Supporting information

Ni-catalyzed the efficient conversion of phenols protected with 2, 4, 6-trichloro-1, 3, 5- triazine (TCT) to olefins

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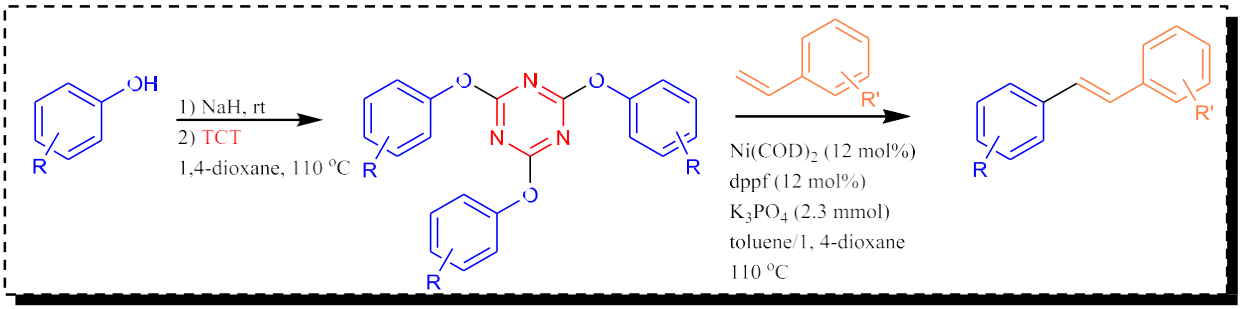
General Information:

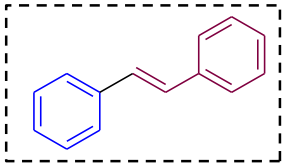
Solvents, reagents and chemicals were obtained from Merck, Acros, and Sigma-Aldrich chemical companies. Purification of the products by chromatography technique on silica gel 60 Merck (230–240 mesh) were conducted using gradient of n-hexane/ethyl acetate. All of the products were characterized by ^{1}H NMR and ^{13}C NMR spectra which were recorded on Brucker Avance DPX 250 and 400 MHz spectrometer using tetramethylsilane (TMS) as an internal standard in pure $CDCl_3$. Data are reported as follows: chemical shifts (δ) in ppm, multipilicity (s = singlet, br = broad signal, d = doublet, t = triplet, q = quartet, quint = quintet, m = multiplet). Elemental analysis was determined using ThermoFinnigan Flash EA 1112 Series.

Experimental Section:

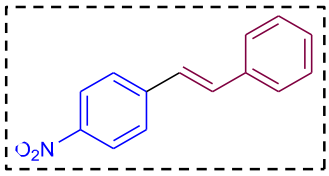
In a flask, NaH (0.6 mmol) was added to a stirring mixture of phenol (1.0 mmol) in dry 1,4-dioxane (1.5 mL) at room temperature and stirred for 1h.Then, TCT (0.37 mmol) was added and the mixture was stirred for 10h at 100 °C which delivered TAT in good yield. Then, the reaction was cooled down to room temperature and K_3PO_4 (2.3 mmol), $Ni(COD)_2$ (12 mol%),and dppf (12 mol%) were weighed and added in a glove box. Then, the olefin derivative (1.2 mmol) and 1,4-dioxane/toluene (1: 2, 3.0 mL) was added under nitrogen. The reaction was heated at 110 °C overnight. Then, the mixture was cooled down to room temperature and TLC was taken. The mixture was filtered and the solvent was evaporated to give the crude mixture. The pure product was isolated using column chromatography on silica gel using *n*-hexane/ETOAc as eluent.



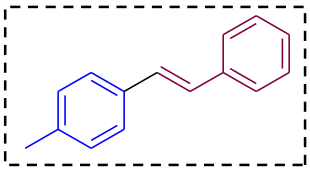
Product Characterization Data



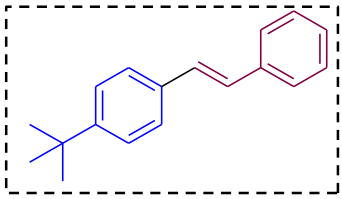
(3aa')[1]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.67-7.63 (m, 4H), 7.52-7.46 (m, 4H), 7.42-7.39 (m, 2H), 7.24 (s, 2H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 137.3, 128.7, 127.6, 126.5. Anal. Calcd for $C_{14}H_{12}$ (180.24): C, 93.29; H, 6.71. Found: C, 93.36; H, 6.64.



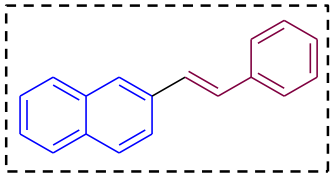
(3ba')[2]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 8.13 (d, *J* = 8.8 Hz, 2H), 7.54 (d, *J* = 8.8 Hz, 2H), 7.46 (d, *J* = 7.8 Hz, 2H), 7.35-7.25 (m, 3H), 7.19 (d, *J* = 16.3 Hz, 1H), 7.05 (d, *J* = 16.3 Hz, 1H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 147.4, 143.8, 136.4, 133.1, 128.8, 128.0, 127.1, 126.8, 125.9, 124.5. Anal. Calcd for $C_{14}H_{11}NO_2$ (225.25): C, 74.65; H, 4.92; N, 6.22. Found: C, 74.60; H, 4.87; N, 6.22.



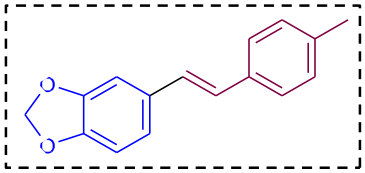
(3ca')[3]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.56 (d, *J* = 8.0 Hz, 2H), 7.49-7.38 (m, 5H), 7.08 (d, *J* = 7.8 Hz, 2H), 7.02-6.90 (m, 2H), 2.42 (s, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 137.6, 134.7, 129.4, 128.7, 128.6, 127.7, 127.4, 126.4, 126.4, 21.3. Anal. Calcd for $C_{15}H_{14}$ (194.11): C, 92.74; H, 7.26. Found: C, 92.65; H, 7.35.



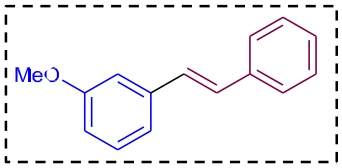
(3da')[4]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.42 (d, *J* = 7.9 Hz, 2H), 7.33 (d, *J* = 7.9 Hz, 2H), 7.27 (t, *J* = 7.5 Hz, 2H), 7.19-7.14 (m, 1H), 7.08 (m, 2H) 1. 42 (s, 9H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 151.3, 138.2, 134.8, 128.7, 128.4, 128.1, 127.5, 126.7, 125.5, 34.5, 31.1. Anal. Calcd for $C_{18}H_{20}$ (236.35): C, 91.47; H, 8.53. Found C, 91.55; H, 8.45.



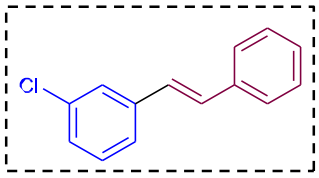
(3ea')[5]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 8.39-8.13 (m, 4H), 7.82 (d, *J* = 8.3 Hz, 1H), 7.67-7.64 (m, 2H), 7.55-7.35 (m, 7H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 137.3, 135.2, 133.7, 133.1, 129.3, 128.7, 128.5, 128.2, 127.5, 126.8, 126.5, 126.3, 125.3, 123.2. Anal. Calcd for $C_{18}H_{14}$ (230.31): C, 93.87; H, 6.13. Found C, 93.79; H, 6.21.



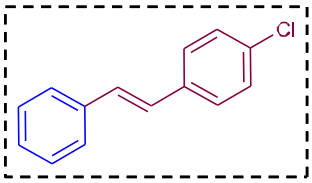
(3fb')[6]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.50 (d, *J* = 7.8 Hz, 2H), 7.25 (d, *J* = 7.8 Hz, 2H), 7.05 (d, *J* = 16.2 Hz, 1H), 6.96 (d, *J* = 16.2 Hz, 1H), 6.84-6.71 (m, 3H), 5.97 (s, 2H), 2.41 (s, 3H).; ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 148.0, 147.1, 137.4, 134.5, 132.8, 129.9, 127.7, 127.4, 126.2, 121.9, 108.7, 104.9, 101.5, 21.8. Anal. Calcd for $C_{16}H_{14}O_2$ (238.29): C, 80.65; H, 5.92. Found C, 80.70; H, 5.90.



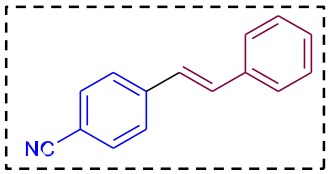
(3ga')[2]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.51 (d, *J* = 7.1 Hz, 2H), 7.39-7.25 (m, 4H), 7.13-7.05 (m, 4H), 6.84-6.80 (m, 1H), 3.81 (s, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm) 159.8, 138.9, 137.3, 129.5, 129.0, 128.7, 128.5, 127.6, 126.7, 119.2, 113.4, 111.6, 55.3; Anal. Calcd for $C_{15}H_{14}O$ (210.10): C, 85.68; H, 7.19. Found: C, 85.73; H, 7.08.



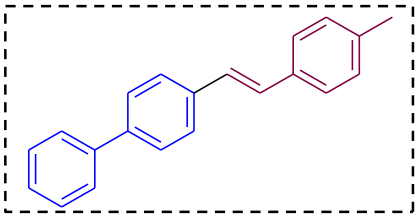
(3ha')[7]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.55-7.52 (m, 3H), 7.41-7.37 (m, 3H), 7.29 (t, *J* = Hz, 2H), 7.22 (d, *J* = Hz, 1H), 7.12 (d, *J* = 15.9 Hz, 1H), 7.03 (d, *J* = 15.9 Hz, 1H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 139.7, 136.5, 134.3, 130.2, 129.6, 128.5, 128.0, 127.3, 127.0, 126.7, 126.0, 124.3. Anal. Calcd for $C_{14}H_{11}Cl$ (194.28): C, 78.32; H, 5.16. Found: C, 78.35; H, 5.10.



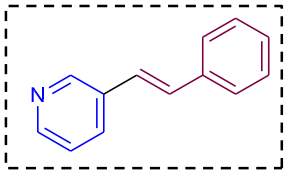
(3ac')[8]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.49 (d, *J* = 7.2 Hz, 2H), 7.41 (d, *J* = 8.1 Hz, 2H), 7.39 (d, *J* = 7.2 Hz, 2H), 7.32-7.26 (m, 3H), 7.23-7.19 (m, 2H); ^{13}C NMR (62.9 MHz, CDCl3) δ (ppm): 137.3, 135.4, 133.8, 130.1, 128.8, 128.2, 127.8, 127.4, 127.2, 126.7. Calcd for $C_{14}H_{11}Cl$ (214.69): C, 78.32; H, 5.16. Found: C, 78.39; H, 5.20.



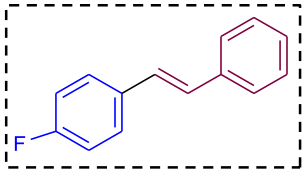
(3ia')[7]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.76 (d, *J* = 8.0 Hz, 2H), 7.71 (d, *J* = 8.0 Hz, 2H), 7.66 (d, *J* = 7.4 Hz, 2H), 7.53-7.46 (m, 3H), 7.30 (d, *J* =15.5 Hz, 1H), 7.22 (d, J = 15.5 Hz, 1H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 140.8, 136.5, 132.7, 132.6, 128.7, 128.1, 126.7, 126.6, 126.4, 118.3, 110.5. Anal. Calcd for $C_{15}H_{11}N$ (205.31): C, 87.77; H, 5.40; N, 6.83. Found C, 87.87; H, 5.27; N, 6.86.



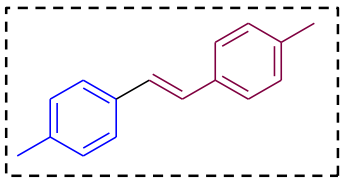
(3jb')[9]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.73-7.68 (m, 6H), 7.58-7.55 (m, 4H), 7.40 (t, *J* = 7.9 Hz, 1H), 7.23 (d, *J* = 8.1 Hz, 2H), 7.13 (d, *J* = 16.1 Hz, 1H), 7.07 (d, *J* = 16.1 Hz, 1H), 2.35 (s, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 141.3, 140.4, 137.6, 136.5, 134.2, 128.9, 128.7, 128.1, 127.7, 127.6, 127.2, 126.6, 126.4, 126.1, 21.4. Anal. Calcd for $C_{21}H_{18}$ (270.38): C, 93.29; H, 6.71. Found C, 93.19; H, 6.81.



(3ka')[10]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 8.80 (s, 1H), 8.47-8.45 (m, 1H), 7.80 (d, *J* = 8.5 Hz, 1H), 7.68 (d, *J* = 7.7 Hz, 2H), 7.38-7.33 (m, 2H), 7.29-7.26 (m, 2H), 7.23-7.08 (m, 2H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 148.4, 136.6, 133.0, 132.2, 130.1, 129.0, 128.0, 126.5, 125.0, 123.5. Anal. Calcd for $C_{13}H_{11}N$ (181.24): C, 86.15; H, 6.12; N, 7.73. Found: C, 86.05; H, 6.19; N, 7.76.

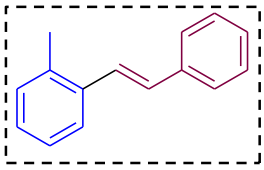


(3la')[11]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.75-7.70 (m, 4H), 7.62 (t, *J* = 7.7 Hz, 2H), 7.56-7.52 (m, 1H), 7.48-7.43 (m, 4H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 162.7 (d, *J* = 247.6 Hz), 137.2, 133.6, 128.7, 128.4, 127.9 (d, *J* = 8.1 Hz), 127.7, 127.5, 126.4, 115.6 (d, *J* = 21.8 Hz). Anal. Calcd for $C_{14}H_{11}F$ (198.24): C, 84.82; H, 5.59. Found: C, 84.82; H, 5.70.

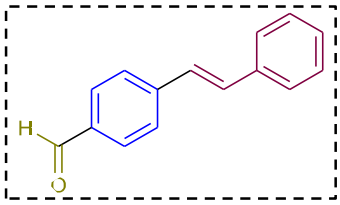


(3cb')[12]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.38 (d, *J* = 7.9 Hz, 2H), 7.18 (d, *J* = 7.9 Hz, 2H), 7.00 (s, 2H), 2.38 (s, 6H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 137.9, 135.3,

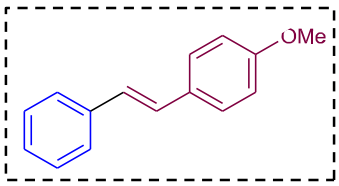
130.5, 128.2, 126.8, 21.7. Anal. Calcd for $C_{16}H_{16}$ (205.31): C, 92.26; H, 7.74. Found C, 92.19; H, 7.81.



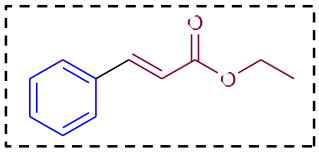
(3ja')[2]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.61 (d, *J* = 8.2 Hz, 1H), 7.55-7.49 (m, 2H), 7.37-7.32 (m, 3H), 7.25-7.16 (m, 4H), 7.12 (d, *J* = 16.4 Hz, 1H), 2.26 (s, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 138.0, 136.5, 136.0, 130.2, 129.8, 129.1, 128.4, 127.2, 127.1, 126.7, 126.6, 125.7, 20.5. Anal. Calcd for $C_{15}H_{14}$ (194.28): C, 92.74; H, 7.26. Found: C, 92.84; H, 7.16.



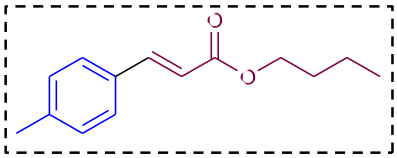
(3ka')[13]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 10.05 (s, 1H), 7.86 (d, *J* = 8.0 Hz, 2H), 7.62 (d, *J* = 8.0 Hz, 2H), 5.54 (d, *J* = 7.5 Hz, 2H), 7.35-7.28 (m, 3H), 7.25-7.19 (m, 2H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 191.4, 143.7, 136.8, 135.4, 132.3, 130.0, 129.1, 128.9, 127.7, 126.9. Anal. Calcd for $C_{15}H_{12}O$ (208.26): C, 86.51; H, 5.81. Found: C, 86.59; H, 5.85.



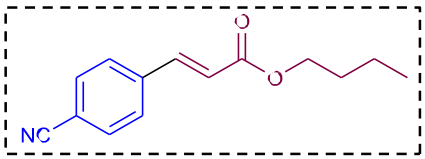
(3ag')[14]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.53-7.68 (m, 4H), 7.38 (t, *J* = 7.8 Hz, 2H), 7.28-7.24 (m, 1H), 7.10 (d, *J* = 16.1 Hz, 1H), 7.03 (d, *J* = 16.1 Hz, 1H), 6.94 (d, *J* = 8.7 Hz, 2H), 3.80 (s, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 159.3, 137.5, 130.5, 128.7, 128.1, 128.0, 127.6, 127.0, 126.7, 126.6, 126.1, 114.4, 55.3. Anal. Calcd for $C_{15}H_{14}O$ (210.27): C, 85.68; H, 6.71. Found: C, 85.76; H, 5.68.



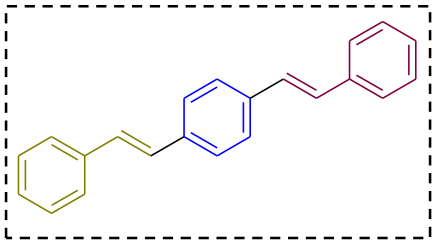
(3ah')[15]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.60 (d, *J* = 16.0 Hz, 1H), 7.45-7.41 (m, 2H), 7.30-7.27 (m, 3H), 6.36 (d, *J* = 16.0 Hz, 1H), 4.18 (q, *J* = 7.1 Hz, 2H), 1.25 (t, *J* = 7.1 Hz, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 166.9, 144.9, 134.4, 130.2, 128.8, 128.0, 118.2, 60.7, 14.4. Anal. Calcd for $C_{11}H_{12}O_2$ (176.21): C, 74.98; H, 6.86. Found: C, 74.89; H, 6.84.



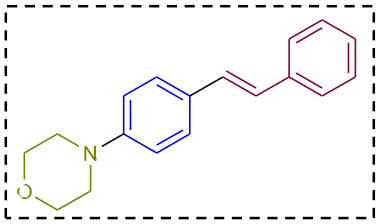
(3cj')[16]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.65 (d, *J* = 16.0 Hz, 1H), 7.41 (d, *J* = 8.0 Hz, 2H), 7.17 (d, *J* = 16.0 Hz, 2H), 6.39 (d, *J* = 16.0 Hz, 1H), 4.20 (t, *J* = 6.7 Hz, 2H), 2.36 (s, 3H), 1.74-1.62 (m, 2H), 1.50-1.36 (m, 2H), 0.96 (t, *J* = 7.0 Hz, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 167.1, 144.5, 140.4, 131.7, 129.5, 128.0, 117.3, 64.3, 30.9, 21.5, 19.3, 13.7. Anal. Calcd for $C_{14}H_{18}O_2$ (218.29): C, 77.03; H, 8.31. Found: C, 77.11; H, 8.35.



(3ij')[13]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.69-7.60 (m, 5H), 6.53 (d, *J* = 16.0 Hz, 1H), 4.23 (t, *J* = 6.5 Hz), 1.75-1.64 (m, 2H), 1.53-1.36 (m, 2H), 0.97 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 166.2, 142.3, 138.8, 132.5, 128.3, 121.8, 118.6, 113.2, 64.9, 30.6, 19.4, 13.6. Anal. Calcd for $C_{14}H_{15}NO_2$ (229.27): C, 73.34; H, 6.59; N, 6.11. Found: C, 73.30; H, 6.65; N, 6.03.

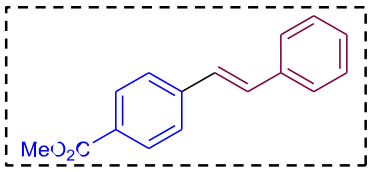


(5a')[17]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.51-7.47 (m, 8H), 7.34 (t, *J* = 7.8 Hz, 4H), 7.25-7.22 (m, 2H), 7.11-7.07 (m, 4H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 137.7, 136.7, 128.7, 128.2, 127.4, 126.9, 126.4. Anal. Calcd for $C_{22}H_{18}$ (282.39): C, 93.57; H, 6.43. Found: C, 93.46; H, 6.54.



(7a')[18]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 7.64 (d, *J* = 7.8 Hz, 2H), 7.56-7.45 (m, 4H), 7.37-7.21 (m, 3 H), 7.16-7.02 (m, 2H), 3.81 (t, *J* = 4.9 Hz, 4H), 3.13 (t, *J* = 4.9 Hz, 4H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 151.0, 138.0, 129.8, 128.7, 128.5, 127.9, 127.4,

126.8, 126.5, 115.6, 67.1, 48.7. Anal. Calcd for $C_{18}H_{19}NO$ (265.36): C, 81.47; H, 7.22; N, 5.28. Found: C, 81.53; H, 7.18; N, 5.26.



(8a')[19]: ^{1}H NMR (250 MHz, $CDCl_3$) δ (ppm): 8.02 (d, *J* = 8.3 Hz, 2H), 7.63-7.54 (m, 4H), 7.46-7.31 (m, 3H), 7.12 (d, *J* = 16.4 Hz, 1H), 7.03 (d, *J* = 16.4 Hz, 1H), 3.90 (s, 3H); ^{13}C NMR (62.9 MHz, $CDCl_3$) δ (ppm): 166.3, 141.8, 137.3, 131.5, 130.6, 129.7, 128.8, 128.1, 127.8, 127.0, 126.5, 52.5. Anal. Calcd for $C_{16}H_{14}O_2$ (238.29): C, 80.65; H, 5.92. Found: C, 80.65; H, 6.01.

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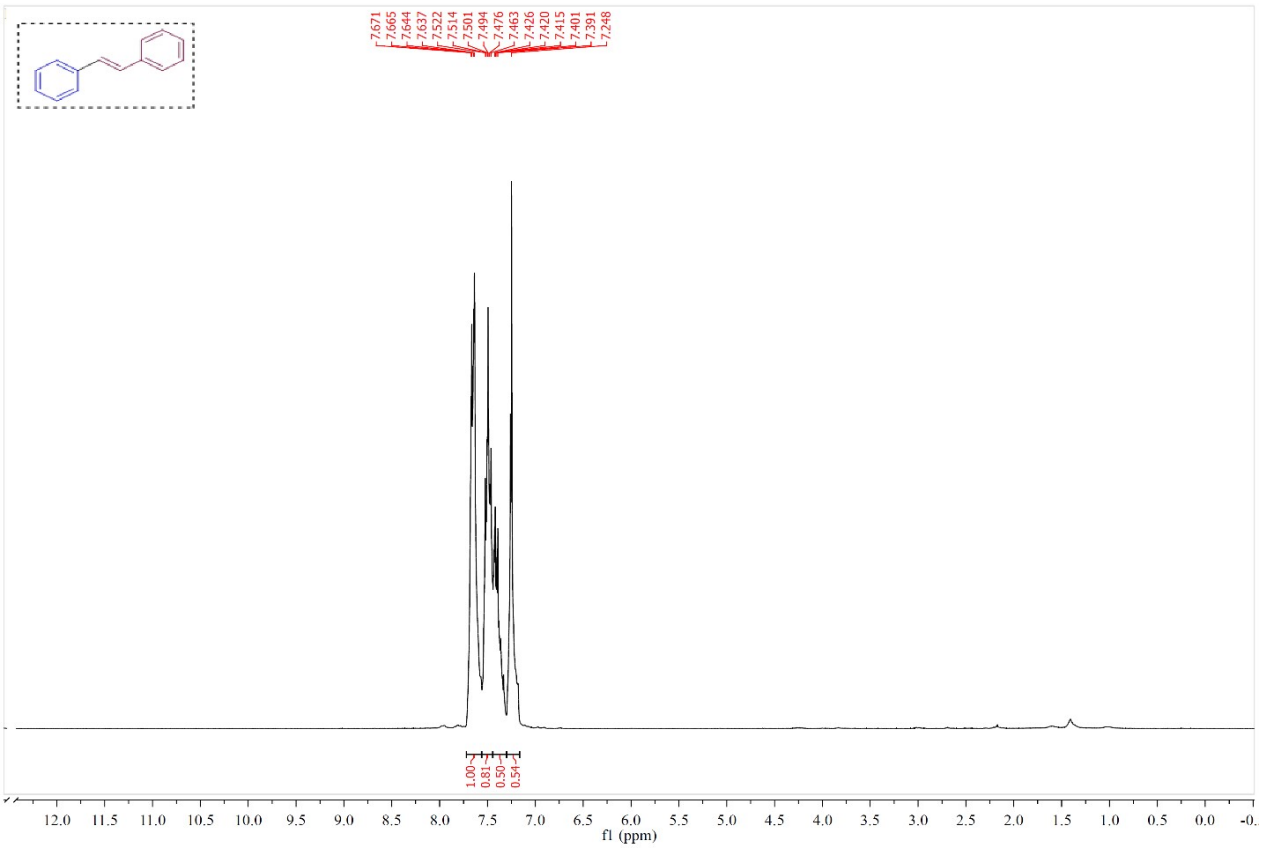
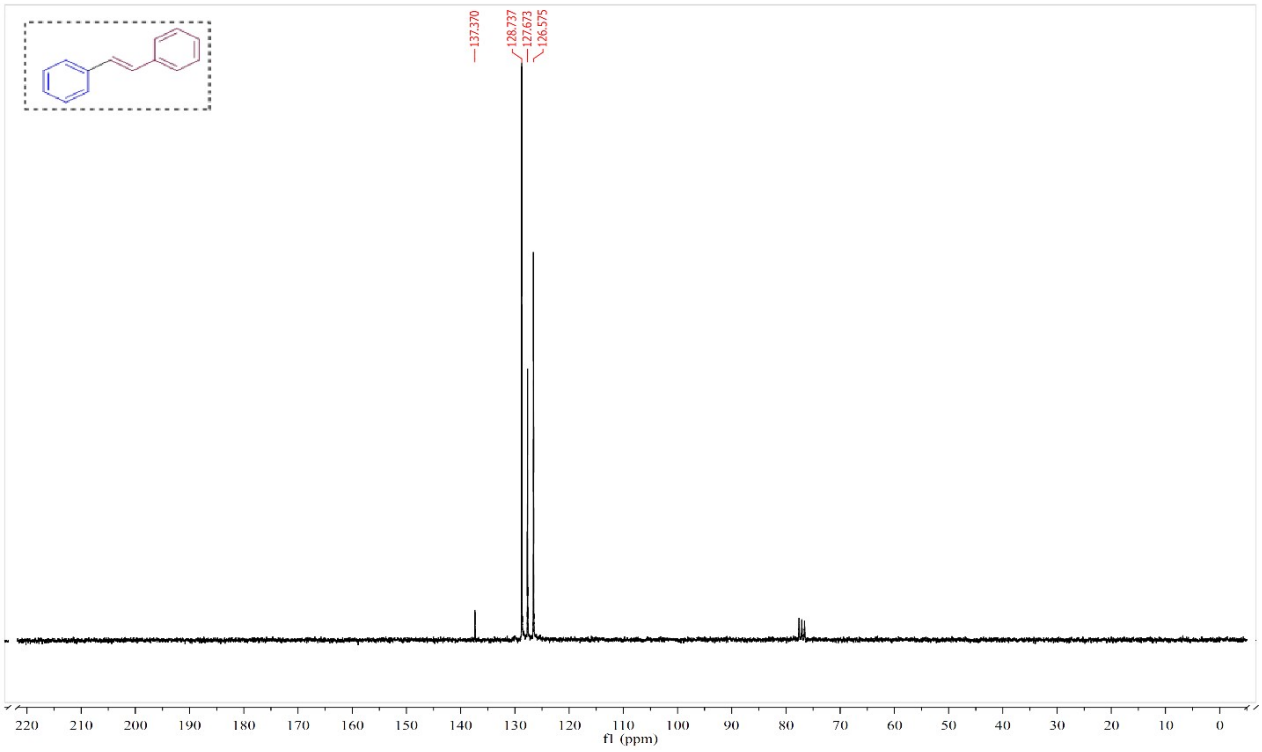
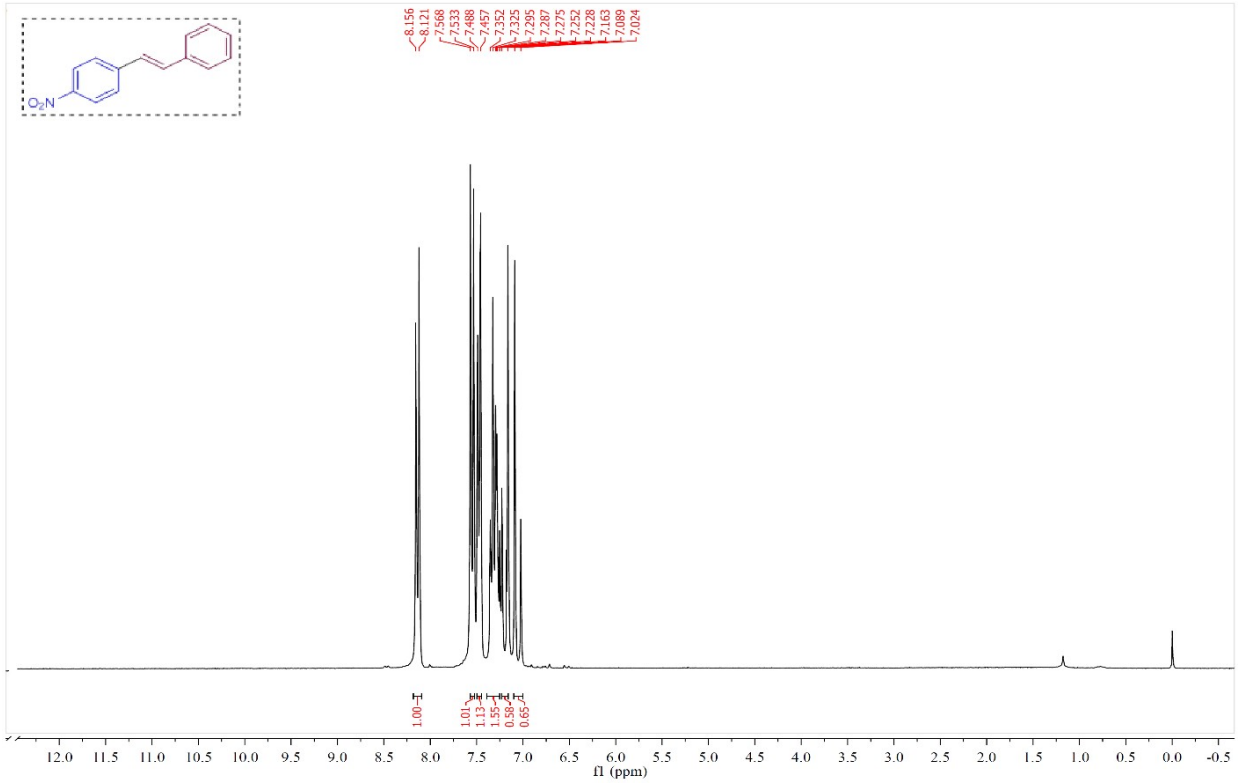
Copy of NMR Spectra of Olefines



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7.287
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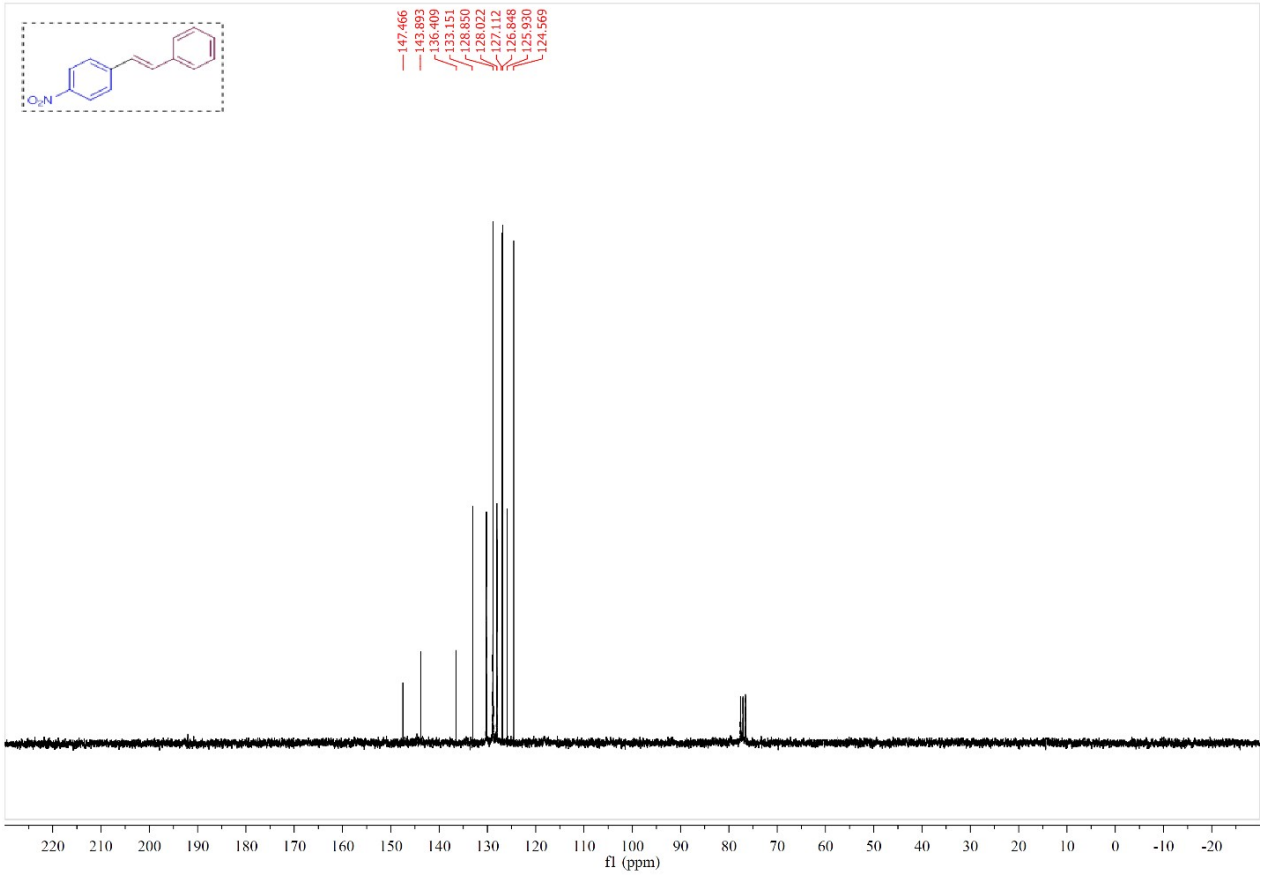
7.228
7.163
7.089
7.024
1.00
1.01
1.13
1.55
0.58
0.65
f1 (ppm)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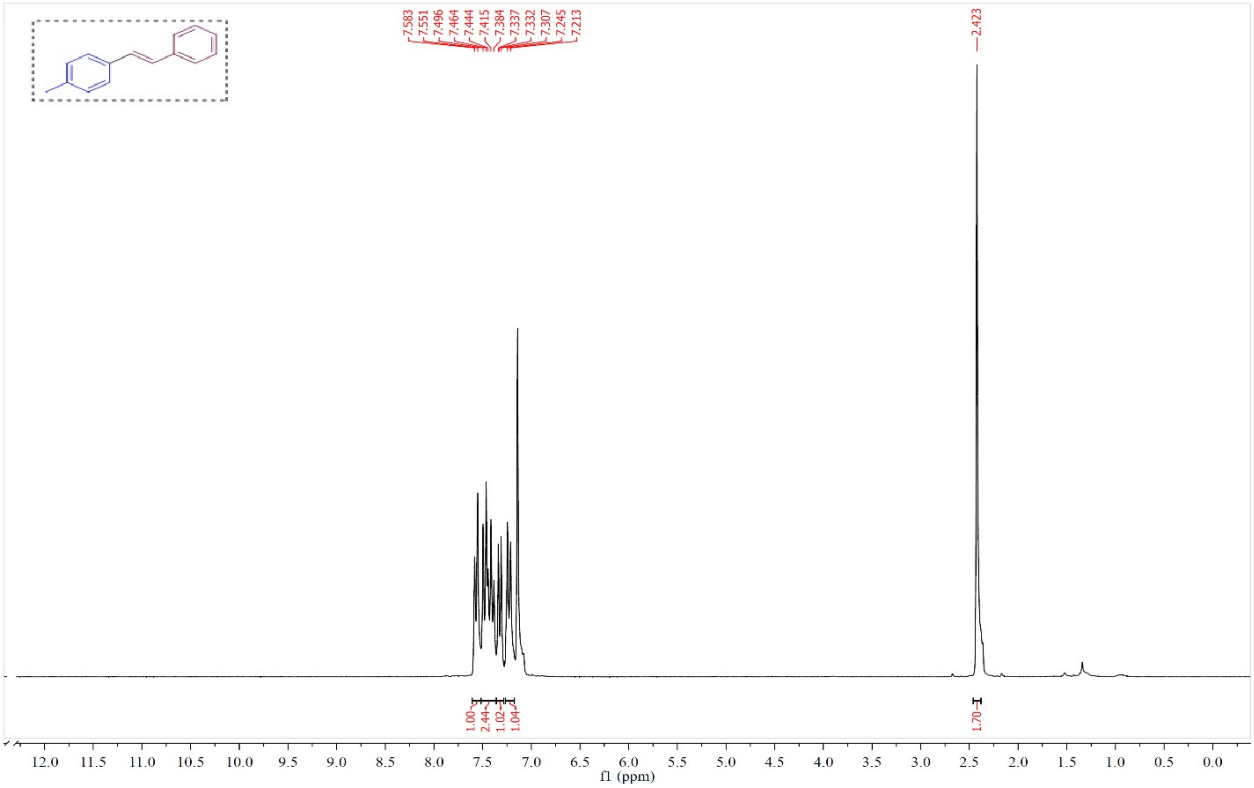
f1 (ppm)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1.02
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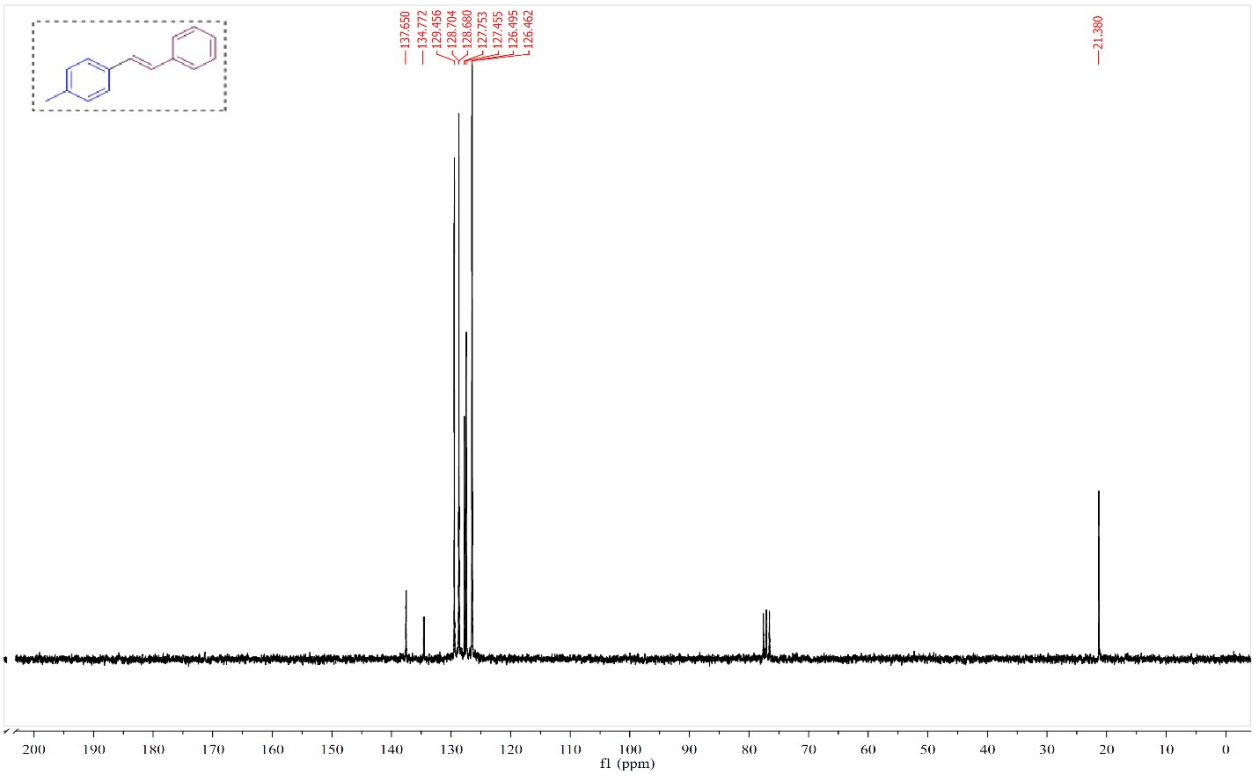
1.70
f1 (ppm)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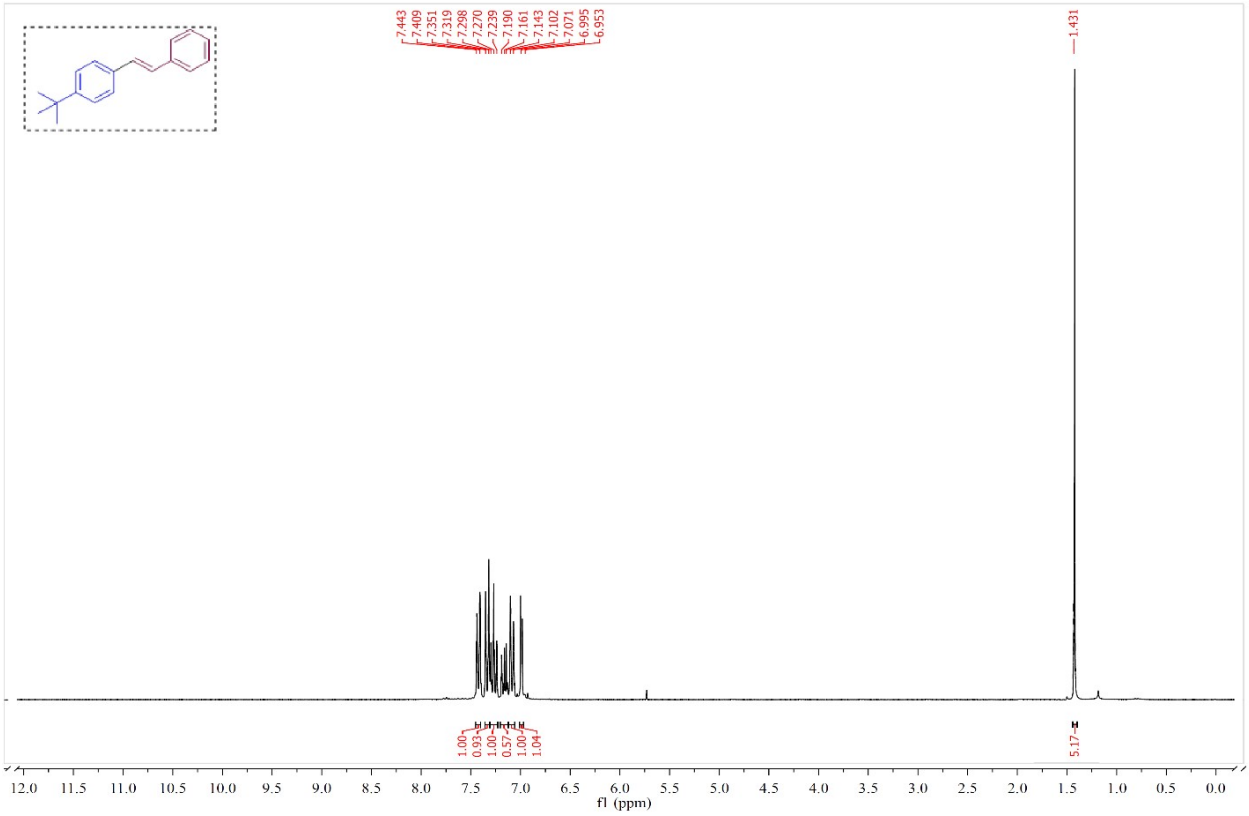
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7.190
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7.143
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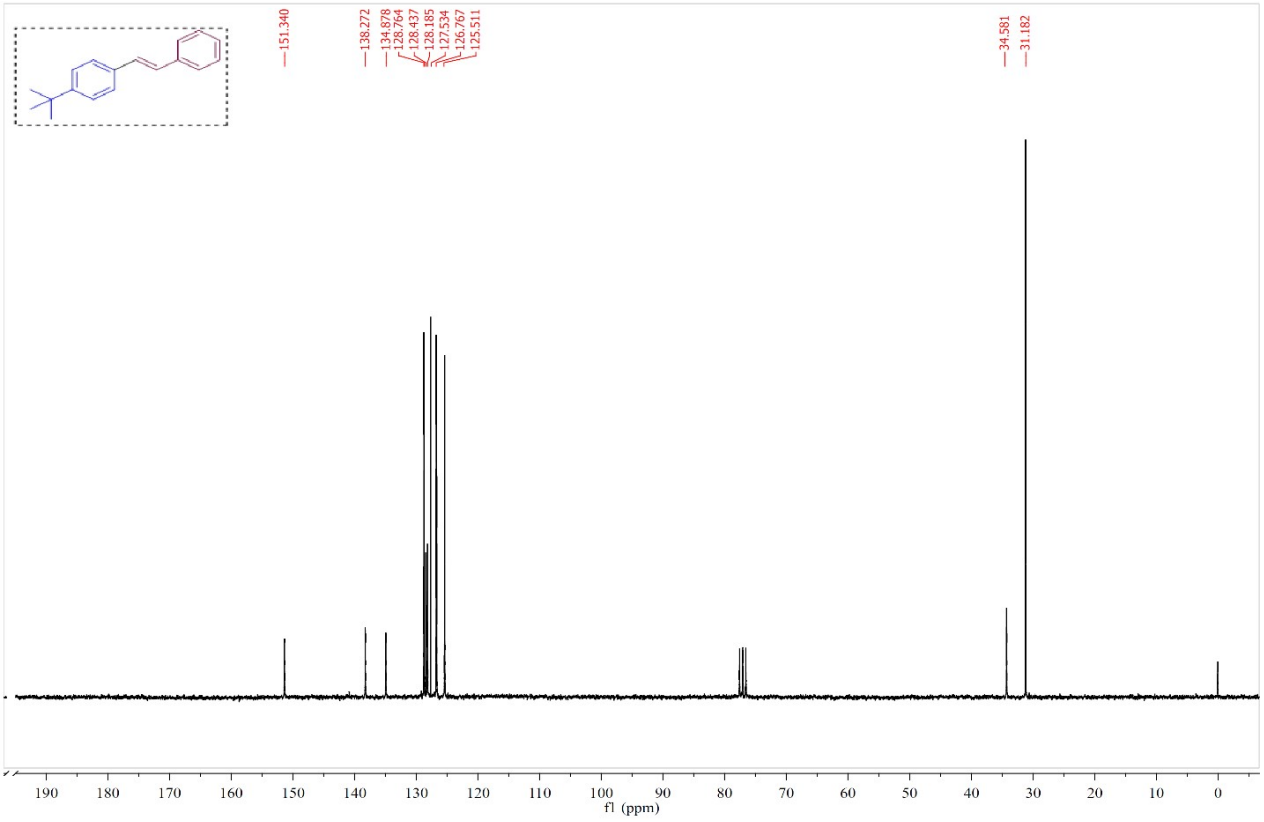
7.071
6.995
6.953
1.431
1.00
0.93
1.00
0.57
1.00
1.04
5.17
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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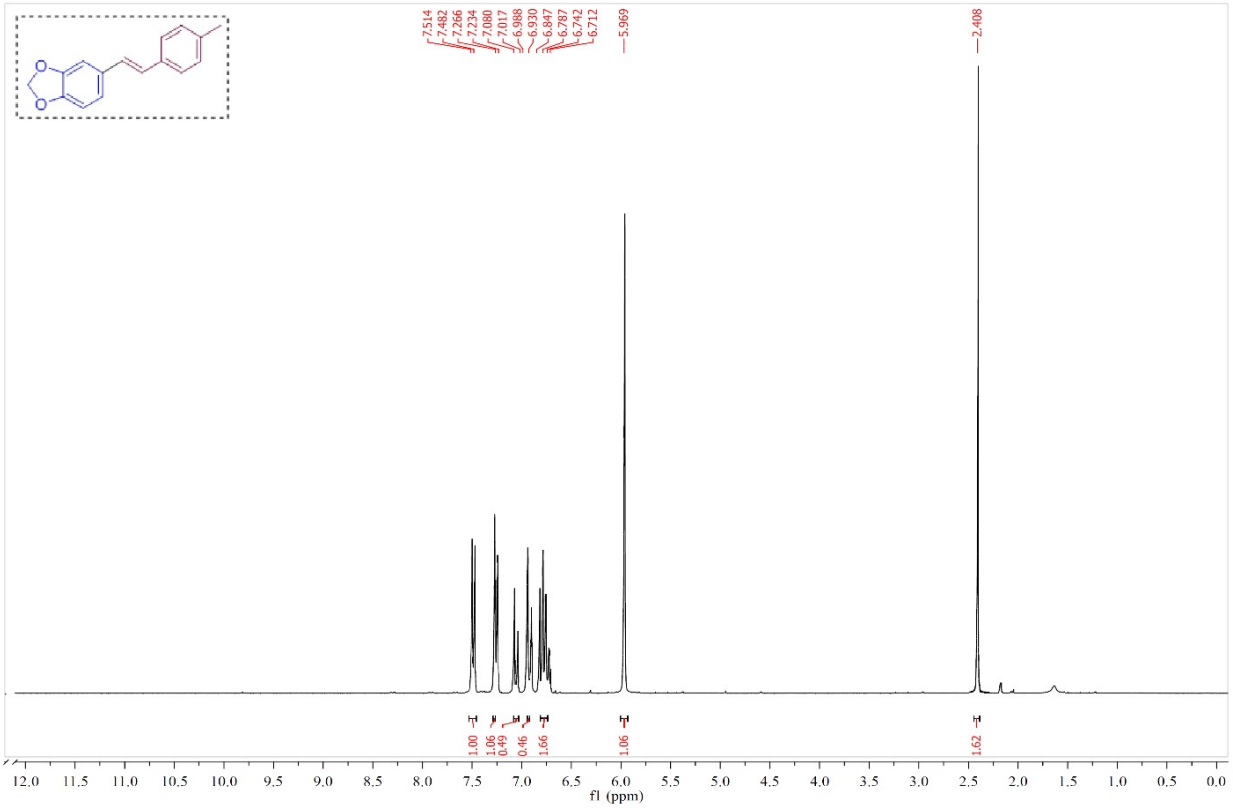
f1 (ppm)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6.988
6.930
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6.787
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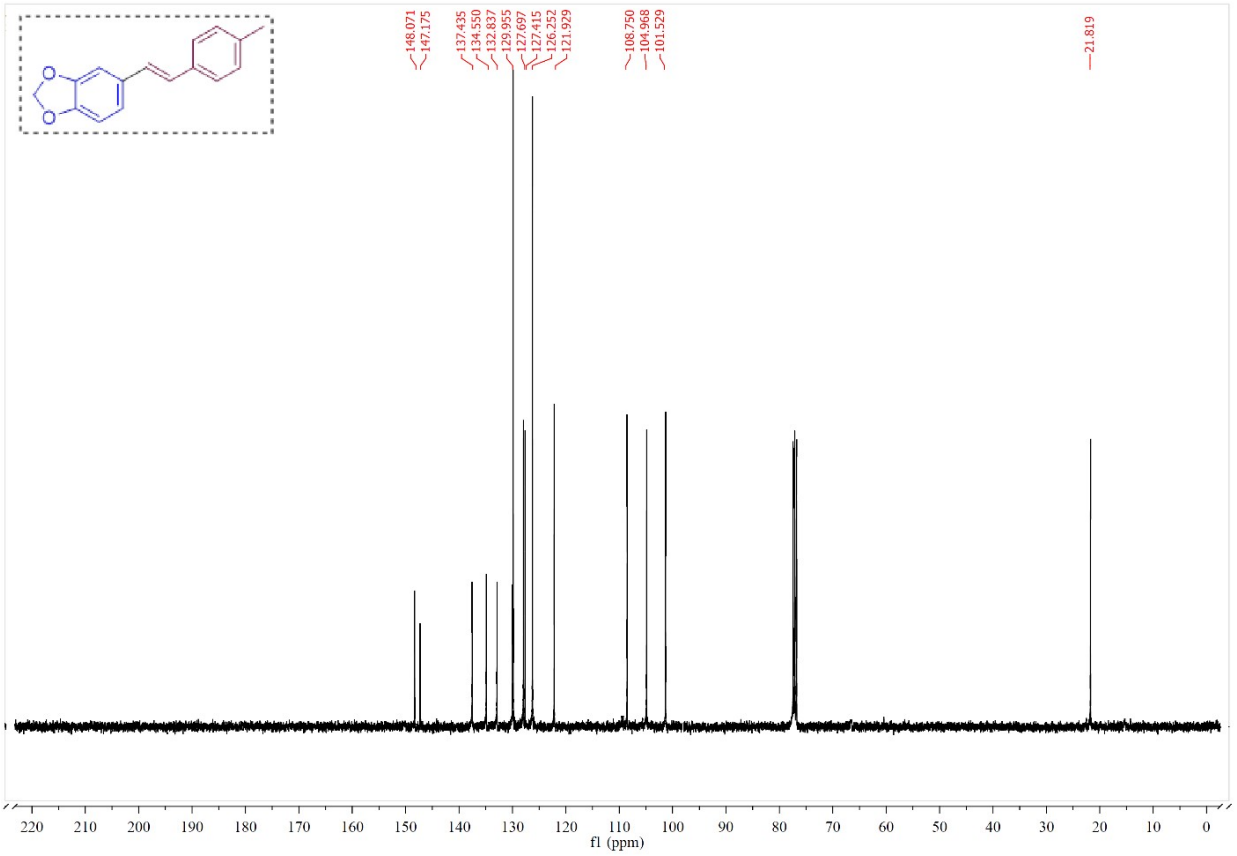
0.49
0.46
1.66
1.06
1.62
fl (ppm)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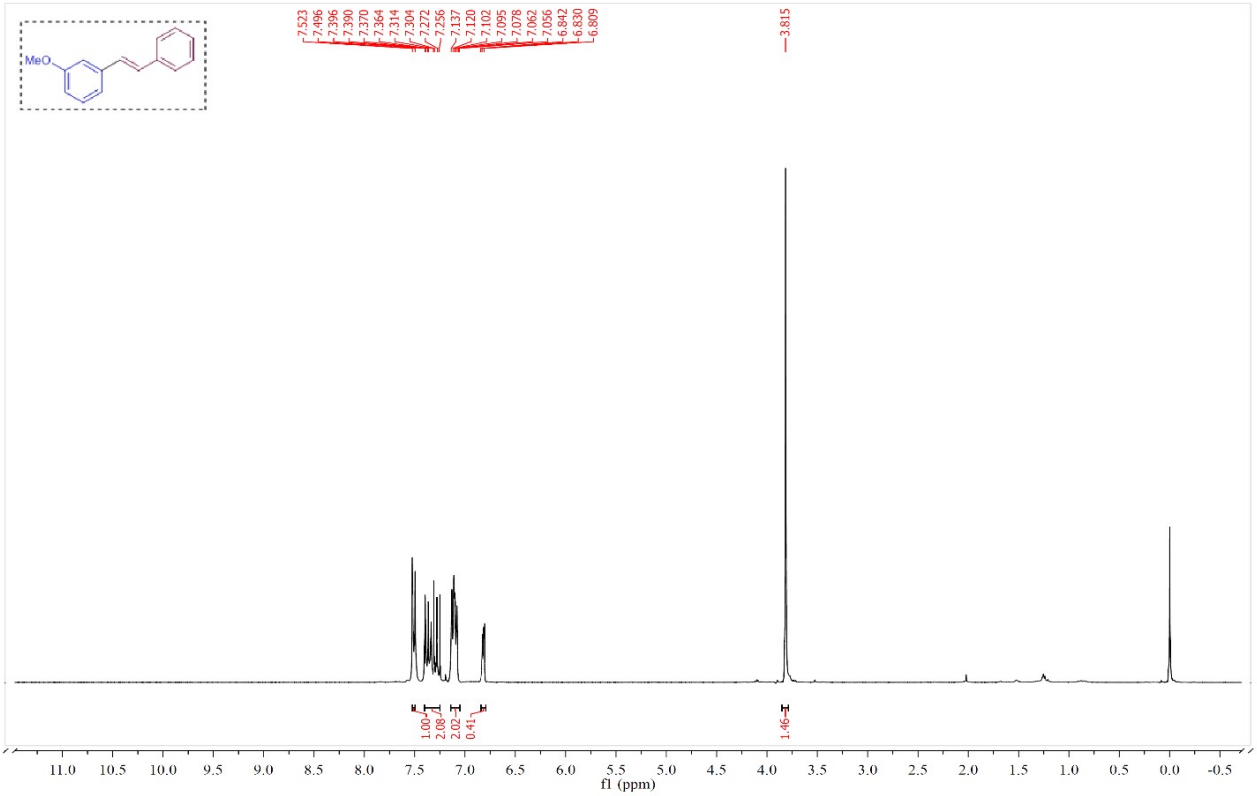
fl (ppm)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7.272
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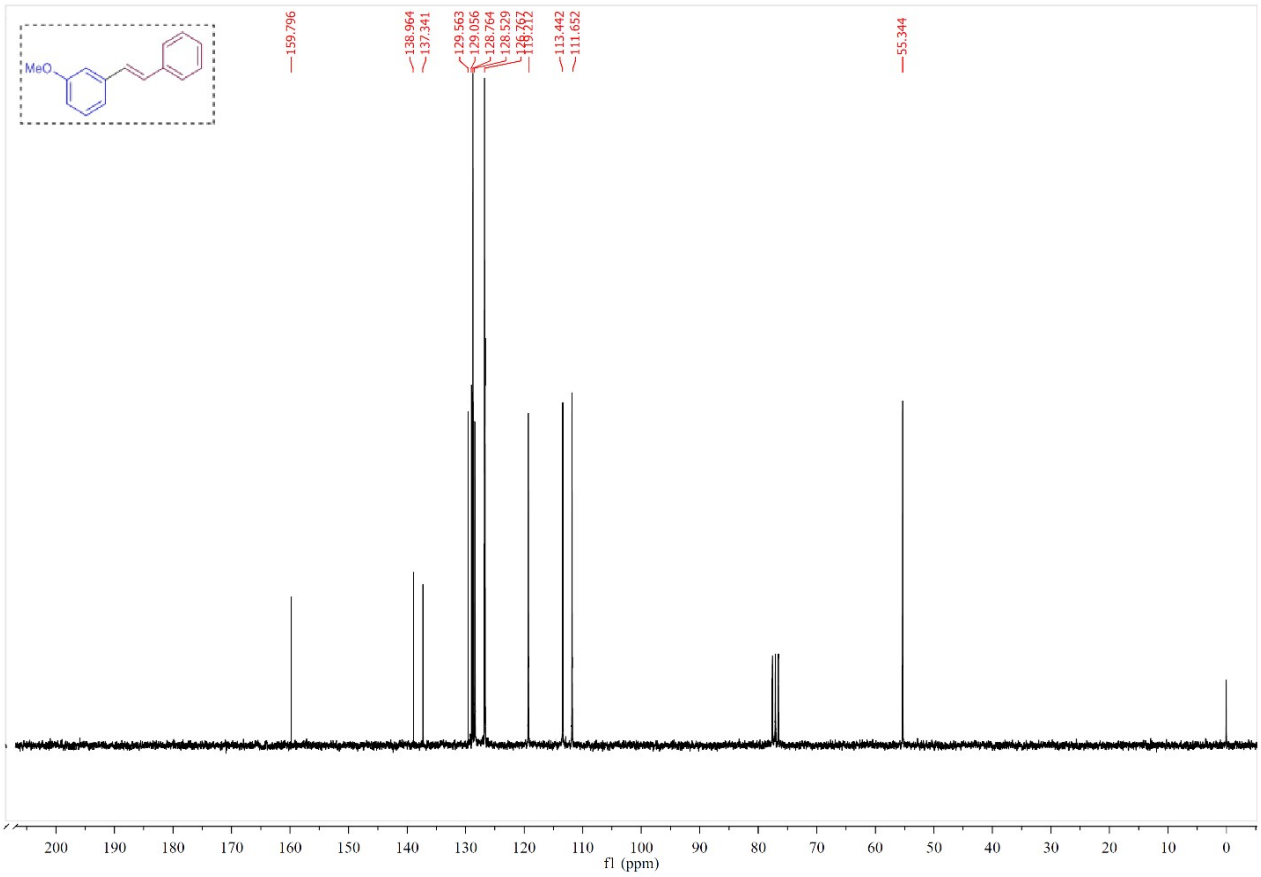
7.120
7.102
7.095
7.078
7.062
7.056
6.842
6.830
6.809
3.815
1.00
2.08
2.02
0.41
1.46
11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)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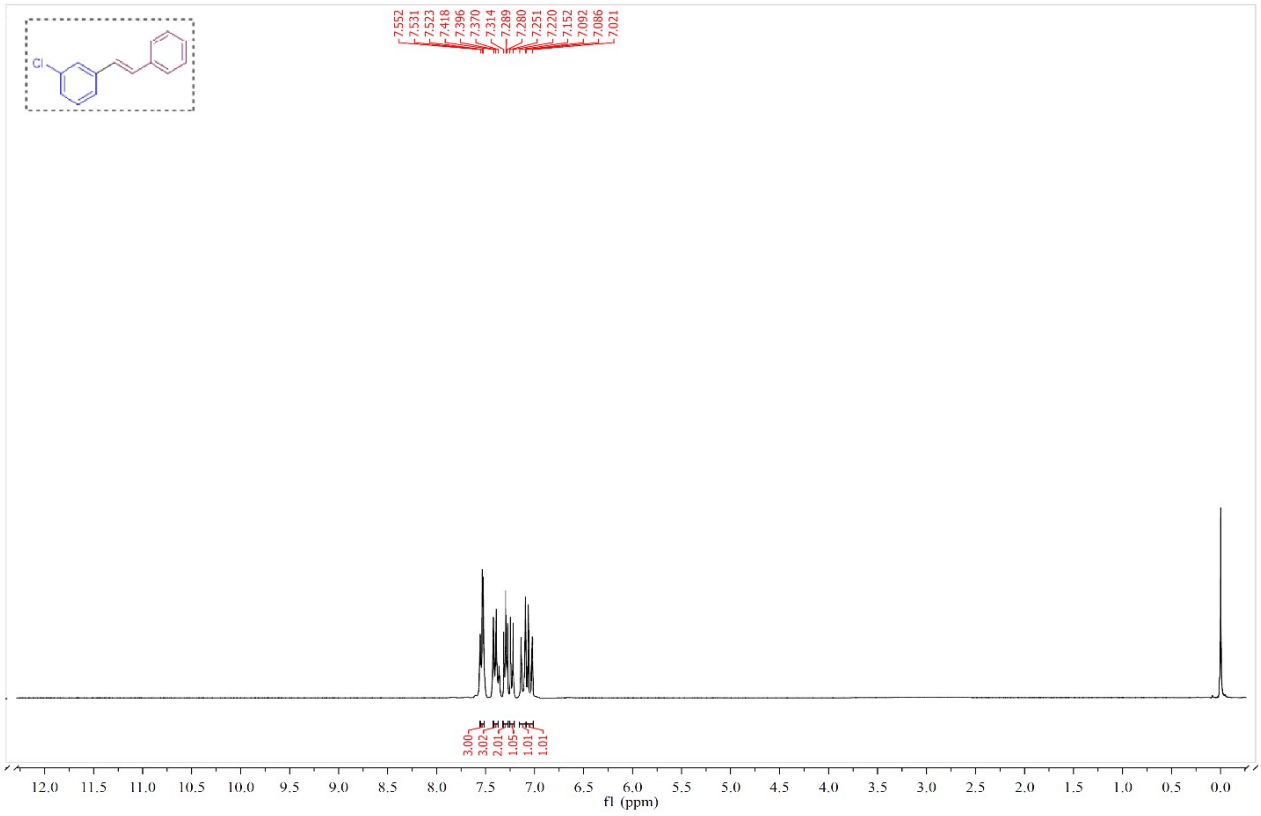
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7.021
3.00
3.02
2.01
1.05
1.01
1.01
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
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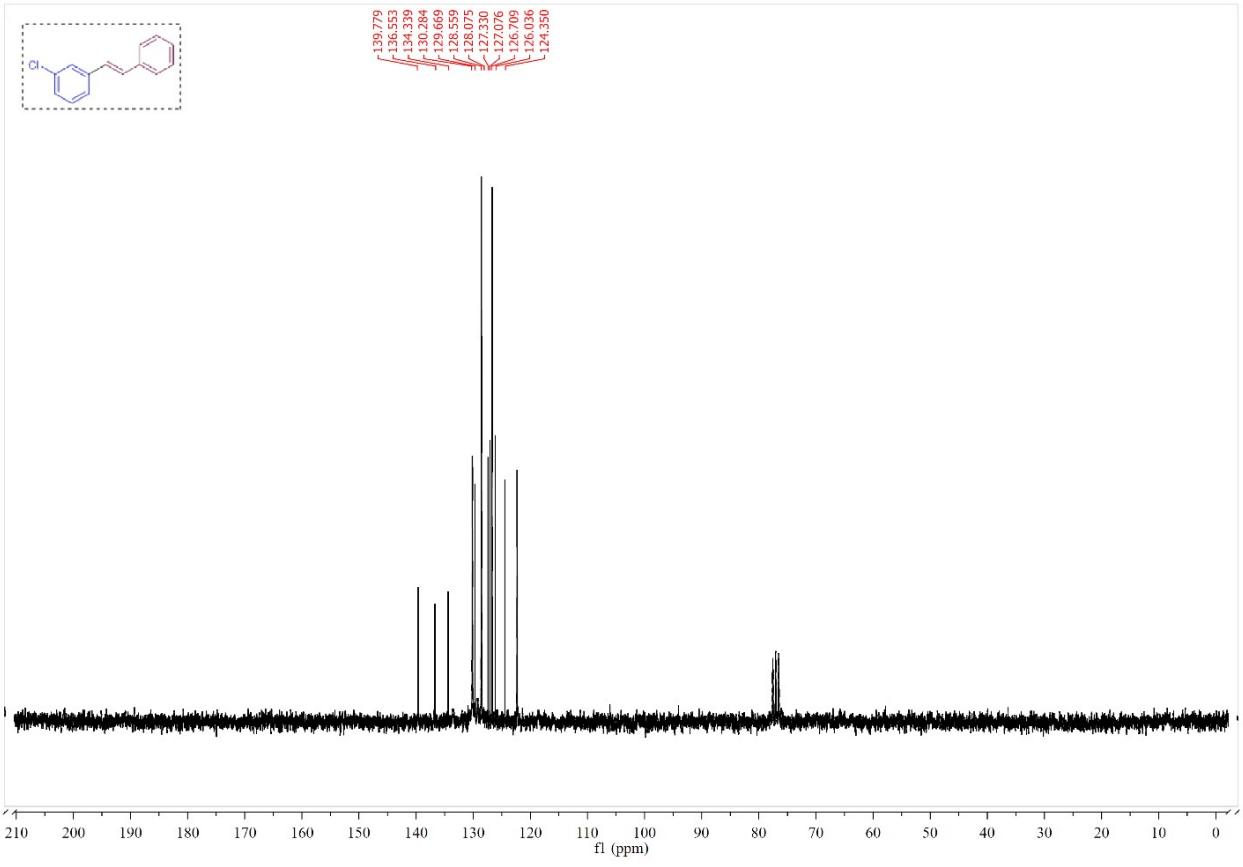
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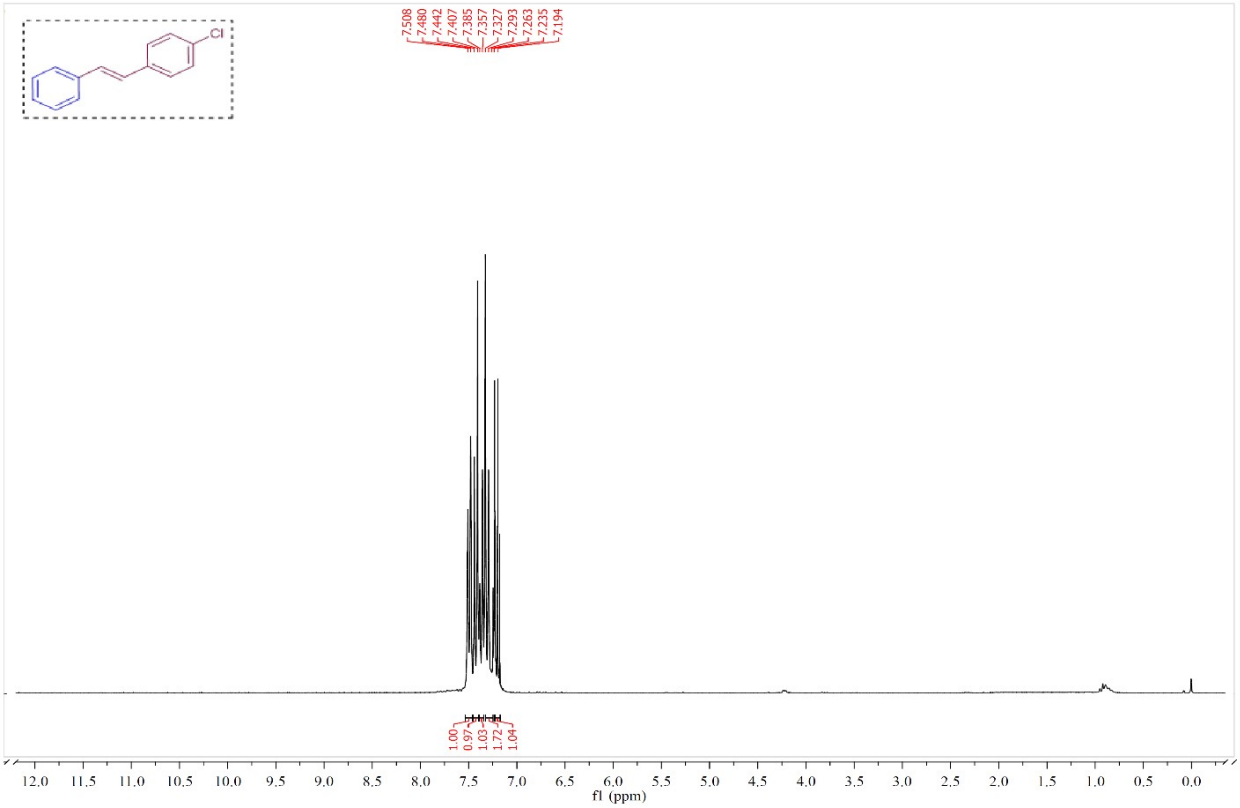
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1.72
1.04
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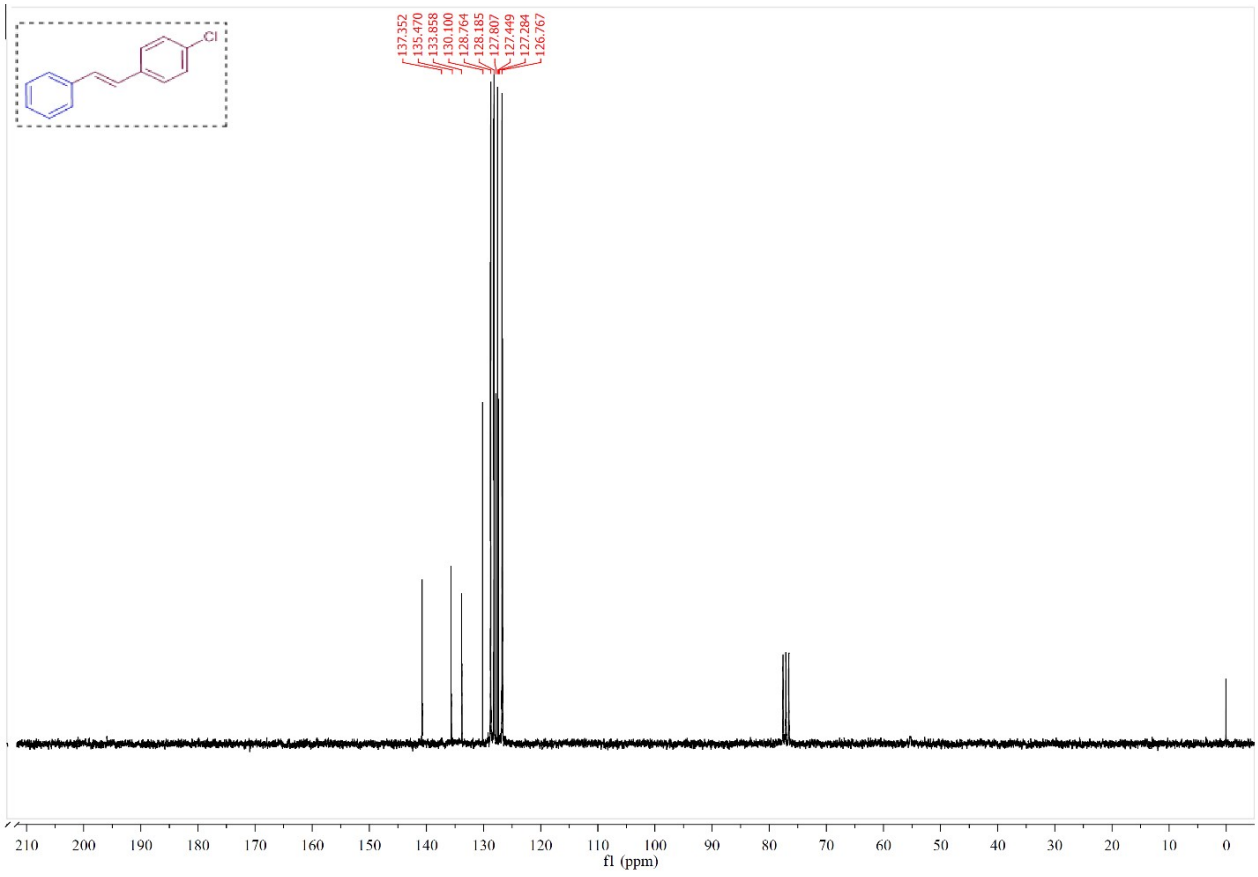
f1 (ppm)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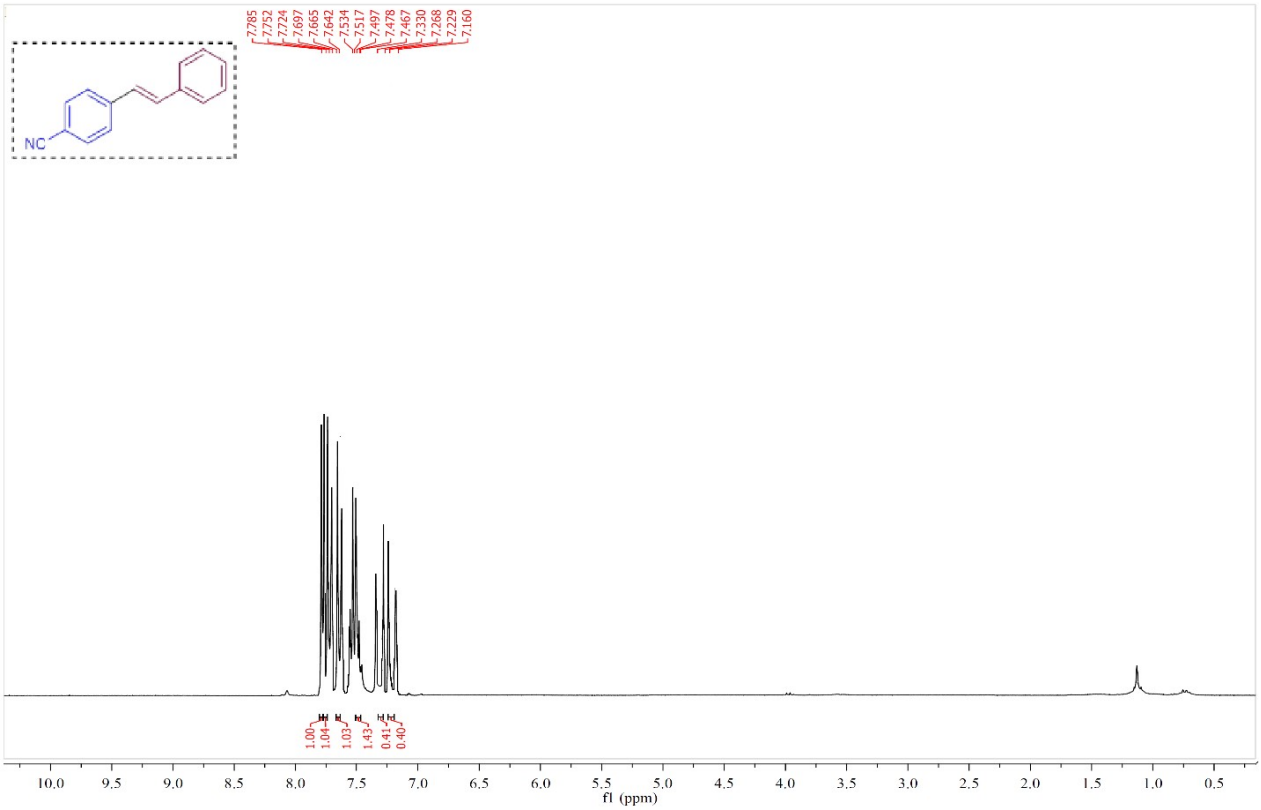
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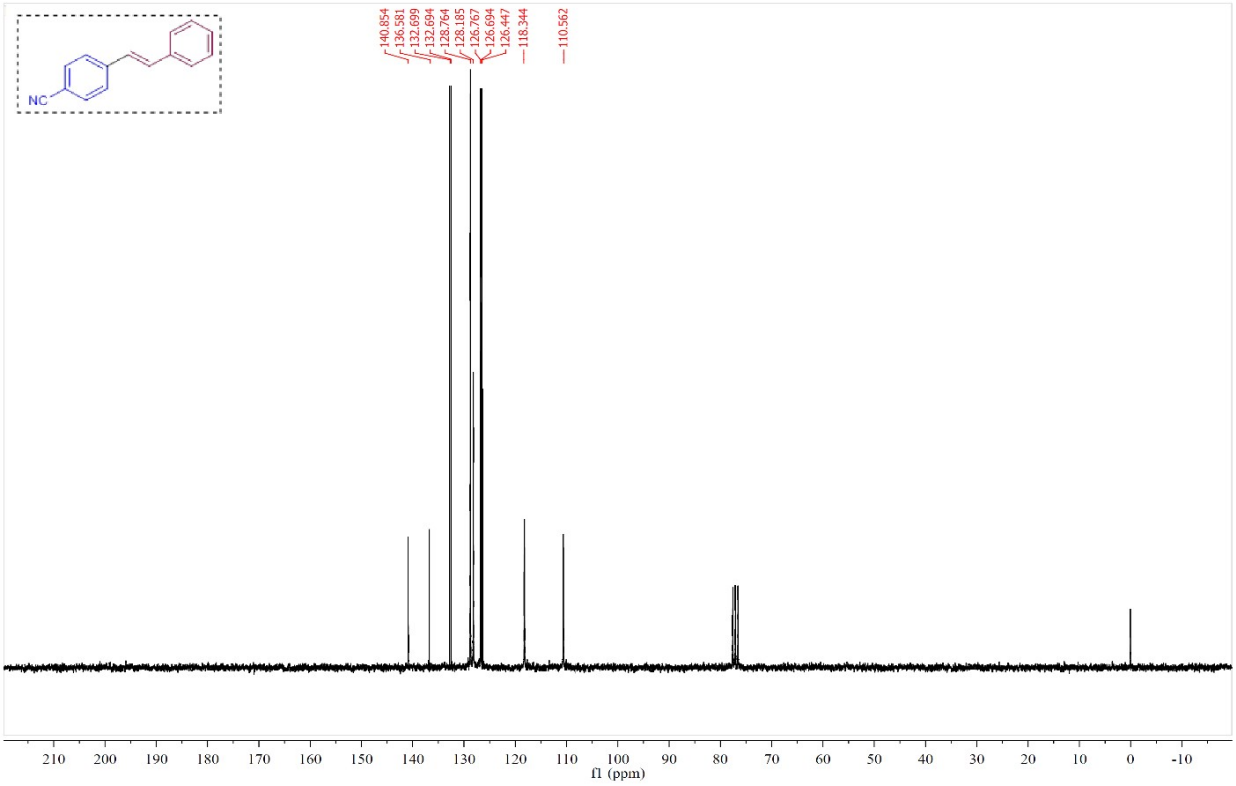
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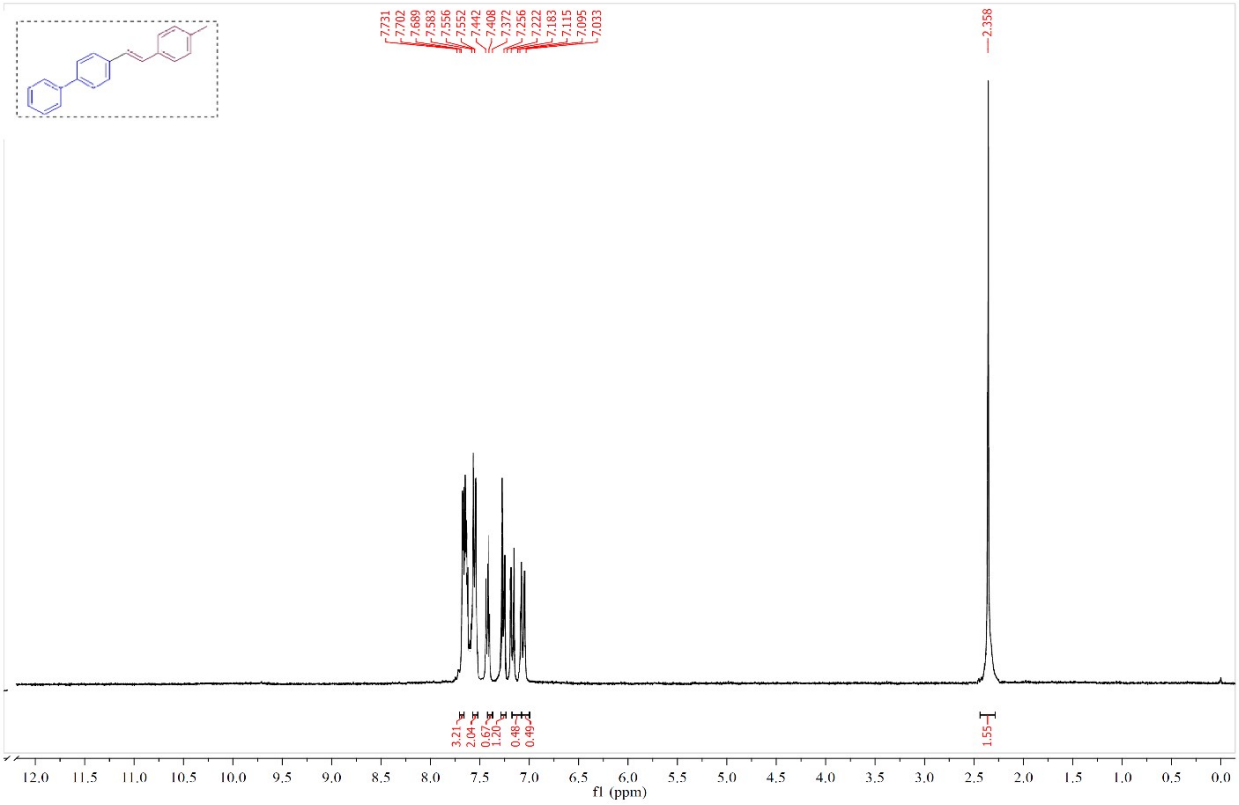
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7.095
7.033
2.358
3.21
2.04
0.67
1.20
0.48
0.49
1.55
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
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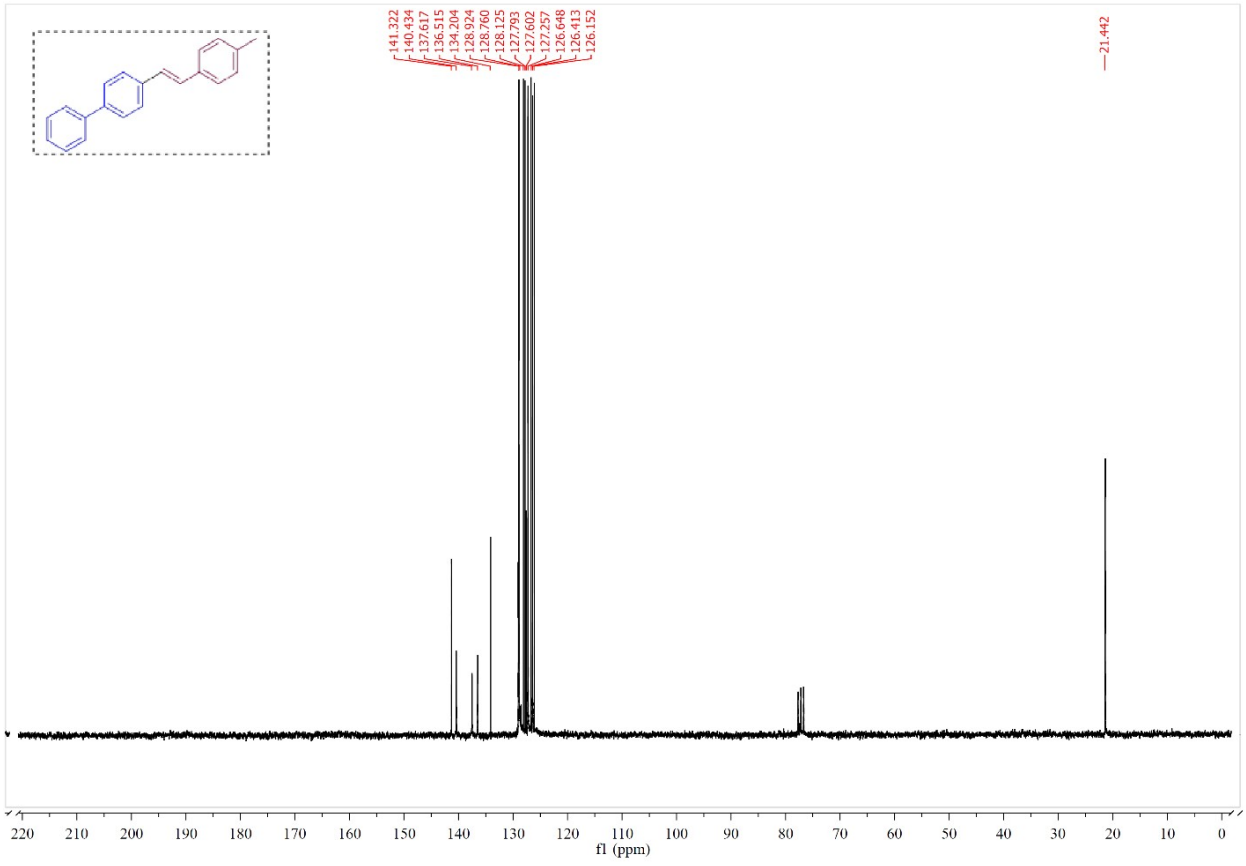
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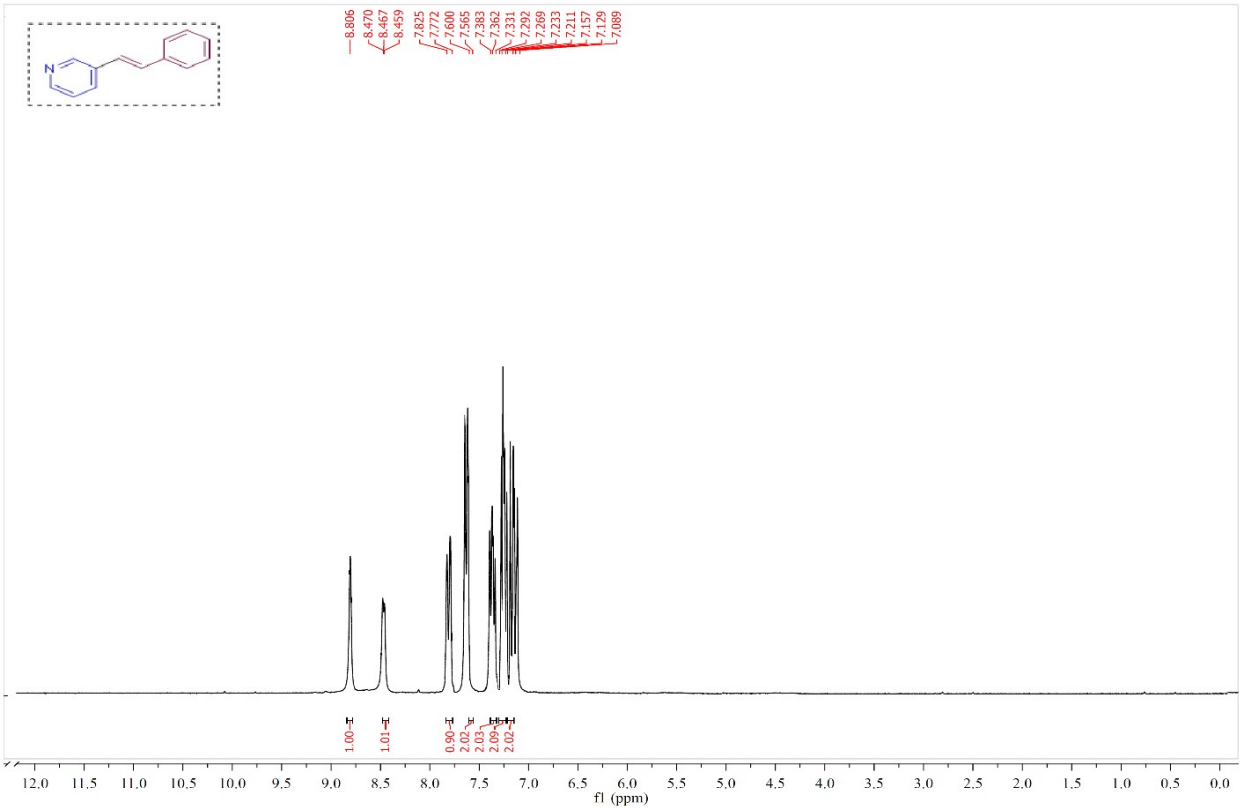
f1 (ppm)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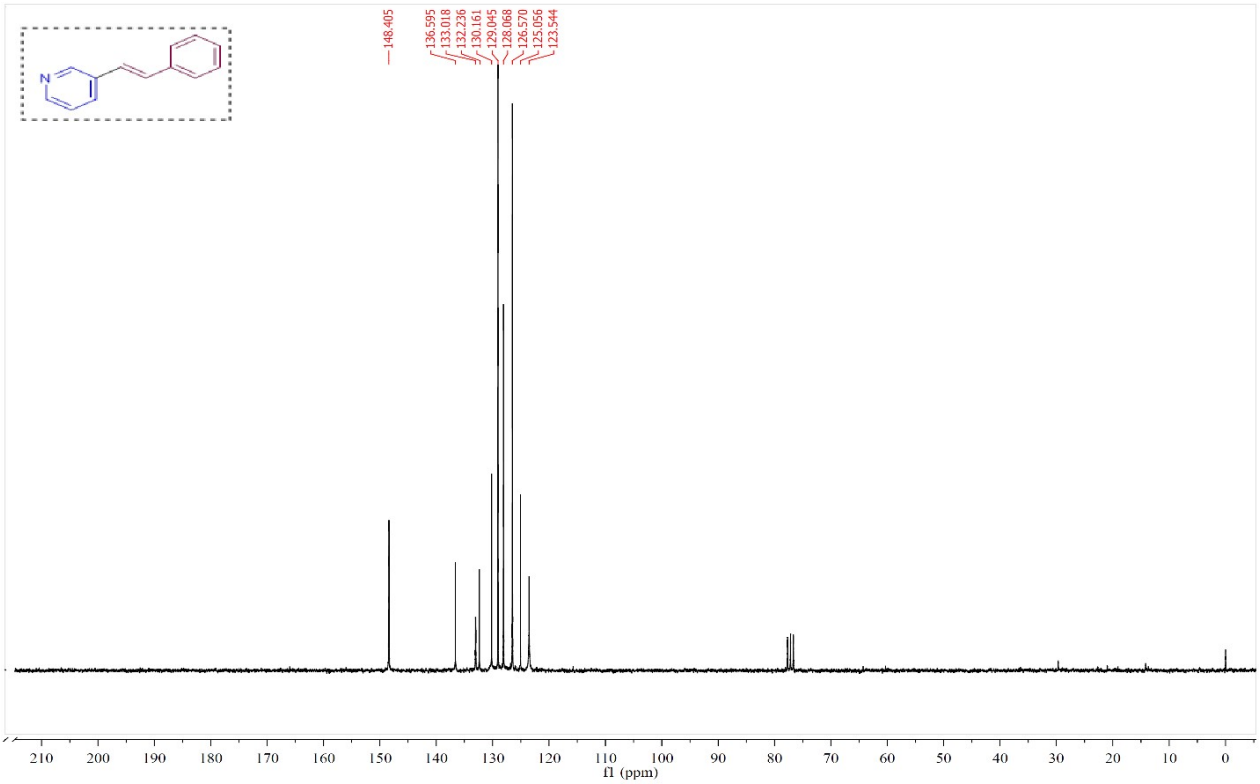
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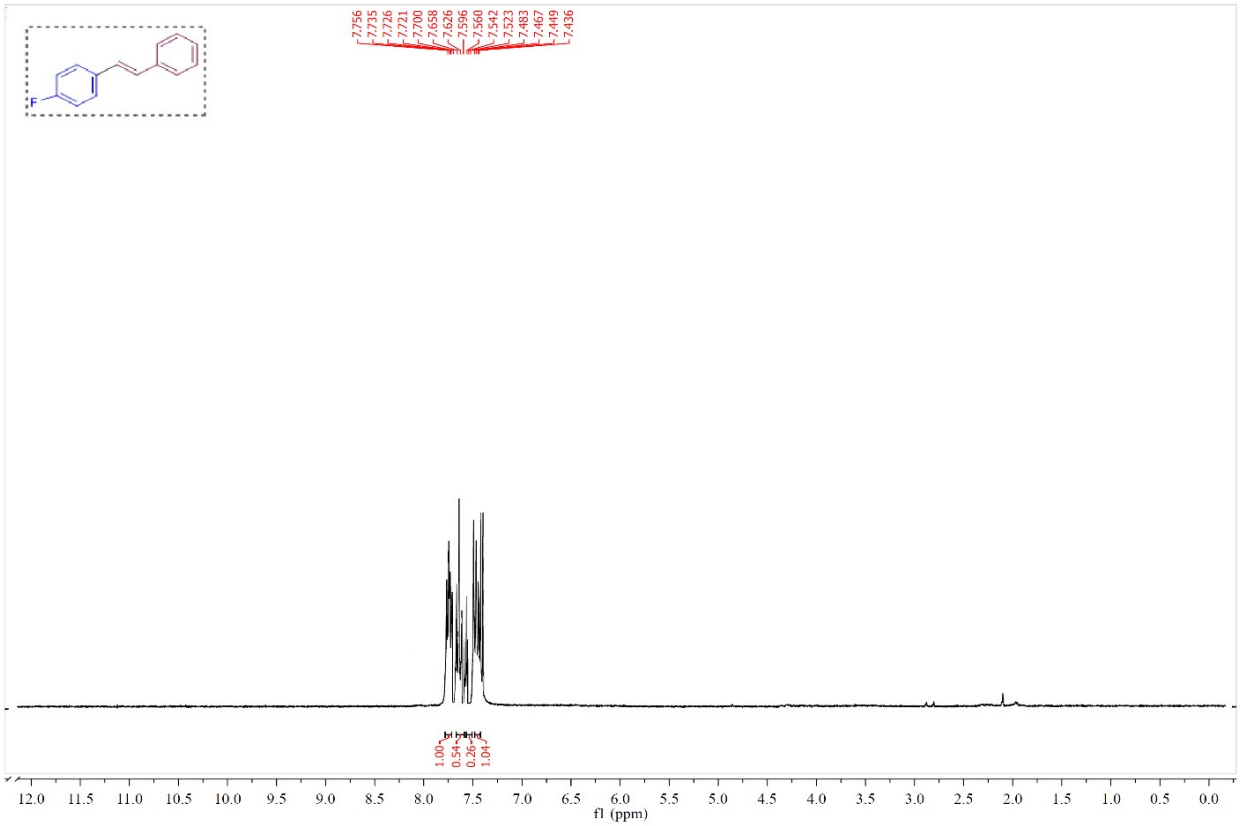
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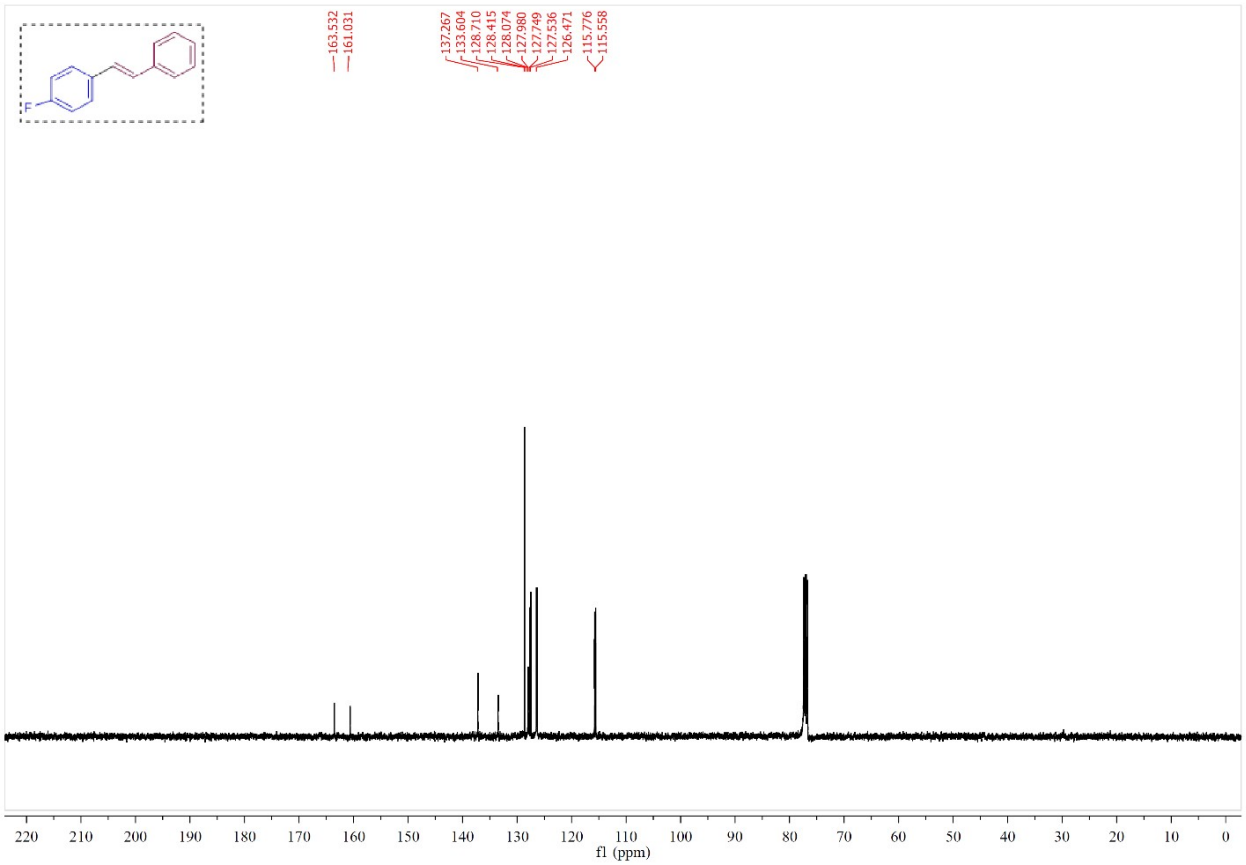
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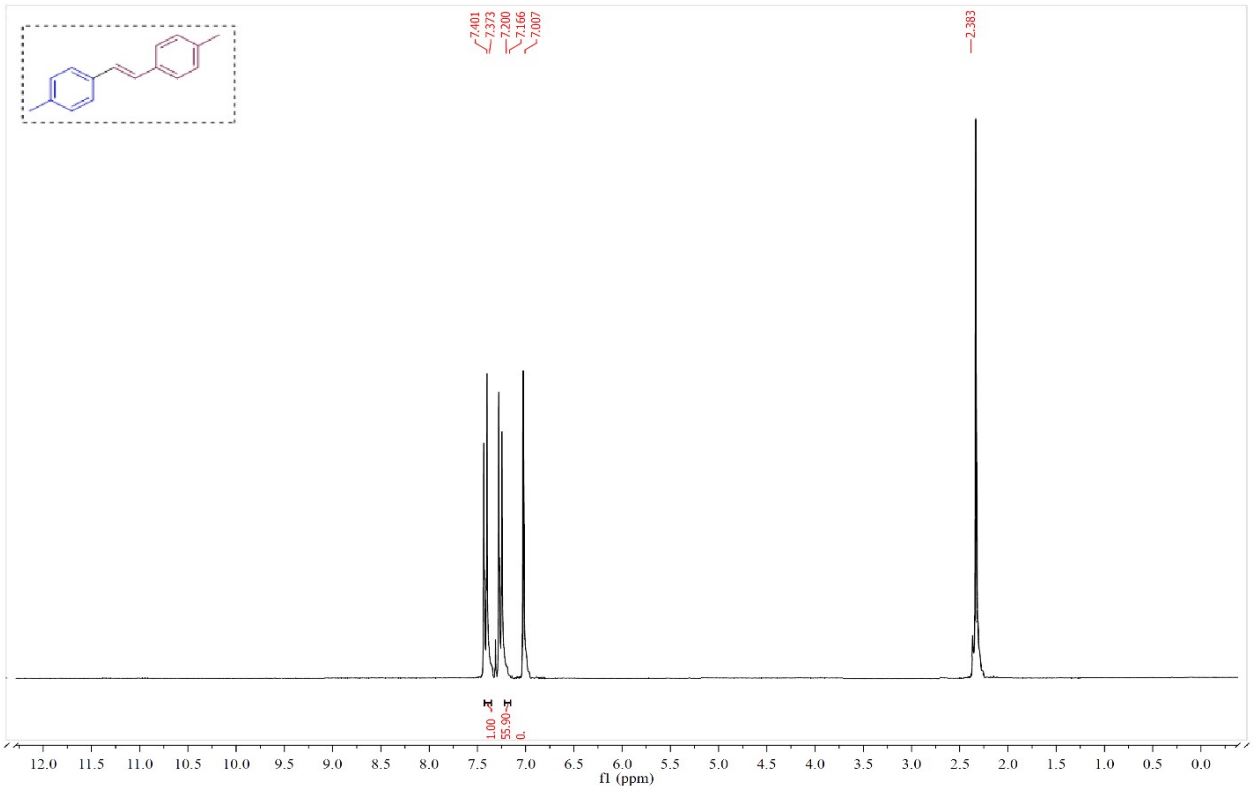
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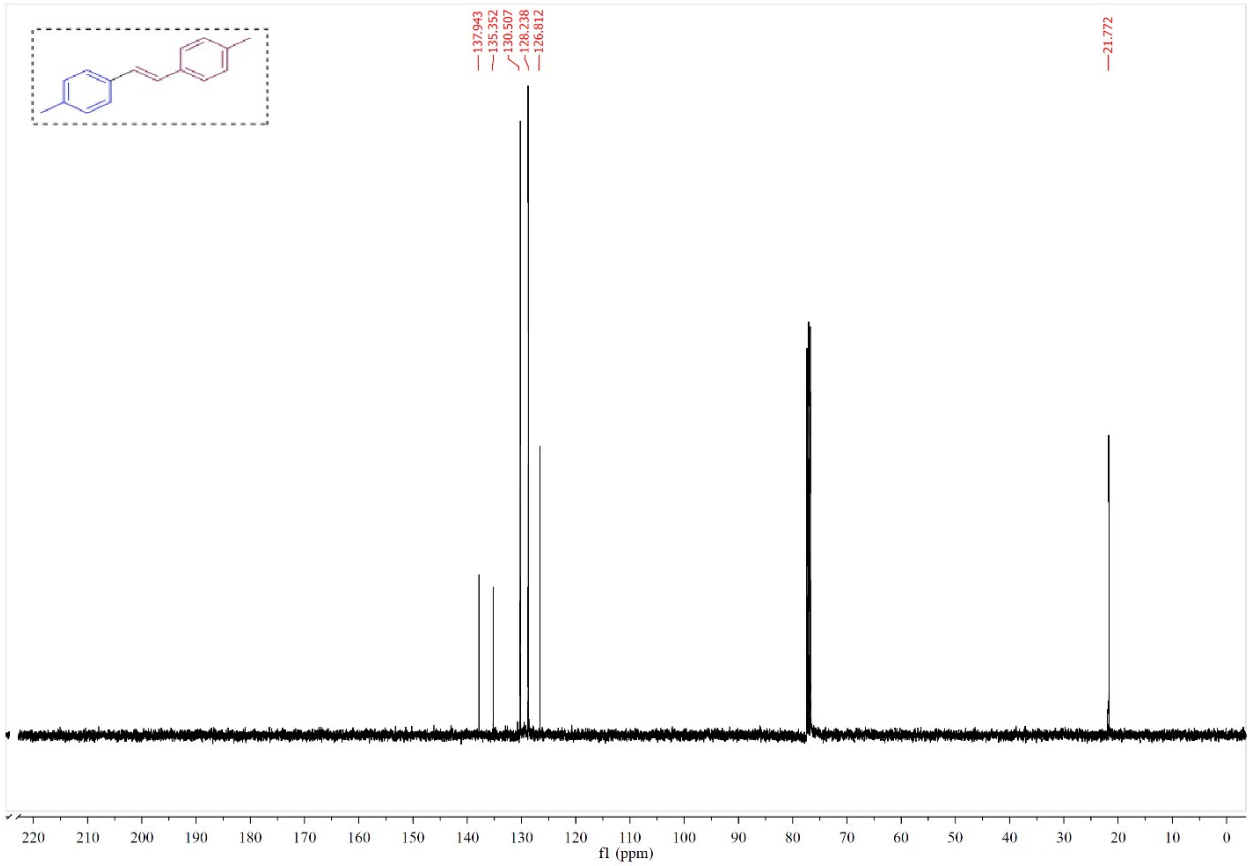
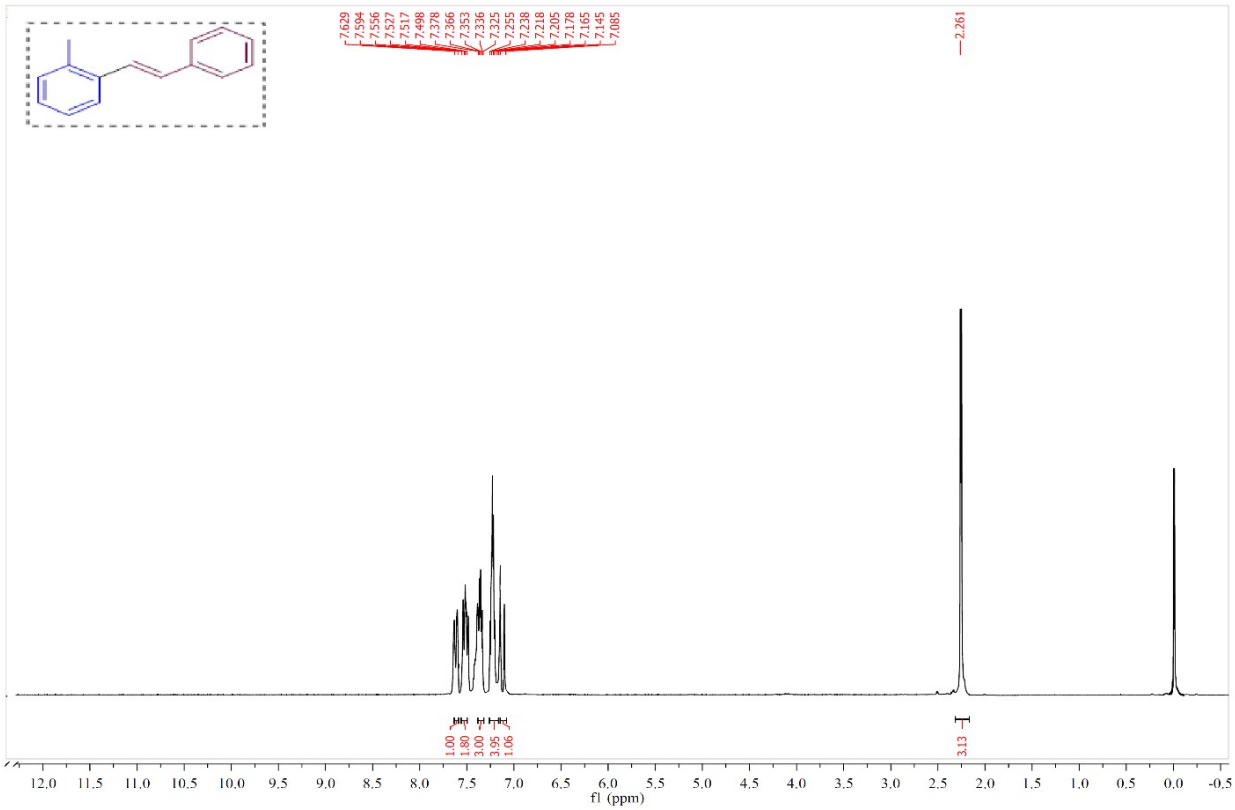
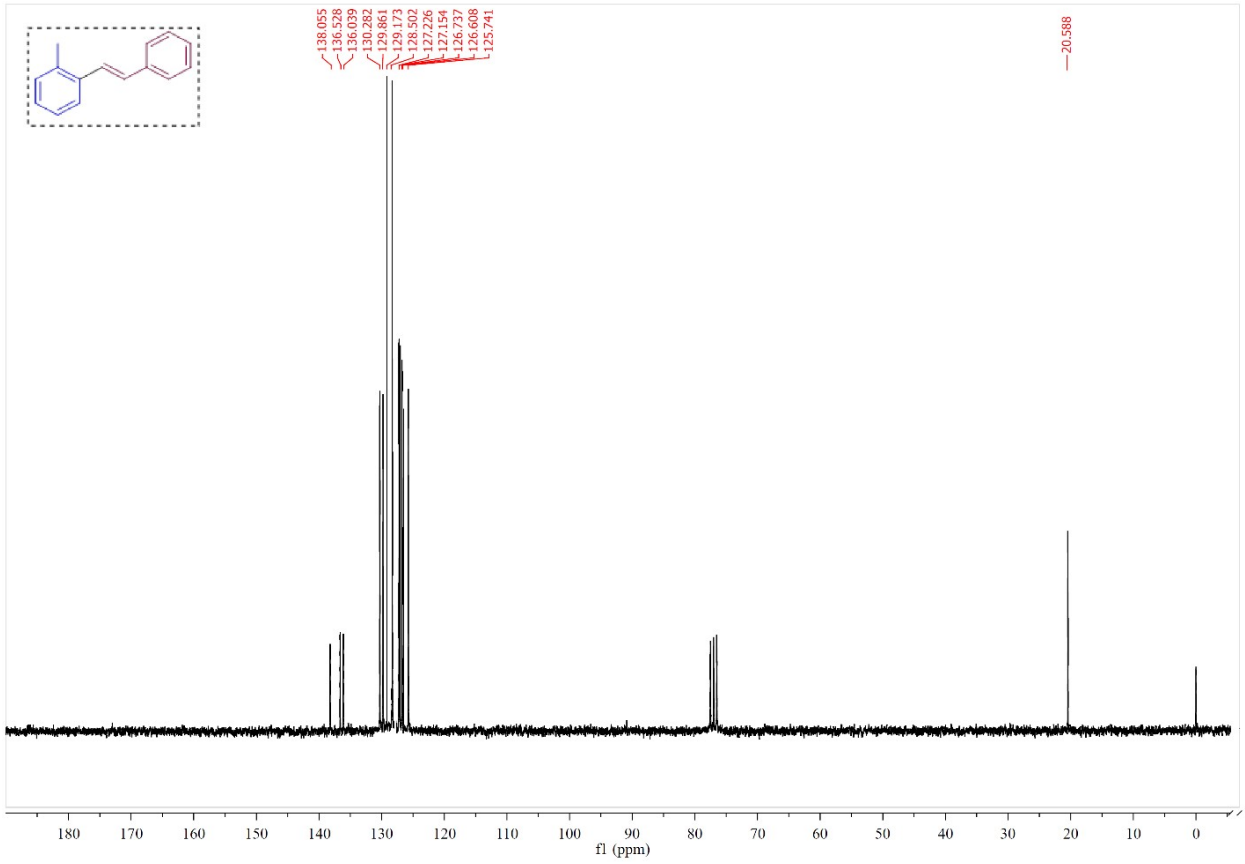
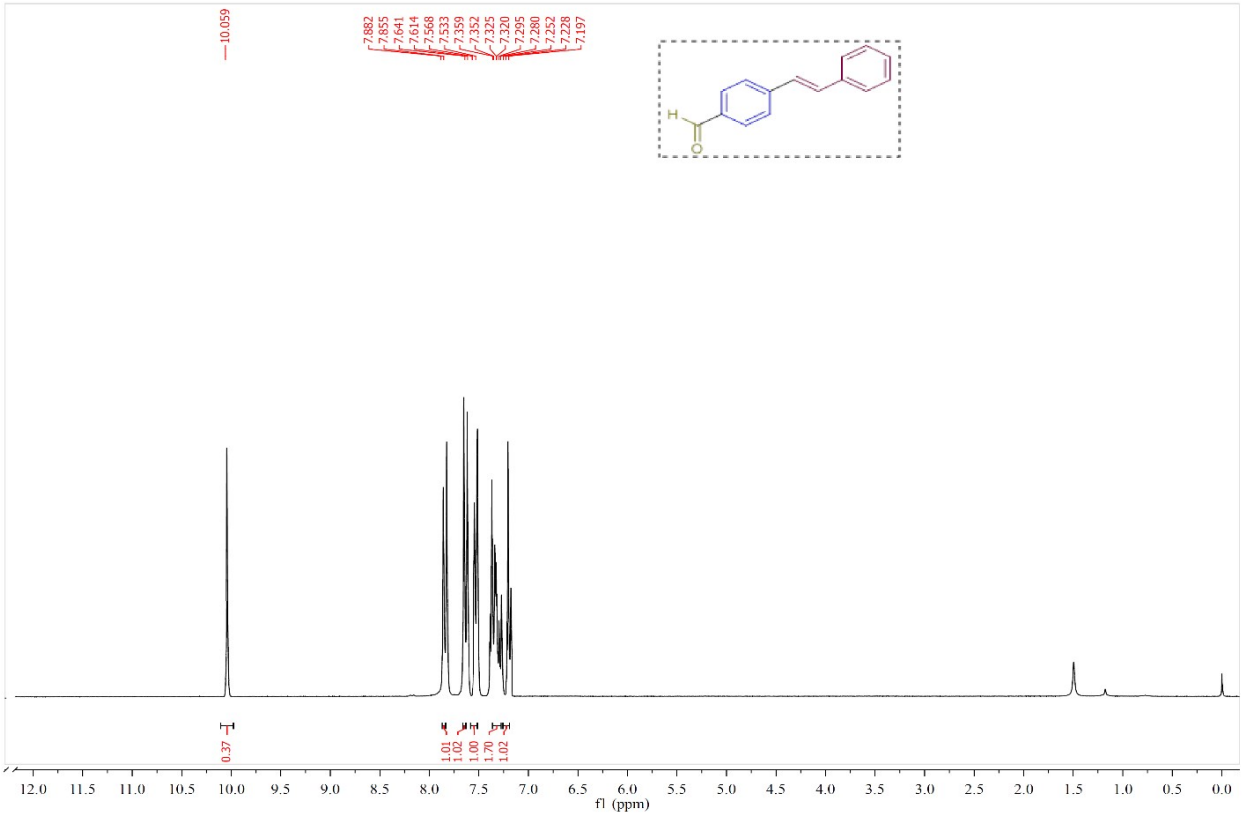
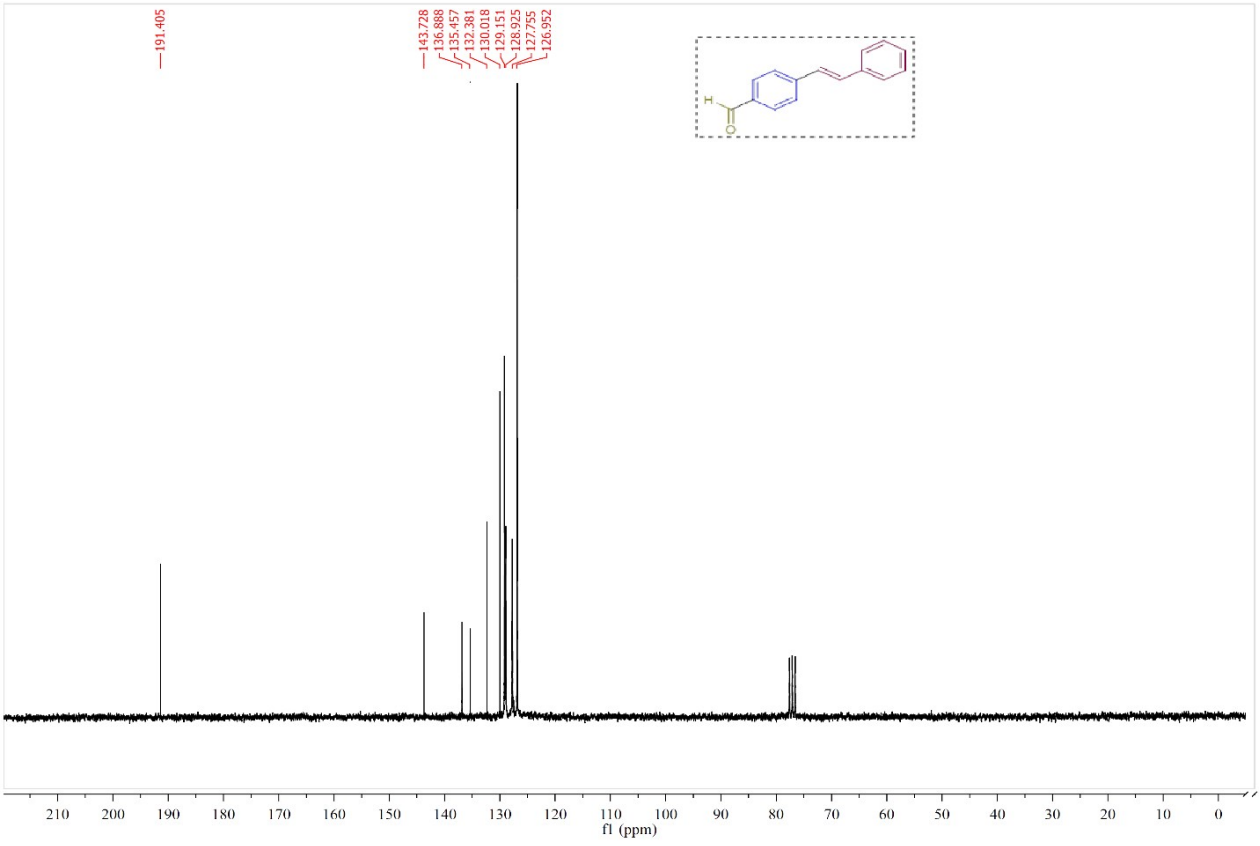
55.90
0.
12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

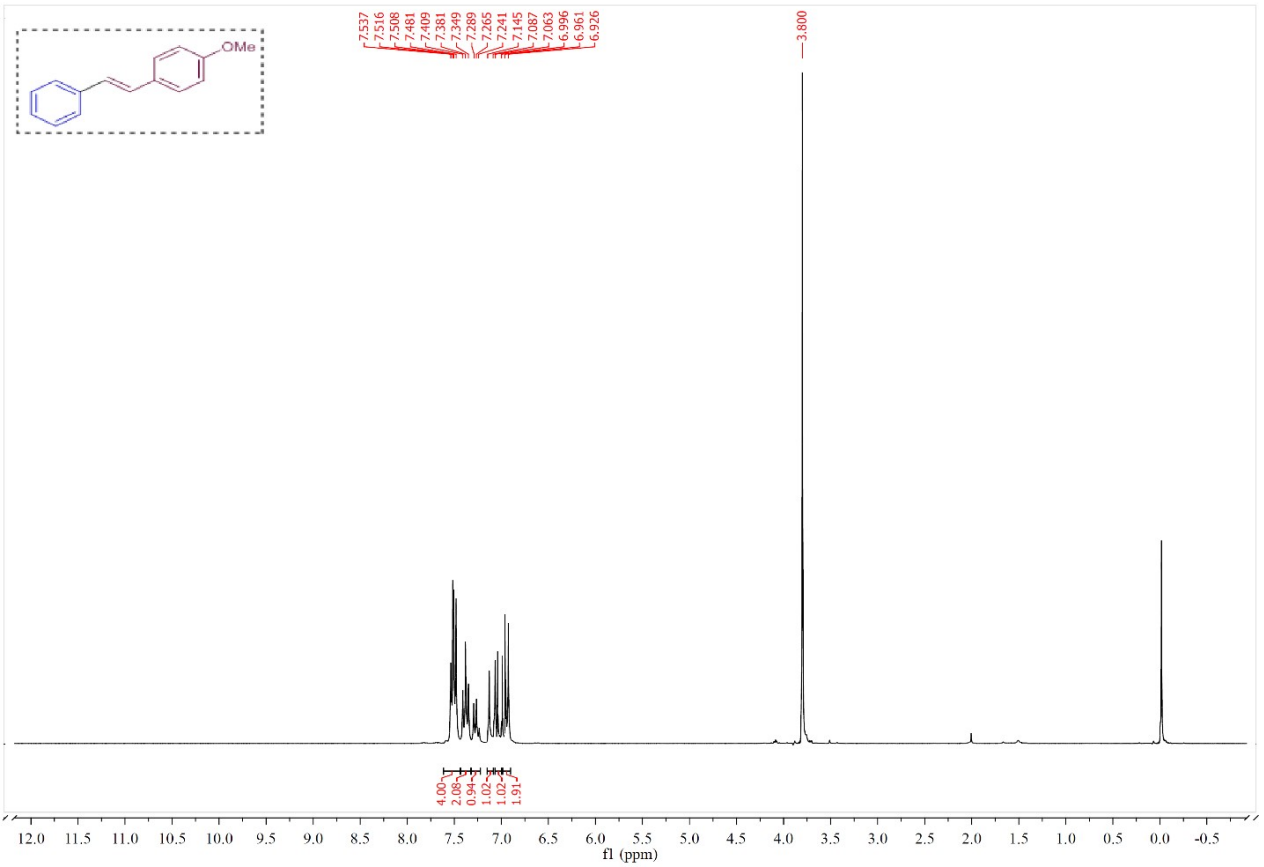

137.943
135.352
130.507
128.238
126.812
21.772
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

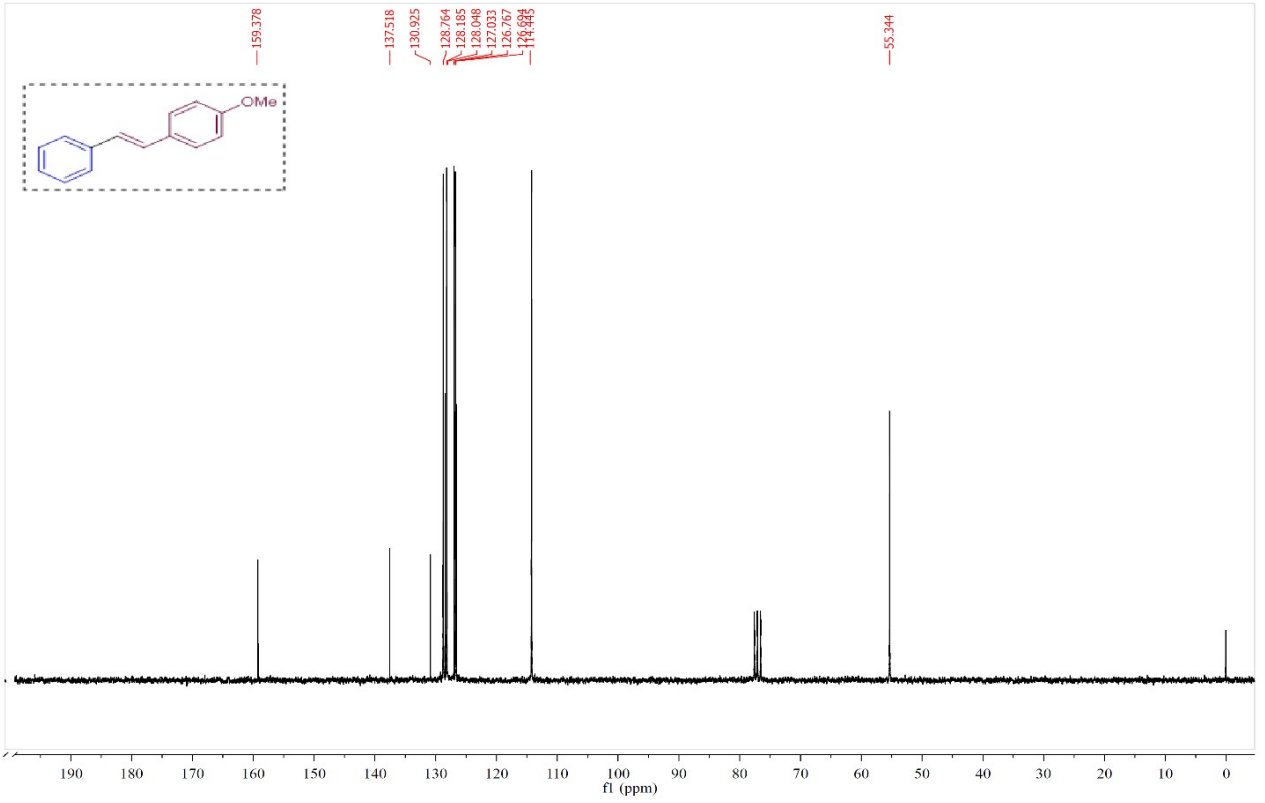

7.629
7.594
7.556
7.527
7.517
7.498
7.378
7.366
7.353
7.336
7.325
7.255
7.238
7.218
7.205
7.178
7.165
7.145
7.085
2.261
1.00
1.80
3.00
3.95
1.06
3.13
f1 (ppm)

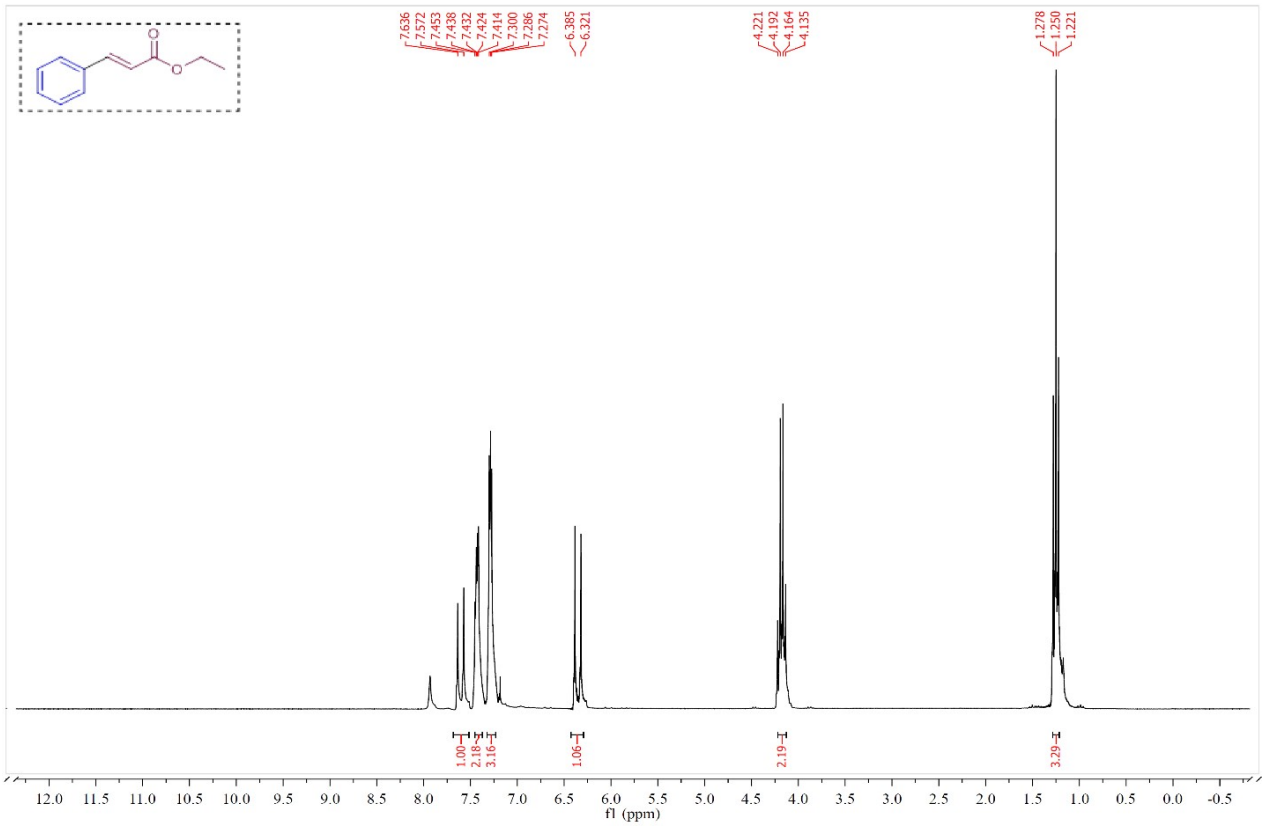

138.055
136.528
136.039
130.282
129.861
129.173
128.502
127.226
127.154
126.737
126.608
125.741
20.588
f1 (ppm)

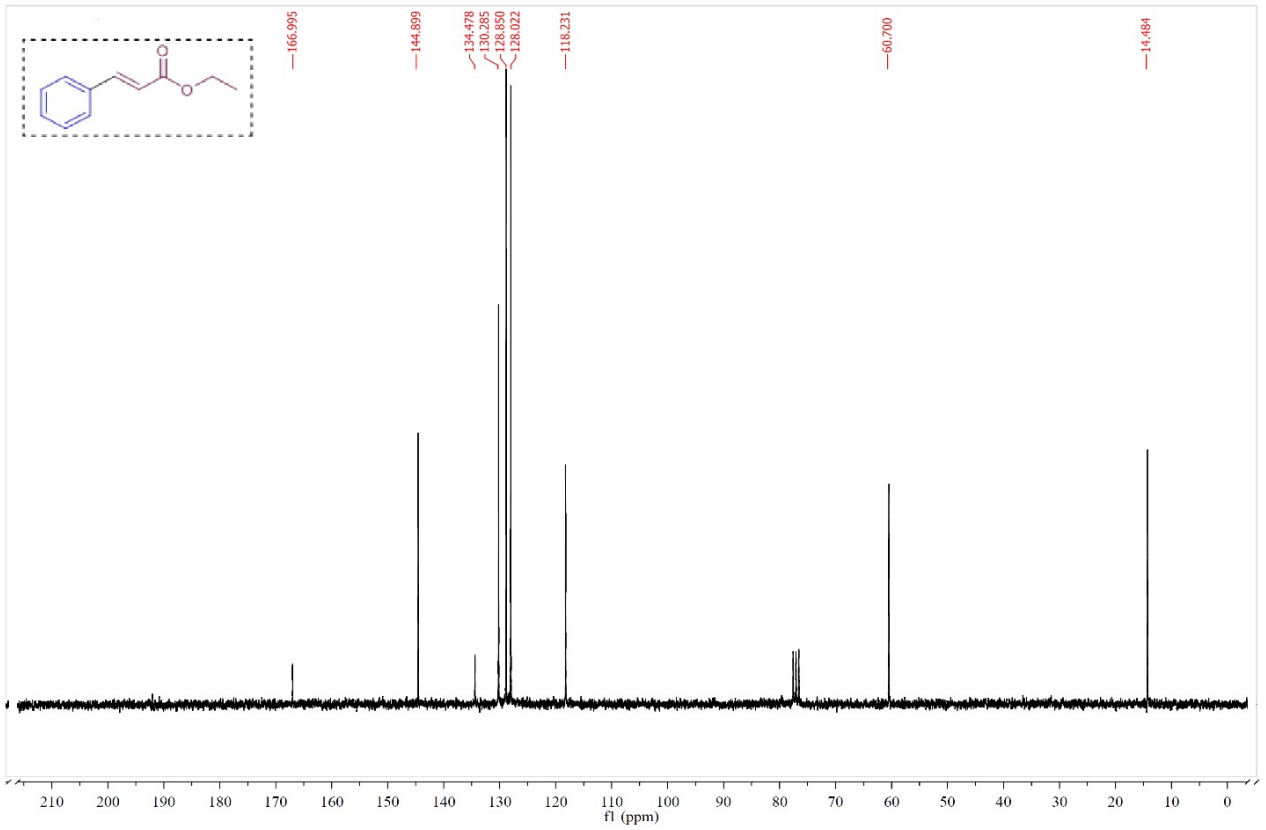

10.059
7.882
7.855
7.641
7.614
7.568
7.533
7.359
7.352
7.325
7.320
7.295
7.280
7.252
7.228
7.197
0.37
1.01
1.02
1.00
1.70
1.02
fl (ppm)

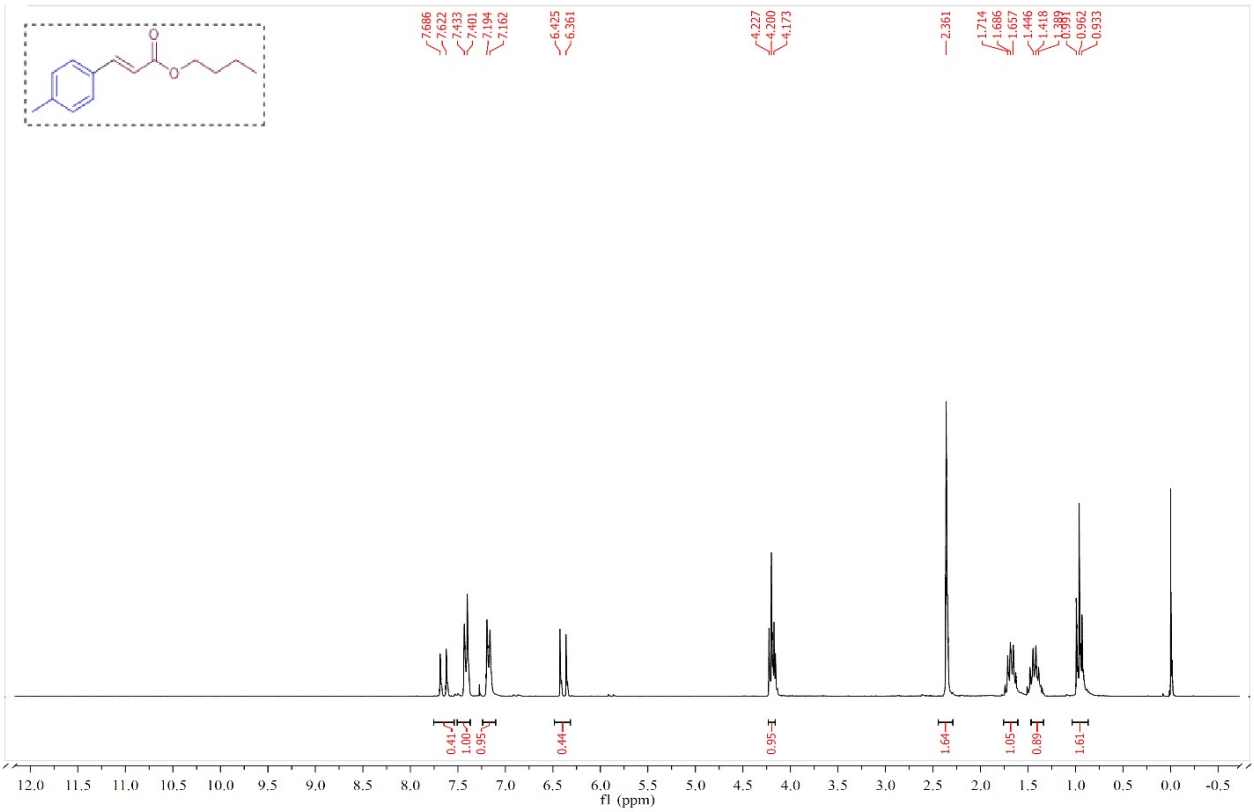

191.405
143.728
136.888
135.457
132.381
130.018
129.151
128.925
127.755
126.952
fl (ppm)

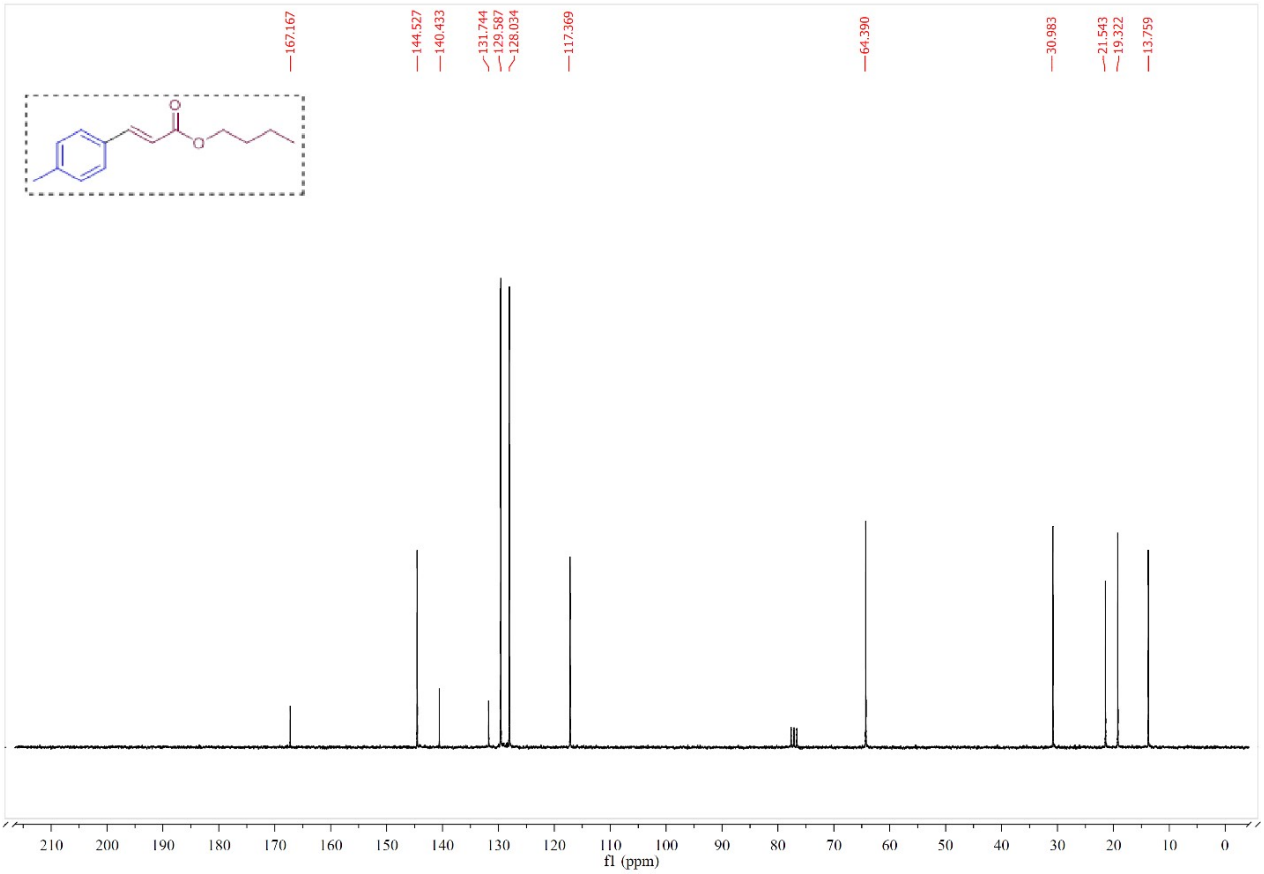

OMe
7.537
7.516
7.508
7.481
7.409
7.381
7.349
7.289
7.265
7.241
7.145
7.087
7.063
6.996
6.961
6.926
3.800
4.00
2.08
0.94
1.02
1.02
1.91
fl (ppm)

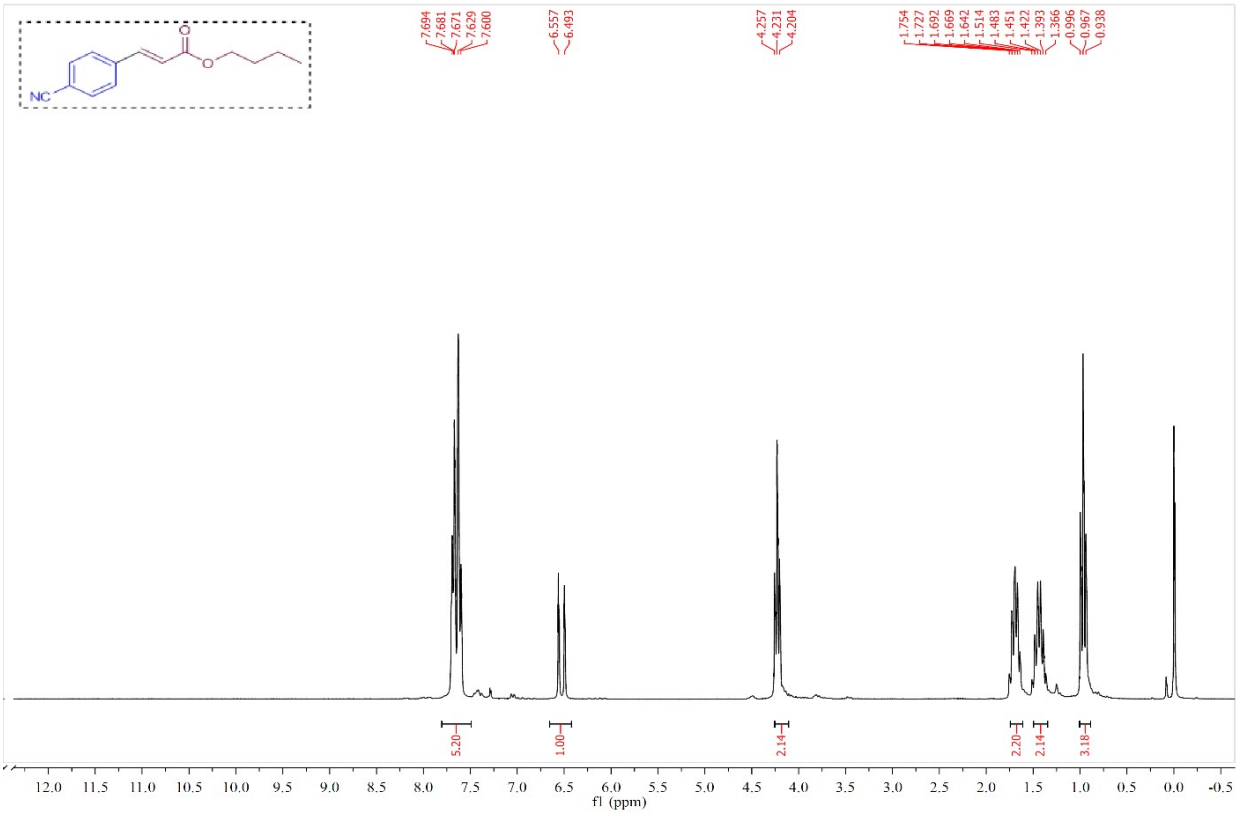

OMe
159.378
137.518
130.925
128.764
128.185
128.048
127.033
126.767
55.344
fl (ppm)

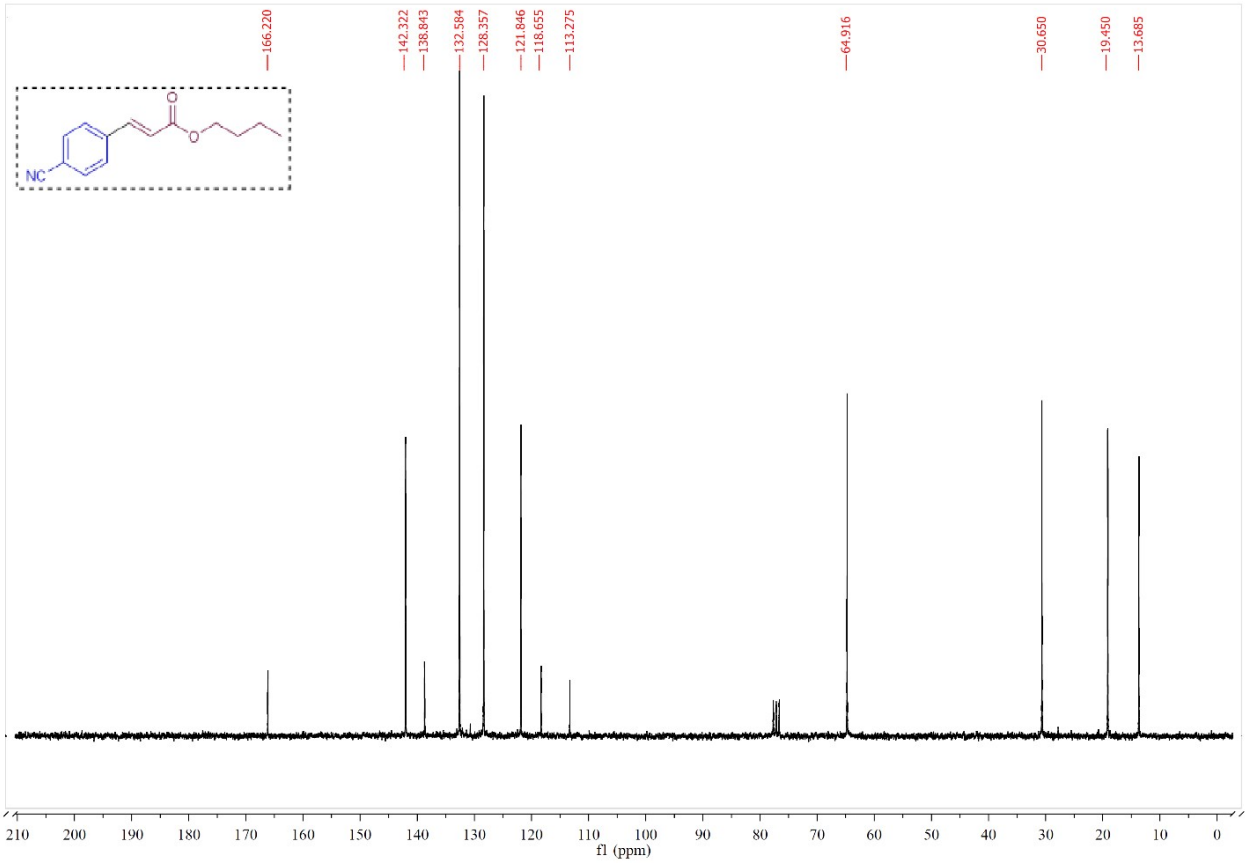

7.636
7.572
7.453
7.438
7.432
7.424
7.414
7.300
7.286
7.274
6.385
6.321
4.221
4.192
4.164
4.135
1.278
1.250
1.221
1.00
2.18
3.16
1.06
2.19
3.29
f1 (ppm)

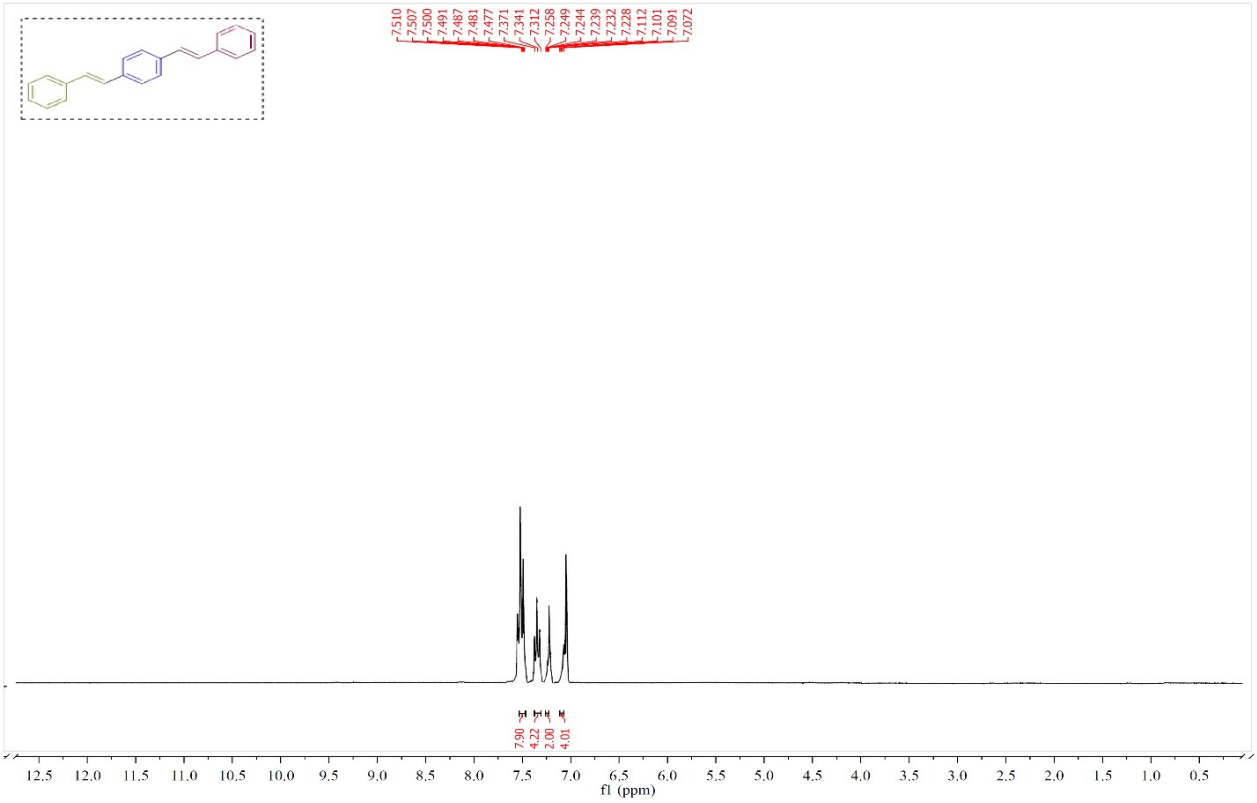

166.995
144.899
134.478
130.285
128.850
128.022
118.231
60.700
14.484
f1 (ppm)

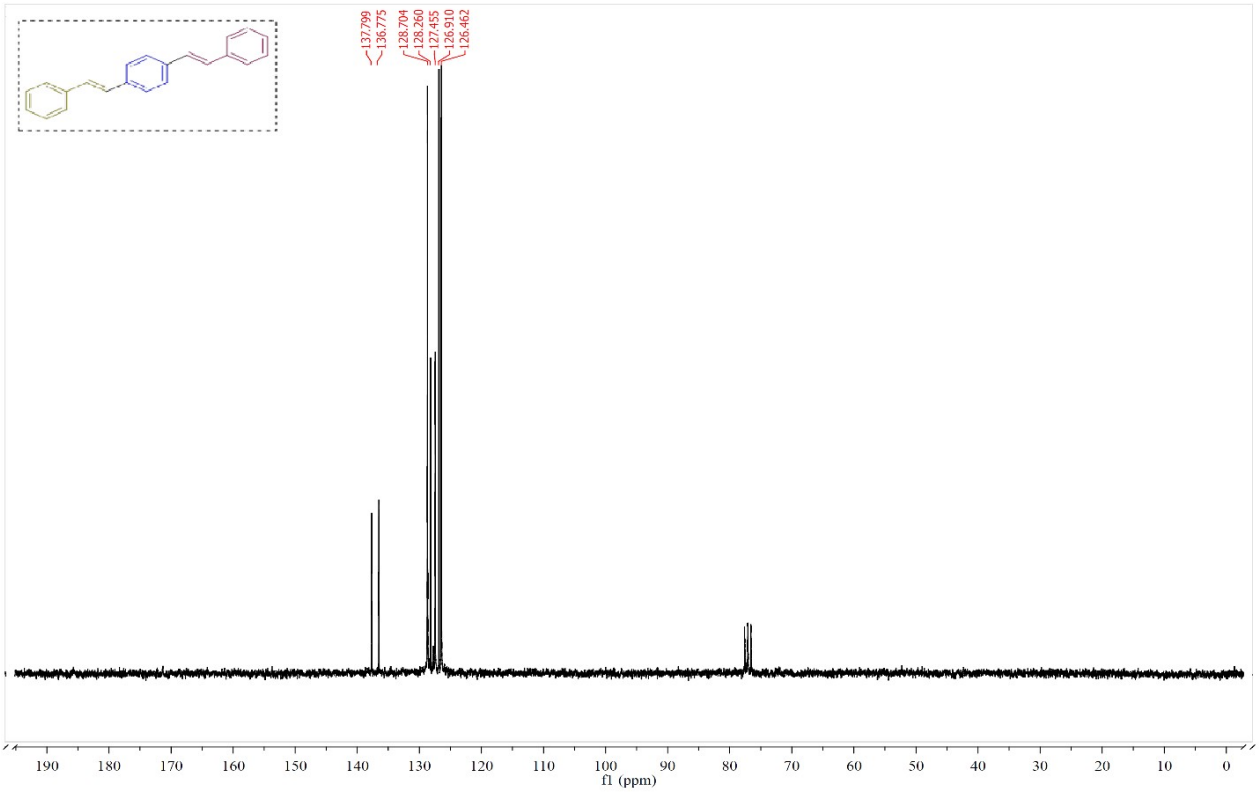

7.686
7.622
7.433
7.401
7.194
7.162
6.425
6.361
4.227
4.200
4.173
2.361
1.714
1.686
1.657
1.446
1.418
0.962
0.933
0.41
1.00
0.95
0.44
0.95
1.64
1.05
0.89
1.61
f1 (ppm)

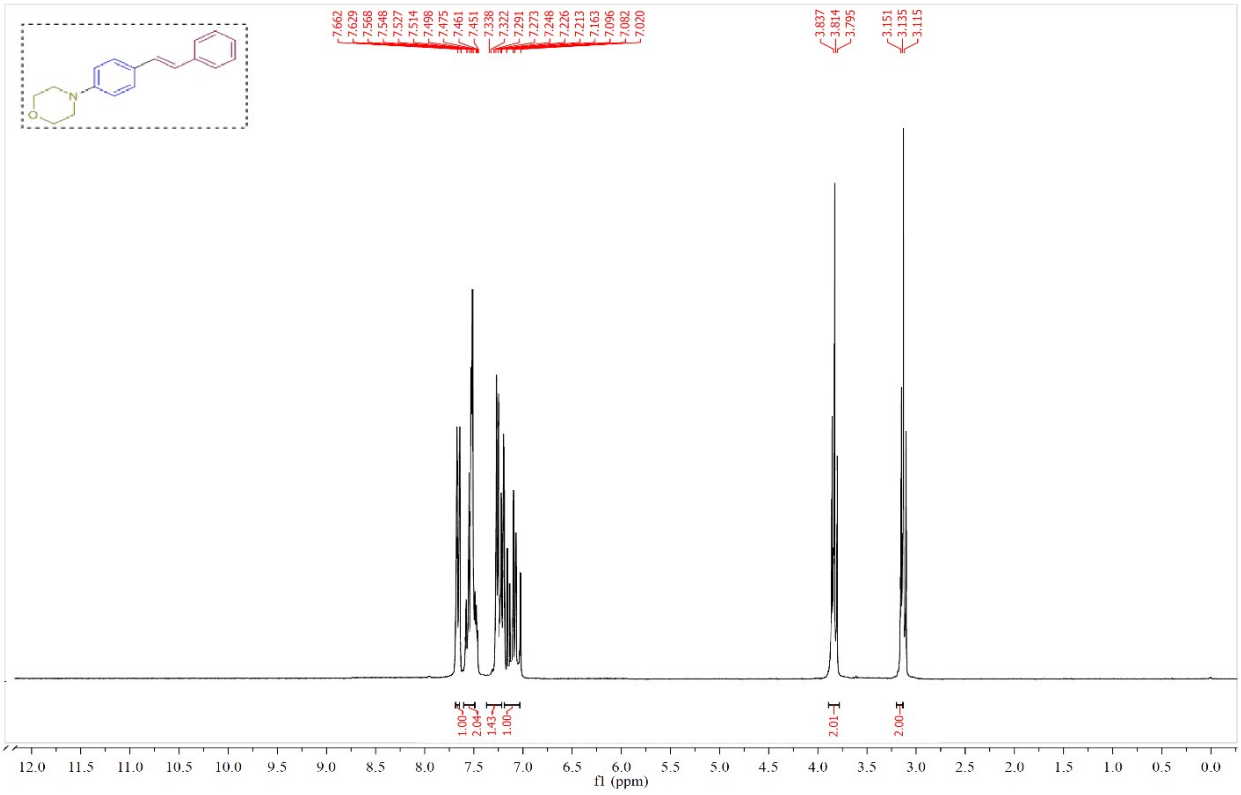

167.167
144.527
140.433
131.744
129.587
128.034
117.369
64.390
30.983
21.543
19.322
13.759
f1 (ppm)

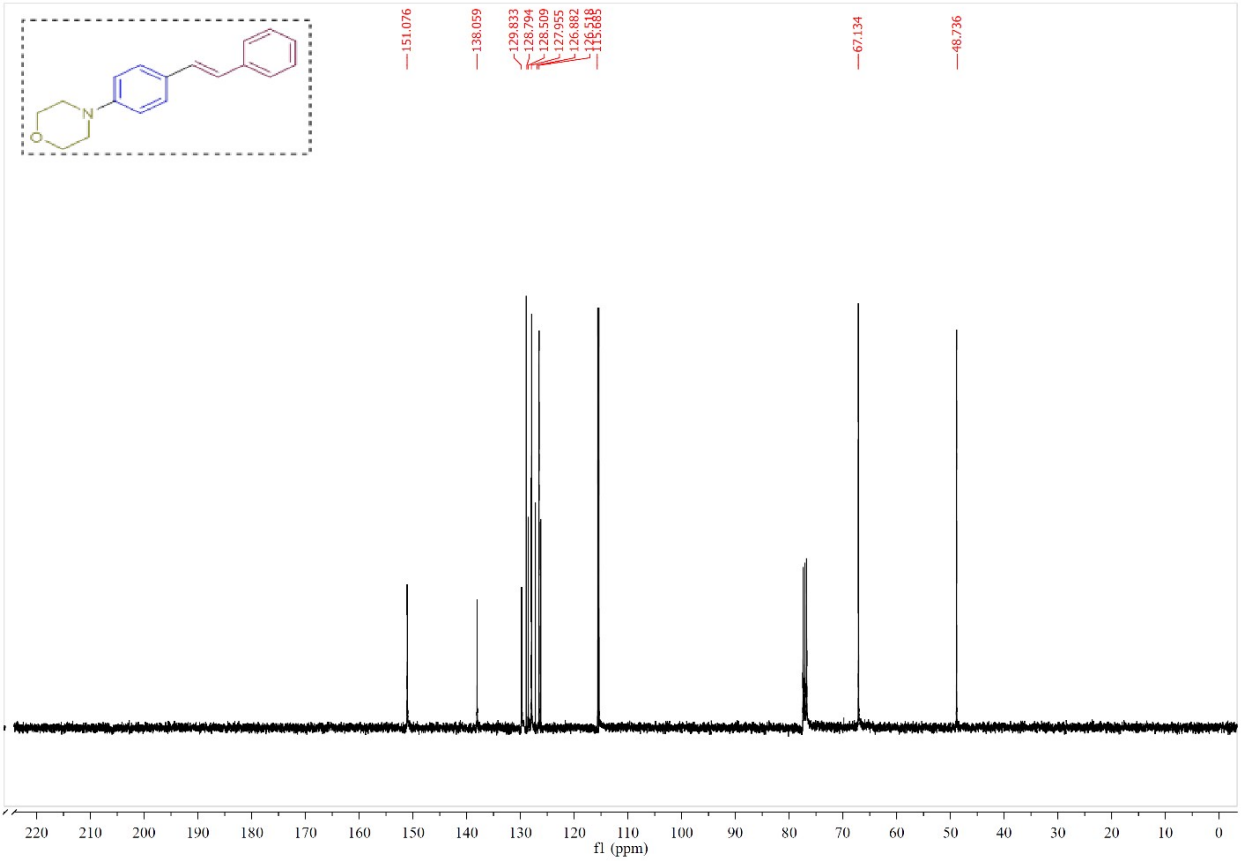

7.694
7.681
7.671
7.629
7.600
6.557
6.493
4.257
4.231
4.204
1.754
1.727
1.692
1.669
1.642
1.514
1.483
1.451
1.422
1.393
1.366
0.996
0.967
0.938
NC
O
O
5.20
1.00
2.14
2.20
2.14
3.18
f1 (ppm)

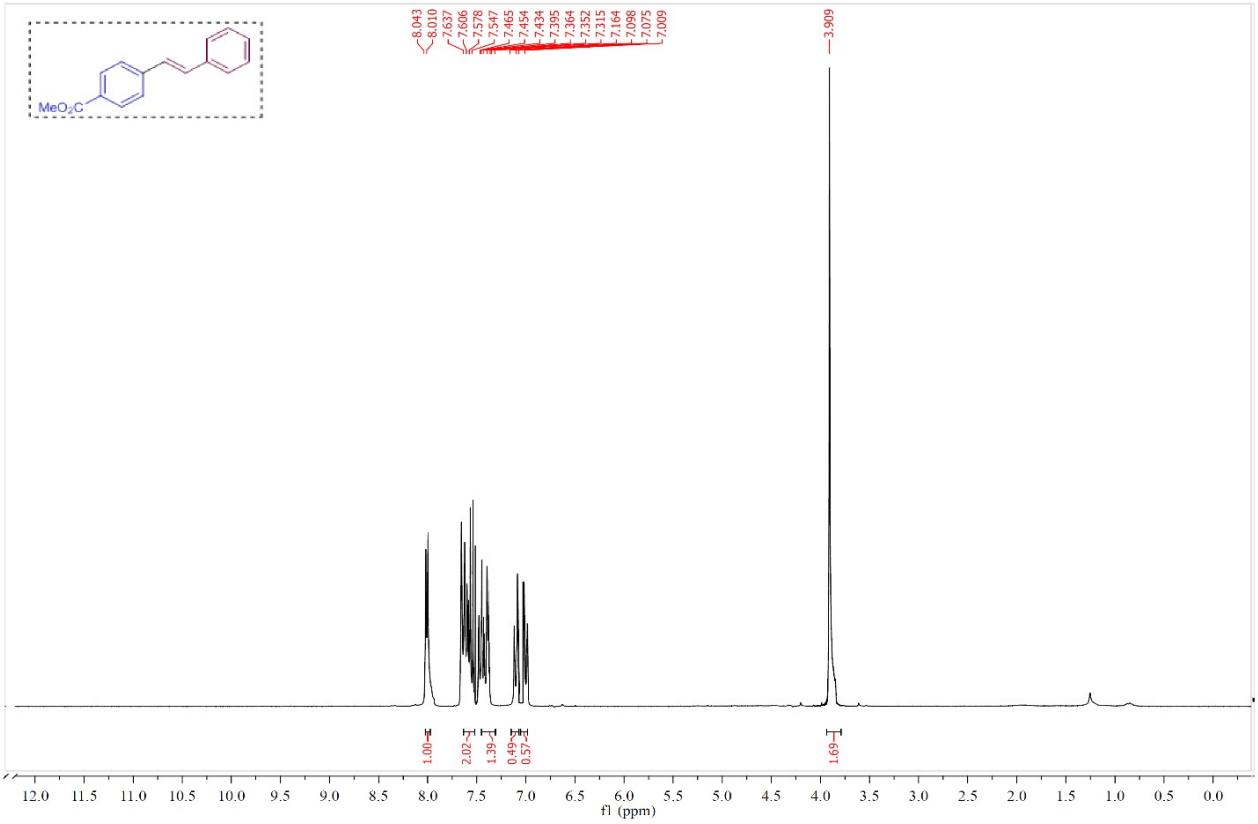

166.220
142.322
138.843
132.584
128.357
121.846
118.655
113.275
64.916
30.650
19.450
13.685
NC
O
O
f1 (ppm)

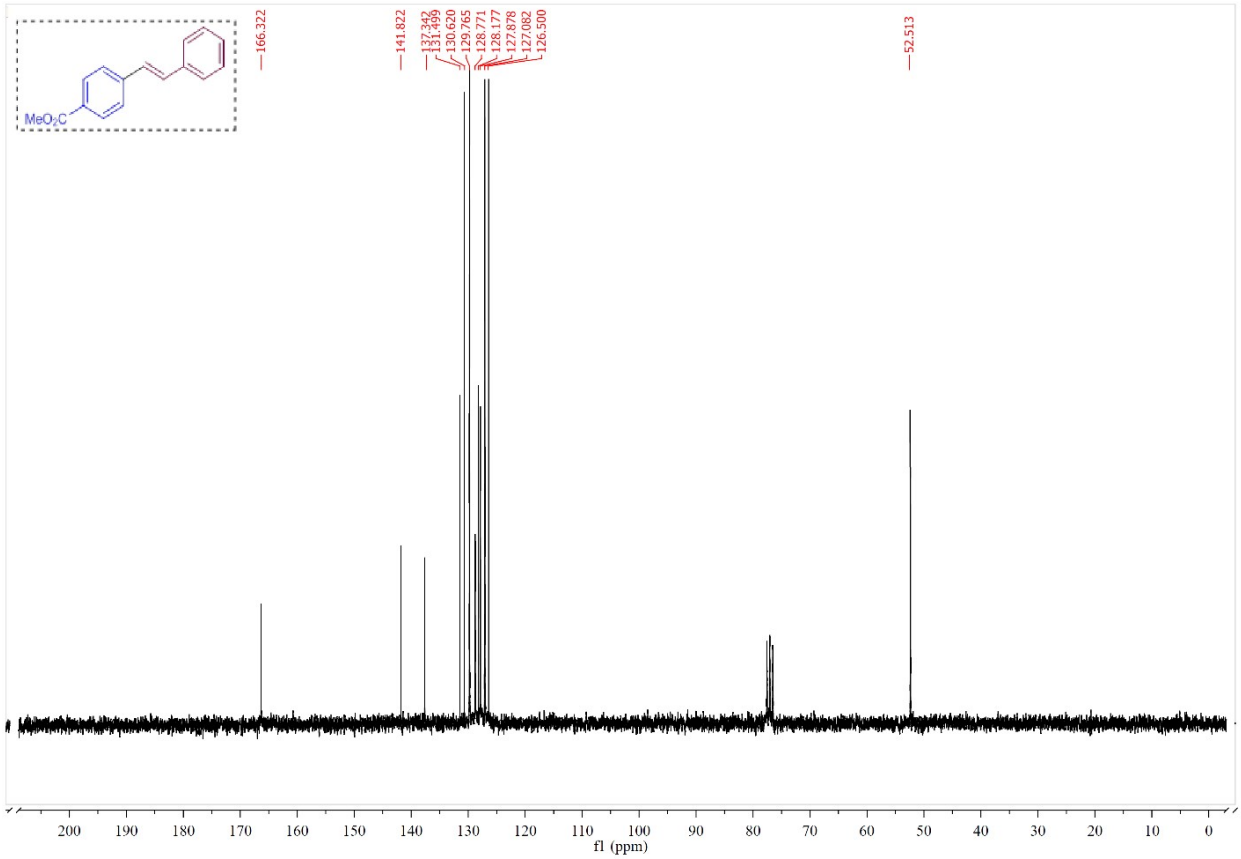

7.510
7.507
7.500
7.491
7.487
7.481
7.477
7.371
7.341
7.312
7.258
7.249
7.244
7.239
7.232
7.228
7.112
7.101
7.091
7.072
7.90
4.22
2.00
4.01
fl (ppm)


137.799
136.775
128.704
128.260
127.455
126.910
126.462
fl (ppm)


7.662
7.629
7.568
7.548
7.527
7.514
7.498
7.475
7.461
7.451
7.338
7.322
7.291
7.273
7.248
7.226
7.213
7.163
7.096
7.082
7.020
3.837
3.814
3.795
3.151
3.135
3.115
1.00
2.04
1.43
1.00
2.01
2.00
12.0 11.5 11.0 10.5 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
f1 (ppm)


151.076
138.059
129.833
128.794
128.509
127.955
126.882
115.885
67.134
48.736
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


MeO2C
8.043
8.010
7.637
7.606
7.578
7.547
7.465
7.454
7.434
7.395
7.364
7.352
7.315
7.164
7.098
7.075
7.009
3.909
1.00
2.02
1.39
0.49
0.57
1.69
fl (ppm)


MeO2C
166.322
141.822
137.342
131.499
130.620
129.765
128.771
128.177
127.878
127.082
126.500
52.513
fl (ppm)