Supporting Information

Rapid Access to Cinnamamides and Piper Amides via Three Component Coupling of Arylaldehyde, Amines, and Meldrum's Acid

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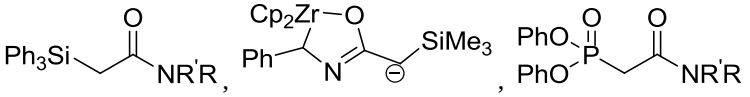
Experimental:

General: All reactions involving air- or moisture-sensitive reagents or intermediates were carried out in oven-dried glassware under an argon atmosphere. Dichloromethane (CH_2Cl_2) was freshly distilled from phosphorus(V)oxide (P_2O_5). Commercial grade xylene, benzene and toluene were distilled over CaH_2 before use. All other solvents and reagents were purified according to standard procedures or were used as received from Aldrich, Acros, Merck and Spectrochem. ^1H, ^{13}C NMR spectroscopy: *Bruker 600 MHz* (at 298 K), *Bruker 400 MHz* (at 298 K). Chemical shifts, δ (in ppm), are reported relative to TMS δ (^1H) 0.0 ppm, δ (^{13}C) 0.0 ppm) which was used as the inner reference. Otherwise the solvents residual proton resonance and carbon resonance ($CHCl_3$, δ (^1H) 7.26 ppm, δ (^{13}C) 77.2 ppm; CD_3OD, (^1H) 3.31 ppm, δ (^{13}C) 49.0 ppm) were used for calibration. Column chromatography: Merck or Spectrochem silica gel 60-120 under gravity. MS (ESI-HRMS): Mass spectra were recorded on an Agilent Accurate-Mass Q-TOF LC/MS 6520, and peaks are given in *m/z* (% of basis peak). IR: IR spectra were recorded on an Agilent Accurate-Mass Q-TOF LC/MS 6520.

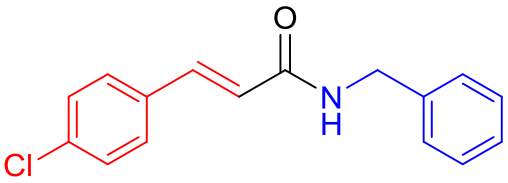
Table s1: Comparison with known methods.

Number of steps from Arylaldehyde[a]	Overall yield (range)	Coupling agents, regents/catalyst, oxidants, base, etc. leading to chemical waste	Refer ence
Cinnamamide from cinnamaldehyde			
4-5	7-56%	Phosphine based Wittig salt, K-^{t}OBu, cobalt(II) chloride, PPh_3, NH_2OH, diacetoxyiodobenzene (DIB), Ionic liquid, [Rh(OTf)($trop_2NH$)(PPh_3)], Methylmethacrylate, K_3PO_4, $PhI(OAc)_2$, Cs_2CO_3, K_2CO_3, N-hydroxysuccinimide (NHSI), N-heterocylic carbine (NHC) (For structure see the manuscript. Schme-1), TEMPO, 3,3′,5,5′-tetra-*tert*-butyldiphenoquinone, $HBF_4.OEt_2$, Trifluoromethane sulfonic acid (TfOH),	10a – 10l
Cinnamamide from cinnamic acid			
2	42 -90%	Pyridine (as solvent), piperidine, (Benzotriazol-1-yloxy)tris(dimethylamino)phosphonium hexafluorophosphate (BOP), 1-tert-butoxy-2-tert-butoxycarbonyl-1,2-dihydroisoquinoline (BDDI), PhSiH3, Butyl(hydroxy)stannanone, $PPh_3/CBrCl_3$, Zr-complex, PPh_3/NCBT (*N*-chlorobenzotriazole), Et_3N, $ZrCp_2Cl_2$ or $ZrCl_4$, silicone supported boronic acid, TiO_2, $PhSiH_2$.	9a - 9q
Cinnamamide from arylaldehyde			
1 (3 or more steps are used to prepare the ylide precursor)	38 - 90% (E/Z selectivity was poor for some cases)		11a - 11d
This method			
1	58 - 73%	No additional reagents used. CO_2 and acetone are the byproducts.	

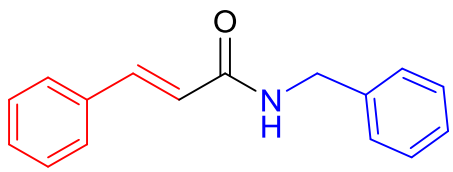
[a]Arylaldehyde was taken as the starting materials for the comparison.

General procedure for the synthesis of cinnamamide (GP I): Arylaldehyde (0.94 – 0.56 mmol) was added to a solution of amine (0.94 – 0.56 mmol) and Meldrum's acid (0.94 – 0.56 mmol) in toluene (2 – 4 mL) and the mixture was refluxed (110 ^oC) for 8 h. After disappearance of starting materials (indicated by TLC), solvent was evaporated under reduced pressure. The crude mixture was purified by column chromatography to get analytically pure product.

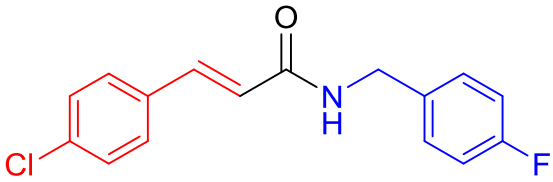
(*E*)-*N*-benzyl-3-(4-chlorophenyl)acrylamide (6a)[6]: According to GP I, 4-chlorobenzaldehyde (0.10 g, 0.71 mmol), benzylamine (76 mg, 0.71 mmol) and Meldrum's acid (0.10 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6a** as white solid (0.14 g, 68%). ^{1}H NMR (600 MHz, $CDCl_3$) δ = 7.64 (d, *J* = 15.6 Hz, 1H), 7.43 (d, *J* = 8.4 Hz, 3H), 7.39 – 7.29 (m, 6H), 6.41 (d, *J* = 15.6 Hz, 1H), 6.07 (br. s, 1H), 4.59 (d, *J* = 5.8 Hz, 2H) ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ = 165.5, 140.1, 138.1, 135.6, 133.2, 129.1, 129.0, 128.8, 127.9, 127.7, 120.9, 43.9 ppm.



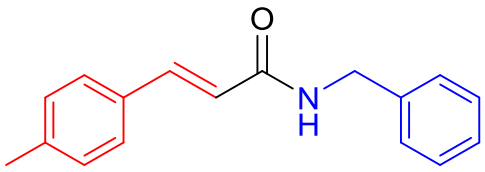
(*E*)-*N*-benzylcinnamamide (6b)[1,6]: According to GP I, benzaldehyde (0.1 g, 0.94 mmol), benzylamine (0.1 g, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6b** as white solid (0.14 g, 63%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.56 (d, *J* = 15.6 Hz, 1H), 7.37 – 7.35 (m, 2H), 7.26 – 7.13 (m, 8H), 6.38 (d, *J* = 15.6 Hz, 1H), 6.36 (br. s, 1H), 4.43 (d, *J* = 5.8 Hz, 2H). ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 166.0, 141.3, 138.3, 134.8, 129.7, 128.8, 128.7, 127.9, 127.8, 127.5, 120.7, 43.82 ppm.



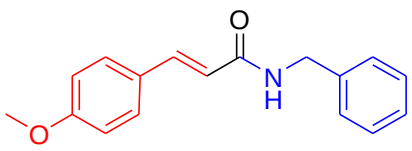
(*E*)-*N*-(4-fluorobenzyl)-3-(4-chlorophenyl)acrylamide (6c): According to GP I, 4-chlorobenzaldehyde (0.10 g, 0.71 mmol), 4-fluorobenzylamine (89 mg, 0.71 mmol) and Meldrum's acid (0.10 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6c** as colouerless gum (0.13 g, 63%). FTIR: $\tilde{\nu}$ = 3288, 1654, 1622, 1510, 1224, 1091, 821 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.56 (d, *J* = 15.6 Hz, 1H), 7.36 (d, *J* = 8.4 Hz, 2H), 7.30 – 7.20 (m, 4H), 6.96 (t, *J* = 8.4 Hz, 2H), 6.30 (d, *J* = 15.6 Hz, 1H), 5.84 (br. s, 1H), 4.48 (d, *J* = 5.7 Hz, 2H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 164.4, 139.4, 134.7, 132.9, 132.1, 128.6, 128.6, 128.1, 128.0, 119.7, 114.7, 114.5, 42.2 ppm. (Increased number of ^{13}C signal is observed due to F-coupling). HRMS: Exact mass calculated for $C_{16}H_{13}ClFNO$ ($[M+H]^+$): 290.0742, Found: 290.0742.



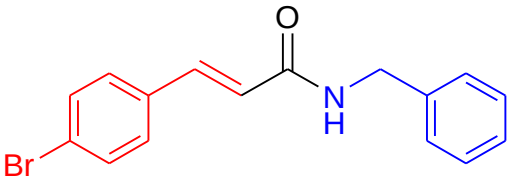
(*E*)-*N*-benzyl-3-*p*-tolylacrylamide (6d)[7]: According to GP I, 4-methylbenzaldehyde (0.10 g, 0.82 mmol), benzylamine (88 mg, 0.82 mmol) and Meldrum's acid (1.20 g, 0.82 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6d** as white solid (0.13 g, 63%). ^{1}H NMR (600 MHz, $CDCl_3$) δ = 7.66 (d, *J* = 15.6 Hz, 1H), 7.39 (d, *J* = 7.8 Hz, 2H), 7.37 – 7.31 (m, 4H), 7.31 – 7.26 (m, 1H), 7.16 (d, *J* = 7.8 Hz, 2H), 6.43 (d, *J* = 15.6 Hz, 1H), 6.29 (br. s, 1H), 4.56 (d, *J* = 5.6 Hz, 2H), 2.37 (s, 3H) ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ = 166.1, 141.3, 140.0, 138.3, 132.1, 129.5, 128.7, 127.9, 127.8, 127.5, 119.5, 43.2, 21.4 ppm.



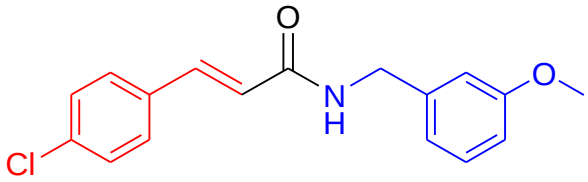
(*E*)-*N*-benzyl-3-(4-methoxyphenyl)acrylamide (6e)[6]: According to GP I, 4-methoxy benzaldehyde (0.10 g, 0.94 mmol), benzylamine (0.10 g, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:3) to get analytically pure product **6e** as white solid (0.18 g, 70%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.53 (d, *J* = 15.6 Hz, 1H), 7.33 (d, *J* = 8.7 Hz, 2H), 7.27 – 7.16 (m, 5H), 6.77 (d, *J* = 8.7 Hz, 2H), 6.23 (d, *J* = 15.6 Hz, 1H), 6.10 (br. s, 1H), 4.46 (d, *J* = 5.8 Hz, 2H), 3.73 (s, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 166.2, 160.9, 140.9, 138.4, 129.4, 128.7, 127.9, 127.54, 127.48, 118.2, 114.3, 55.3, 43.8 ppm.



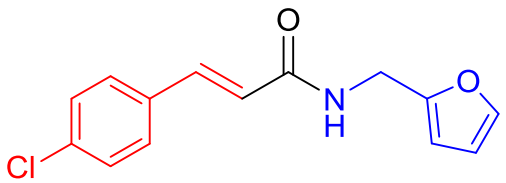
(*E*)-*N*-benzyl-3-(4-bromophenyl)acrylamide (6f)[6]: According to GP I, 4-bromo benzaldehyde (0.10 g, 0.54 mmol), benzylamine (58 mg, 0.54 mmol) and Meldrum's acid (78 mg, 0.54 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6f** as white solid (0.12 g, 70%). ^{1}H NMR (600 MHz, $CDCl_3$) δ = 7.59 (d, *J* = 15.6 Hz, 1H), 7.48 (d, *J* = 8.4 Hz, 2H), 7.35 – 7.26 (m, 7H), 6.40 (d, *J* = 15.6 Hz, 1H), 6.06 (br. s, 1H), 4.56 (d, *J* = 6.0 Hz, 2H). ^{13}C NMR (151 MHz, $CDCl_3$) δ = 165.4, 140.2, 138.1, 133.7, 132.1, 129.2, 128.8, 127.9, 127.7, 123.9, 121.1, 43.9.



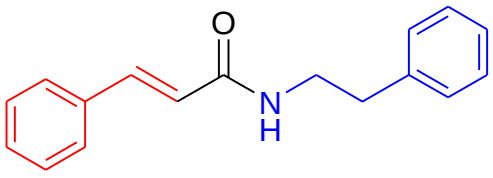
(*E*)-*N*-(4-methoxybenzyl)-3-(4-chlorophenyl)acrylamide (6g): According to GP I, 4-chloro benzaldehyde (0.10 g, 0.71 mmol), 3-methoxylbenzylamine (98 mg, 0.71 mmol) and Meldrum's acid (0.1 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6g** as colouerless gum (0.15 g, 68%). FTIR: $\tilde{\nu}$ = 2917, 2850, 1735, 1656, 1619, 1491, 1465, 1243, 1091, 1027, 821, 752 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.58 (d, *J* = 15.6 Hz, 1H), 7.41 (d, *J* = 8.4 Hz, 2H), 7.31 – 7.28 (m, 4H), 6.96 – 6.87 (m, 2H), 6.35 (d, *J* = 15.6 Hz, 1H), 6.12 (br. s, 1H), 4.57 (d, *J* = 6.0 Hz, 2H), 3.88 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.3, 157.6, 139.6, 135.4, 133.4, 130.0, 129.0, 128.9, 126.1, 121.4, 120.8, 110.3, 55.4, 39.7 ppm. (Reduced number of ^{13}C signal is observed due to overlapping in aromatic region). HRMS: Exact mass calculated for $C_{17}H_{16}ClNO_2$ ($[M+H]^+$): 302.0942, Found: 302.0947.



(*E*)-3-(4-chlorophenyl)-*N*-((furan-2-yl)methyl)acrylamide (6h): According to GP I, 4-chlorobenzaldehyde (0.10 g, 0.71 mmol), furfurylamine (70 mg, 0.71 mmol) and Meldrum's acid (0.1 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:3) to get analytically pure product **6h** as colourless gum (0.12 g, 62%). FTIR: $\tilde{\nu}$ = 3287, 1655, 1625, 1551, 1491, 1405, 1328, 1225, 1149, 1090, 975, 820, 737 cm^{-1}. ^{1}H NMR (600 MHz, $CDCl_3$) δ = 7.61 (d, *J* = 15.6 Hz, 1H), 7.42 (d, *J* = 8.4 Hz, 2H), 7.37 – 7.33 (m, 3H), 6.36 (d, *J* = 15.6 Hz, 1H), 6.34 – 6.33 (m, 1H), 6.29 – 6.27 (m, 1H), 5.95 (br. s, 1H), 4.57 (d, *J* = 5.4 Hz, 2H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.3, 151.0, 142.3, 140.3, 135.6, 133.2, 129.1, 129.0, 120.7, 110.6, 107.7, 36.7 ppm. HRMS: Exact mass calculated for $C_{14}H_{12}ClNO_2$ ($[M+H]^+$): 262.0629, Found: 262.0624.

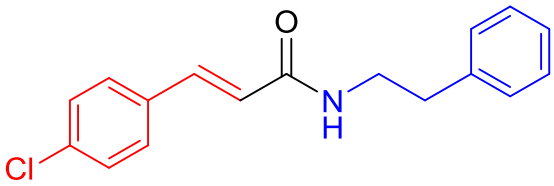


(*E*)-*N*-phenethylcinnamamide (6i)[9]: According to GP I, benzaldehyde (0.1 g, 0.94 mmol), phenethylamine (0.10 g, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:5) to get analytically pure product **6i** as colouerless liquid (0.14 g,

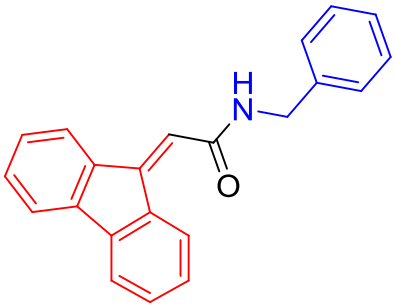


61%). 1H NMR (400 MHz, $CDCl_3$) δ = 7.54 (d, *J* = 15.6 Hz, 1H), 7.42 – 7.52 (m, 2H), 7.30 – 7.23 (m, 5H), 7.19 – 7.14 (m, 3H), 6.25 (d, *J* = 15.6 Hz, 1H), 5.64 (br. s, 1H), 3.61 – 3.56 (m, 2H), 2.84 – 2.80 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.9, 141.1, 138.9, 134.8, 129.7, 128.8, 128.8, 128.7, 127.8, 126.6, 120.6, 40.8, 35.7 ppm.

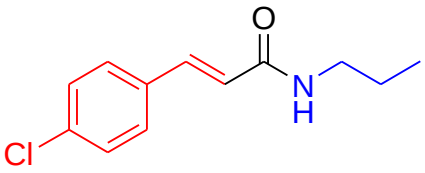
(*E*)-3-(4-chlorophenyl)-*N*-phenethylacrylamide (6j)[8]: According to GP I, 4-chloro benzaldehyde (0.1 g, 0.71 mmol), phenethylamine (86 mg, 0.71 mmol) and Meldrum's acid (0.1 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:5) to get analytically pure product **6j** as colouerless liquid (0.13 g, 67%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.50 (d, *J* = 15.6 Hz, 1H), 7.34 (d, *J* = 8.4 Hz, 2H), 7.28 – 7.24 (m, 4H), 7.19 – 7.16 (m, 3H), 6.21 (d, *J* = 15.6 Hz, 1H), 5.56 (br. s, 1H), 3.62 – 3.57 (m, 2H), 2.82 (t, *J* = 6.8 Hz, 2H). ^{13}C NMR (151 MHz, $CDCl_3$) δ = 165.5, 139.8, 138.8, 135.5, 133.3, 129.1, 128.9, 128.8, 128.7, 126.6, 121.1, 40.8, 35.6 ppm.



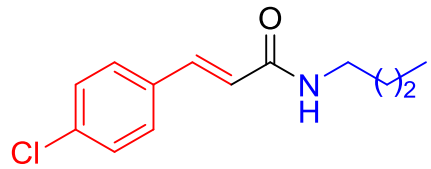
(*E*)-N-benzyl-3-(9*H*-fluoren-9-yl)acrylamide (6k): According to GP I, 9-fluorenone (0.10 g, 0.56 mmol), benzylamine (59.0 mg, 0.56 mmol) and Meldrum's acid (80 mg, 0.56 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6k** as yellow solid (0.11 g, 60%). Mp: 167 – 169 °C. FTIR: $\tilde{\nu}$ = 3295, 2918, 2850, 1644, 1628, 1529, 1441, 1247, 1232, 780, 727, 698 cm^{-1}. ^{1}H NMR (600 MHz, $CDCl_3$) δ = 8.56 (d, *J* = 7.8 Hz, 1H), 7.67 - 7.64 (m, 2H), 7.41 - 7.37 (m, 6H), 7.35 – 7.34 (m, 1H), 7.28 - 7.24 (m, 3H), 6.76 (s, 1H), 6.29 (br. s, 1H), 4.66 (d, *J* = 5.6 Hz, 2H) ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ = 166.1, 143.6, 141.9, 140.4, 138.6, 137.7, 135.3, 130.2, 129.9, 128.9, 128.2, 127.9, 127.79, 127.77, 127.3, 120.7, 119.8, 119.6, 117.1, 44.0 ppm. HRMS: Exact mass calculated for $C_{22}H_{17}NO$ ($[M+H]^+$): 312.1383, Found: 312.1388.



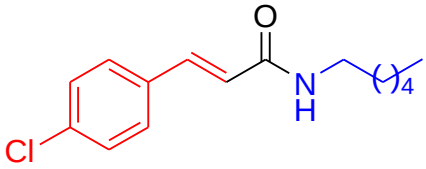
(*E*)-3-(4-chlorophenyl)-*N*-propylacrylamide (6l): According to GP I, 4-chlorobenzaldehyde (0.10 g, 0.71 mmol), n-propylamine (42 mg, 0.71 mmol) and Meldrum's acid (0.10 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6l** as colourless gum (0.10 g, 68%). FTIR: $\tilde{\nu}$ = 3281, 2963, 2927, 1656, 1618, 1551, 1510, 1491, 1406, 1337, 1222, 1092, 1013, 979, 820 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ = 7.51 (d, *J* = 15.6 Hz, 1H), 7.36 (d, *J* = 8.4 Hz, 2H), 7.27 (d, *J* = 8.4 Hz, 2H), 6.29 (d, *J* = 15.6 Hz, 1H), 5.57 (br. s, 1H), 3.32 – 3.27 (m, 2H), 1.56 – 1.50 (m, 2H), 0.90 (t, *J* = 7.4 Hz, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.6, 139.7, 135.5, 133.4, 129.1, 128.9, 121.2, 41.6, 22.9, 11.4 ppm. HRMS: Exact mass calculated for $C_{12}H_{14}ClNO$ ($[M+H]^+$): 224.0837, Found: 224.0837.



(*E*)-*N*-butyl-3-(4-chlorophenyl)acrylamide (6m)[2]: According to GP I, 4-cholorobenzaldehyde (0.10 g, 0.71 mmol), n-butylamine (52 mg, 0.71 mmol) and Meldrum's acid (0.10 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **6m** as colourless gum (0.10 g, 63%). ^1H NMR (400 MHz, $CDCl_3$) δ = 7.59 (d, *J* = 15.6 Hz, 1H), 7.45 (d, *J* = 8.4 Hz, 2H), 7.36 (d, *J* = 8.4 Hz, 2H), 6.36 (d, *J* = 15.6 Hz, 1H), 5.60 (br. s, 1H), 3.44 – 3.39 (m, 2H), 1.62 – 1.54 (m, 2H), 1.46 – 1.39 (m, 2H), 0.97 (t, *J* = 7.4 Hz, 3H). ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ = 165.5, 149.7, 139.6, 136.8, 129.1, 128.9, 121.3, 39.6, 31.7, 20.1, 13.8 ppm.

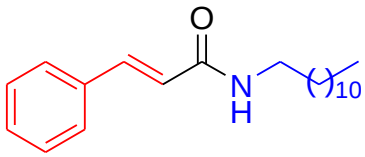


(*E*)-3-(4-chlorophenyl)-*N*-hexylacrylamide (6n): According to GP I, 4-chlorobenzaldehyde (0.1g, 0.71 mmol), n-hexylamine (72 mg, 0.71 mmol) and Meldrum's acid (0.1 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:5) to get analytically pure product **6n** as white solid (0.12 g, 62%). Mp: 113 – 115°C. FTIR: $\tilde{\nu}$ = 3286, 2927, 2857, 1654, 1619, 1545, 1491, 1339, 1221, 1094, 972, 820 cm^{-1}. ^1H NMR (400 MHz, $CDCl_3$) δ = 7.50 (d, *J* = 15.4 Hz, 1H), 7.36 (d, *J* = 8.4 Hz, 2H), 7.27 (d, *J* = 8.4 Hz, 2H), 6.27 (d, *J* = 15.4 Hz, 1H), 5.52 (br. s, 1H), 3.34 – 2.29 (m, 2H), 1.42 – 1.05 (m, 8H), 0.84 – 0.81 (m, 3H) ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ = 165.5, 139.5, 135.4, 133.4,

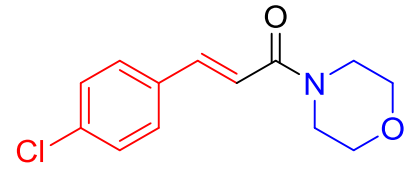


129.1, 128.9, 121.3, 39.85, 31.48, 29.6, 26.6, 22.6, 14.0 ppm. HRMS: Exact mass calculated for $C_{15}H_{20}ClNO$ ($[M+H]^+$): 266.1306, Found: 266.1304.

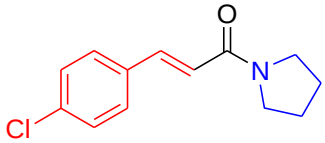
(*E*)-*N*-decylcinnamamide (6o)[12]: According to GP I, benzaldehyde (0.10 g, 0.94 mmol), n-dodecylamine (0.18 g, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:5) to get analytically pure product **6o** as white solid (0.19 g, 71%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.62 (d, *J* = 15.6 Hz, 1H), 7.53 – 7.45 (m, 2H), 7.40 – 7.31 (m, 3H), 6.39 (d, *J* = 15.6 Hz, 1H), 5.59 (br. s, 1H), 3.41 – 3.36 (m, 2H), 1.60 – 1.53 (m, 7H), 1.33 – 1.26 (m, 13H), 0.88 (t, *J* = 6.8 Hz, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.8, 140.8, 134.9, 129.6, 128.8, 127.7, 120.8, 39.8, 31.9, 29.7, 29.64, 29.62, 29.58, 29.54, 29.3, 29.3, 26.0, 22.7, 14.1 ppm.



(*E*)-3-(4-chlorophenyl)-1-morpholinoprop-2-en-1-one (6p)[4]: According to GP I, 4-chlorobenzaldehyde (0.1 g, 0.71 mmol), morpholine (62 mg, 0.71 mmol) and Meldrum's acid (0.10 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:2) to get analytically pure product **6p** as white solid (0.11 g, 61%). Mp: 142 – 143°C. FTIR: $\tilde{\nu}$ = 2966, 2917, 2851, 1648, 1610, 1494, 1430, 1405, 1230, 1112, 1048, 1011, 820 cm^{-1}. ^{1}H NMR (600 MHz, $CDCl_3$) δ = 7.64 (d, *J* = 15.4 Hz, 1H), 7.44 (d, *J* = 8.4 Hz, 2H), 7.34 (d, *J* = 8.4 Hz, 2H), 6.81 (d, *J* = 15.4 Hz, 1H), 3.76 – 3.62 (m, 8H). ppm. ^{13}C NMR (151 MHz, $CDCl_3$) δ = 165.3, 141.9, 135.6, 133.6, 129.1, 129.0, 117.0, 66.8, 46.3, 42.5 ppm. HRMS: Exact mass calculated for $C_{13}H_{14}ClNO_2$ ($[M+H]^+$): 252.0786, Found: 252.0789.

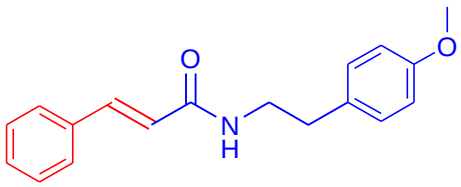


(*E*)-3-(4-chlorophenyl)-1-(pyrrolidin-1-yl)prop-2-en-1-one (6q)[3]: According to GP I, 4-chlorobenzaldehyde (0.10 g, 0.71 mmol), pyrrolidine (51 mg, 0.71 mmol) and Meldrum's acid (0.10 g, 0.71 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:2) to get analytically pure product **6q** as white solid (0.12 g, 70%). ^{1}H NMR (400 MHz, DCl_3) δ = 7.62 (d, *J* = 15.6 Hz, 1H), 7.43 (d, *J* = 8.4 Hz, 2H), 7.31 (d, *J* = 8.4 Hz, 2H), 6.68 (d, *J* = 15.6 Hz, 1H), 3.62 – 3.55 (m, 4H), 2.02 – 1.97 (m,

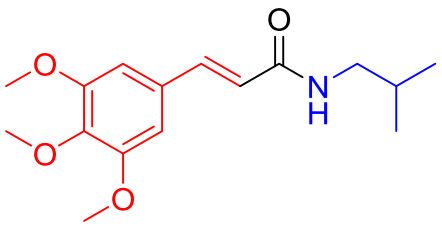


2H), 1.91 – 1.85 (m, 2H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 164.4, 140.3, 135.3, 133.9, 129.00, 119.4, 46.6, 46.1, 26.1, 24.3 ppm.

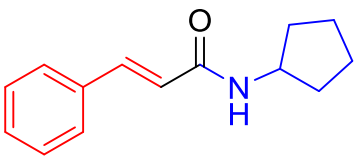
(*E*)-*N*-(4-methoxyphenethyl)cinnamamide (8a)[7]: According to GP I, benzaldehyde (0.1 g, 0.94 mmol), 4-methoxyphenethylamine (0.14 g, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **8a** as colourless gum (0.18 g, 68%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.62 (d, *J* = 15.4 Hz, 1H), 7.49 – 7.46 (m, 2H), 7.36 – 7.34 (m, 3H), 7.14 (d, *J* = 8.4 Hz, 2H), 6.86 (d, *J* = 8.4 Hz, 2H), 6.33 (d, *J* = 15.4 Hz, 1H), 5.70 (br. s, 1H), 3.80 (s, 3H), 3.65 – 3.60 (m, 2H), 2.85 – 2.81 (m, 2H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.9, 158.3, 141.1, 134.8, 130.8, 129.8, 129.7, 128.8, 127.8, 120.5, 114.1, 55.3, 41.0, 34.7 ppm.



(*E*)-*N*-isobutyl-3-(3,4,5-trimethoxyphenyl)acrylamide (8b): According to GP I, 3,4,5-trimethoxybenzaldehyde (0.10 g, 0.51 mmol), isobutylamine (37 mg, 0.51 mmol) and Meldrum's acid (73 mg, 0.51 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:3) to get analytically pure product **8b** as white solid (90 mg, 60%). Mp: 145 – 146°C. FTIR: $\tilde{\nu}$ = 3302, 2917, 2850, 1736, 1655, 1619, 1581, 1546, 1508, 1467, 1417, 1323, 1281, 1241, 1210, 993, 823 cm^{-1}. ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.48 (d, *J* = 15.4 Hz, 1H), 6.66 (s, 2H), 6.27 (d, *J* = 15.4 Hz, 1H), 5.70 (br. s, 1H), 3.81 (s, 6H), 3.80 (s, 3H), 3.18 – 3.14 (m, 2H), 1.81 – 1.75 (m, 1H), 0.89 (d, *J* = 6.8 Hz, 6H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.9, 153.4, 141.0, 139.5, 130.4, 120.0, 104.9, 61.0, 56.1, 47.1, 28.6, 20.2 ppm. HRMS: Exact mass calculated for $C_{16}H_{23}NO_4$ ([M+H]$^+$): 294.1700, Found: 294.1700.

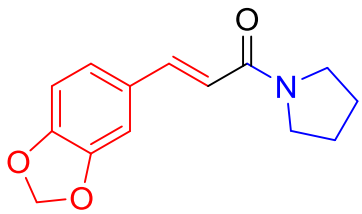


(*E*)-*N*-cyclopentylcinnamamide (8c)[12]: According to GP I, benzaldehyde (0.10 g, 0.94 mmol), cyclopentylamine (82 mg, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **8c** as white solid (0.14 g, 70%). Mp: 144 – 145°C. FTIR: $\tilde{\nu}$ = 3256, 2959, 2870, 1655, 1615, 1543, 1449, 1338, 1225, 978, 765, 701 cm^{-}

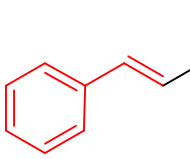


[1]. ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.61 (d, *J* = 15.6 Hz, 1H), 7.50 – 7.48 (m, 2H), 7.36 – 7.34 (m, 3H), 6.36 (d, *J* = 15.6 Hz, 1H), 5.63 (br. s, 1H), 4.37 – 4.32 (m, 1H), 2.10 – 2.02 (m, 2H), 1.72 – 1.61 (m, 4H), 1.47 – 1.41 (m, 2H). ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 165.5, 140.8, 134.9, 129.6, 128.8, 127.7, 120.9, 51.5, 33.3, 23.8 ppm. HRMS: Exact mass calculated for $C_{14}H_{17}NO$ ($[M+H]^+$): 216.1383, Found: 216.1389.

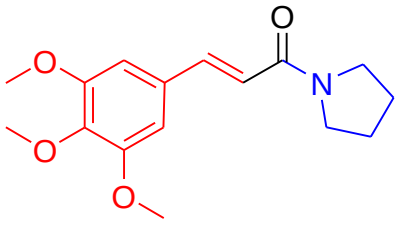
(*E*)-3-(benzo[*d*][1,3]dioxol-5-yl)-1-(pyrrolidin-1-yl)prop-2-en-1-one (8d)[7]: According to GP I, piperonyl aldehyde (0.10 g, 0.66 mmol), pyrrolidine (47 mg, 0.66 mmol) and Meldrum's acid (96 mg, 0.66 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:1) to get analytically pure product **8d** as white solid (98 mg, 58%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.57 (d, *J* = 15.4 Hz, 1H), 7.03 – 6.95 (m, 2H), 6.76 (d, *J* = 8.0 Hz, 1H), 6.53 (d, *J* = 15.4 Hz, 1H), 5.95 (s, 2H), 3.60 – 3.54 (m, 4H), 2.00 – 1.95 (m, 2H), 1.90 – 1.83 (m, 2H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 164.8, 148.9, 148.2, 141.4, 129.8, 123.8, 116.9, 108.5, 106.4, 101.4, 46.5, 46.0, 26.1, 24.3 ppm.



(*E*)-3-phenyl-1-(pyrrolidin-1-yl)prop-2-en-1-one (8e)[6,7]: According to GP I, benzaldehyde (0.10 g, 0.94 mmol), pyrrolidine (67 mg, 0.94 mmol) and Meldrum's acid (0.14 g, 0.94 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:1) to get analytically pure product **8e** as white solid (0.13 g, 72%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.63 (d, *J* = 15.6 Hz, 1H), 7.51 – 7.42 (m, 2H), 7.35 – 7.23 (m, 3H), 6.66 (d, *J* = 15.6 Hz, 1H), 3.64 – 3.57 (m, 4H), 2.03 – 1.97 (m, 2H), 1.93 – 1.88 (m, 2H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 164.7, 141.7, 135.4, 129.5, 128.8, 127.8, 118.9, 46.6, 46.1, 26.2, 24.4 ppm.

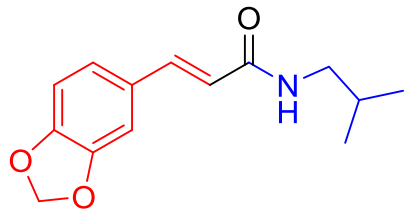


(*E*)-3-(3,4,5-trimethoxyphenyl)-1-(pyrrolidin-1-yl)prop-2-en-1-one (8f)[5]: According to GP I, 3,4,5-trimethoxybenzaldehyde (0.10 g, 0.51 mmol), pyrrolidine (36 mg, 0.51 mmol) and Meldrum's acid **1** (73 mg, 0.51 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:1) to get analytically pure product **8f** as white solid (91 mg, 64%). ^{1}H NMR (600 MHz, $CDCl_3$) δ =

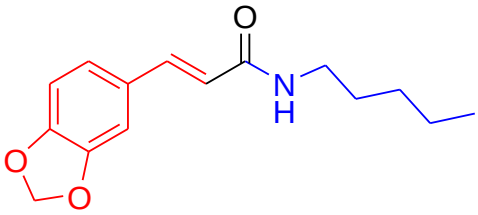


7.59 (d, *J* = 15.4 Hz, 1H), 6.73 (s, 2H), 6.60 (d, *J* = 15.4 Hz, 1H), 3.87 (s, 6H), 3.85 (s, 3H), 3.64 – 3.62 (m, 2H), 3.59 – 3.56 (m, 2H), 2.02 – 1.96 (m, 3H), 1.92 – 1.85 (m, 2H). ^{13}C NMR (151 MHz, $CDCl_3$) δ = 164.7, 153.4, 141.8, 139.6, 130.9, 118.1, 105.1, 60.9, 56.2, 46.6, 46.1, 26.1, 24.3 ppm.

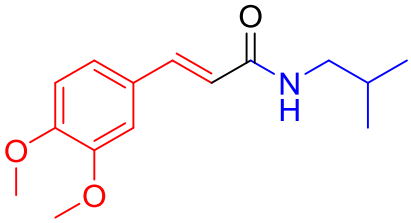
(*E*)-3-(benzo[*d*][1,3]dioxol-5-yl)-*N*-isobutylacrylamide (8g)[7]: According to GP I, piperonyl aldehyde (0.10 g, 0.66 mmol), isobutylamine (50 mg, 0.66 mmol) and Meldrum's acid (96 mg, 0.66 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:2) to get analytically pure product **8g** as white solid (0.12 g, 73%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.54 (d, *J* = 15.5 Hz, 1H), 7.00 – 6.97 (m, 2H), 6.79 (d, *J* = 7.8 Hz, 1H), 6.24 (d, *J* = 15.5 Hz, 1H), 5.99 (s, 2H), 5.73 (br. s, 1H), 3.23 – 3.20 (m, 2H), 1.87 – 1.81 (m, 1H), 0.95 (d, *J* = 6.8 Hz, 6H). ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 166.2, 149.0, 148.2, 140.9, 129.2, 123.9, 118.6, 108.5, 106.3, 101.4, 47.2, 28.6, 20.2 ppm.



(*E*)-3-(benzo[*d*][1,3]dioxol-5-yl)-*N*-pentylacrylamide (8h)[11]: According to GP I, piperonyl aldehyde (0.10 g, 0.66 mmol), amylamine (58 mg, 0.66 mmol) and Meldrum's acid (96 mg, 0.66 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **8h** as white solid (0.11 g, 64%). ^{1}H NMR (400 MHz, $CDCl_3$) δ = 7.53 (d, *J* = 15.6 Hz, 1H), 7.01 – 6.95 (m, 2H), 6.79 (d, *J* = 7.6 Hz, 1H), 6.20 (d, *J* = 15.6 Hz, 1H), 5.98 (s, 2H), 5.59 (br. s, 1H), 3.39 – 3.34(m, 2H), 1.60 – 1.53 (m, 2H), 1.35 – 1.33 (m, 4H), 0.90 (t, *J* = 6.8 Hz, 3H) ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 166.0, 149.0, 148.2, 140.5, 129.3, 123.8, 118.9, 108.5, 106.3, 101.4, 39.8, 29.4, 29.1, 22.4, 14.0 ppm.



(*E*)-*N*-isobutyl-3-(3,4-dimethoxyphenyl)acrylamide (8i)[7]: According to GP I, 3,4-dimethoxybenzaldehyde (0.10 g, 0.60 mmol), isobutylamine (44 mg, 0.60 mmol) and Meldrum's acid (87 mg, 0.60 mmol) was reacted for 8 h and the crude mixture was purified by coloum chromatography (Silica gel; EtOAc: Hexane, 1:4) to get analytically pure product **8i** as white solid (0.10 g, 65%). ^{1}H NMR (600 MHz, $CDCl_3$) δ = 7.58 (d, *J* = 15.6Hz, 1H), 7.09 (d, *J* = 7.8 Hz, 1H), 7.03 (s, 1H), 6.86 (d, *J* = 8.4 Hz, 1H), 6.27 (d, *J* = 15.6 Hz, 1H), 5.59 (br. s, 1H), 3.912 (s, 3H), 3.907 (s, 3H), 3.23 – 3.21 (m, 2H), 1.86 – 1.82 (m, 1H), 0.96 (d, *J* = 7.2 Hz, 6H). ppm. ^{13}C NMR (101 MHz, $CDCl_3$) δ = 166.2, 150.5, 149.1, 140.9, 127.8, 121.9, 118.6, 111.1, 109.6, 56.0, 55.9, 47.1, 28.7, 20.2 ppm.



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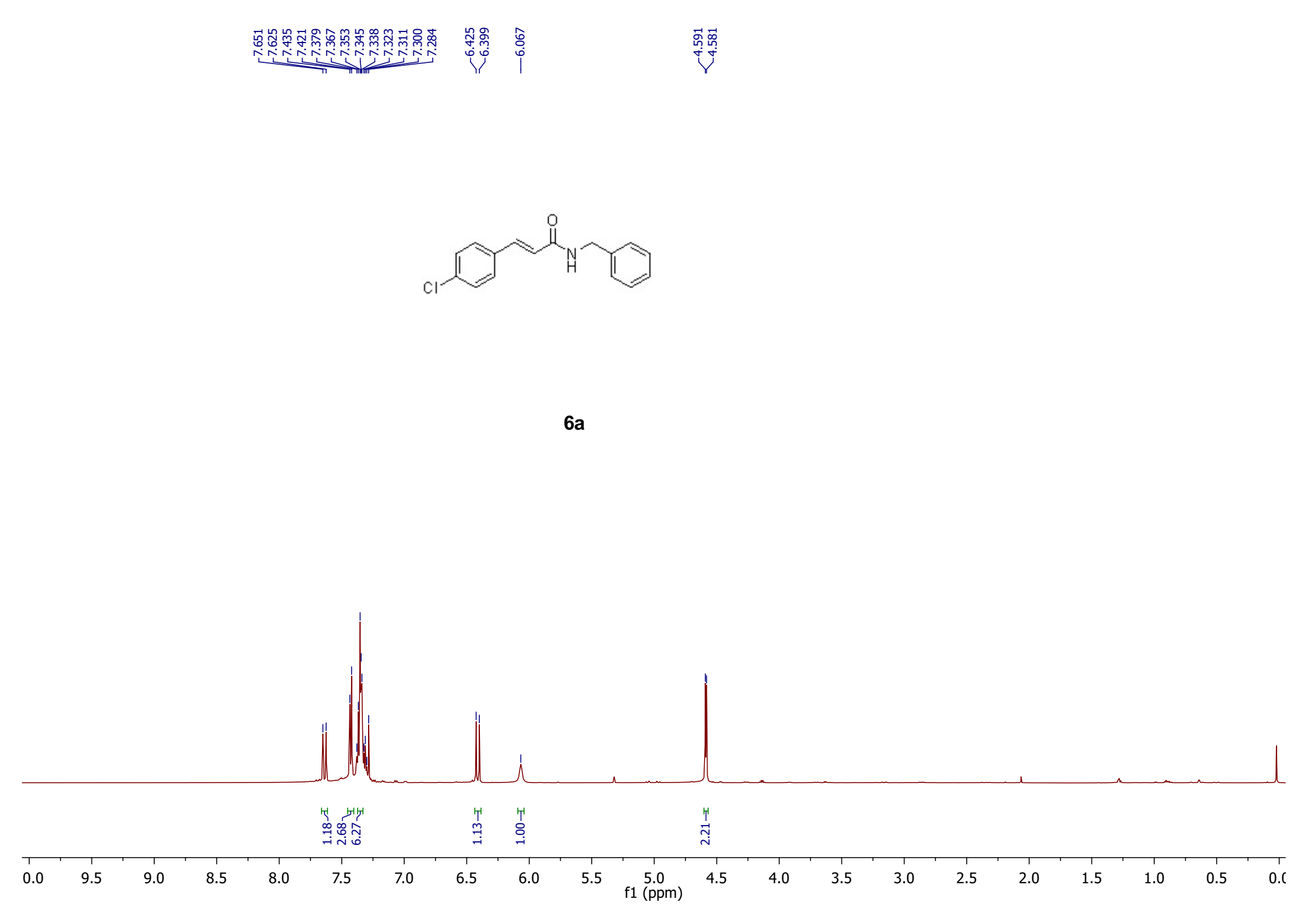
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6.399
6.067
4.591
4.581
O
N
H
Cl
1.18
2.68
6.27
1.13
1.00
2.21
0.0
9.5
9.0
8.5
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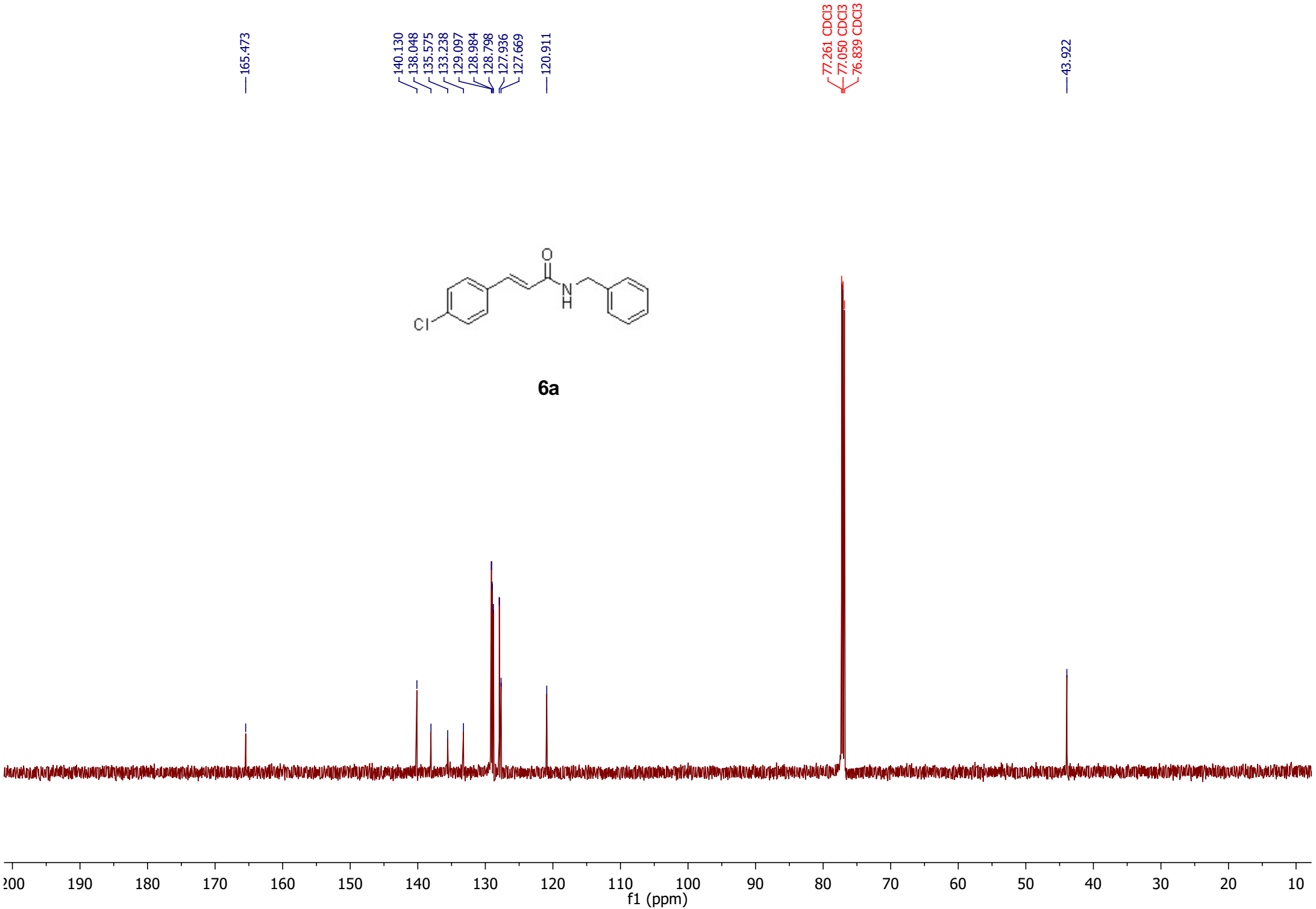
f1 (ppm)

6a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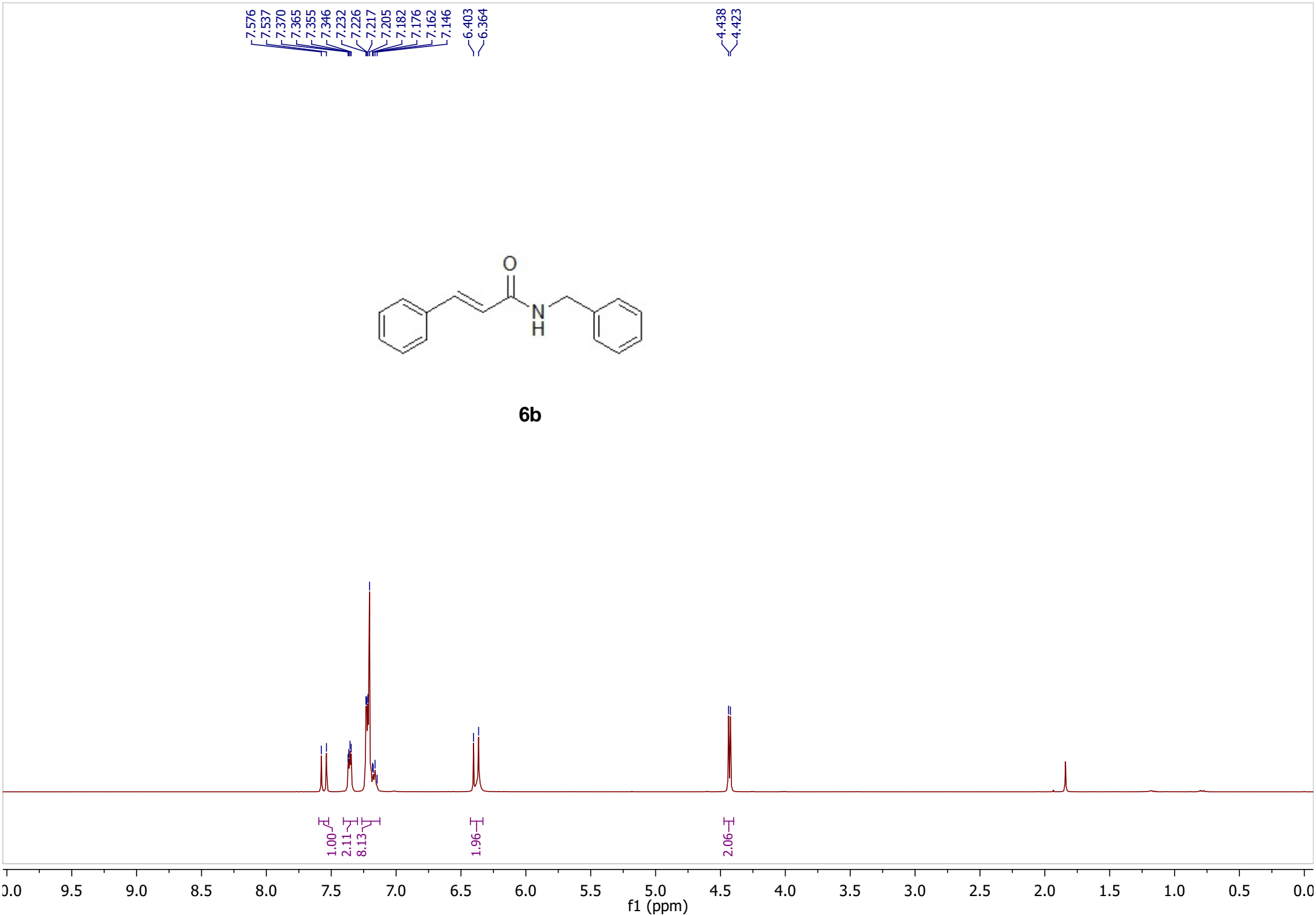
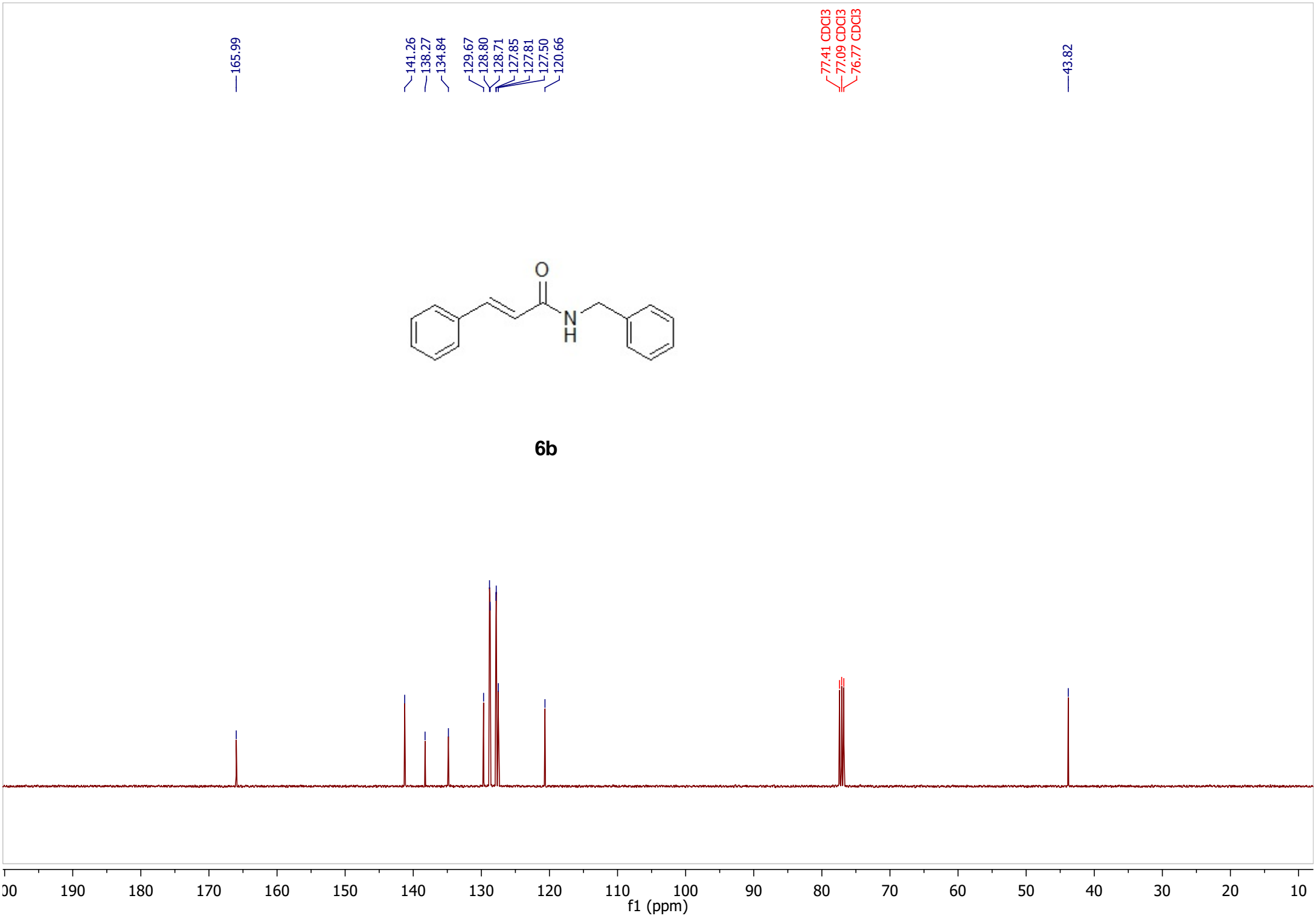
O
N
H
Cl
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

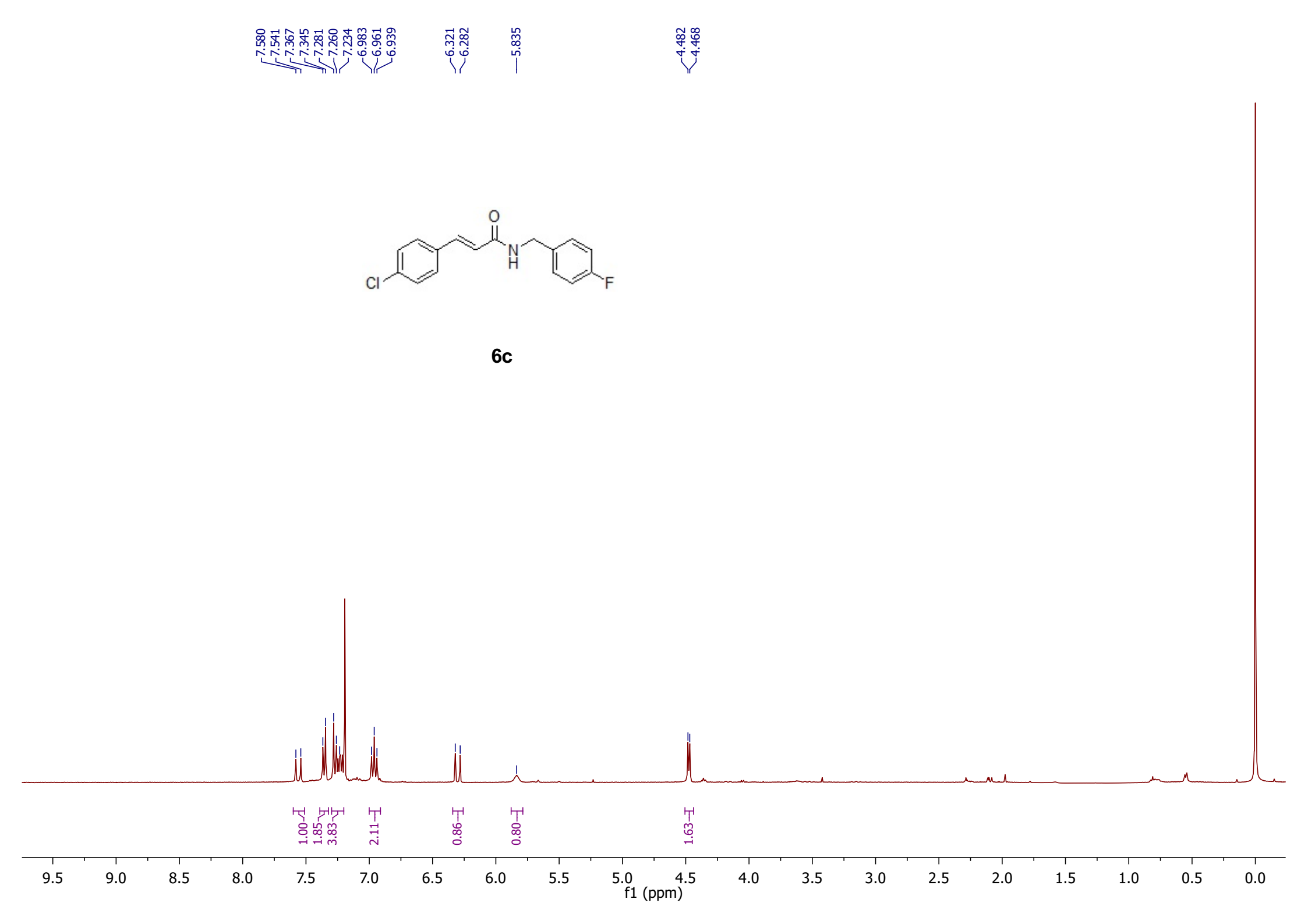
6a


7.576
7.537
7.370
7.365
7.355
7.346
7.232
7.226
7.217
7.205
7.182
7.176
7.162
7.146
6.403
6.364
4.438
4.423
O
N
H
1.00
2.11
8.13
1.96
2.06
f1 (ppm)

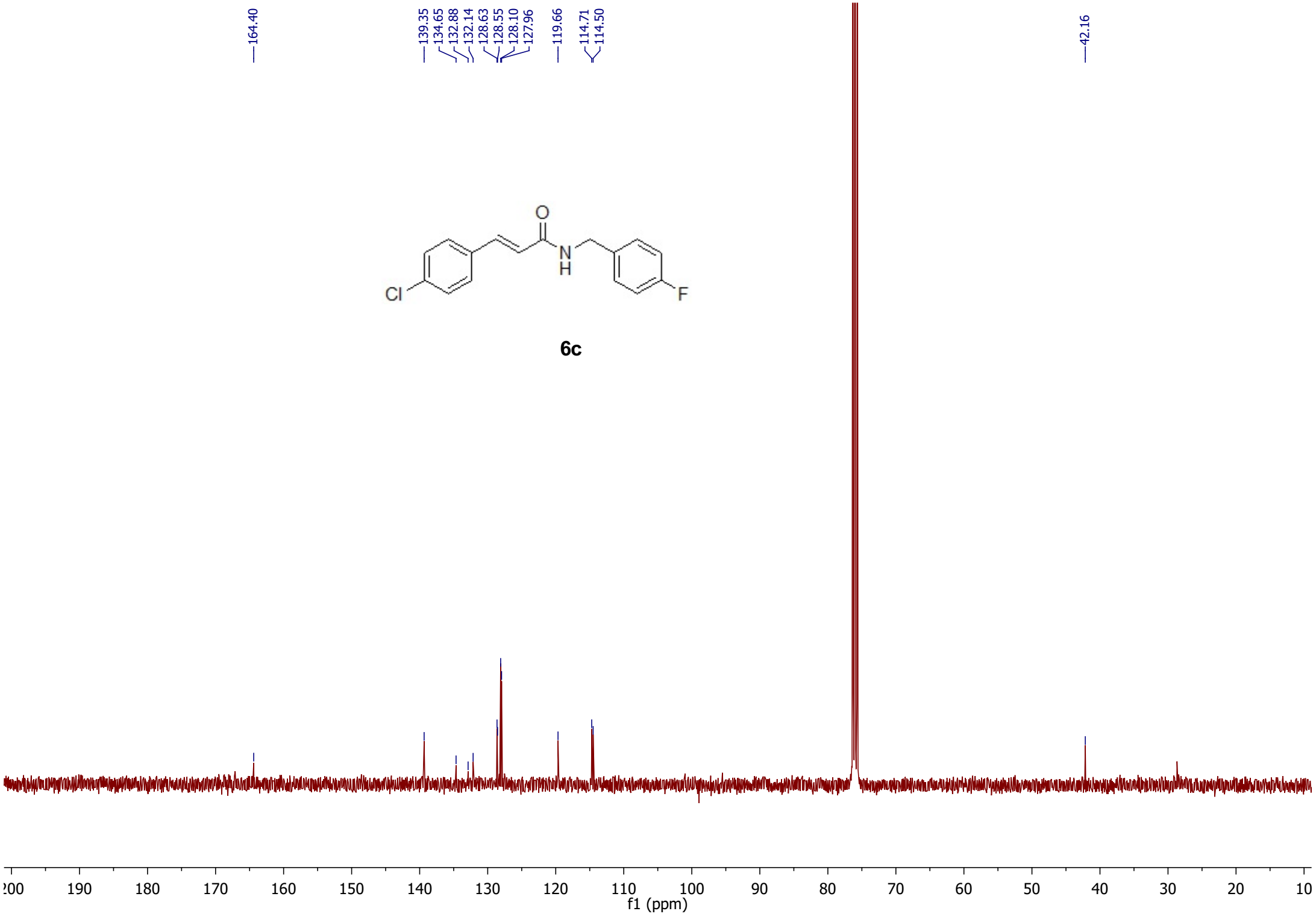
6b

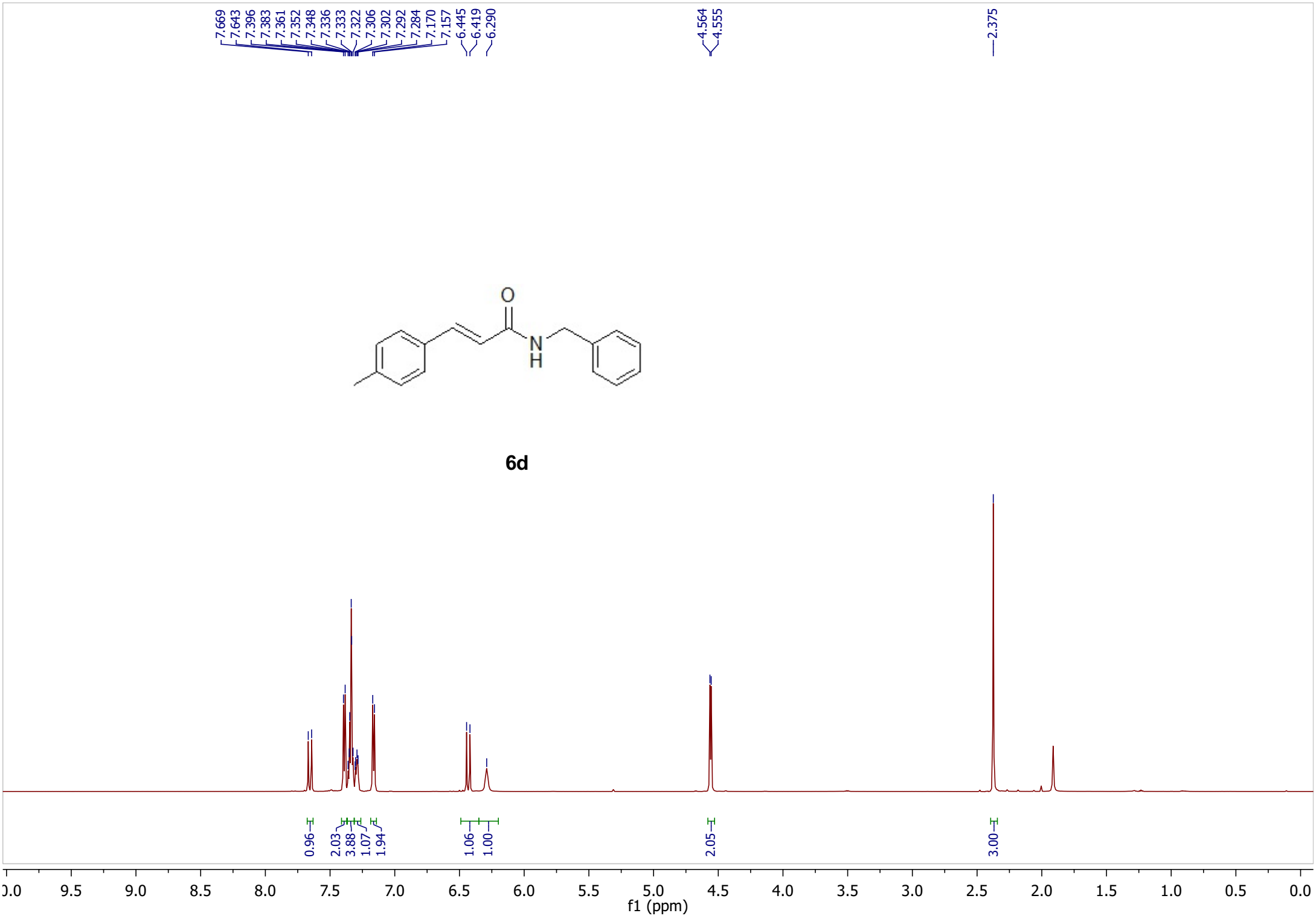

165.99
141.26
138.27
134.84
129.67
128.80
128.71
127.85
127.81
127.50
120.66
77.41 CDCl3
77.09 CDCl3
76.77 CDCl3
43.82
O
N
H
f1 (ppm)

6b

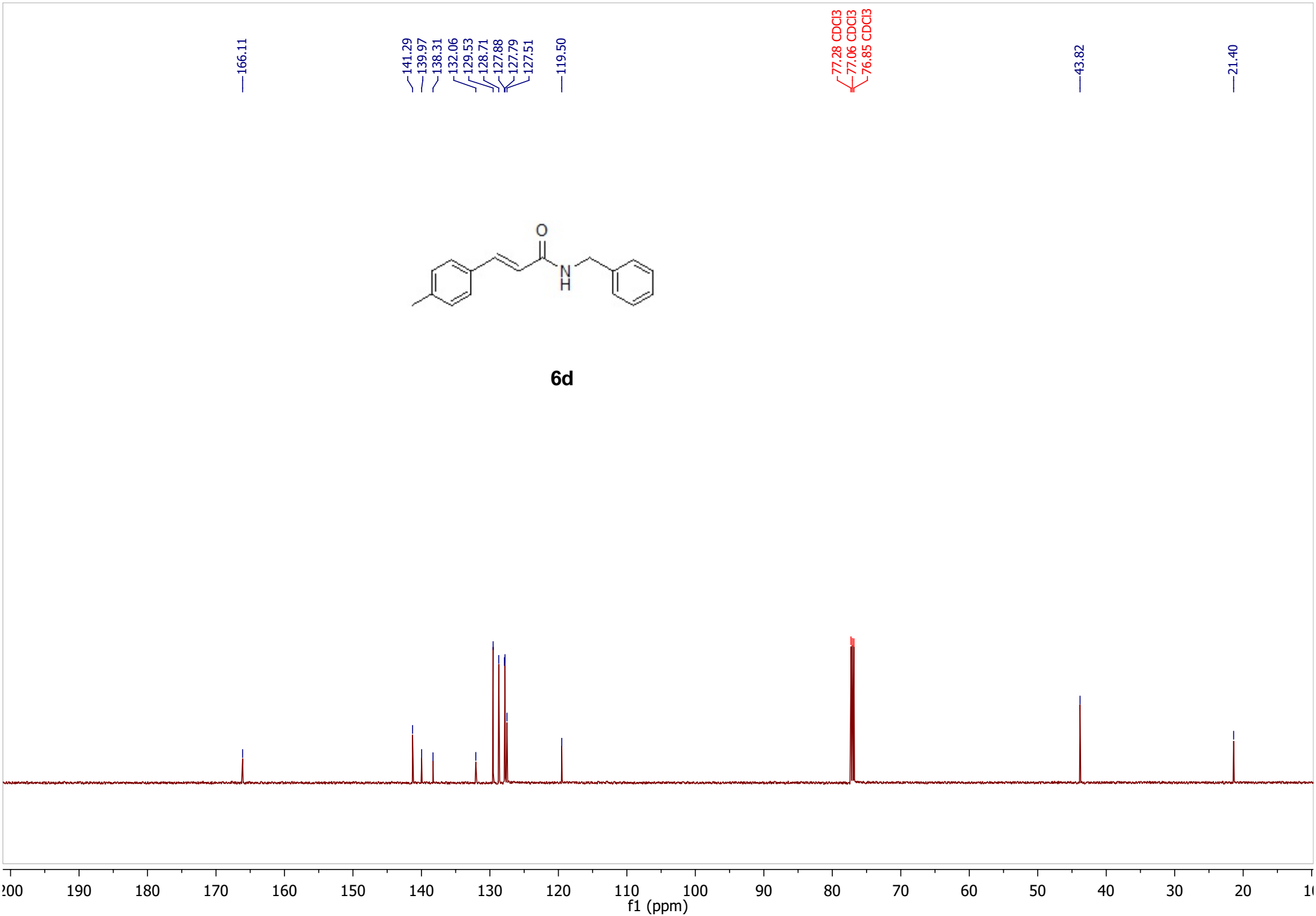

7.580
7.541
7.367
7.345
7.281
7.260
7.234
6.983
6.961
6.939
6.321
6.282
5.835
4.482
4.468
O
N
H
Cl
F
1.00
1.85
3.83
2.11
0.86
0.80
1.63
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

6c

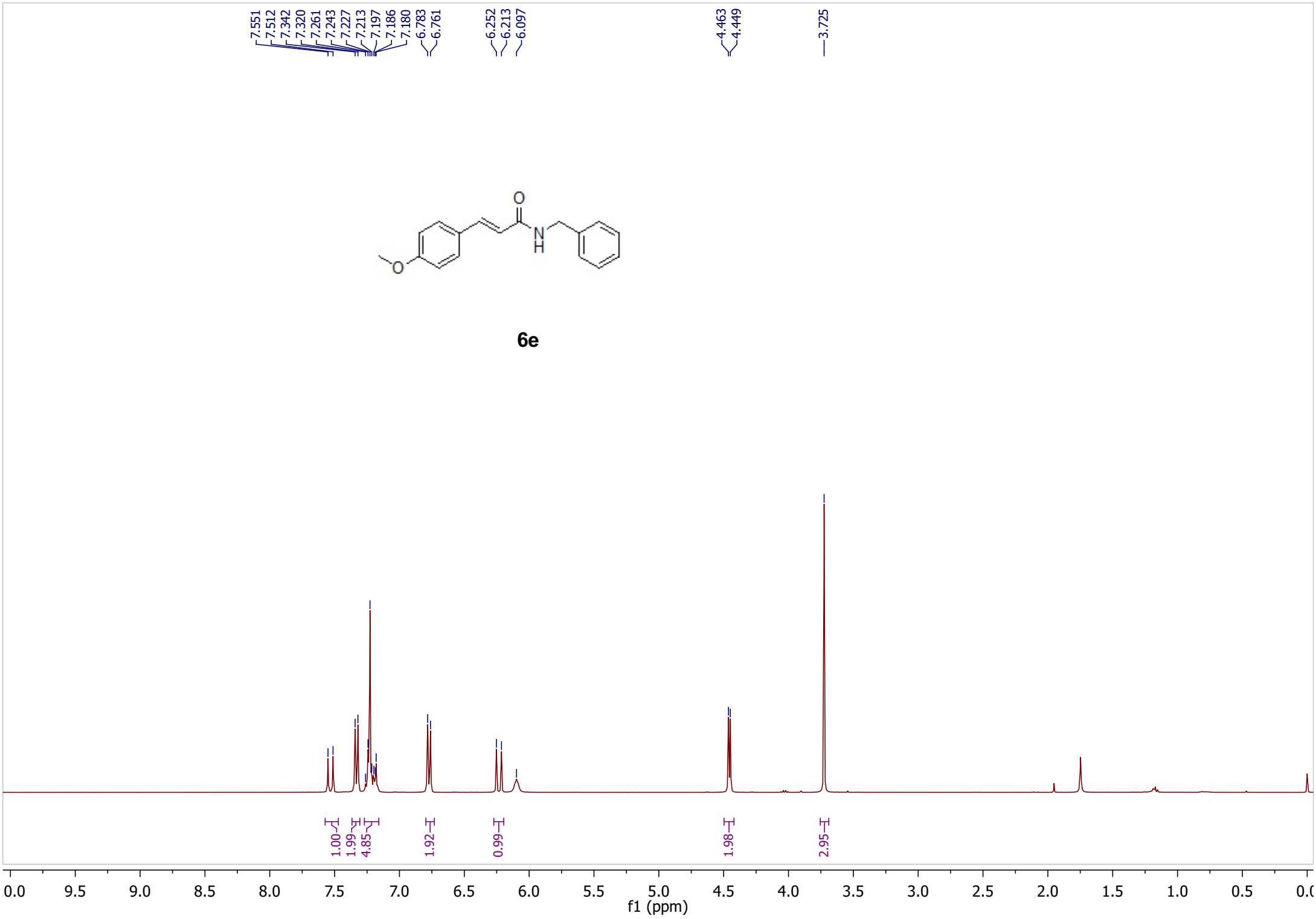

164.40
139.35
134.65
132.88
132.14
128.63
128.55
128.10
127.96
119.66
114.71
114.50
42.16
O
N
H
Cl
F
6c
f1 (ppm)


7.669
7.643
7.396
7.383
7.361
7.352
7.348
7.336
7.333
7.322
7.306
7.302
7.292
7.284
7.170
7.157
6.445
6.419
6.290
4.564
4.555
2.375
O
N
H
0.96
2.03
3.88
1.07
1.94
1.06
1.00
2.05
3.00
f1 (ppm)

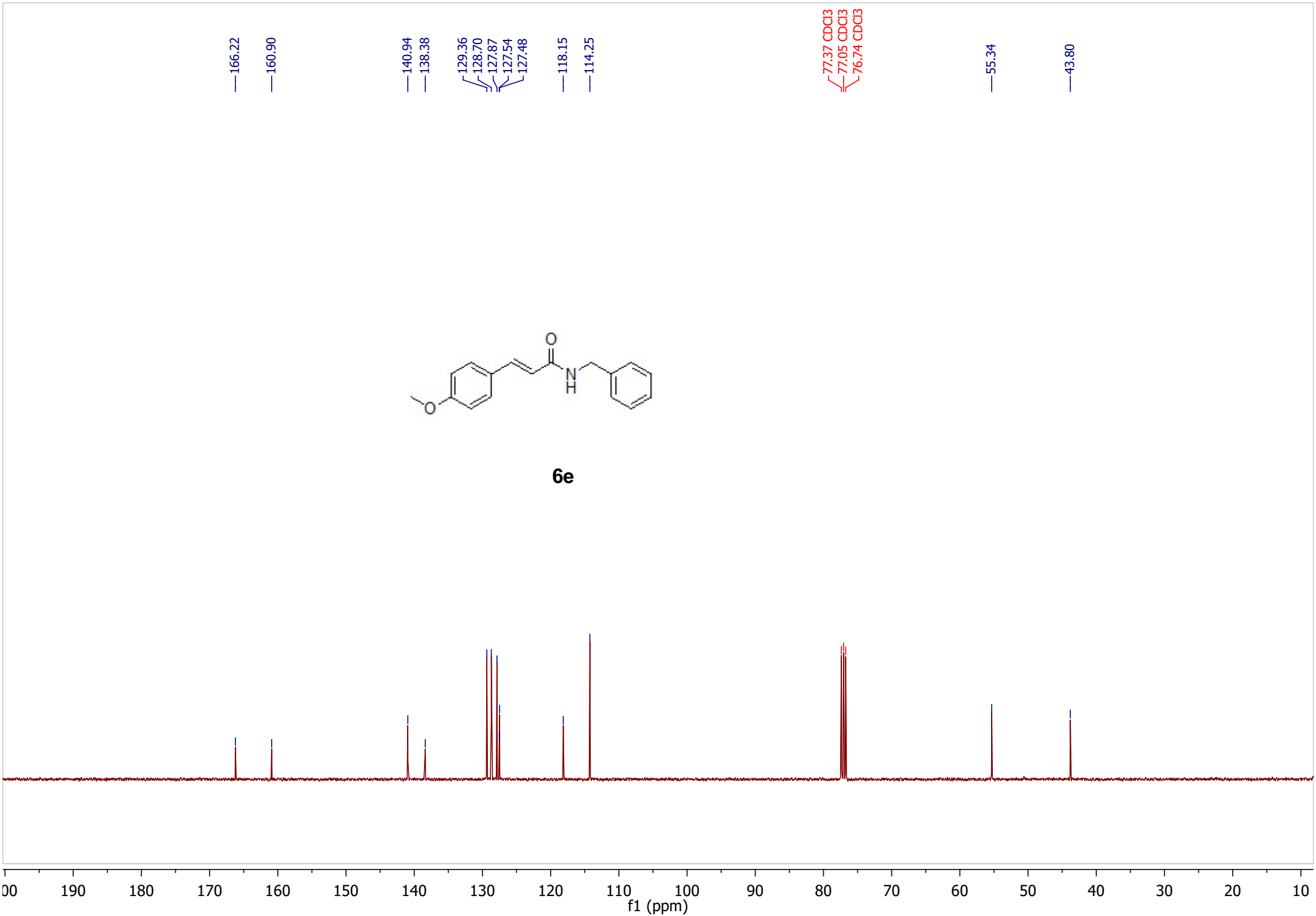
6d

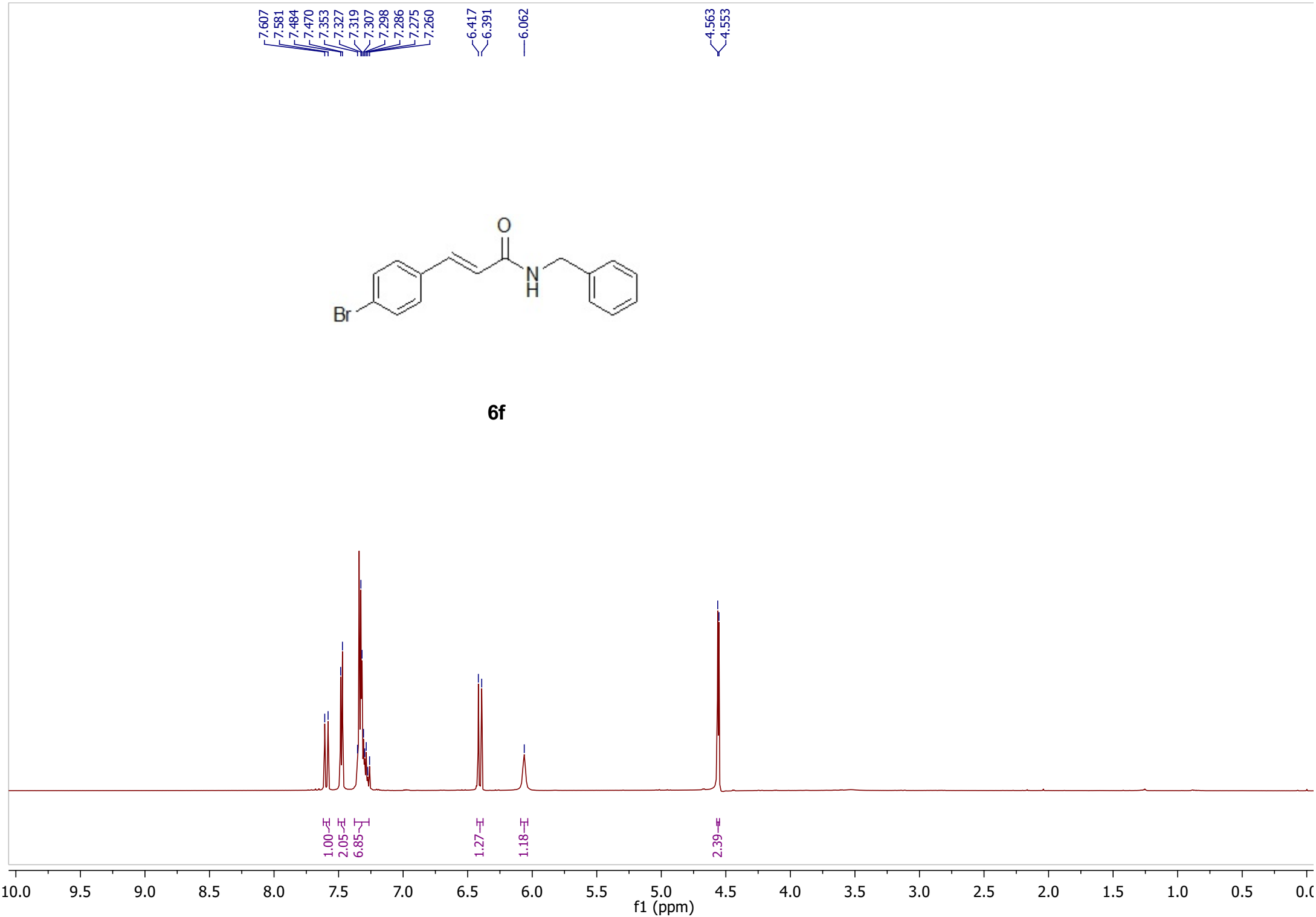

166.11
141.29
139.97
138.31
132.06
129.53
128.71
127.88
127.79
127.51
119.50
77.28 CDCl3
77.06 CDCl3
76.85 CDCl3
43.82
21.40
O
N
H
f1 (ppm)

6d

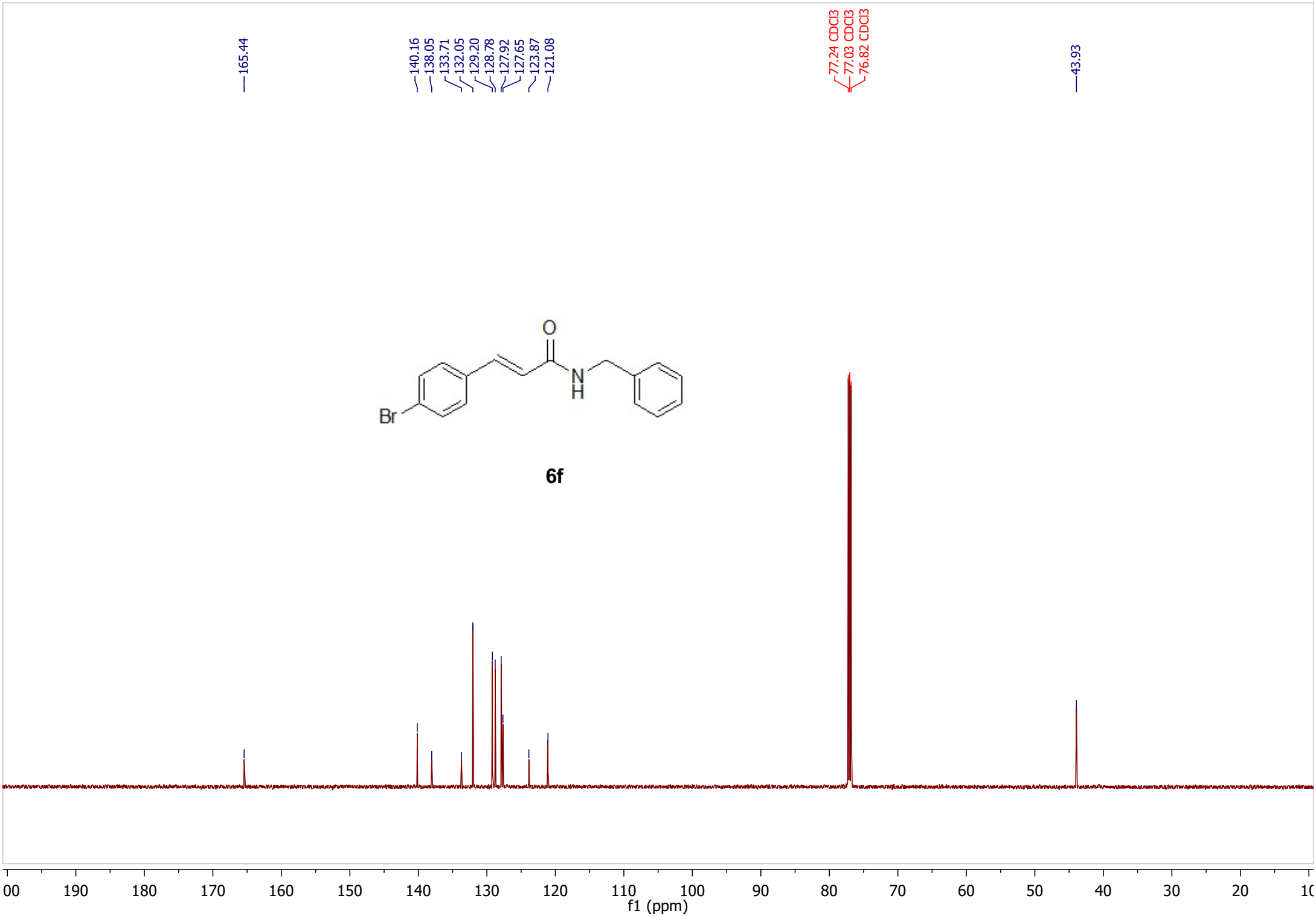

7.551
7.512
7.342
7.320
7.261
7.243
7.227
7.213
7.197
7.186
7.180
6.783
6.761
6.252
6.213
6.097
4.463
4.449
3.725
O
N
H
O
1.00
1.99
4.85
1.92
0.99
1.98
2.95
f1 (ppm)

6e

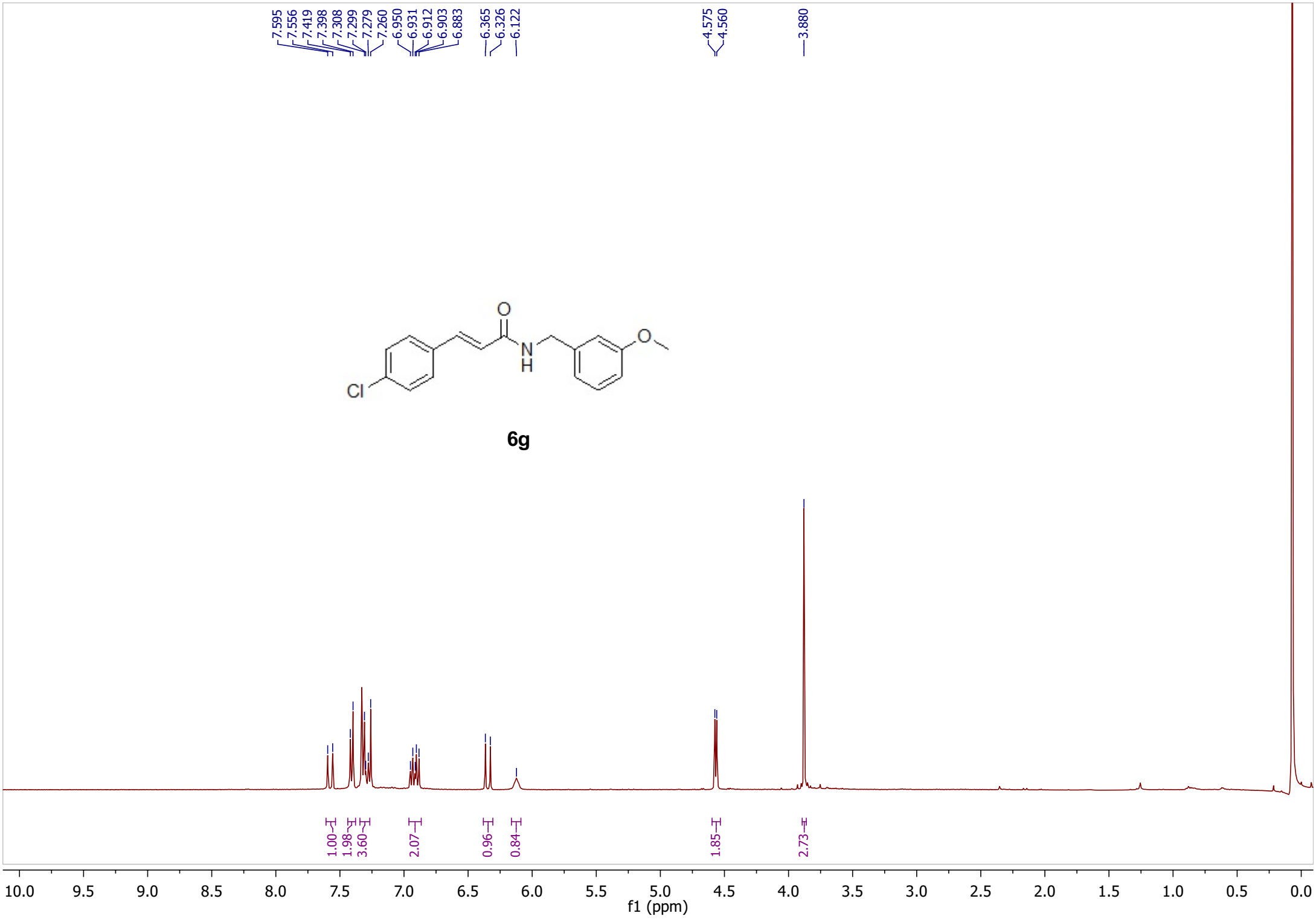

166.22
160.90
140.94
138.38
129.36
128.70
127.87
127.54
127.48
118.15
114.25
77.37 CDCl3
77.05 CDCl3
76.74 CDCl3
55.34
43.80
O
N
H
O
6e
00
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


7.607
7.581
7.484
7.470
7.353
7.327
7.319
7.307
7.298
7.286
7.275
7.260
6.417
6.391
6.062
4.563
4.553
O
N
H
Br
1.00
2.05
6.85
1.27
1.18
2.39
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
f1 (ppm)

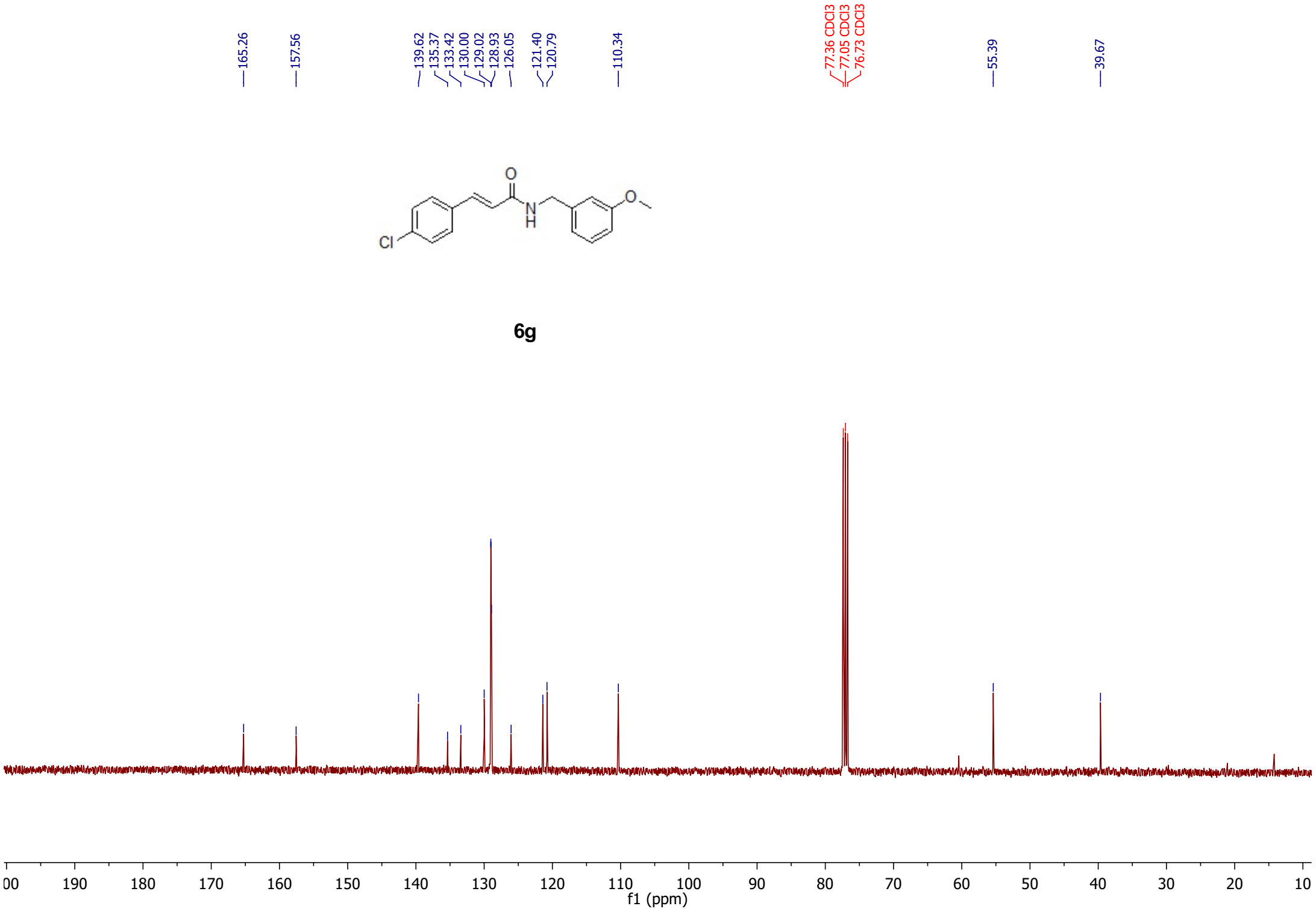
6f


165.44
140.16
138.05
133.71
132.05
129.20
128.78
127.92
127.65
123.87
121.08
77.24 CDCl3
77.03 CDCl3
76.82 CDCl3
43.93
O
N
H
Br
f1 (ppm)

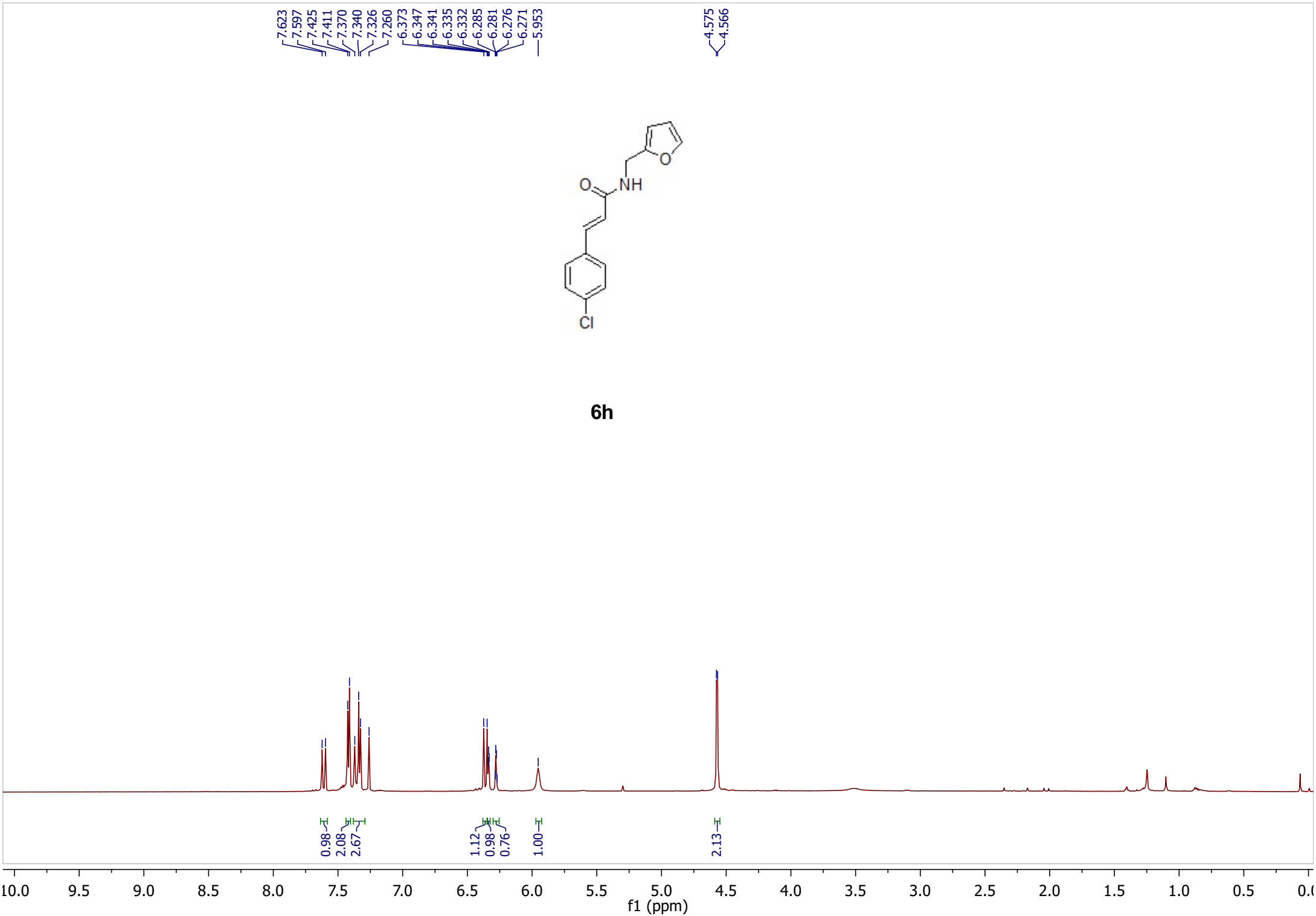
6f


7.595
7.556
7.419
7.398
7.308
7.299
7.279
7.260
6.950
6.931
6.912
6.903
6.883
6.365
6.326
6.122
4.575
4.560
3.880
O
N
H
O
Cl
1.00
1.98
3.60
2.07
0.96
0.84
1.85
2.73
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)

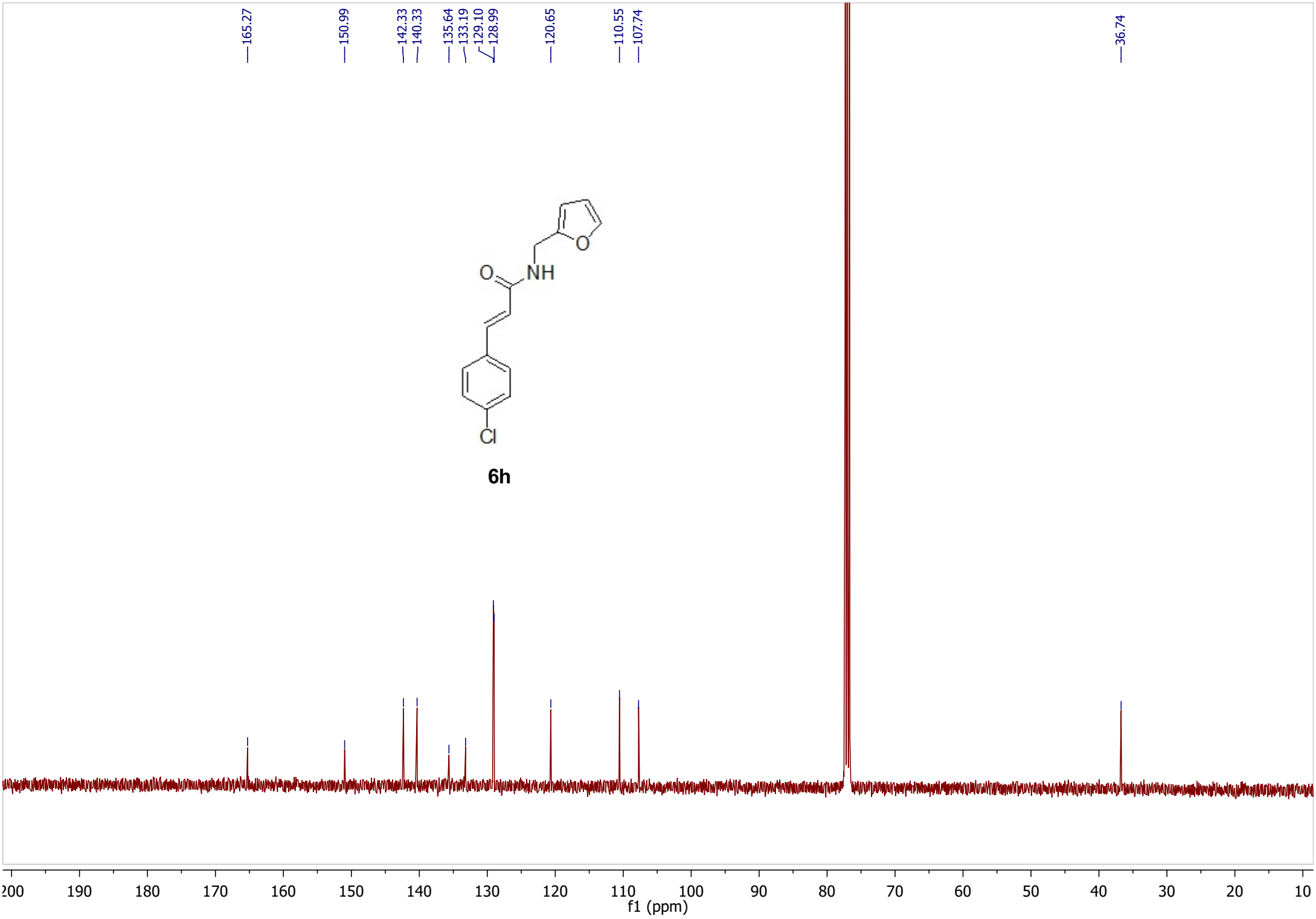
6g

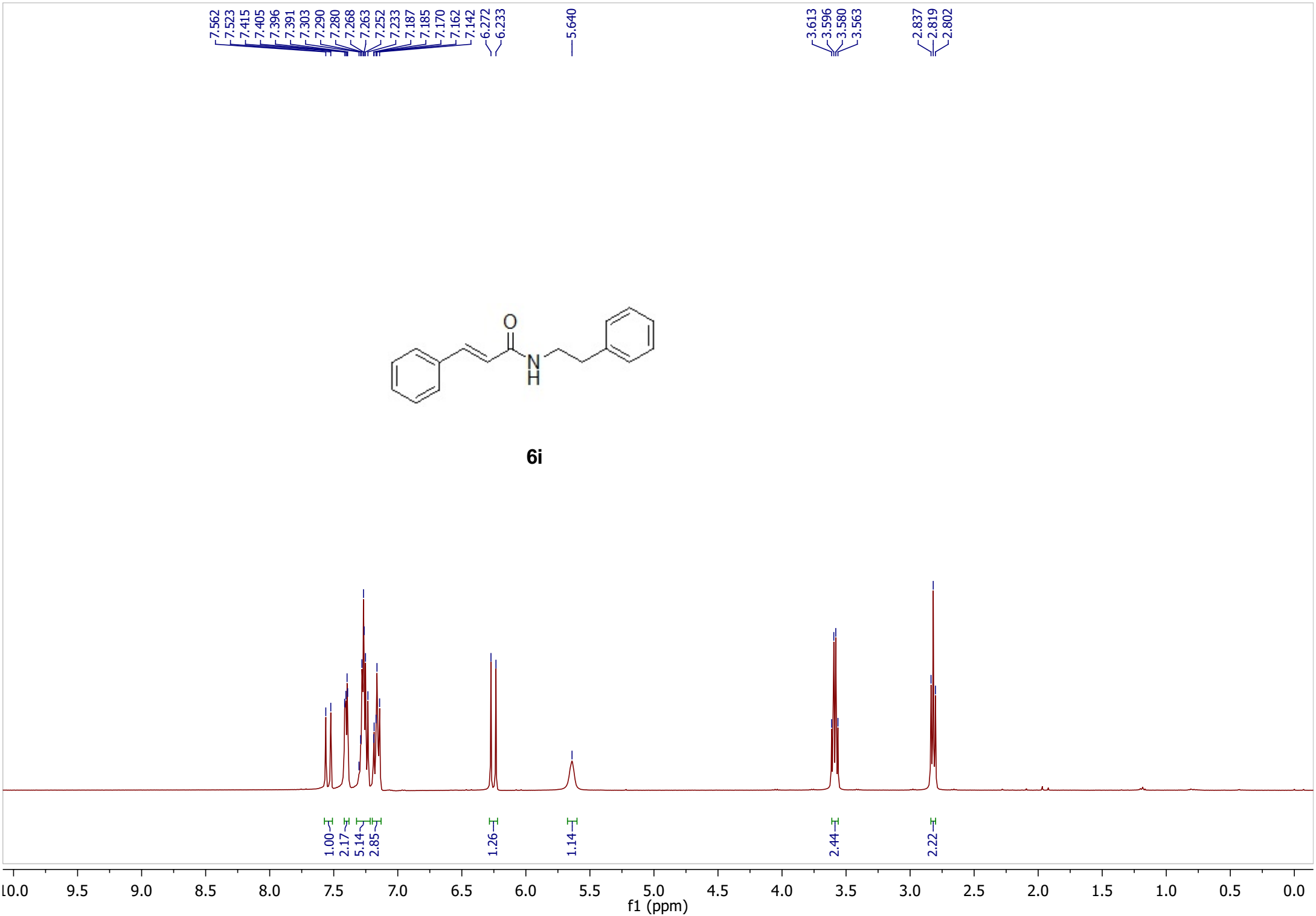

165.26
157.56
139.62
135.37
133.42
130.00
129.02
128.93
126.05
121.40
120.79
110.34
77.36 CDCl3
77.05 CDCl3
76.73 CDCl3
55.39
39.67
O
N
H
Cl
O
f1 (ppm)

6g

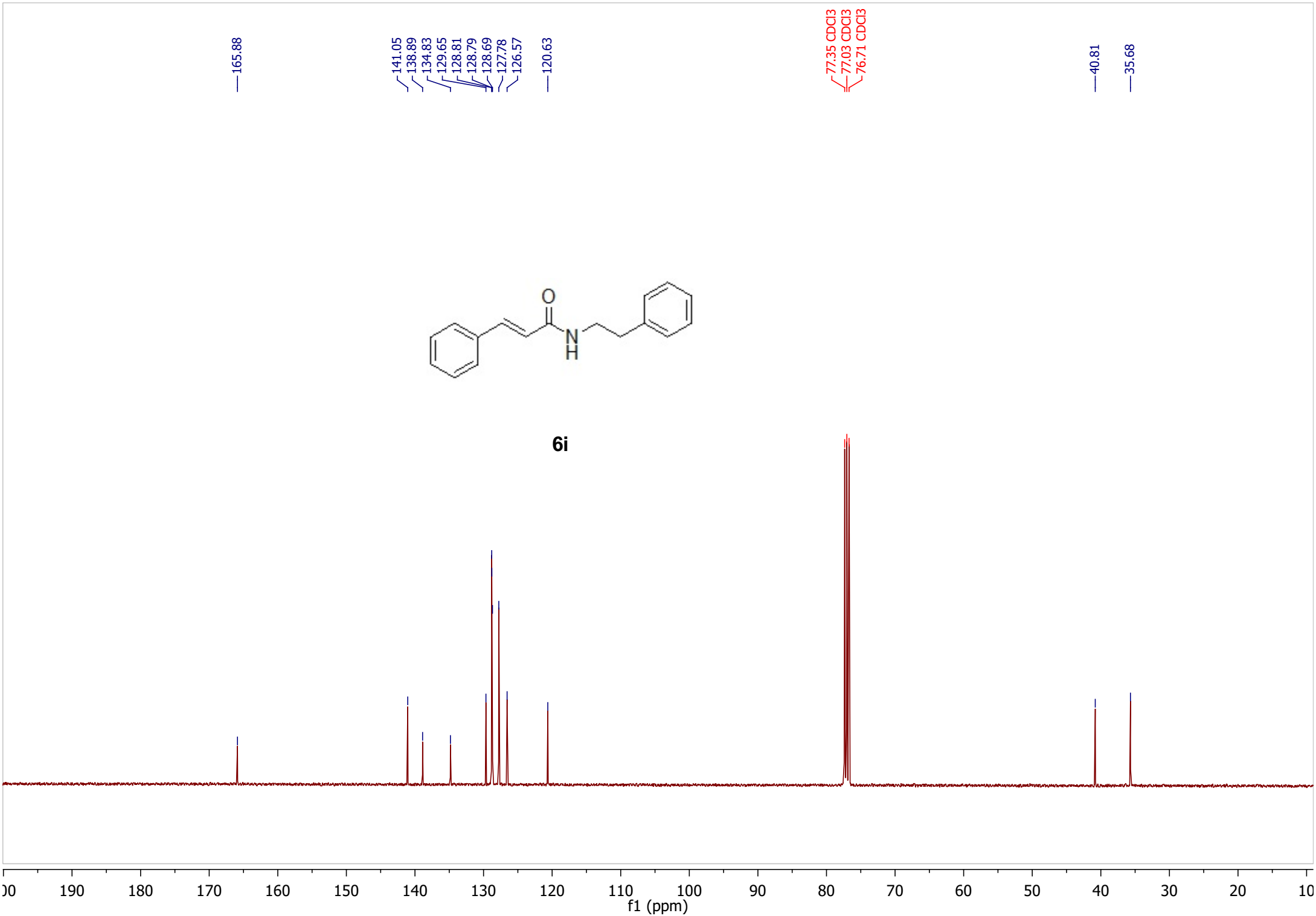

7.623
7.597
7.425
7.411
7.370
7.340
7.326
7.260
6.373
6.347
6.341
6.335
6.332
6.285
6.281
6.276
6.271
5.953
4.575
4.566
O
NH
O
Cl
0.98
2.08
2.67
1.12
0.98
0.76
1.00
2.13
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

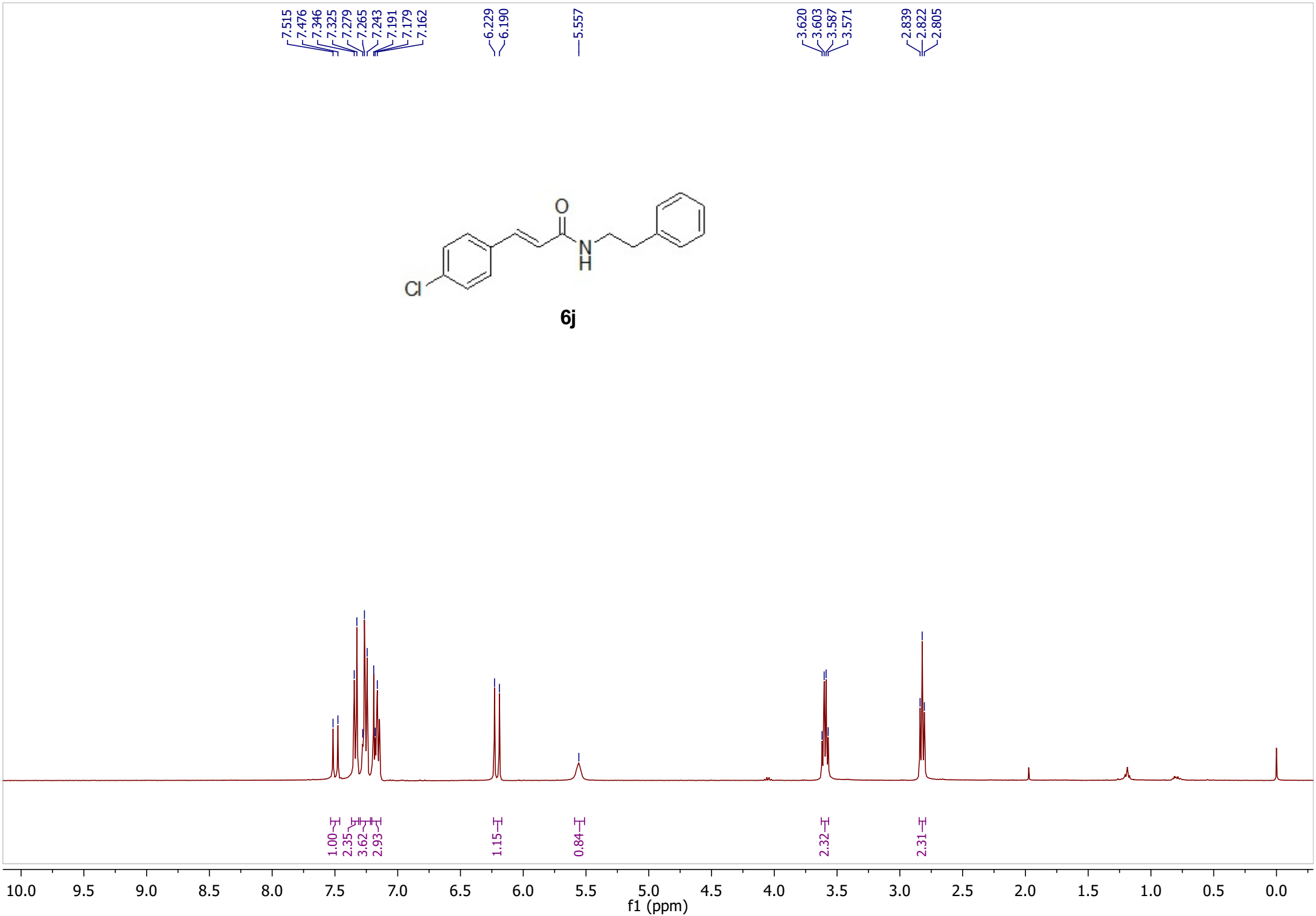
6h


165.27
150.99
142.33
140.33
135.64
133.19
129.10
128.99
120.65
110.55
107.74
36.74
O
NH
O
Cl
6h
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

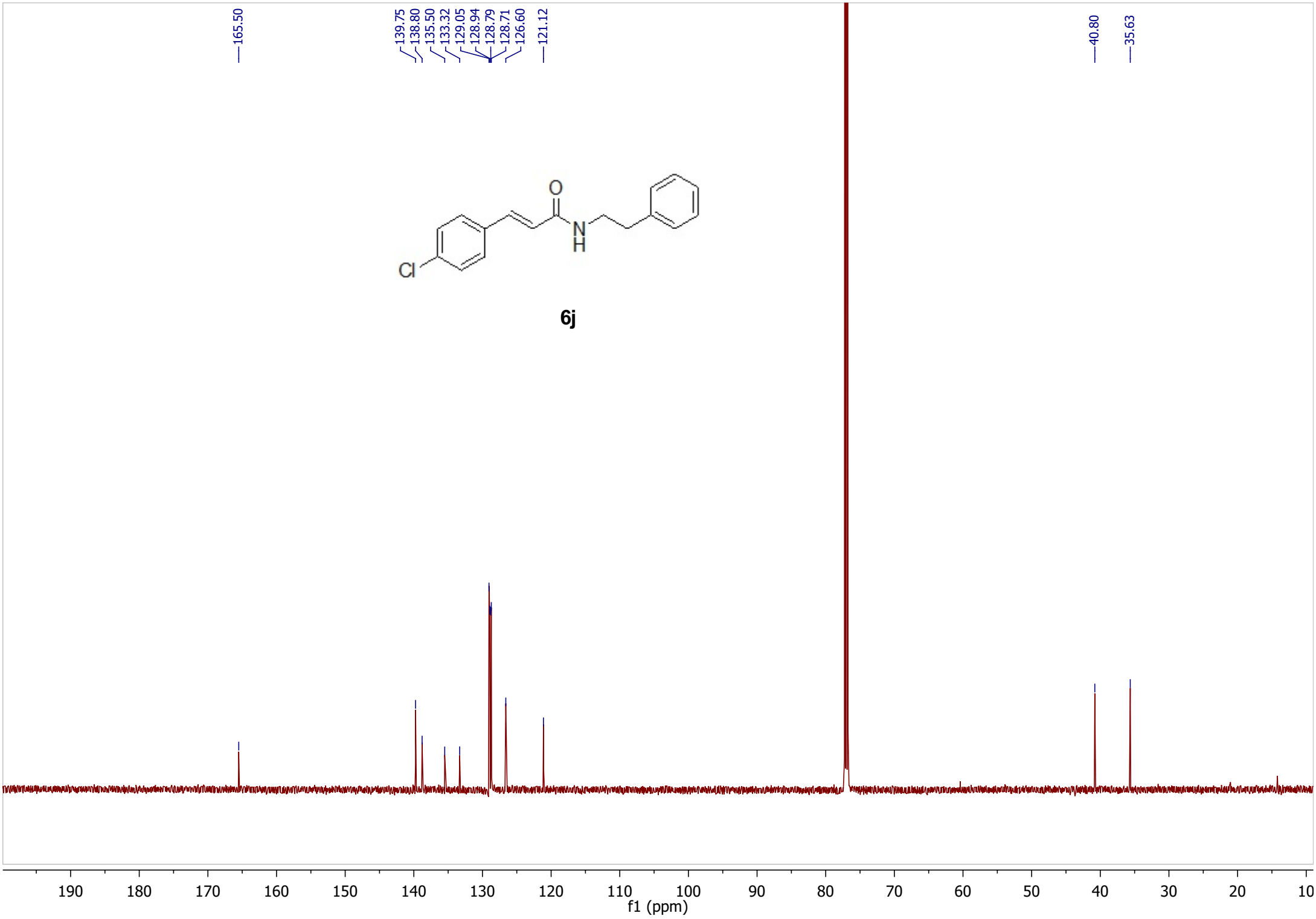

7.562
7.523
7.415
7.405
7.396
7.391
7.303
7.290
7.280
7.268
7.263
7.252
7.233
7.187
7.185
7.170
7.162
7.142
6.272
6.233
5.640
3.613
3.596
3.580
3.563
2.837
2.819
2.802
O
N
H
1.00
2.17
5.14
2.85
1.26
1.14
2.44
2.22
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

6i

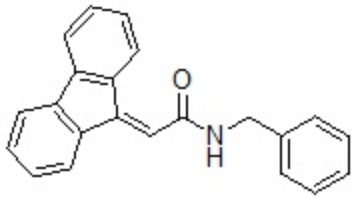

165.88
141.05
138.89
134.83
129.65
128.81
128.79
128.69
127.78
126.57
120.63
77.35 CDCl3
77.03 CDCl3
76.71 CDCl3
40.81
35.68
O
N
H
6i
f1 (ppm)


7.515
7.476
7.346
7.325
7.279
7.265
7.243
7.191
7.179
7.162
6.229
6.190
5.557
3.620
3.603
3.587
3.571
2.839
2.822
2.805
O
N
H
Cl
1.00
2.35
3.62
2.93
1.15
0.84
2.32
2.31
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)

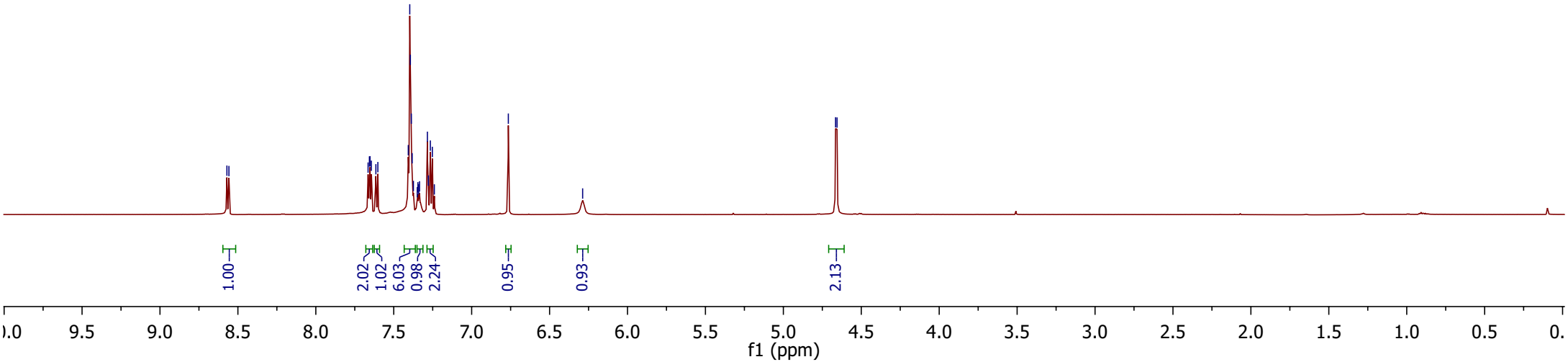
6j

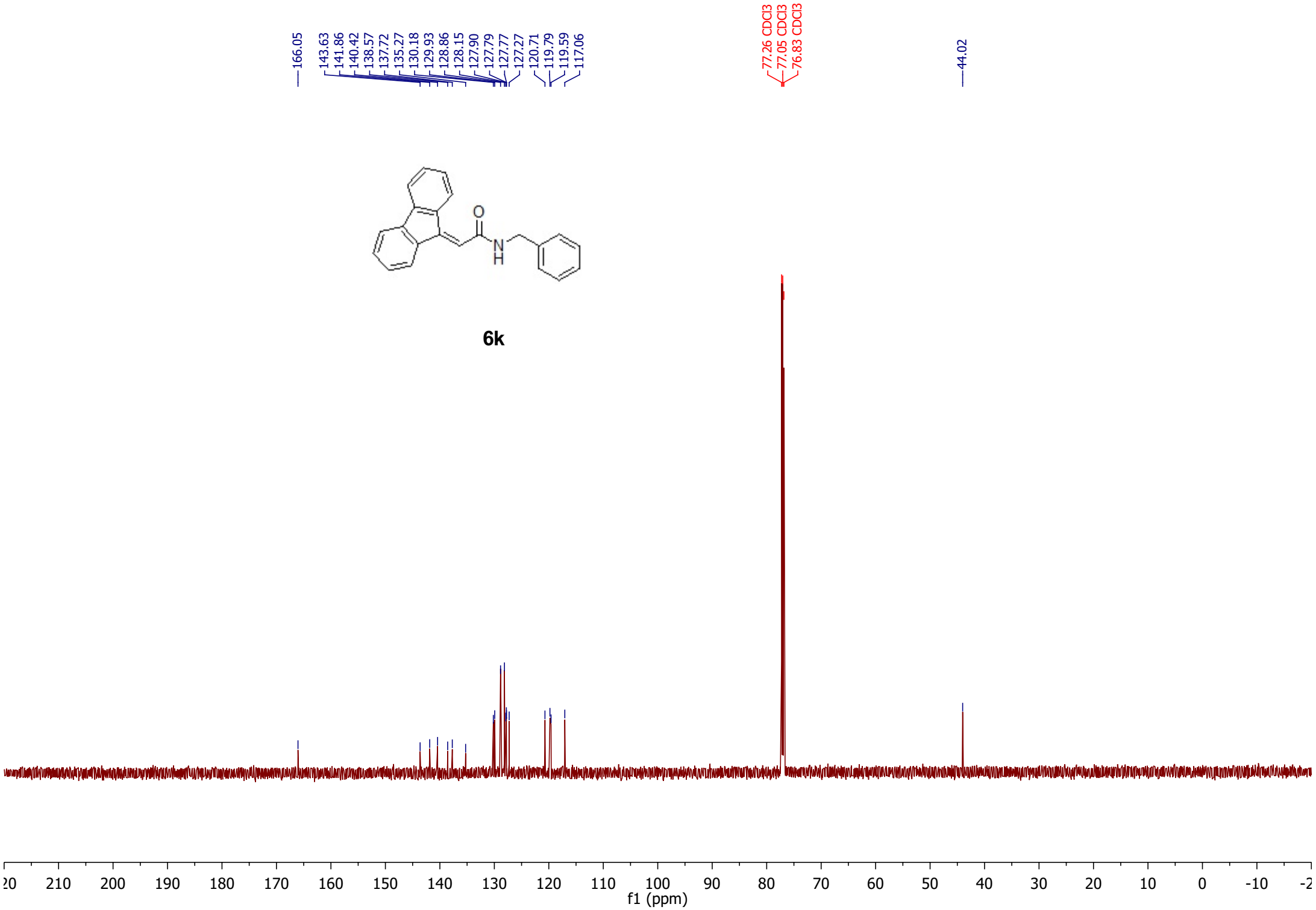

165.50
139.75
138.80
135.50
133.32
129.05
128.94
128.79
128.71
126.60
121.12
40.80
35.63
O
N
H
Cl
6j
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

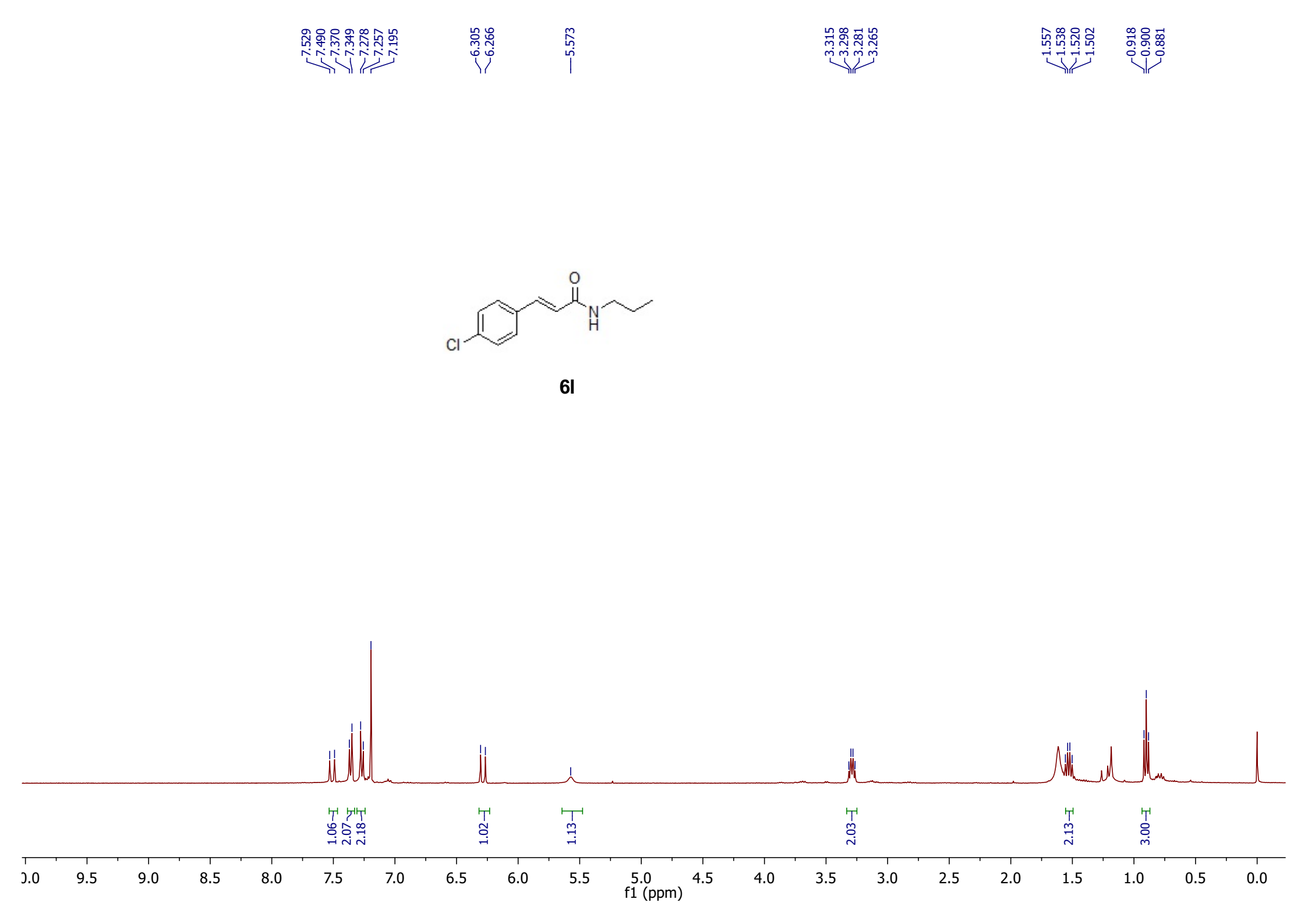

8.571
8.558
7.665
7.656
7.652
7.644
7.615
7.602
7.407
7.397
7.393
7.387
7.382
7.374
7.349
7.345
7.340
7.335
7.284
7.278
7.265
7.252
7.240
6.765
6.288
4.665
4.655

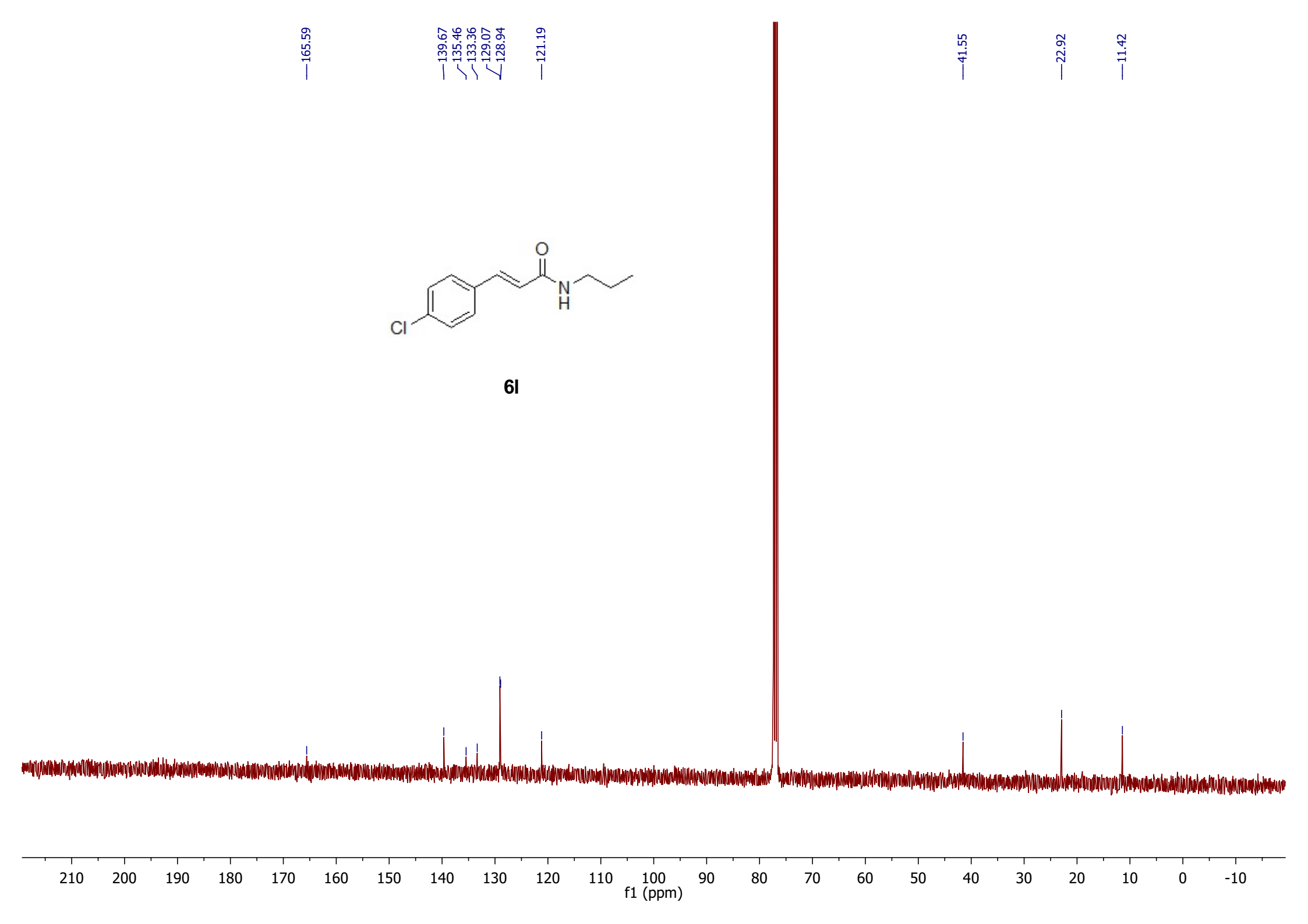

O
N
H

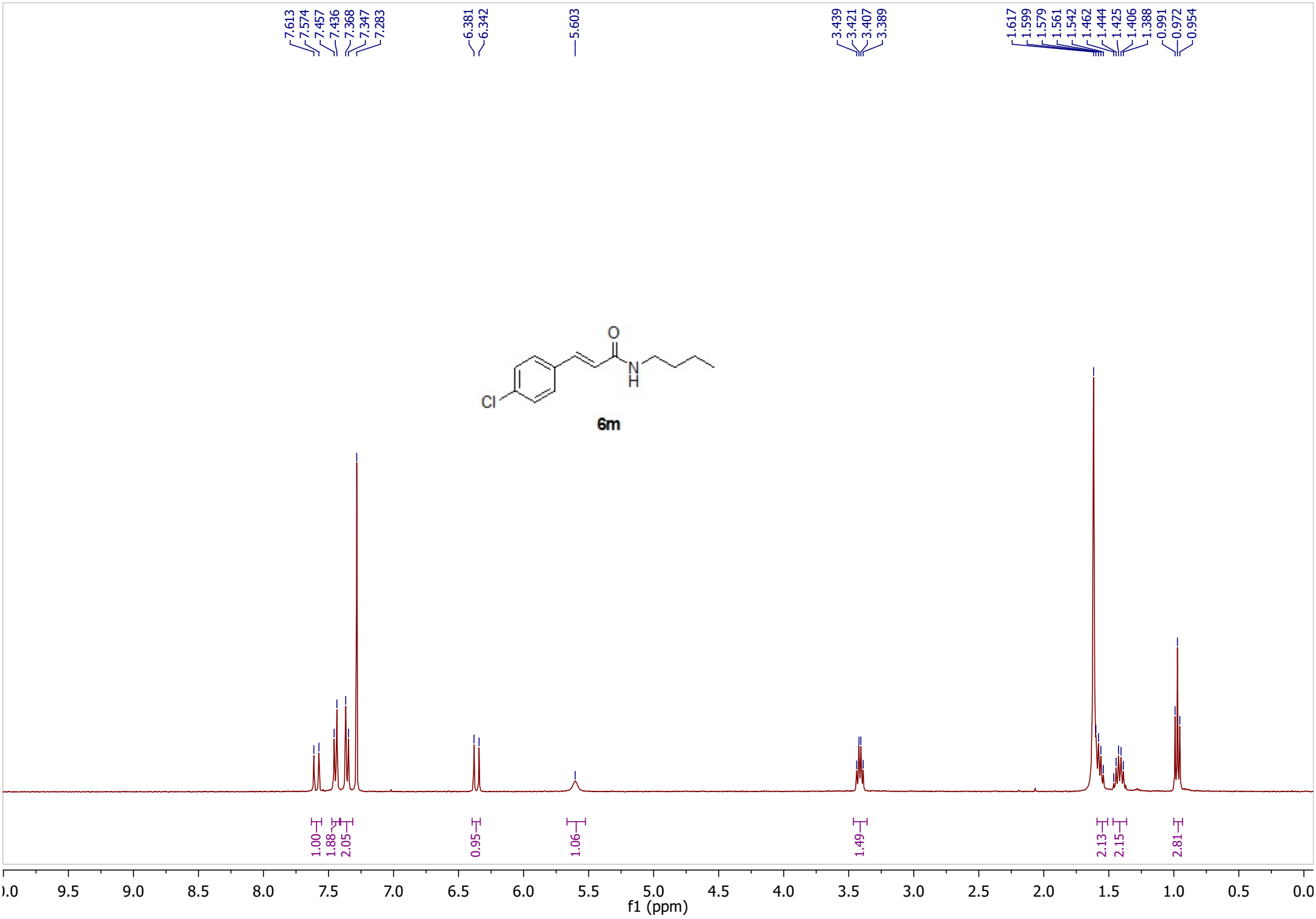
6K

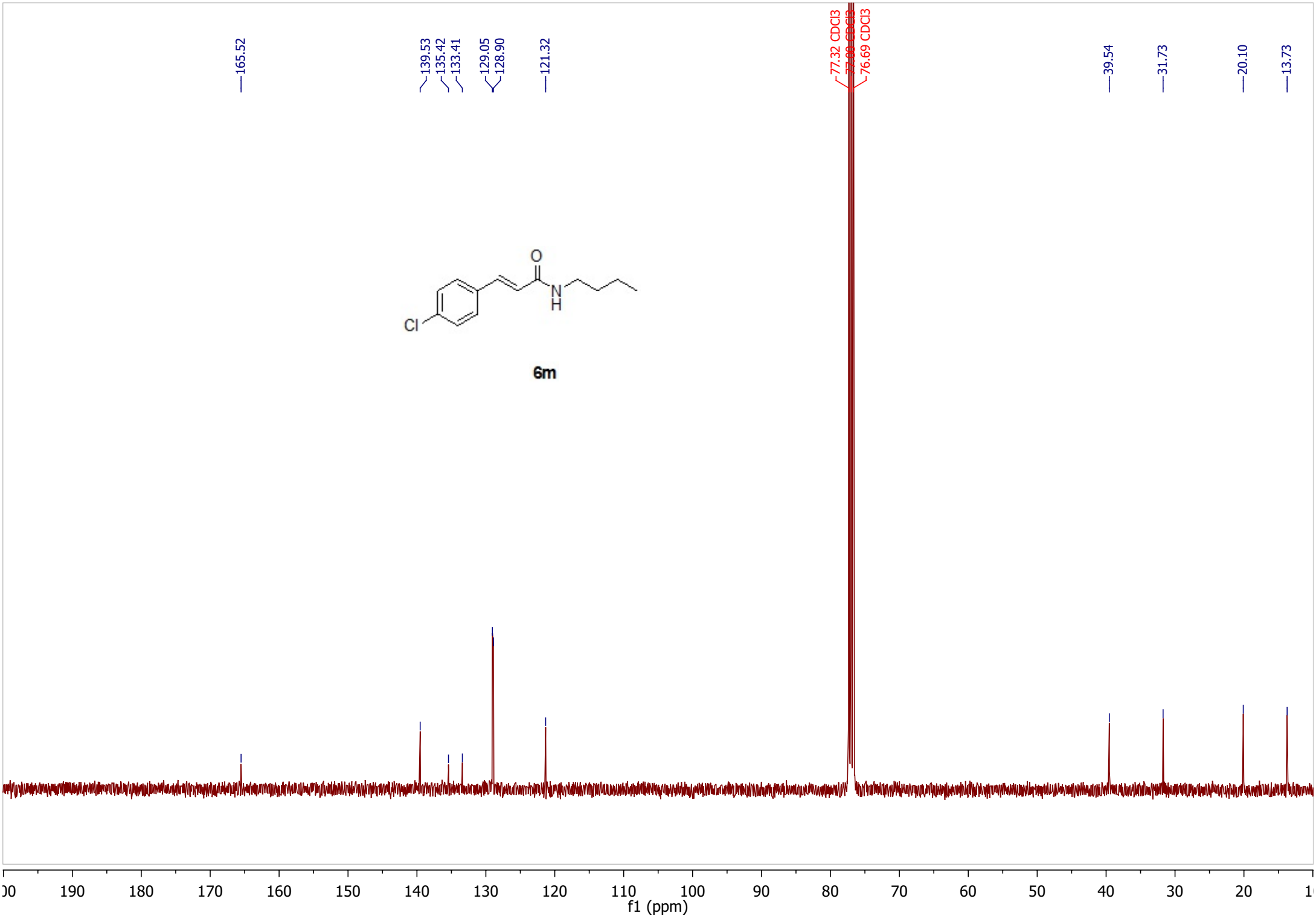

1.00
2.02
1.02
6.03
0.98
2.24
0.95
0.93
2.13
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

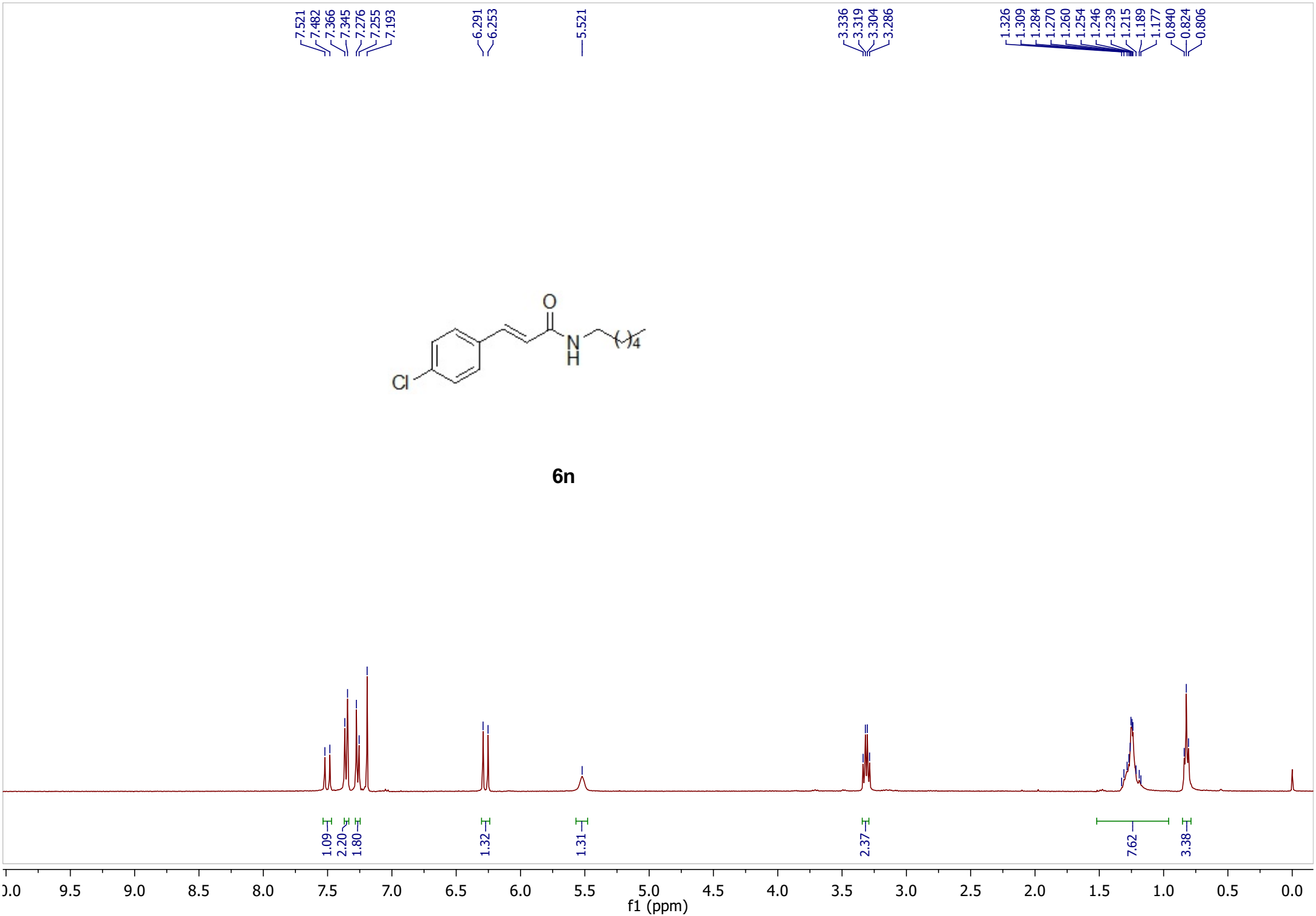

166.05
143.63
141.86
140.42
138.57
137.72
135.27
130.18
129.93
128.86
128.15
127.90
127.79
127.77
127.27
120.71
119.79
119.59
117.06
77.26 CDCl3
77.05 CDCl3
76.83 CDCl3
44.02
O
N
H
6k
f1 (ppm)


7.529
7.490
7.370
7.349
7.278
7.257
7.195
6.305
6.266
5.573
3.315
3.298
3.281
3.265
1.557
1.538
1.520
1.502
0.918
0.900
0.881
O
N
H
Cl
6l
1.06
2.07
2.18
1.02
1.13
2.03
2.13
3.00
f1 (ppm)

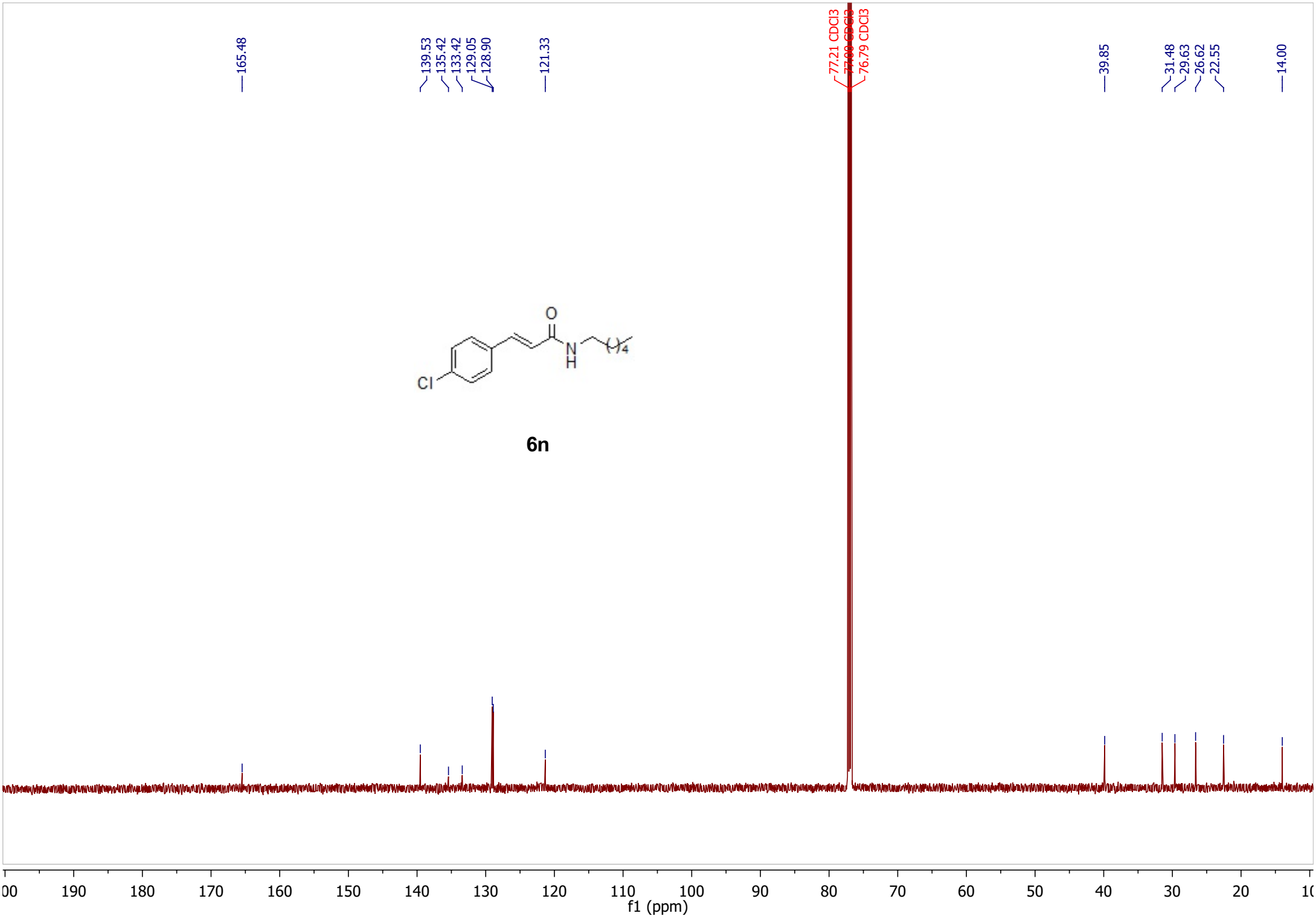

165.59
139.67
135.46
133.36
129.07
128.94
121.19
41.55
22.92
11.42
O
N
H
Cl
6l
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

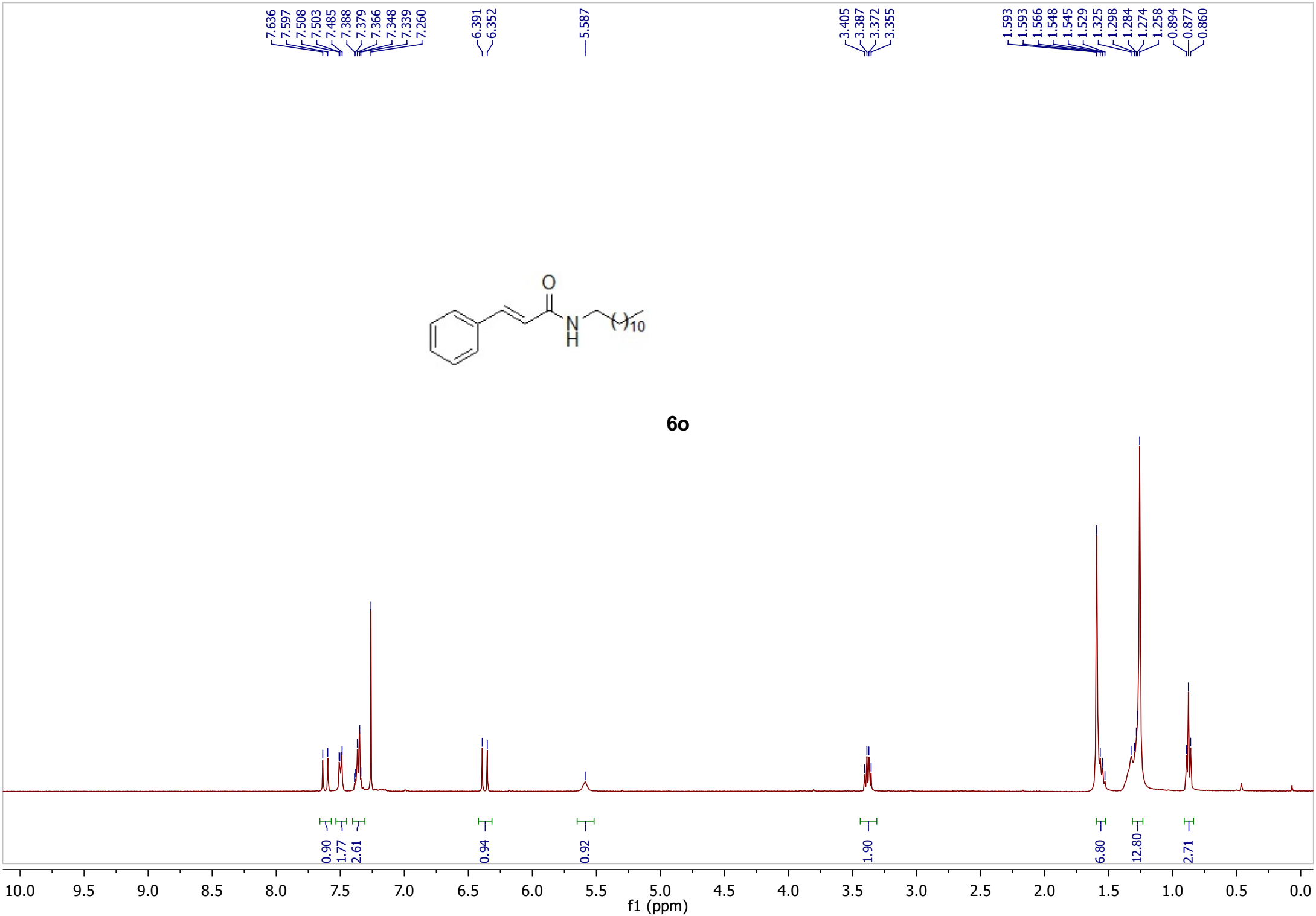

7.613
7.574
7.457
7.436
7.368
7.347
7.283
6.381
6.342
5.603
3.439
3.421
3.407
3.389
1.617
1.599
1.579
1.561
1.542
1.462
1.444
1.425
1.406
1.388
0.991
0.972
0.954
O
N
H
Cl
6m
1.00
1.88
2.05
0.95
1.06
1.49
2.13
2.15
2.81
f1 (ppm)

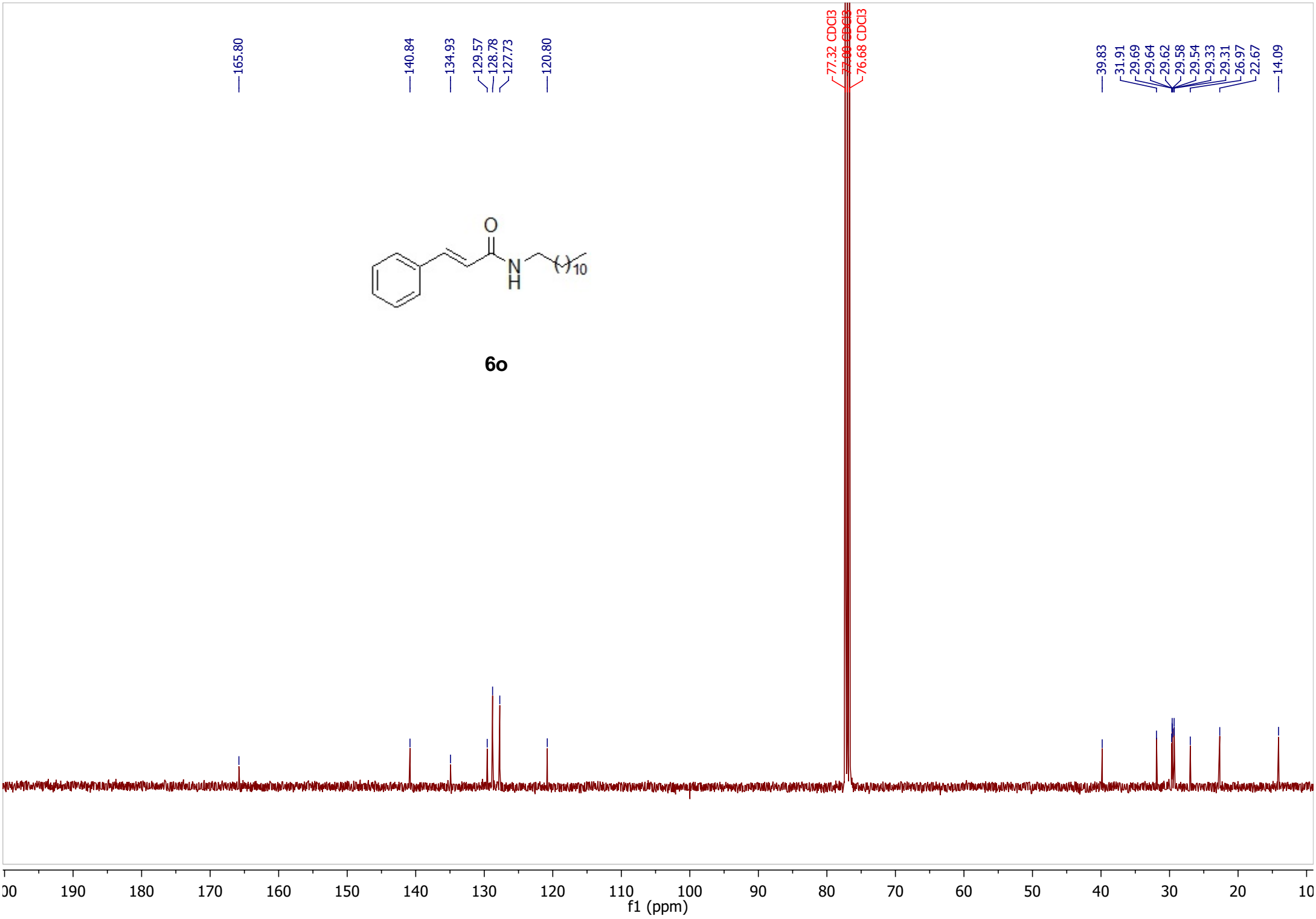

165.52
139.53
135.42
133.41
129.05
128.90
121.32
77.32 CDCl3
76.69 CDCl3
39.54
31.73
20.10
13.73
O
N
H
Cl
6m
f1 (ppm)

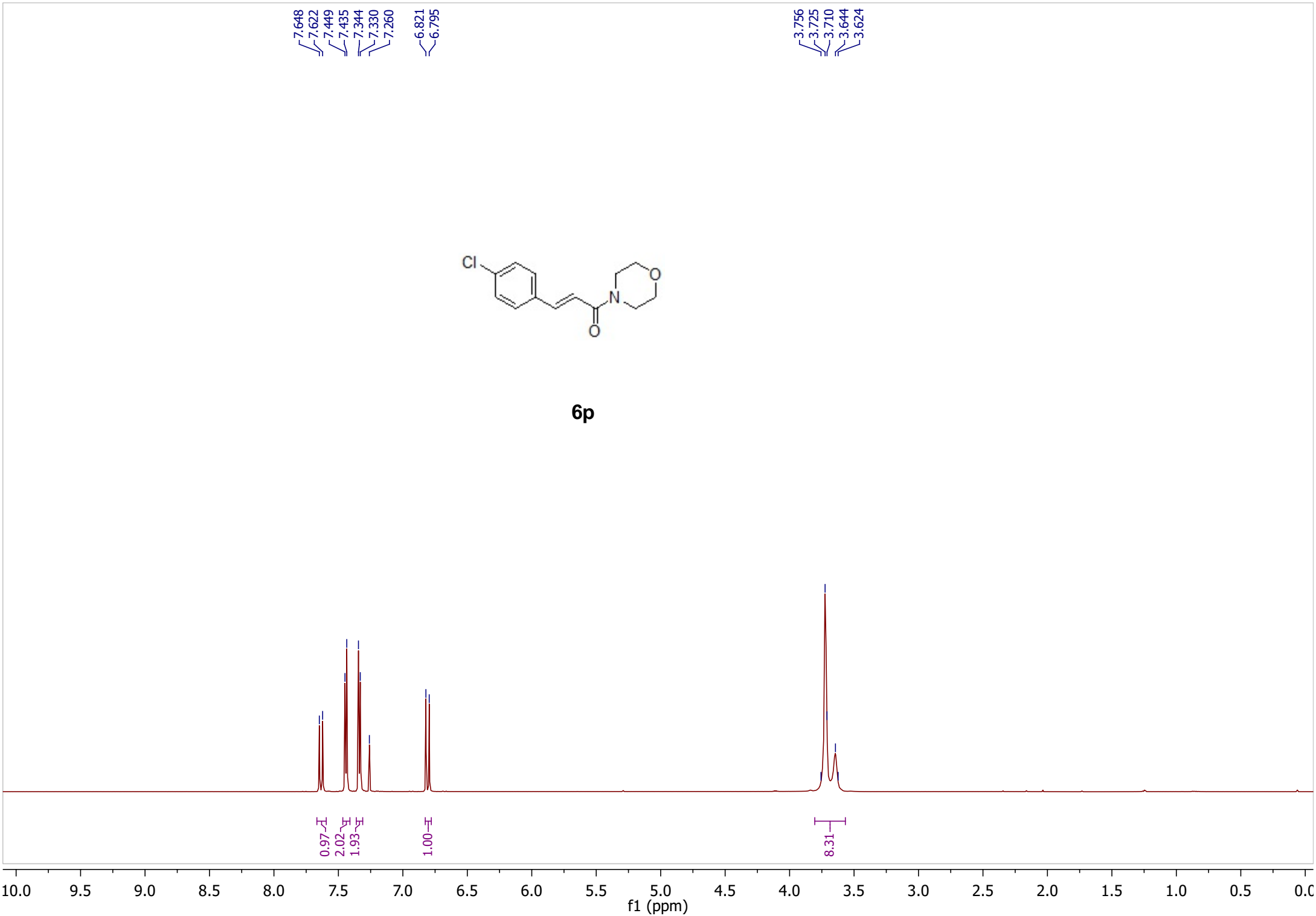

7.521
7.482
7.366
7.345
7.276
7.255
7.193
6.291
6.253
5.521
3.336
3.319
3.304
3.286
1.326
1.309
1.284
1.270
1.260
1.254
1.246
1.239
1.215
1.189
1.177
0.840
0.824
0.806
O
N
H
(-)4
Cl
1.09
2.20
1.80
1.32
1.31
2.37
7.62
3.38
f1 (ppm)

6n

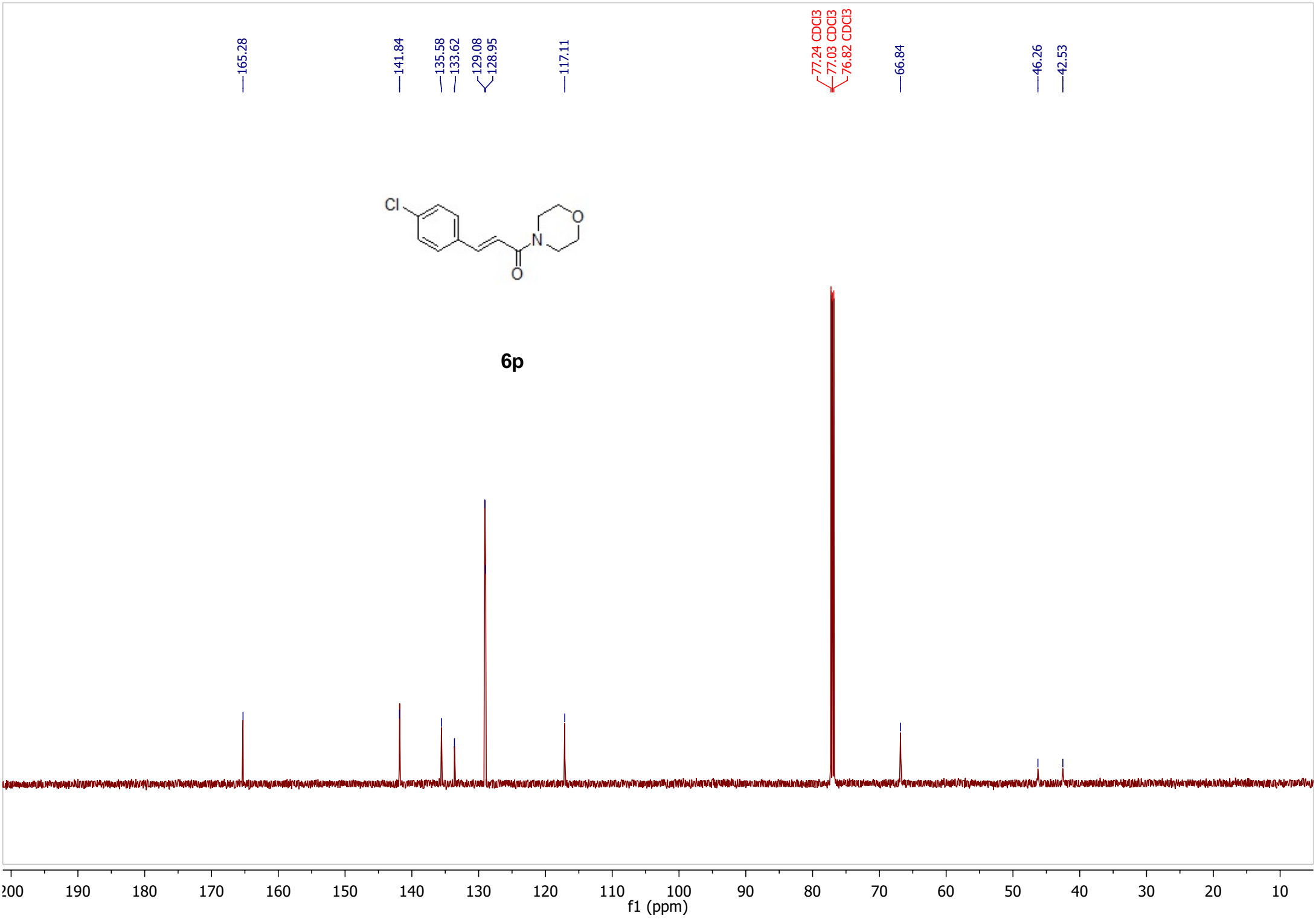

165.48
139.53
135.42
133.42
129.05
128.90
121.33
77.21 CDCl3
76.79 CDCl3
39.85
31.48
29.63
26.62
22.55
14.00
O
N
H
Cl
6n
f1 (ppm)

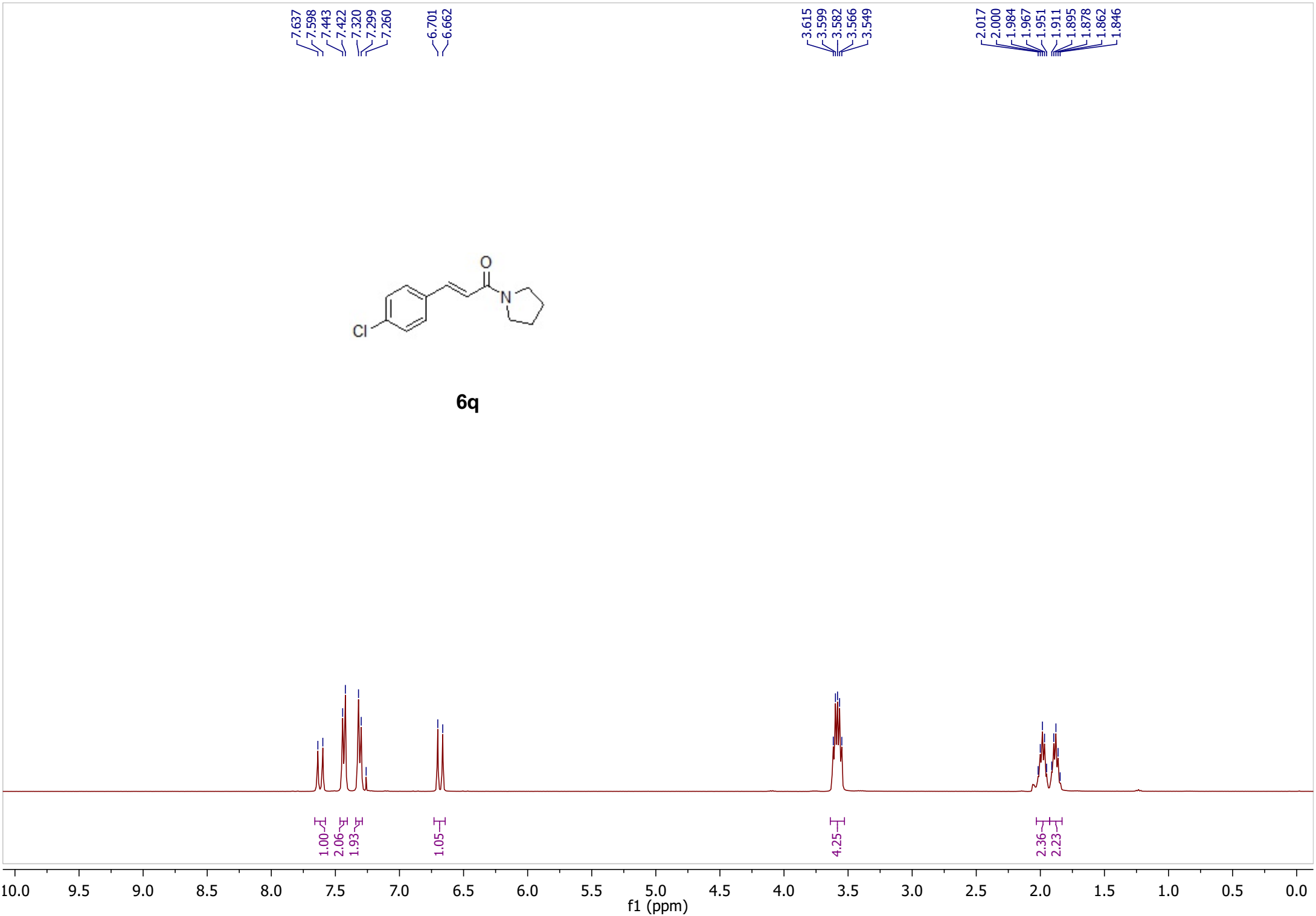

7.636
7.597
7.508
7.503
7.485
7.388
7.379
7.366
7.348
7.339
7.260
6.391
6.352
5.587
3.405
3.387
3.372
3.355
1.593
1.593
1.566
1.548
1.545
1.529
1.325
1.298
1.284
1.274
1.258
0.894
0.877
0.860
O
N
H
10
6o
0.90
1.77
2.61
0.94
0.92
1.90
6.80
12.80
2.71
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


165.80
140.84
134.93
129.57
128.78
127.73
120.80
77.32 CDCl3
77.00 CDCl3
76.68 CDCl3
39.83
31.91
29.69
29.64
29.62
29.58
29.54
29.33
29.31
26.97
22.67
14.09
O
N
H
10
6o
f1 (ppm)

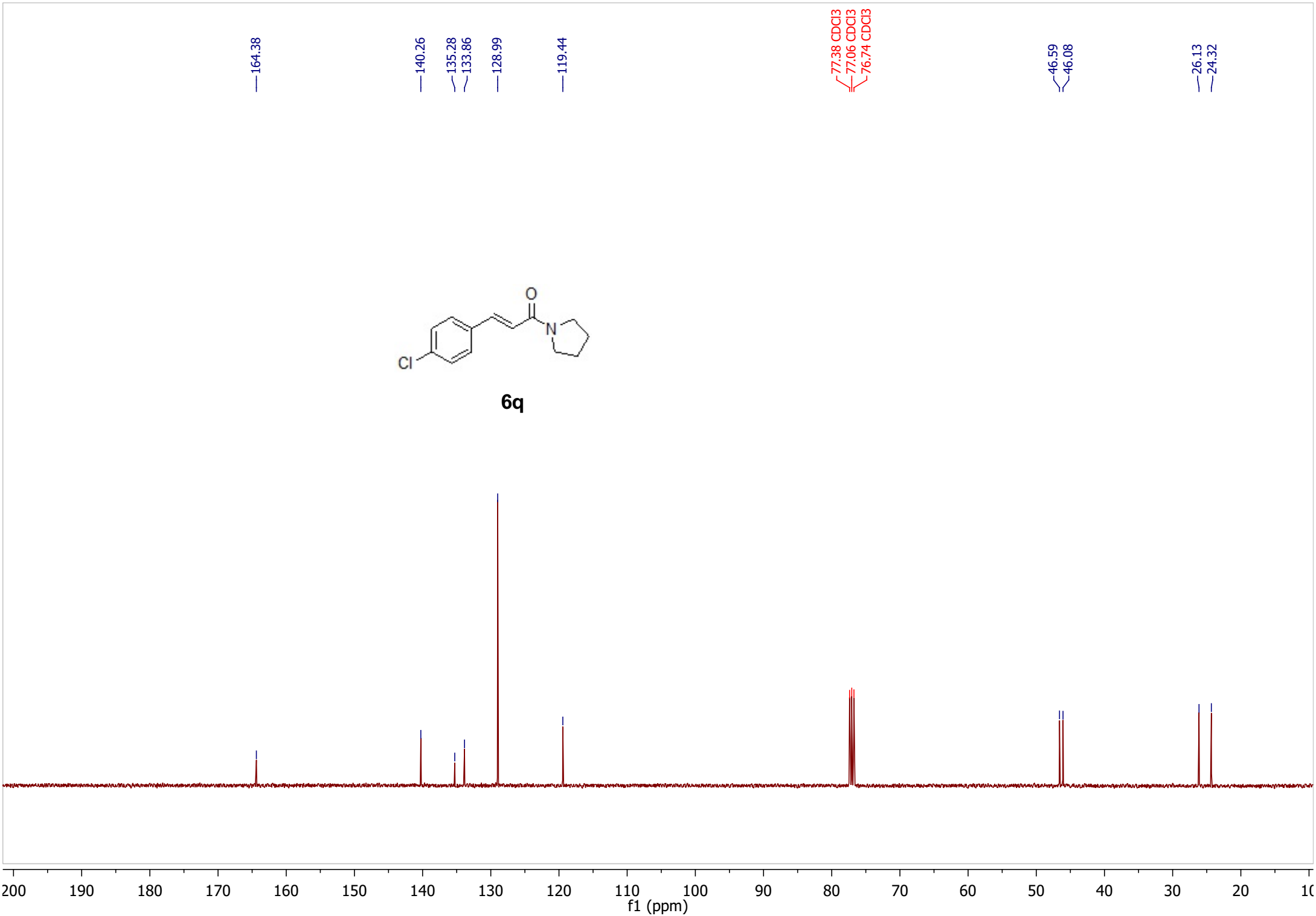

7.648
7.622
7.449
7.435
7.344
7.330
7.260
6.821
6.795
3.756
3.725
3.710
3.644
3.624
Cl
O
N
O
0.97
2.02
1.93
1.00
8.31
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

6p

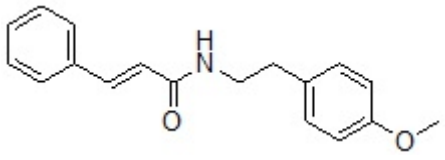

165.28
141.84
135.58
133.62
129.08
128.95
117.11
77.24 CDCl3
77.03 CDCl3
76.82 CDCl3
66.84
46.26
42.53
Cl
O
N
O
6p
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


7.637
7.598
7.443
7.422
7.320
7.299
7.260
6.701
6.662
3.615
3.599
3.582
3.566
3.549
2.017
2.000
1.984
1.967
1.951
1.911
1.895
1.878
1.862
1.846
O
N
Cl
1.00
2.06
1.93
1.05
4.25
2.36
2.23
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
f1 (ppm)

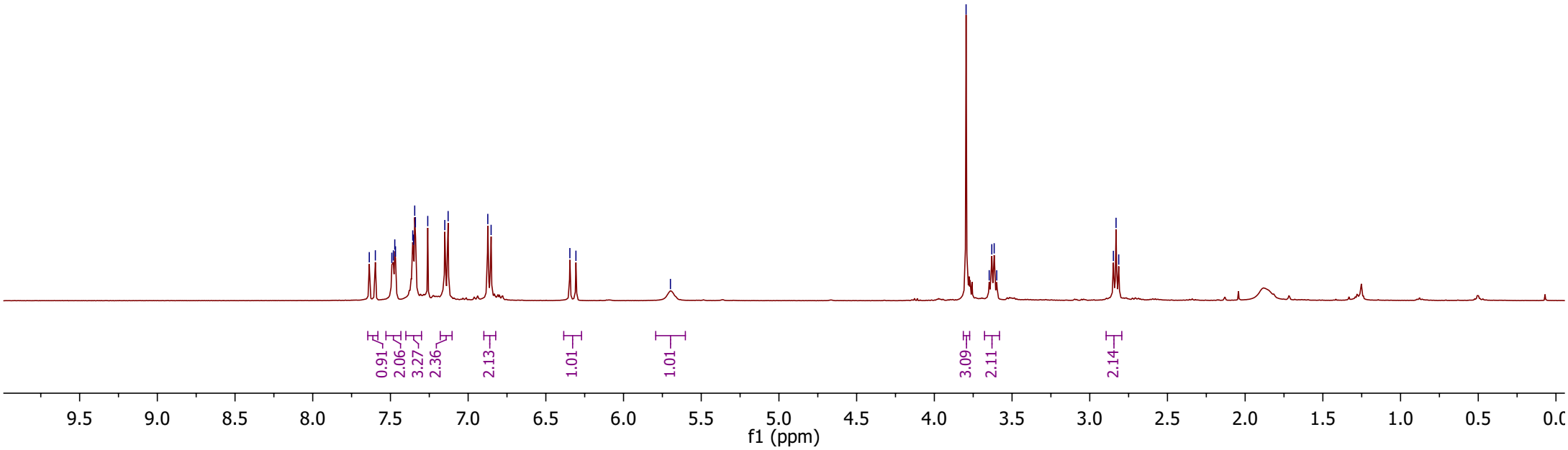
6q

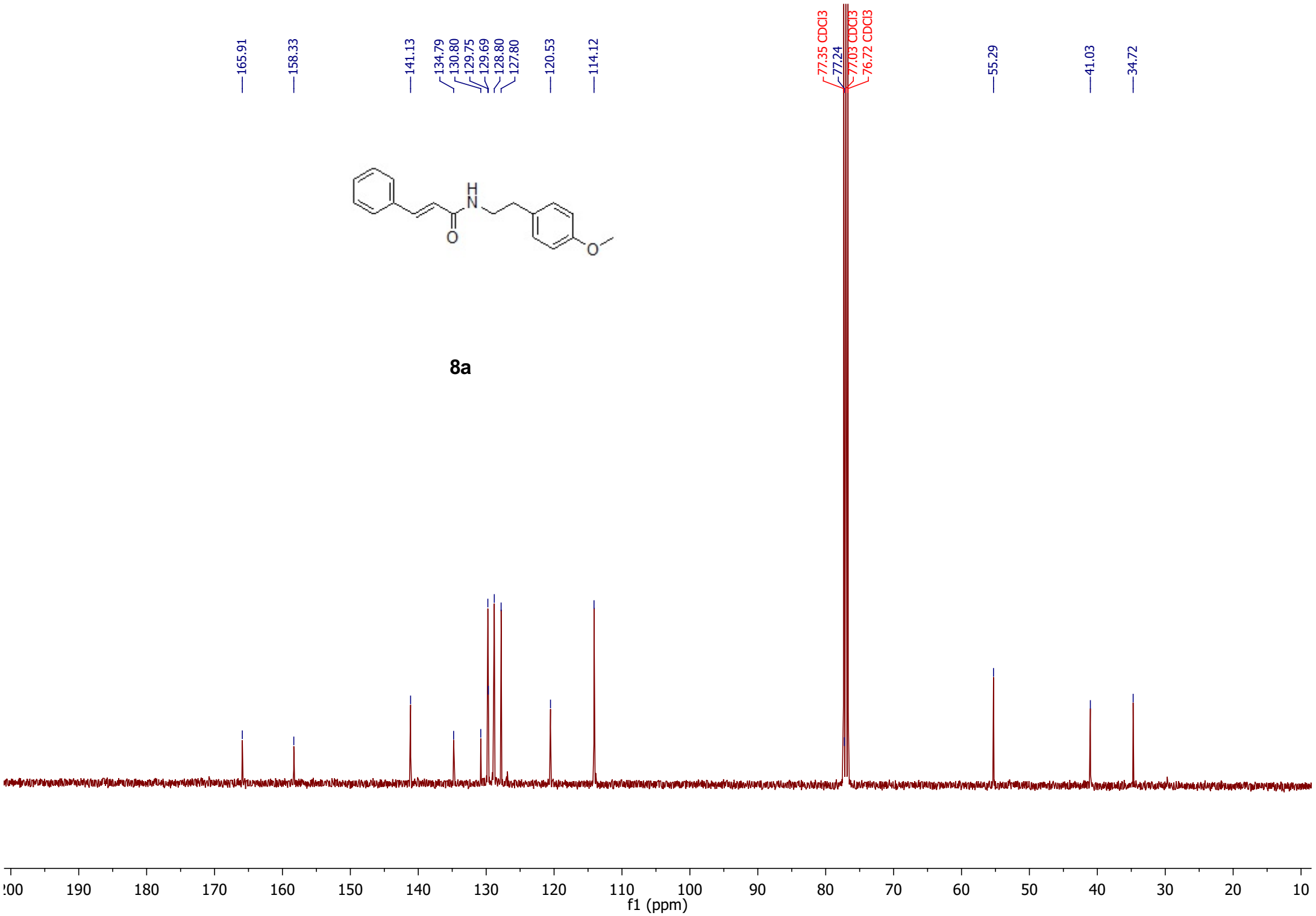

164.38
140.26
135.28
133.86
128.99
119.44
77.38 CDCl3
77.06 CDCl3
76.74 CDCl3
46.59
46.08
26.13
24.32
O
N
Cl
6q
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


7.636
7.597
7.491
7.481
7.472
7.468
7.357
7.352
7.344
7.339
7.260
7.150
7.129
6.874
6.852
6.345
6.306
5.698
3.796
3.647
3.630
3.615
3.598
2.848
2.831
2.813

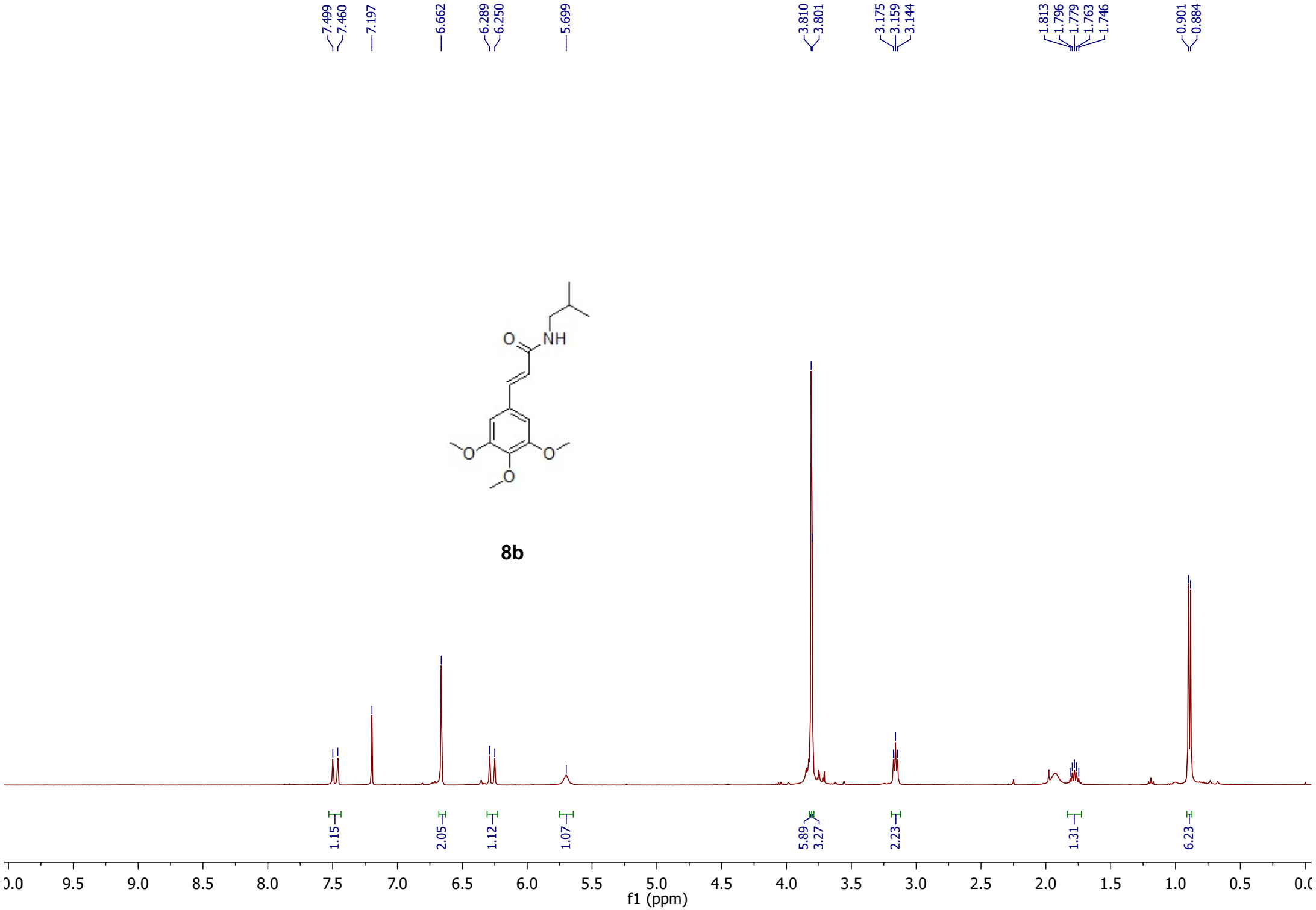

H
N
O
O

8a

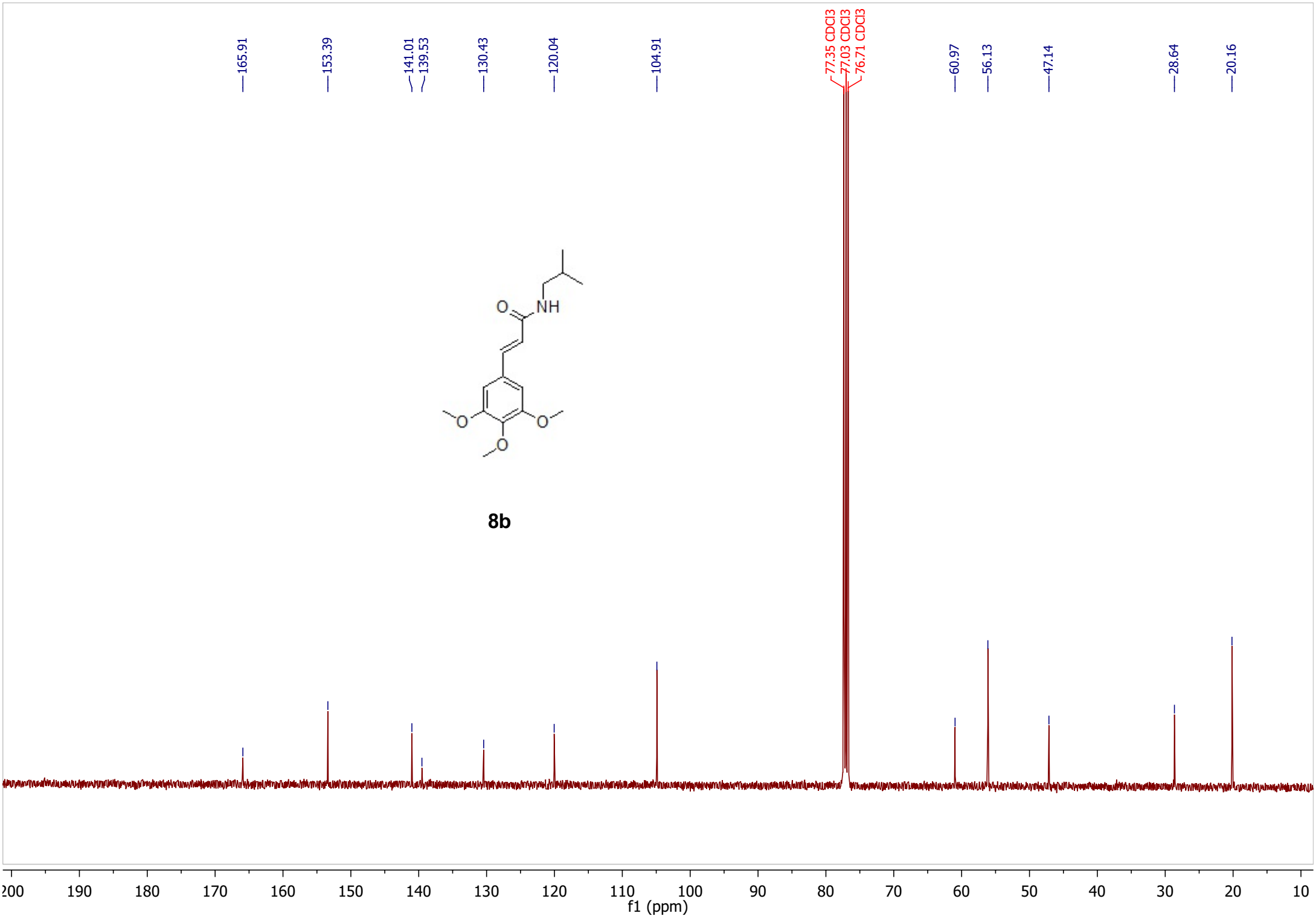

0.91
2.06
3.27
2.36
2.13
1.01
1.01
3.09
2.11
2.14
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

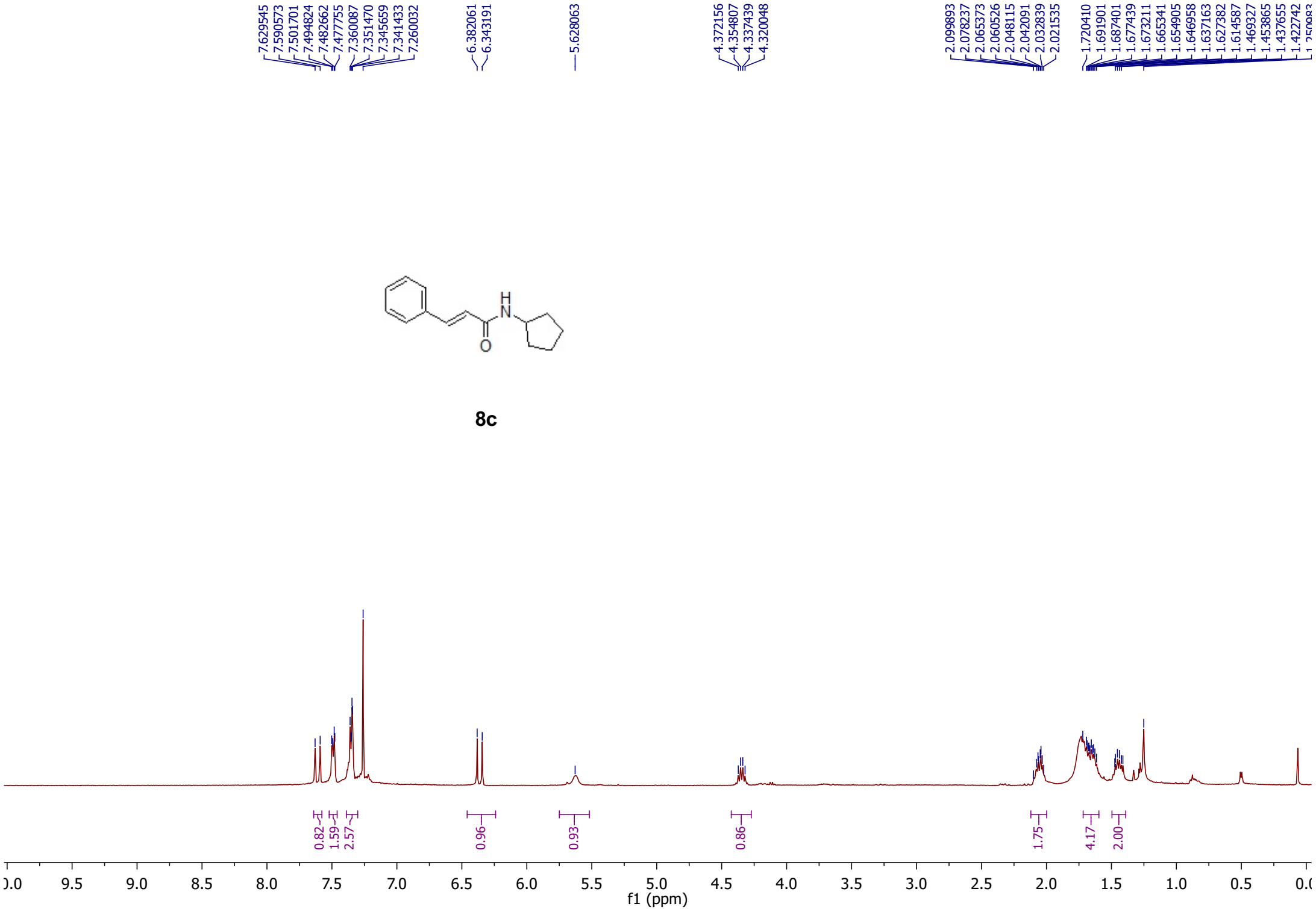

165.91
158.33
141.13
134.79
130.80
129.75
129.69
128.80
127.80
120.53
114.12
77.35 CDCl3
77.24
77.03 CDCl3
76.72 CDCl3
55.29
41.03
34.72
H
N
O
O
f1 (ppm)

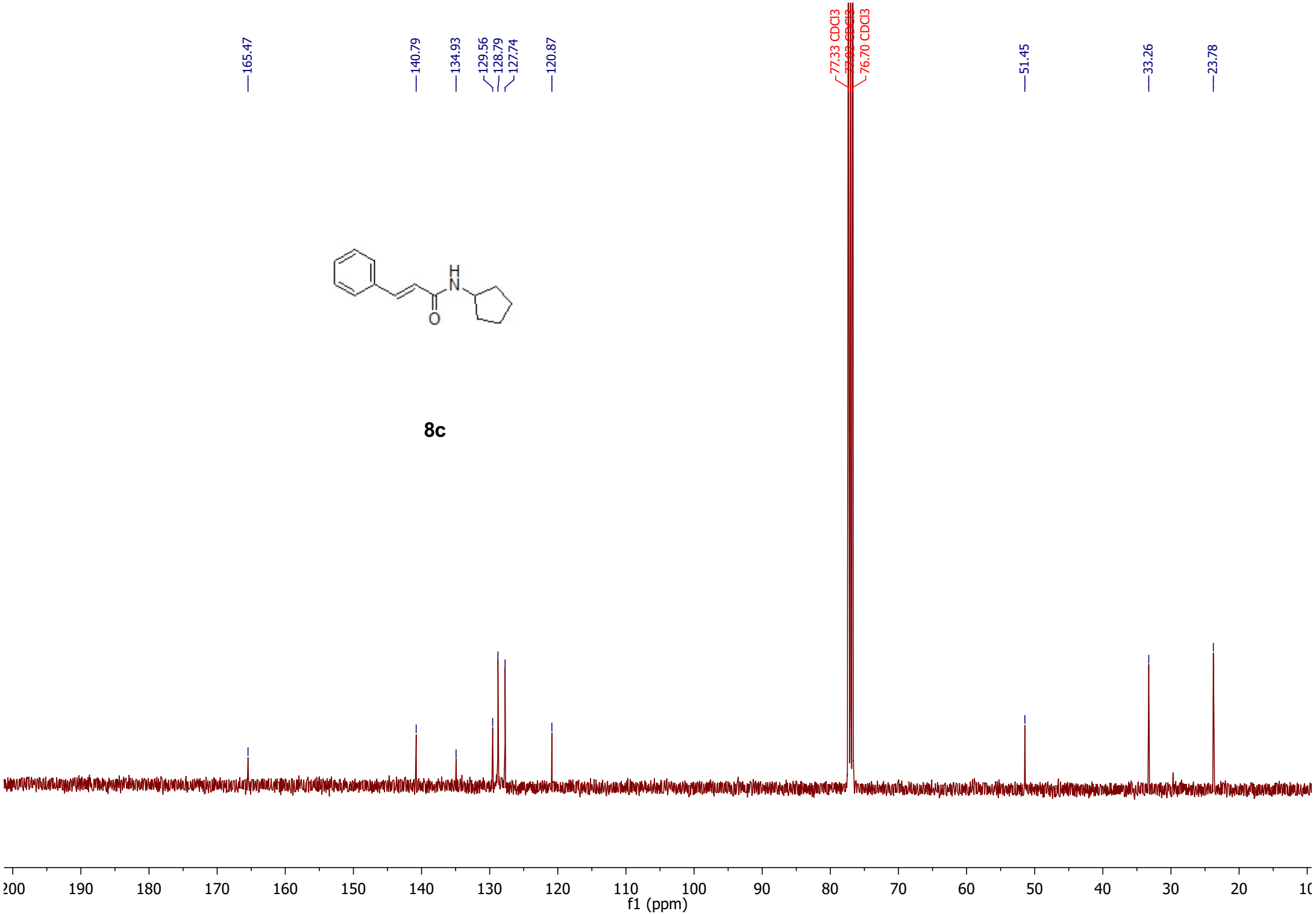
8a


7.499
7.460
7.197
6.662
6.289
6.250
5.699
3.810
3.801
3.175
3.159
3.144
1.813
1.796
1.779
1.763
1.746
0.901
0.884
O
NH
O
O
O
1.15
2.05
1.12
1.07
5.89
3.27
2.23
1.31
6.23
f1 (ppm)

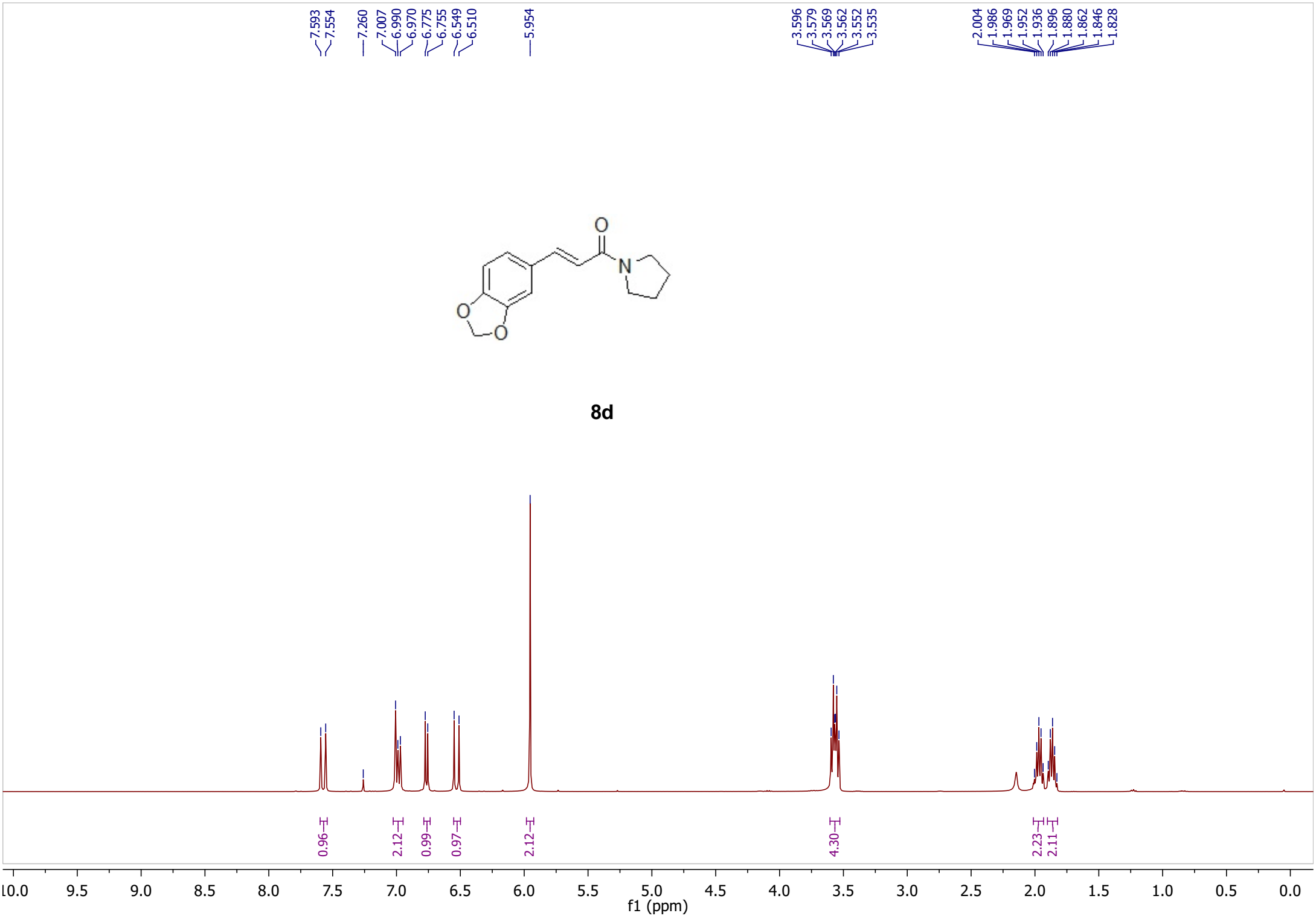
8b


165.91
153.39
141.01
139.53
130.43
120.04
104.91
77.35 CDCl3
77.03 CDCl3
76.71 CDCl3
60.97
56.13
47.14
28.64
20.16
O
NH
O
O
O
8b
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

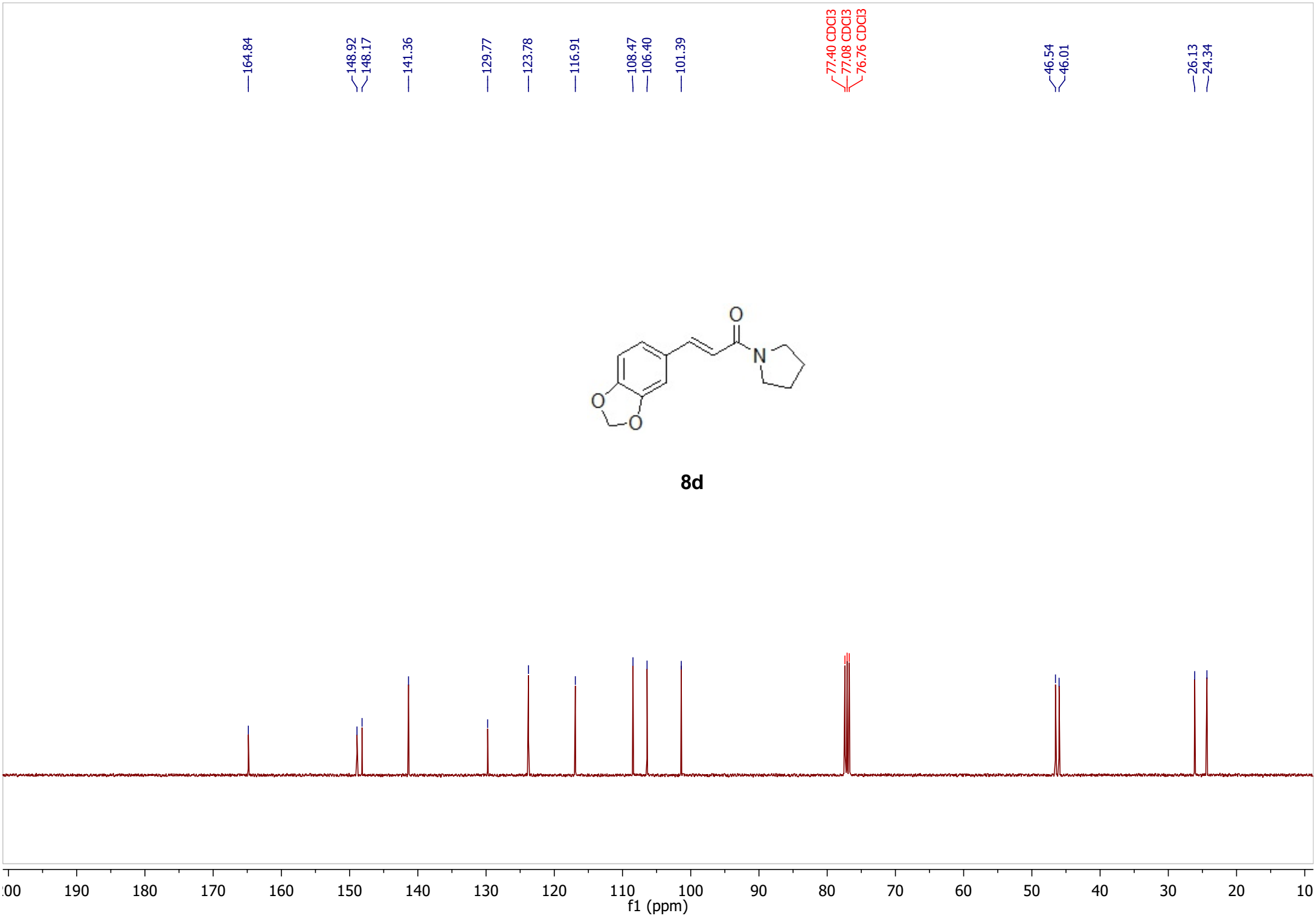

7.629545
7.590573
7.501701
7.494824
7.482662
7.477755
7.360087
7.351470
7.345659
7.341433
7.260032
6.382061
6.343191
5.628063
4.372156
4.354807
4.337439
4.320048
2.099893
2.078237
2.065373
2.060526
2.048115
2.042091
2.032839
2.021535
1.720410
1.691901
1.687401
1.677439
1.673211
1.665341
1.654905
1.646958
1.637163
1.627382
1.614587
1.469327
1.453865
1.437655
1.422742
H
N
O
8c
0.82
1.59
2.57
0.96
0.93
0.86
1.75
4.17
2.00
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
f1 (ppm)


165.47
140.79
134.93
129.56
128.79
127.74
120.87
77.33 CDCl3
76.70 CDCl3
51.45
33.26
23.78
H
N
O
f1 (ppm)

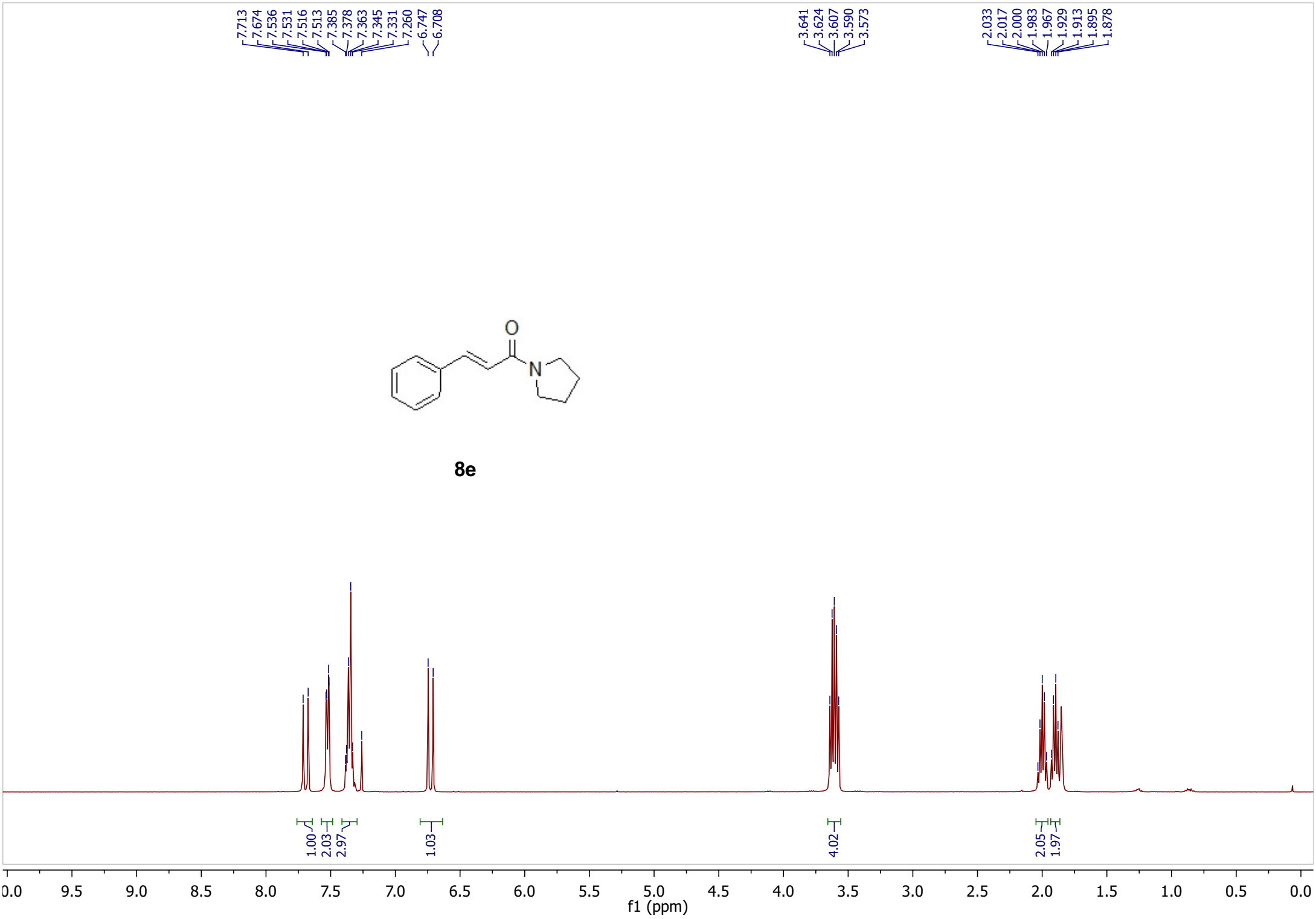
8c


7.593
7.554
7.260
7.007
6.990
6.970
6.775
6.755
6.549
6.510
5.954
3.596
3.579
3.569
3.562
3.552
3.535
2.004
1.986
1.969
1.952
1.936
1.896
1.880
1.862
1.846
1.828
O
N
O
O
0.96
2.12
0.99
0.97
2.12
4.30
2.23
2.11
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
f1 (ppm)

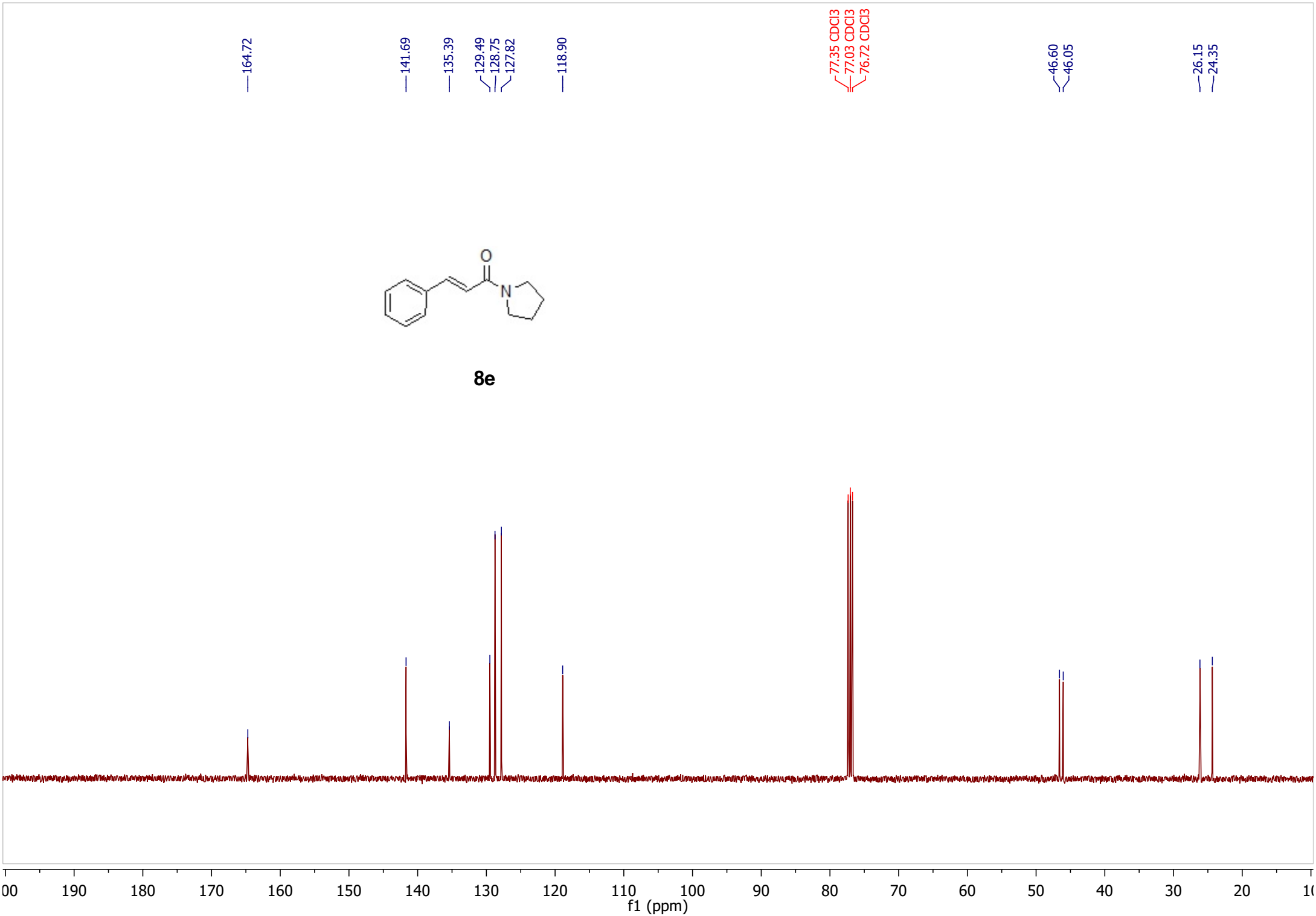
8d

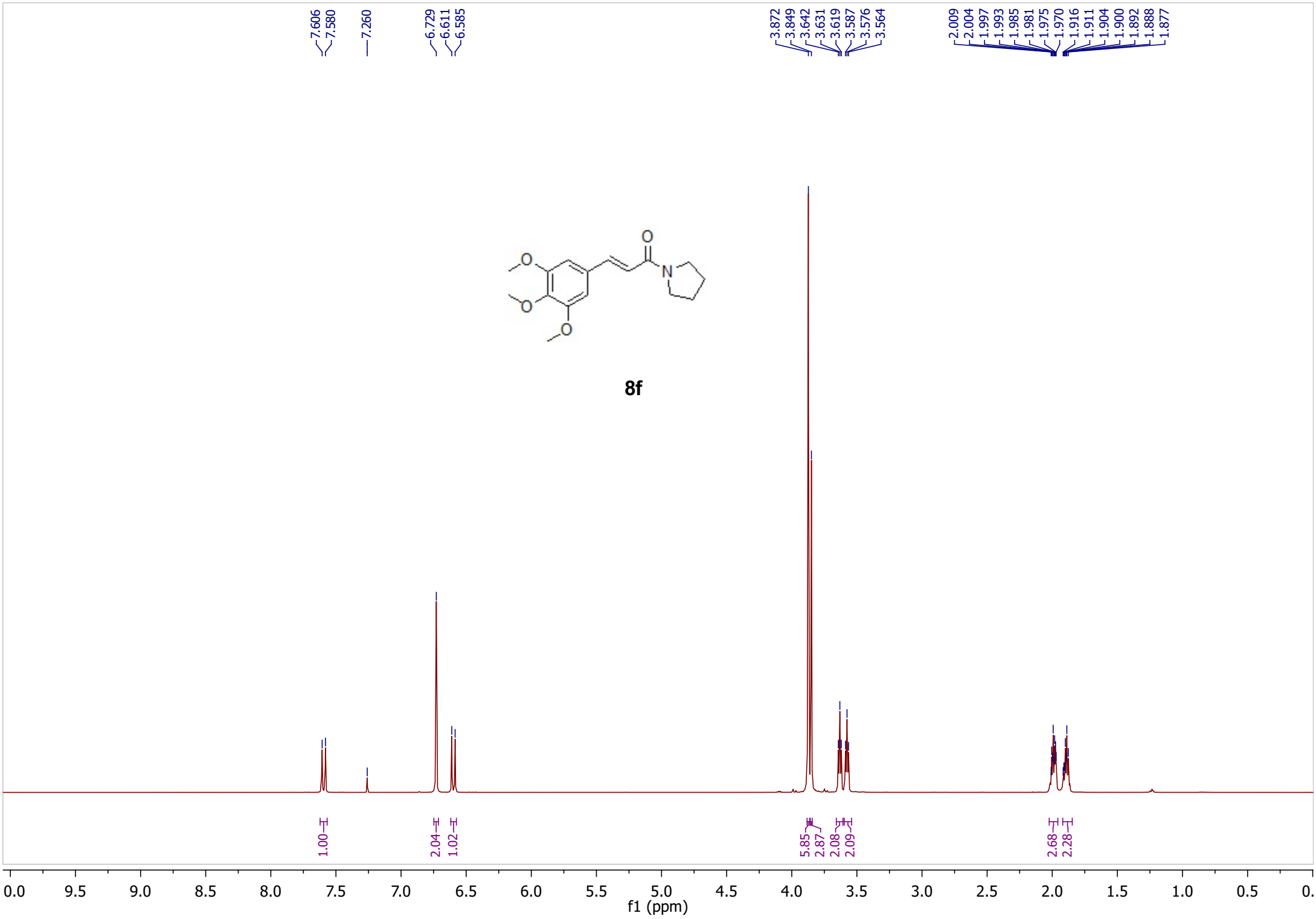

164.84
148.92
148.17
141.36
129.77
123.78
116.91
108.47
106.40
101.39
77.40 CDCl3
77.08 CDCl3
76.76 CDCl3
46.54
46.01
26.13
24.34
O
N
O
O
f1 (ppm)

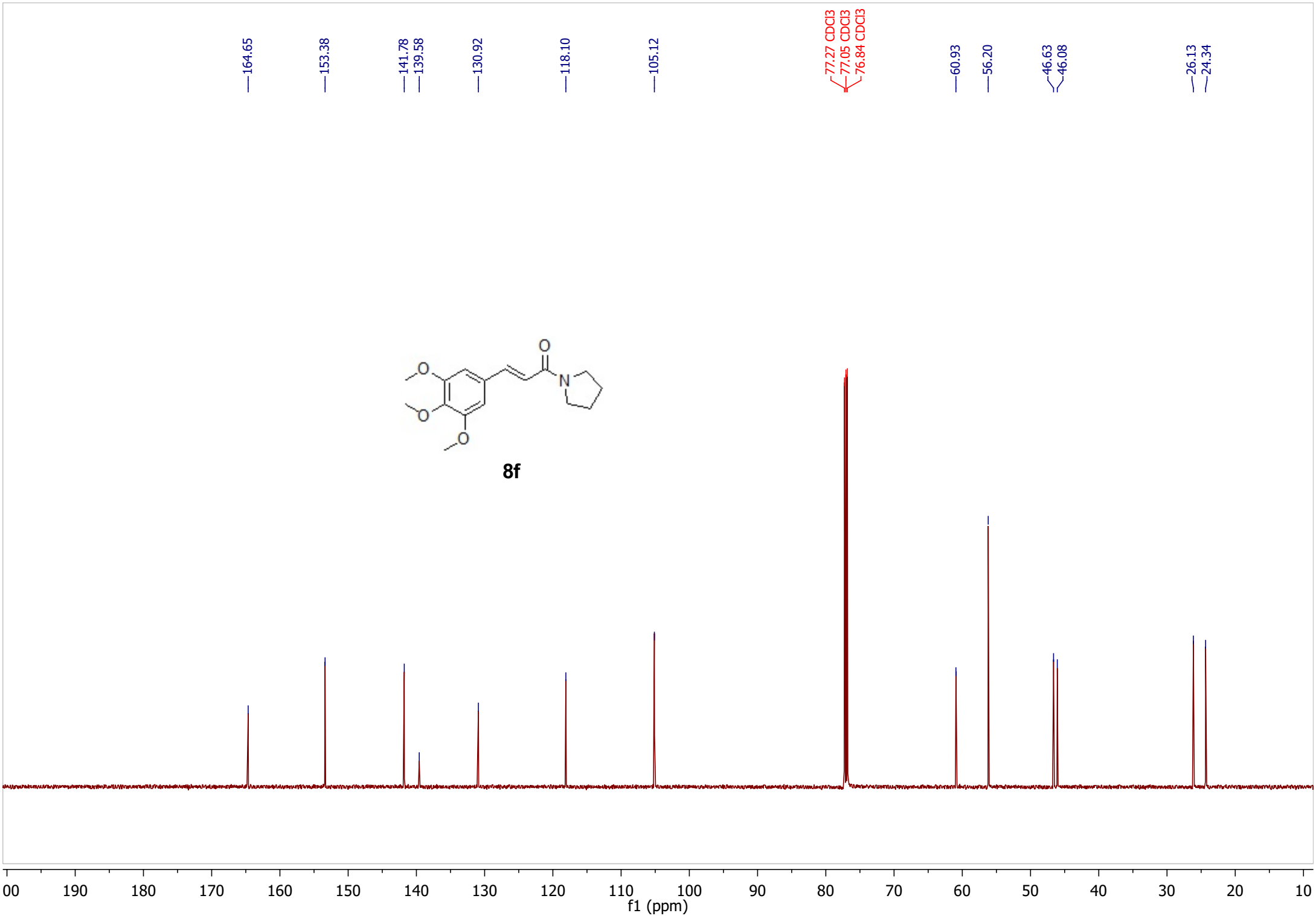
8d


7.713
7.674
7.536
7.531
7.516
7.513
7.385
7.378
7.363
7.345
7.331
7.260
6.747
6.708
3.641
3.624
3.607
3.590
3.573
2.033
2.017
2.000
1.983
1.967
1.929
1.913
1.895
1.878
O
N
1.00
2.03
2.97
1.03
4.02
2.05
1.97
f1 (ppm)

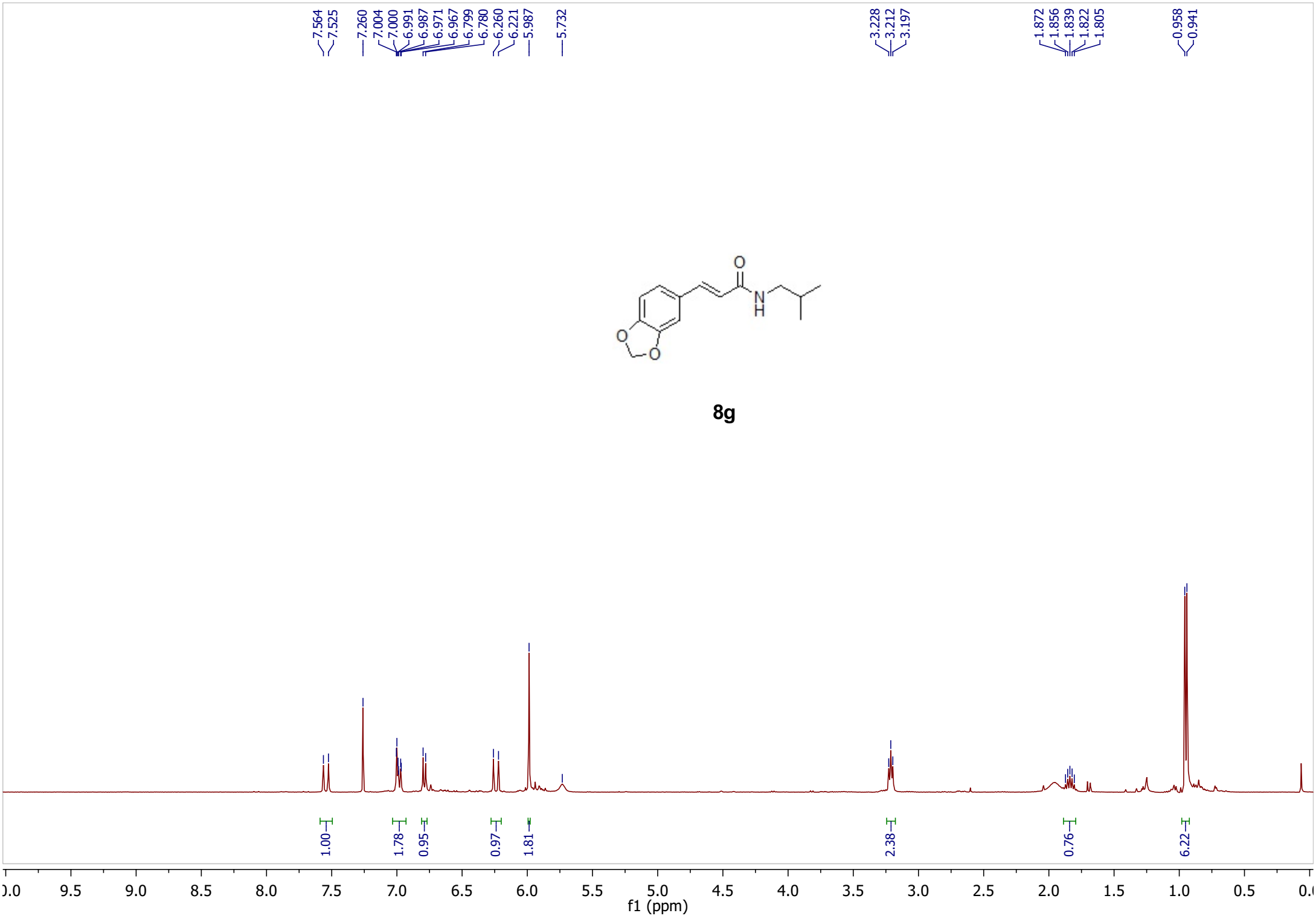
8e

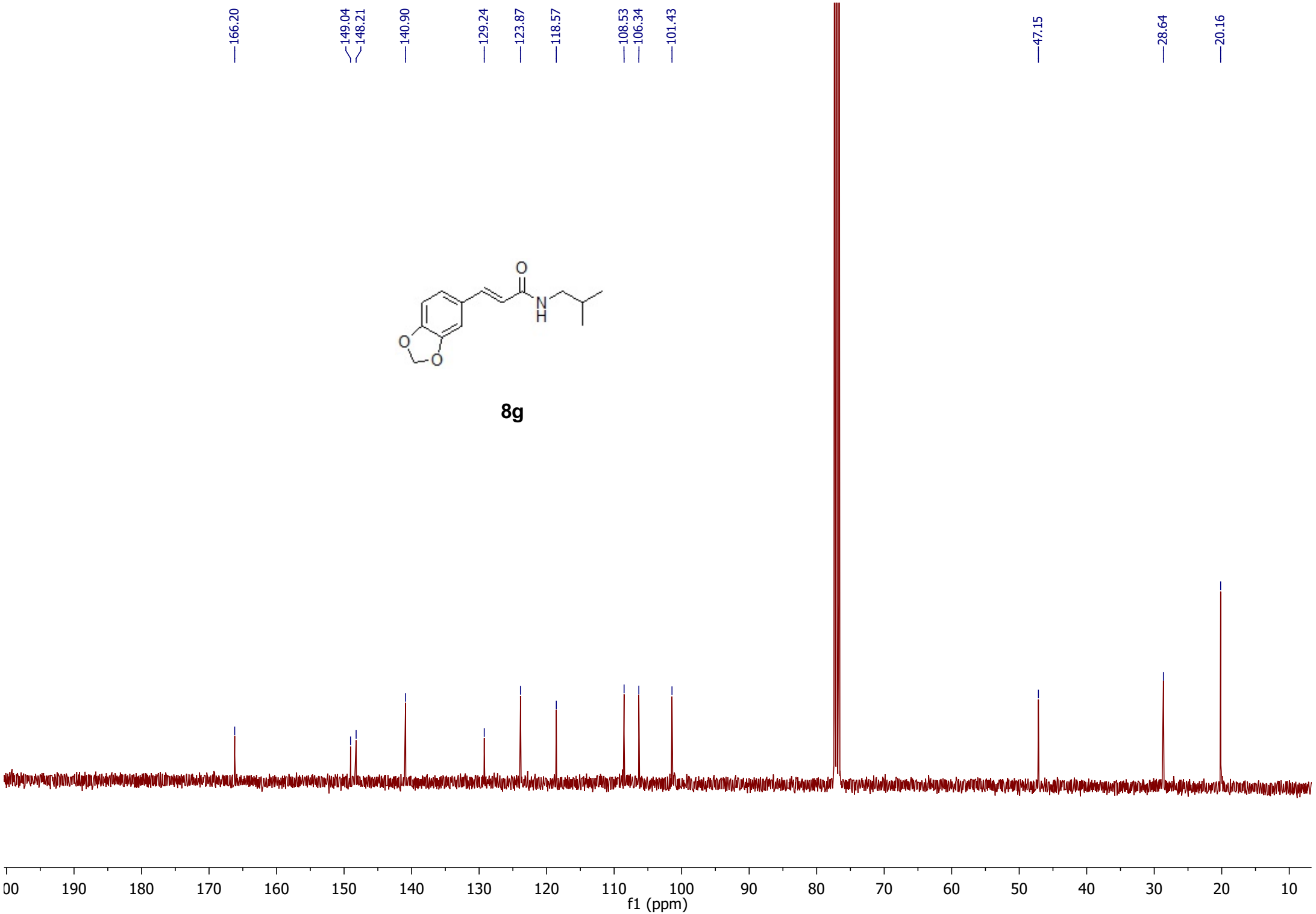

164.72
141.69
135.39
129.49
128.75
127.82
118.90
77.35 CDCl3
77.03 CDCl3
76.72 CDCl3
46.60
46.05
26.15
24.35
O
N
8e
f1 (ppm)

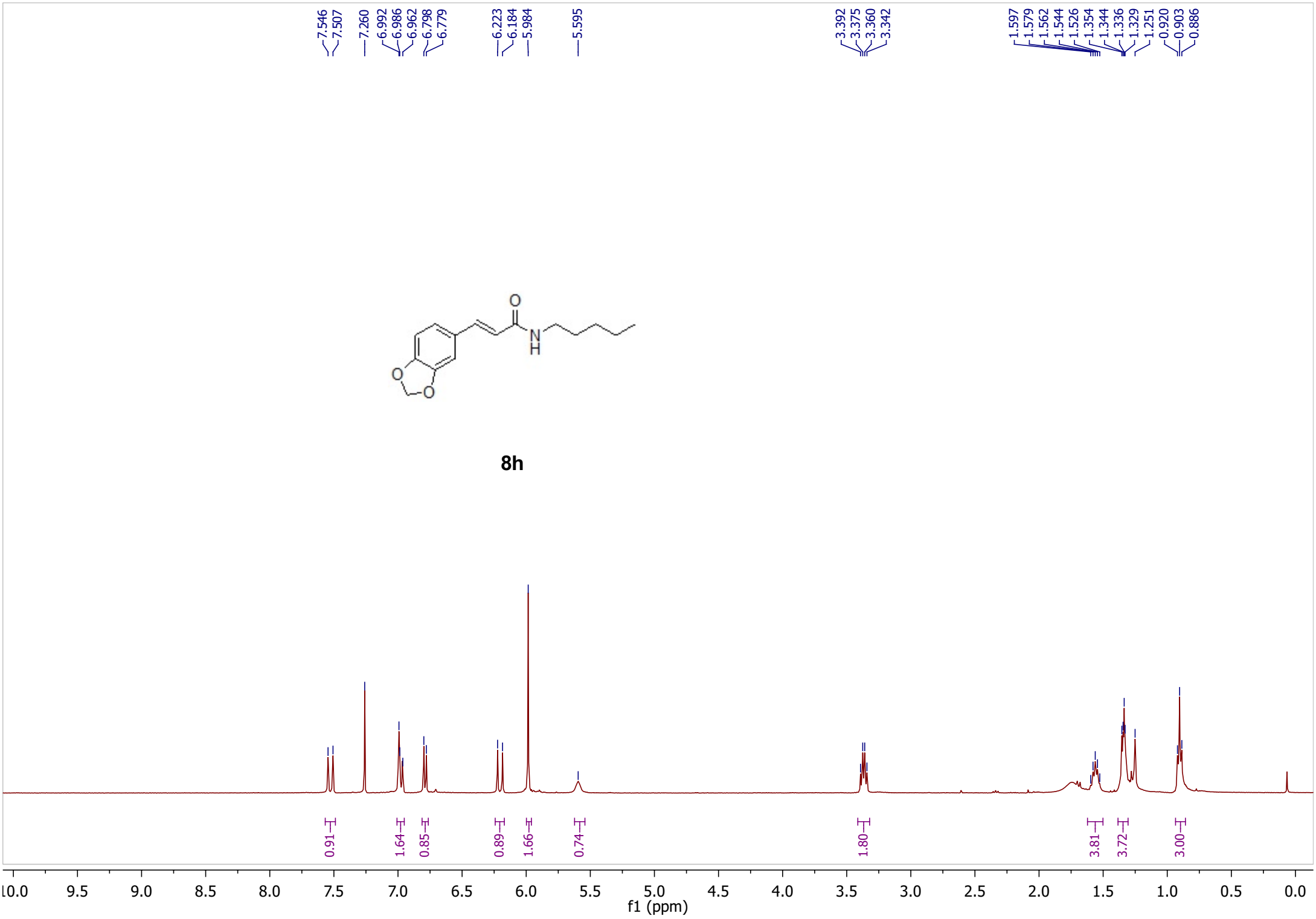

7.606
7.580
7.260
6.729
6.611
6.585
3.872
3.849
3.642
3.631
3.619
3.587
3.576
3.564
2.009
2.004
1.997
1.993
1.985
1.981
1.975
1.970
1.916
1.911
1.904
1.900
1.892
1.888
1.877
O
O
O
O
N
8f
1.00
2.04
1.02
5.85
2.87
2.08
2.09
2.68
2.28
0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.
f1 (ppm)


164.65
153.38
141.78
139.58
130.92
118.10
105.12
77.27 CDCl3
77.05 CDCl3
76.84 CDCl3
60.93
56.20
46.63
46.08
26.13
24.34
O
O
O
O
N
f1 (ppm)

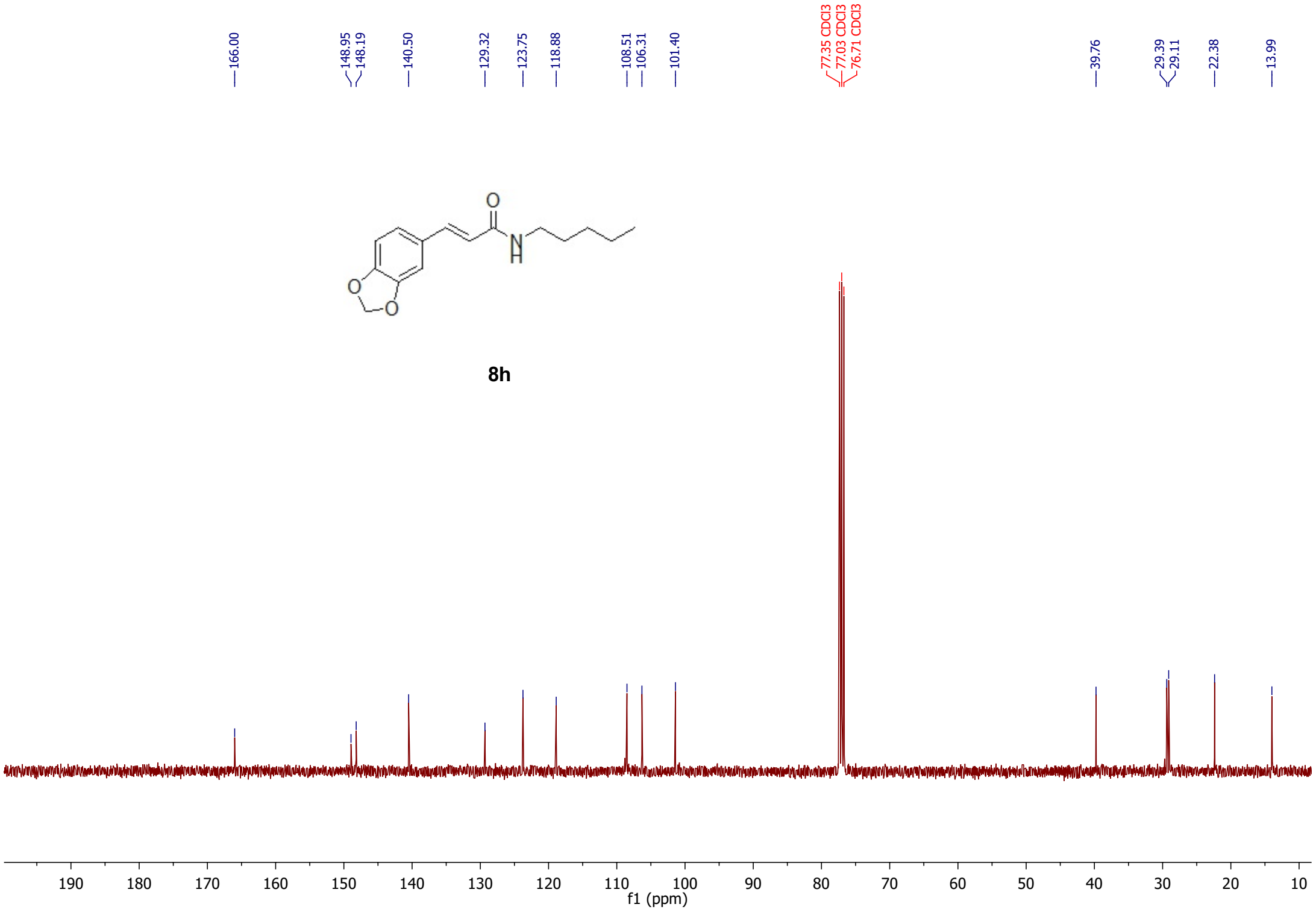
8f

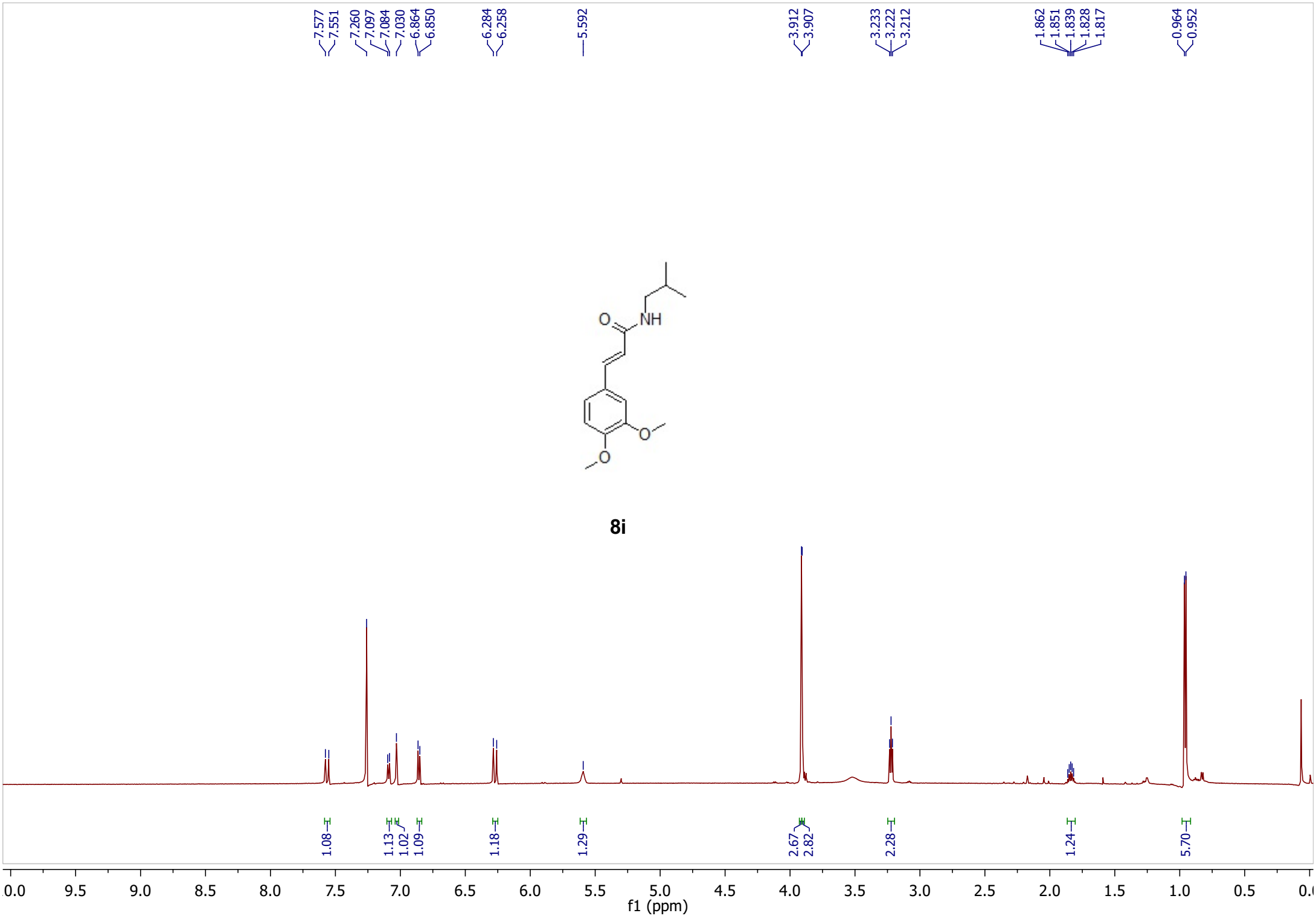

7.564
7.525
7.260
7.004
7.000
6.991
6.987
6.971
6.967
6.799
6.780
6.260
6.221
5.987
5.732
3.228
3.212
3.197
1.872
1.856
1.839
1.822
1.805
0.958
0.941
O
N
H
O
O
8g
1.00
1.78
0.95
0.97
1.81
2.38
0.76
6.22
f1 (ppm)


166.20
149.04
148.21
140.90
129.24
123.87
118.57
108.53
106.34
101.43
47.15
28.64
20.16
O
N
H
O
O
8g
00
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)

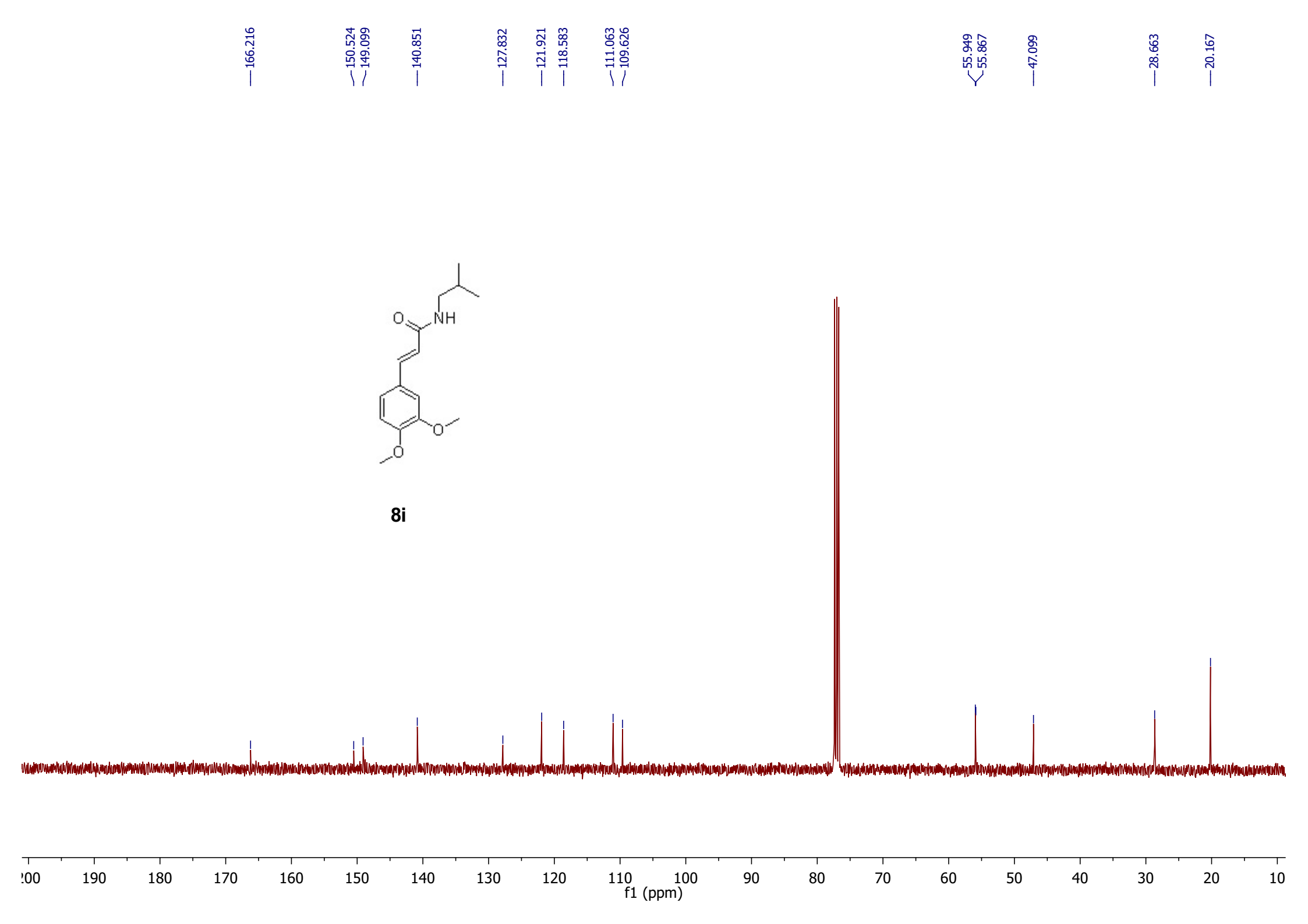

7.546
7.507
7.260
6.992
6.986
6.962
6.798
6.779
6.223
6.184
5.984
5.595
3.392
3.375
3.360
3.342
1.597
1.579
1.562
1.544
1.526
1.354
1.344
1.336
1.329
1.251
0.920
0.903
0.886
O
N
H
O
O
0.91
1.64
0.85
0.89
1.66
0.74
1.80
3.81
3.72
3.00
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

8h


166.00
148.95
148.19
140.50
129.32
123.75
118.88
108.51
106.31
101.40
77.35 CDCl3
77.03 CDCl3
76.71 CDCl3
39.76
29.39
29.11
22.38
13.99
O
N
H
O
O
8h
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


7.577
7.551
7.260
7.097
7.084
7.030
6.864
6.850
6.284
6.258
5.592
3.912
3.907
3.233
3.222
3.212
1.862
1.851
1.839
1.828
1.817
0.964
0.952
O
NH
O
O
1.08
1.13
1.02
1.09
1.18
1.29
2.67
2.82
2.28
1.24
5.70
f1 (ppm)

8i


166.216
150.524
149.099
140.851
127.832
121.921
118.583
111.063
109.626
55.949
55.867
47.099
28.663
20.167
O
NH
O
O
8i
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)