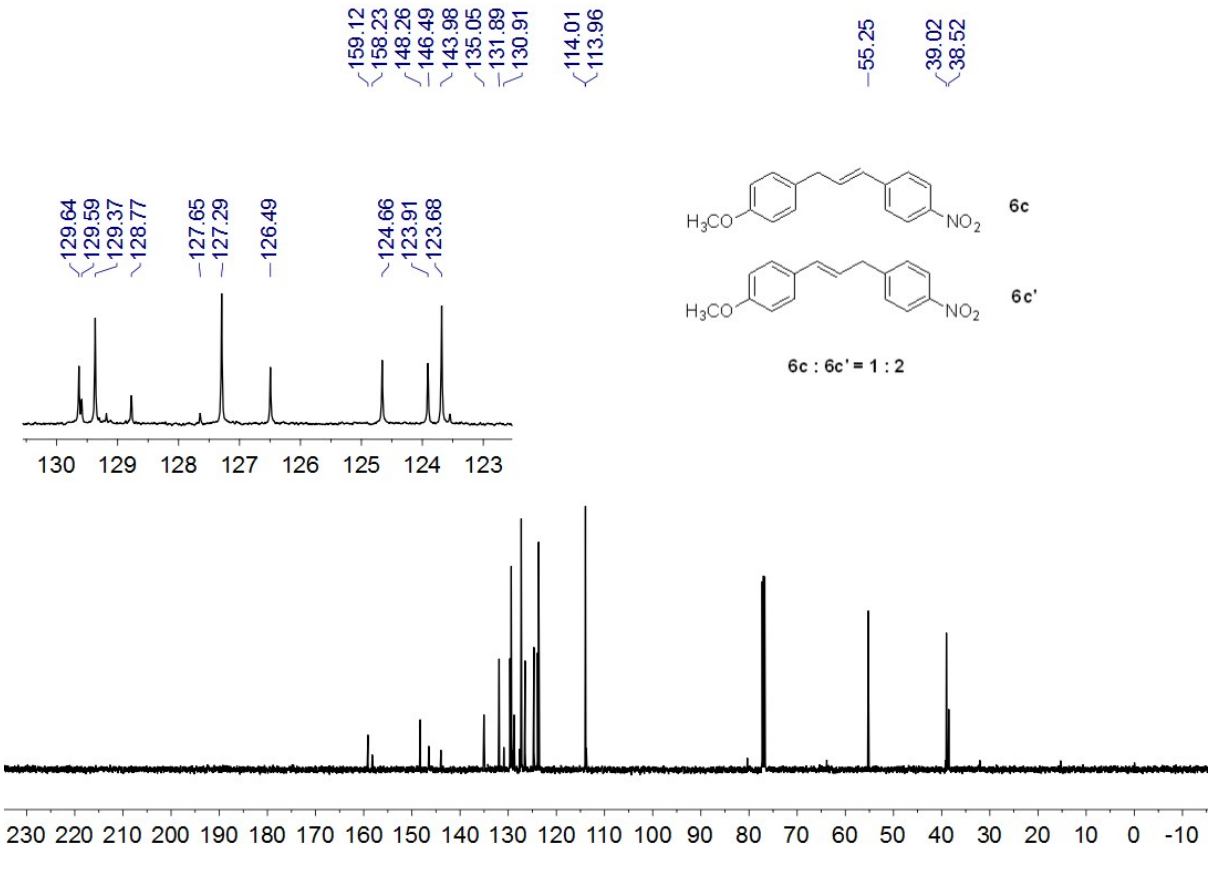
H3CO NO2
6c
H3CO NO2
6c'
6c : 6c' = 1 : 2
2.00 0.66 1.30 1.39 0.61 0.73 1.32 0.29 0.96 0.65 3.13 1.41 0.63
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5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129.64 129.59 129.37 128.77 127.65 127.29 126.49 124.66 123.91 123.68
130 129 128 127 126 125 124 123
H3CO NO2
6c
H3CO NO2
6c'
6c : 6c' = 1 : 2
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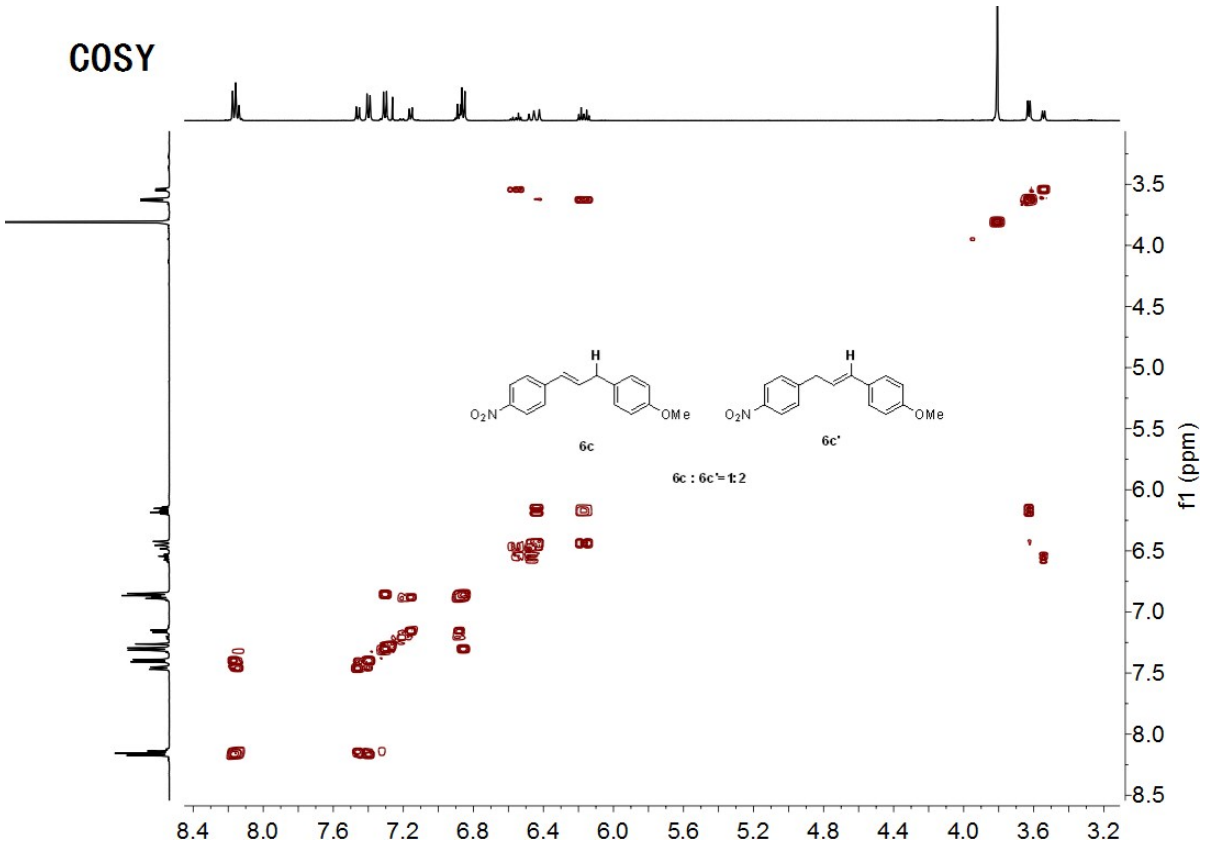
COSY


H
O2N
OMe
6c
6c'
6c : 6c'= 1:2
f1 (ppm)
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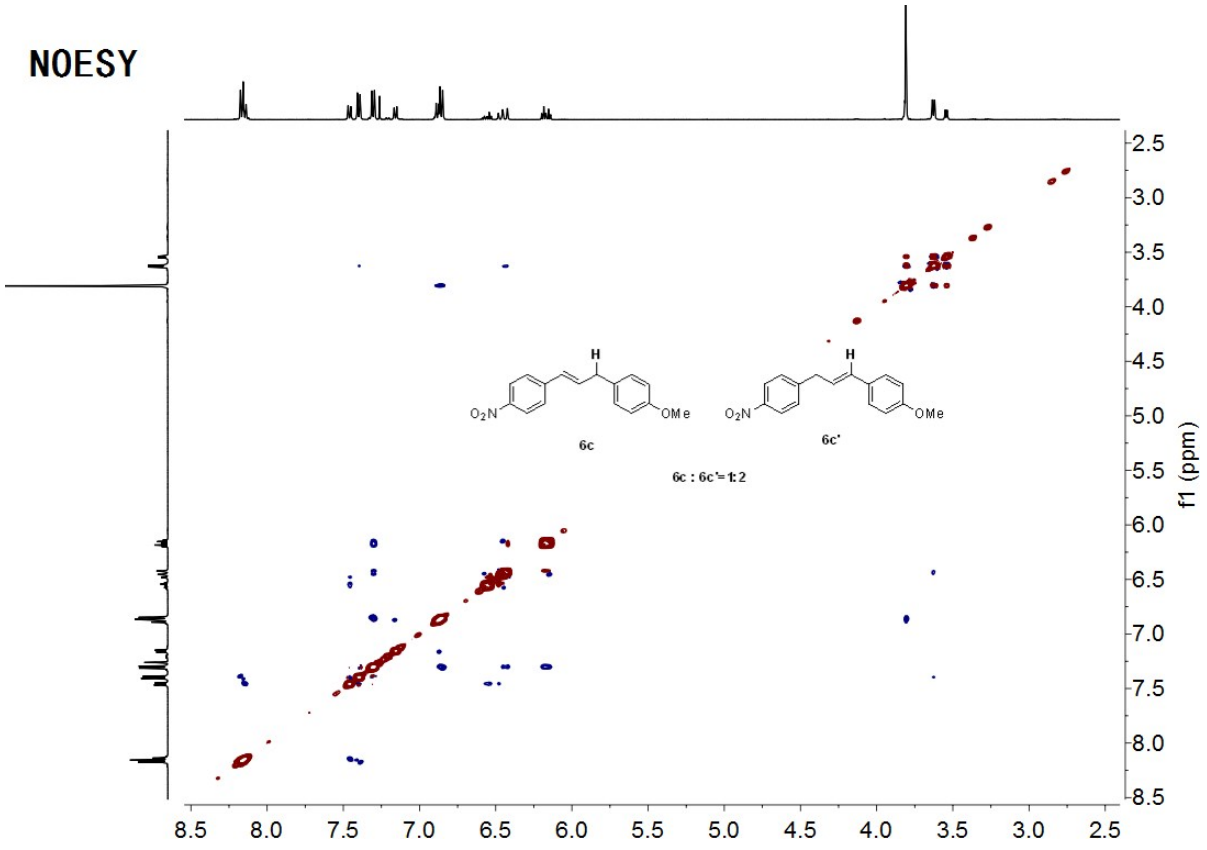
3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5

NOESY


H
O2N
OMe
6c
6c'
6c : 6c'= 1:2
f1 (ppm)
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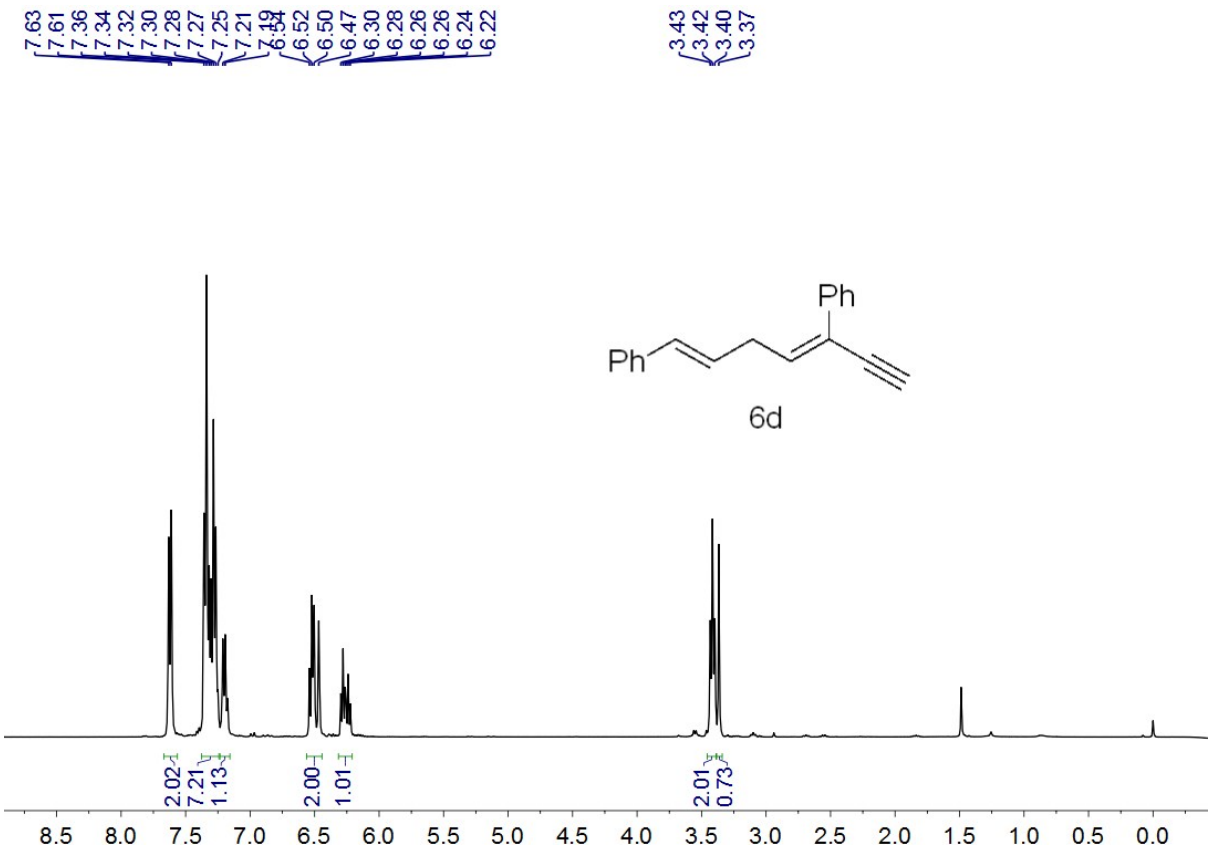
2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5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Ph
6d
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2.00
1.01
2.01
0.73
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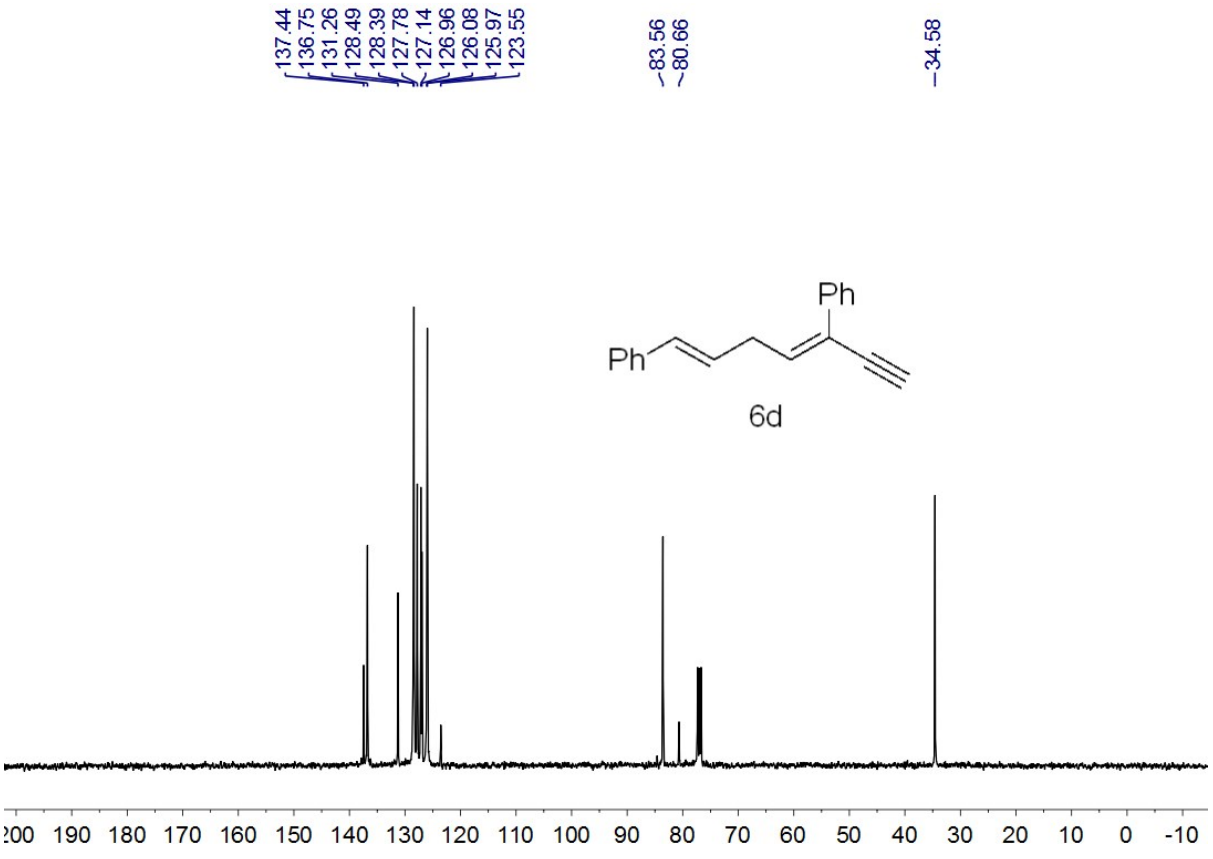
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Ph
Ph
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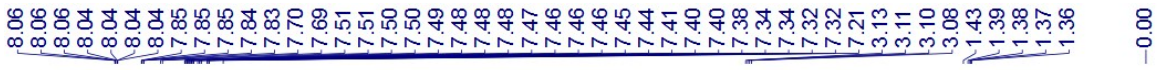
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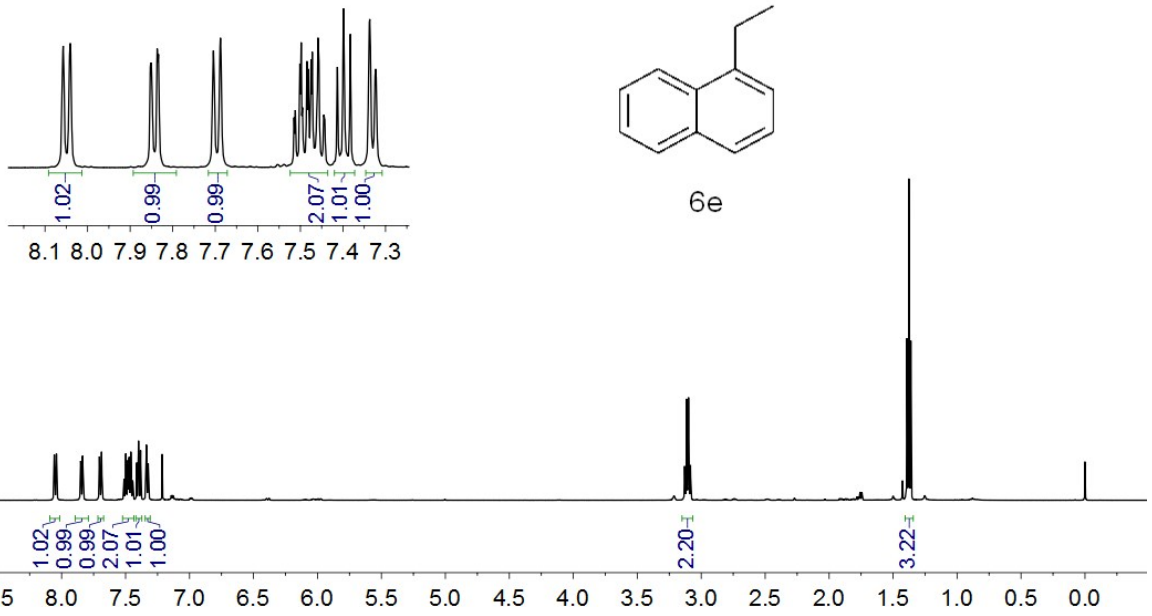
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6e
1.02
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1.01
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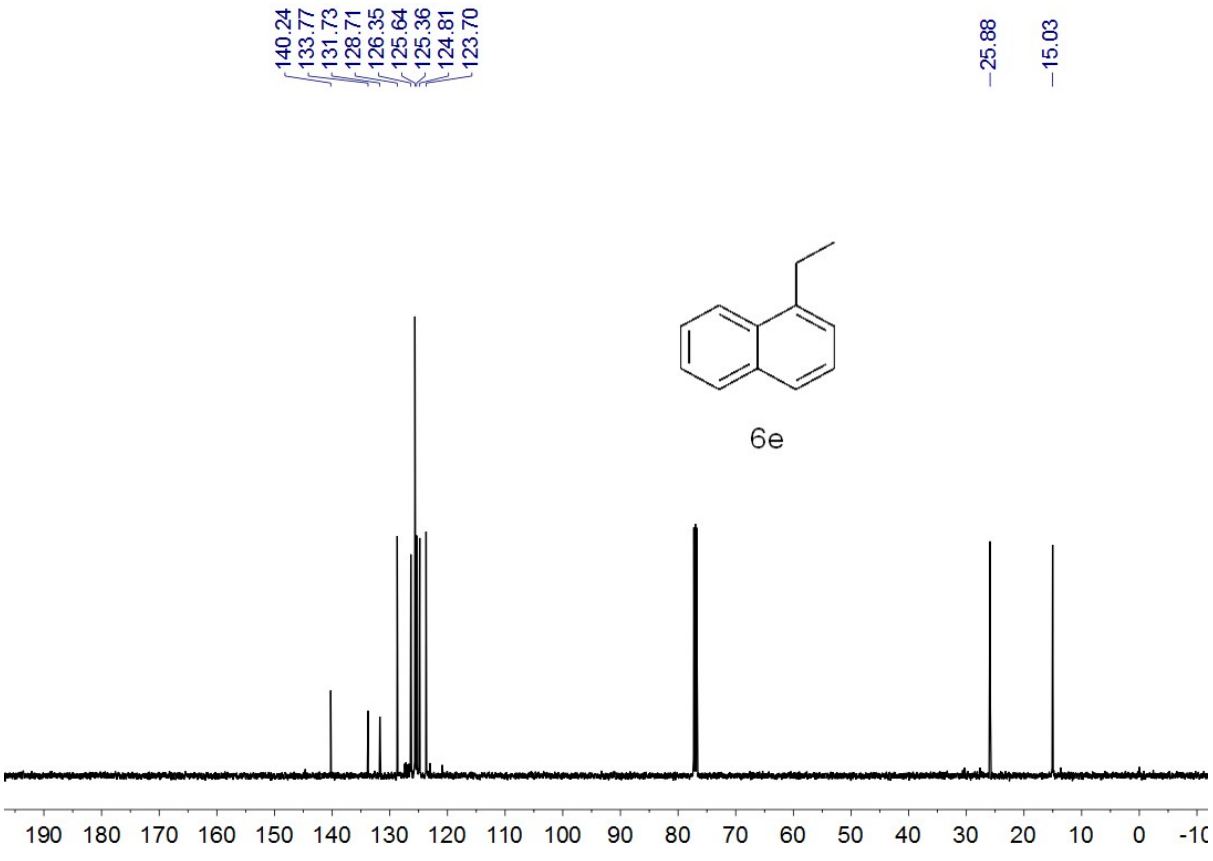
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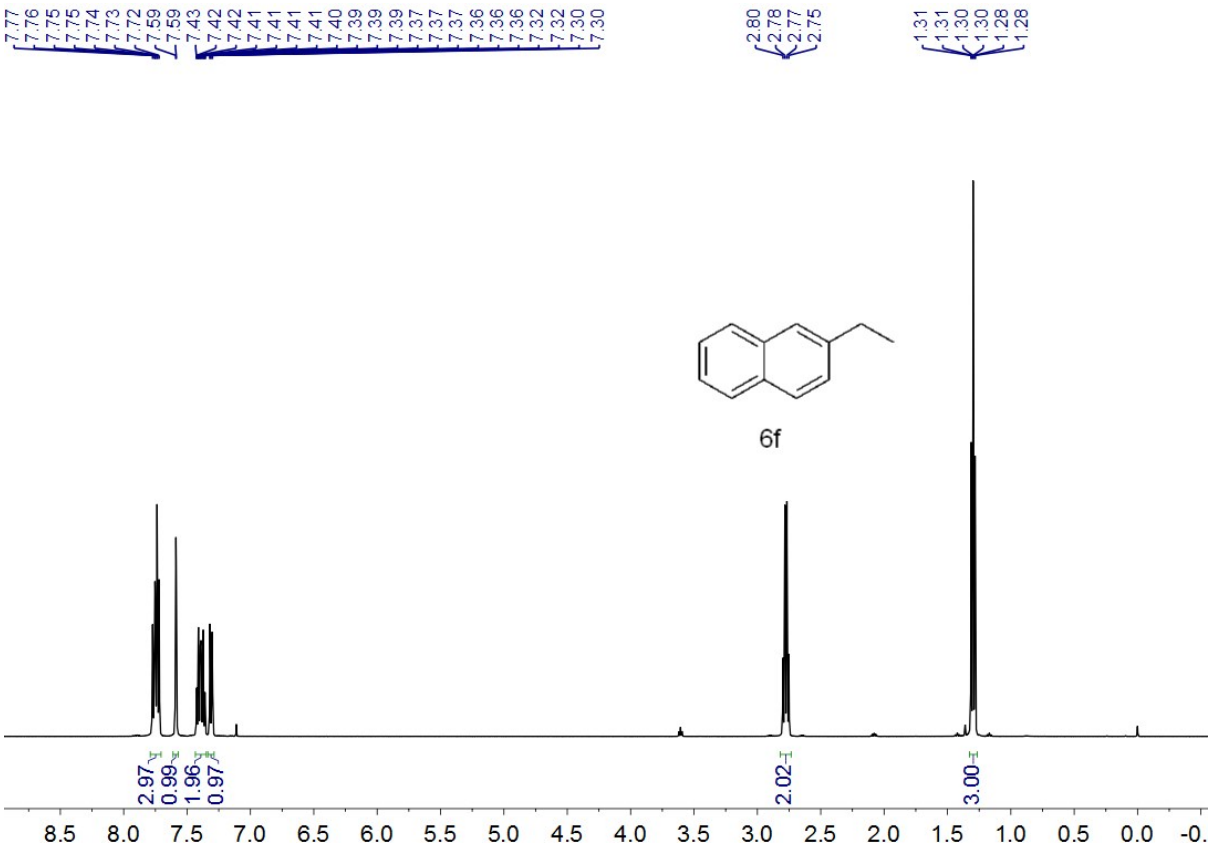
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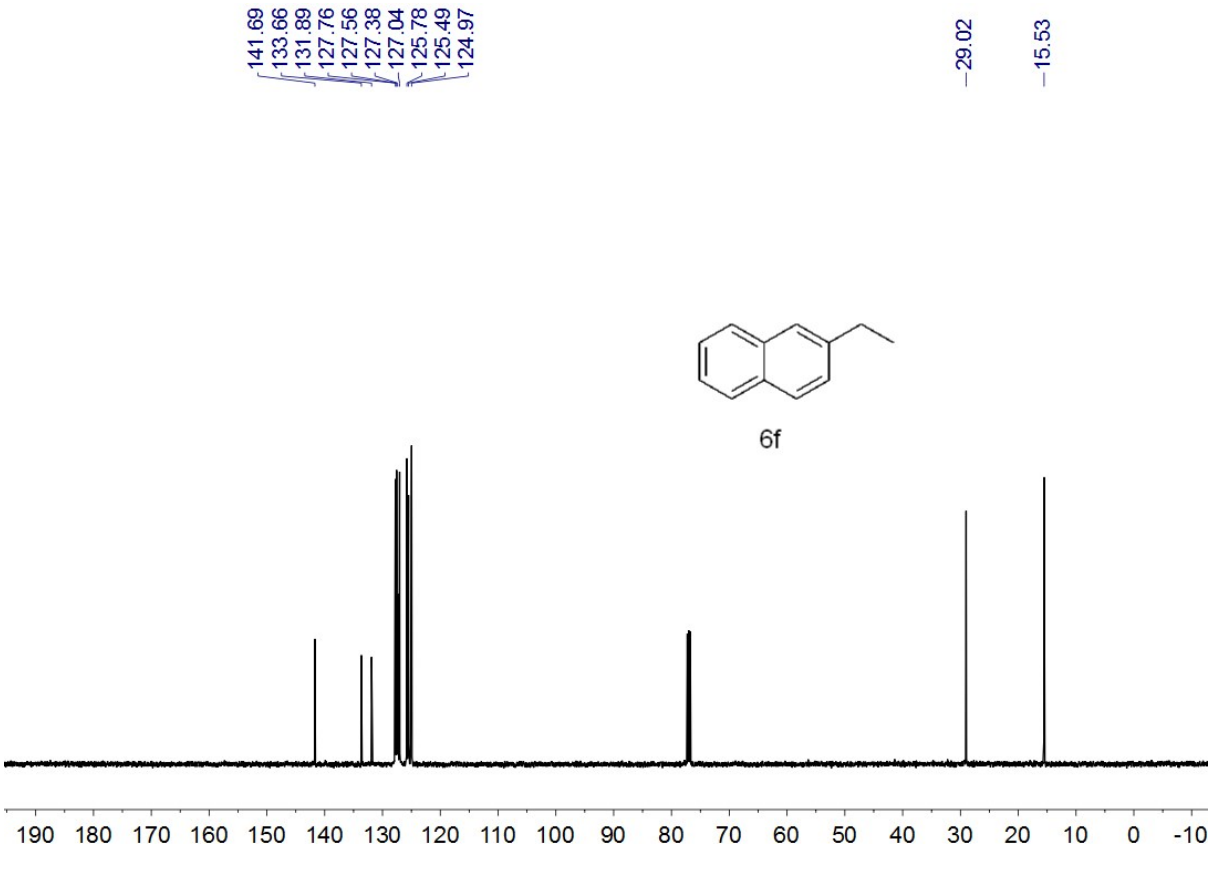
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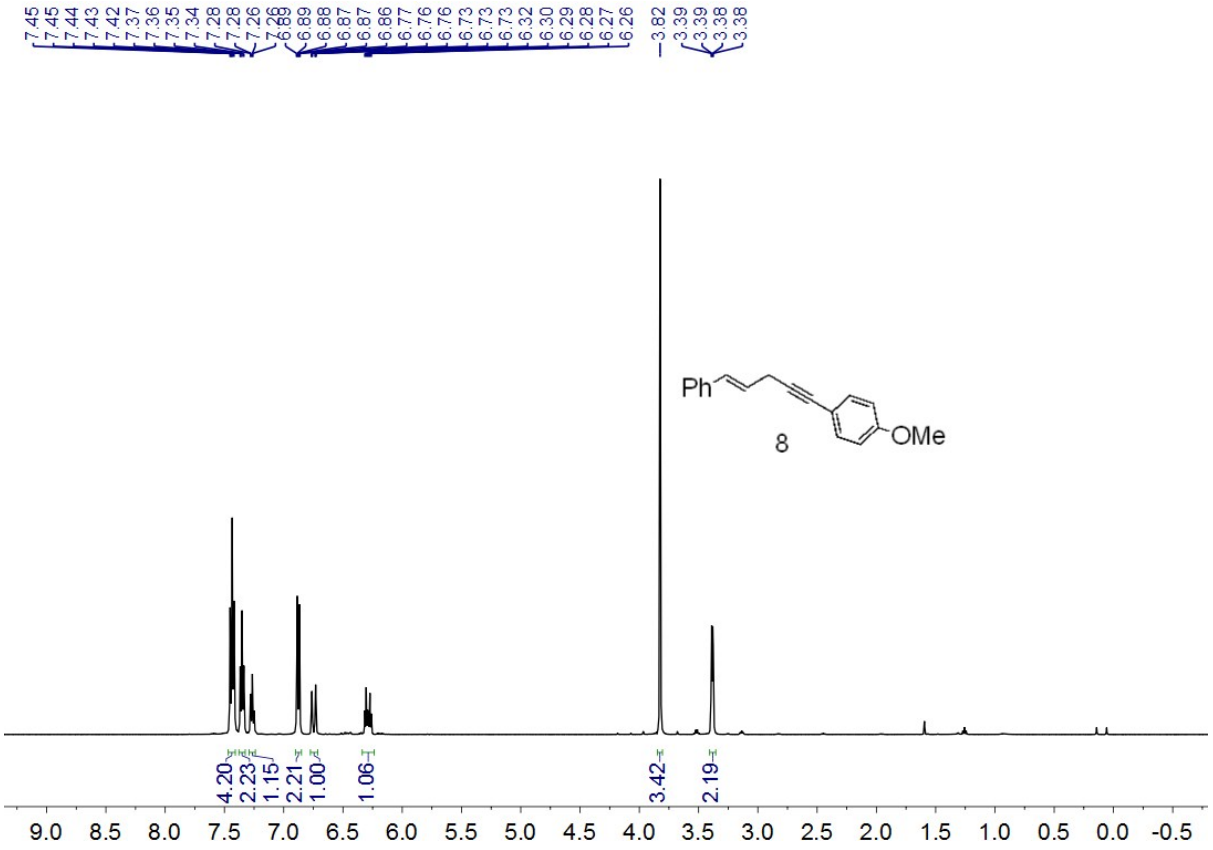
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Ph
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4.20
2.23
1.15
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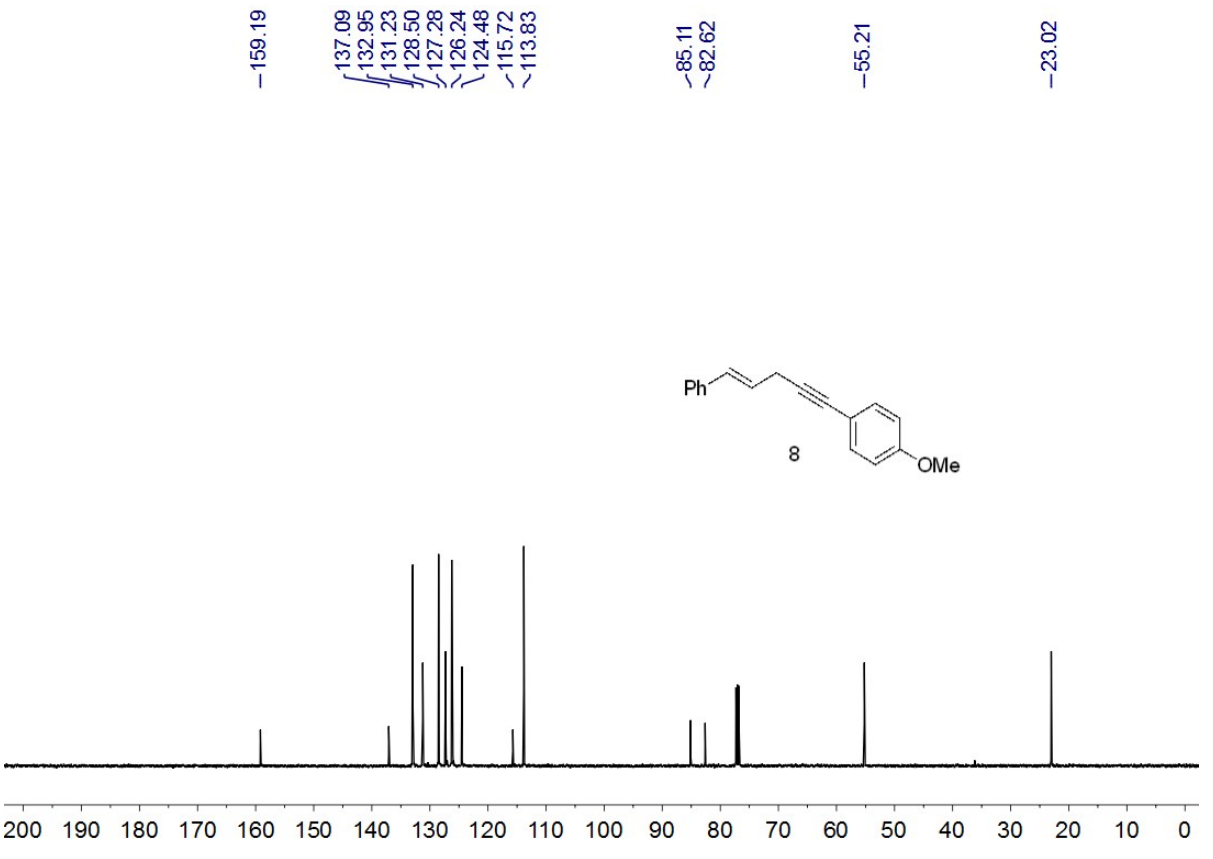
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5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200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0