Visible Light–Mediated Ring–Ablative Functionalization of Oxazoles: Oxidative Azidation and Demethylative Amination

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1. General Information

Reagents were purchased at the highest commercial quality and used without further purification unless otherwise stated. Oxazole derivatives and aniline precursors[1,2] were synthesized according to known procedures. Yields refer to chromatographically pure material. Reactions were monitored via thin-layer chromatography (TLC) performed on 0.25-mm Merck silica gel plates (60F-254) using UV light as the visualizing agent and anisaldehyde stain followed by heating as a developing agent. Merck silica gel (particle size 100–200 mesh) was used for flash column chromatography.

NMR spectra were recorded on Bruker Advance 500 (^{1}H: 500 MHz and ^{13}C: 125 MHz) or 400 (^{1}H: 400 MHz and^{13}C: 100 MHz) in $CDCl_3$, with TMS 0.03% as internal standard. Mass spectrometric data were obtained using WATERS-Q-TOF Premier-ESI-MS.

The following abbreviations are used to explain the multiplicities: s = singlet, d = doublet, t = triplet, q = quartet, dd = doublet of doublet, ddd = doublet of a doublet of doublet.

The structure of derivative **5a** has been deposited in the CCDC database with the deposition number 2256652.

[1]Huang, N.-Y.; Nie, Y.-B.; Ding, M.-W. New Efficient Synthesis of 5-Ethoxyoxazoles and Oxazolo[3,2-c]quinazolines via Aza-Wittig Reaction. *Synlett***2009**, *2009* (04), 611-614.

[2]Cho, J.-H.; Jung, K.-Y.; Jung, Y.; Kim, M. H.; Ko, H.; Park, C.-S.; Kim, Y.-C. Design and synthesis of potent and selective P2X3 receptor antagonists derived from PPADS as potential pain modulators. *Eur. J. Med. Chem.* **2013**, *70*, 811-830.

2. General Experimental Procedure, Photochemical Setup and Fluorescence Quenching Experiments

2.1. Synthesis of azido-glycine esters 2:

To a glass vial, oxazole derivative (1 equiv), $TMSN_3$ (2equiv), Rhodamine 6G (1 mol%), and 1,4-dioxane (2 mL) were added. The reaction mixture was irradiated with Blue LED's and stirred for 6–24 h under air atmosphere. After the completion of the reaction (monitored *via* TLC), the solvent was removed, and the product was purified using flash column chromatography (ethyl acetate: petroleum ether) to obtain the desired product.

2.2. Synthesis of amino-glycine esters 5:

To a glass vial, oxazole derivative (1 equiv), *N*,*N*-dimethylaniline derivative (3 equiv), Rose Bengal (1 mol%), and dioxane (2 mL) were added. The reaction mixture was irradiated with green LEDs and stirred for 24 h under air atmosphere. After the completion of reaction (monitored via TLC), the solvent was removed, and the product was purified using flash column chromatography (ethyl acetate: petroleum ether) to afford the desired product.

2.3 Photocatalytic device: The photocatalytic device was made by wrapping an LED strip around a 250 mL beaker. The emission of the LED was recorded and is shown below (425-500 nm). Total power was computed to be 18W.

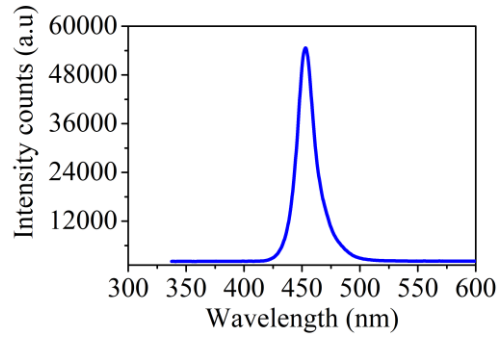
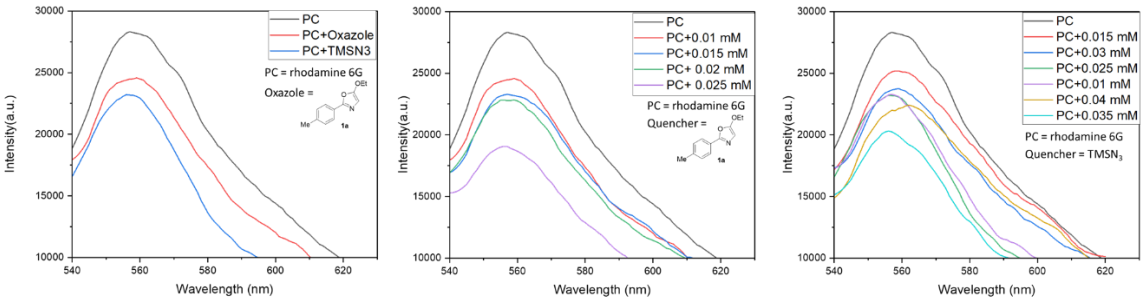


Figure S1. Emission profile of the LED's

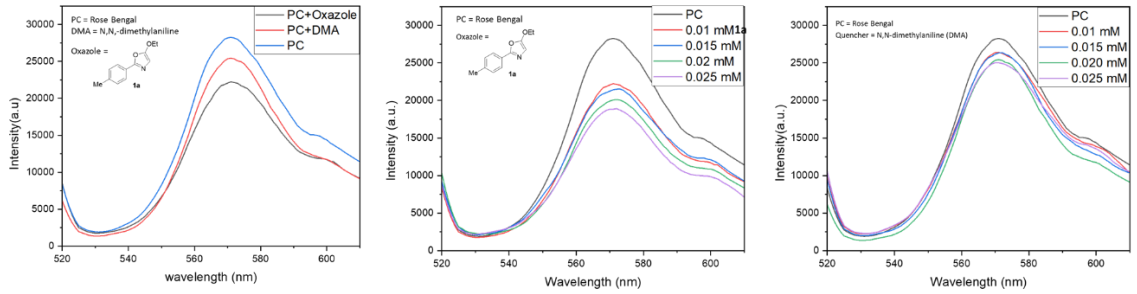
Figure S2. LED light setup

18 W blue LED strip wrapped on a 250 mL beaker

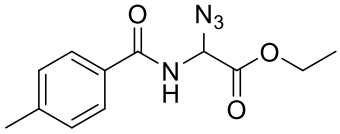
2.4. Fluorescence quenching experiments for azidation



2.5 Fluorescence quenching experiments for amination

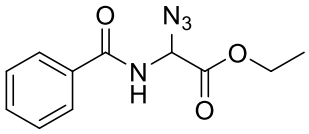


3. Analytical data of synthesized products

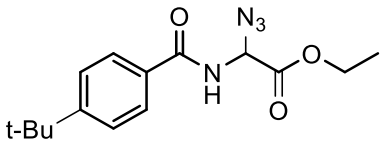


Ethyl 2-azido-2-(4-methylbenzamido)acetate (2a): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **2a** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (55 mg, 85%). R_f = 0.32 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3329, 2924, 2114, 1749, 1657, 1499, 1191, 752. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.74 (d, *J* = 8.2 Hz, 2H), 7.27 (d, *J* = 8.1 Hz, 2H), 7.22 (d, *J* = 8.5 Hz, 1H), 5.99 (d, *J* = 8.1 Hz, 1H), 4.35 (q, *J* = 7.1 Hz, 2H), 2.42 (s, 3H), 1.38 (t, *J* = 7.3 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.3, 167.1, 143.5, 129.8, 129.6, 127.5, 65.3, 63.4, 21.7, 14.2. Exact mass calculated for $C_{12}H_{14}N_4NaO_3^+$[M+Na]$^+$: 285.0958; found: 285.0968.

Gram scale synthesis: According to the general procedure, oxazole derivative (1g, 4.92 mmol), $TMSN_3$ (1.13g, 9.84mmol) and Rhodamine 6g (23mg, 49.2 mmol) in 40 mL 1,4-dioxane, provided **2a** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (1.14 g, 88%).

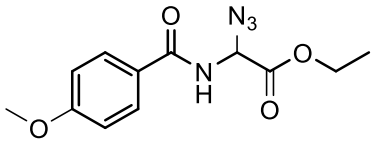


Ethyl 2-azido-2-benzamidoacetate (2b): According to the general procedure, oxazole derivative (50 mg, 0.29 mmol) provided **2b** after flash column chromatography (10% ethyl acetate in petroleum ether) as a colorless liquid (46 mg, 70%). R_f = 0.32 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3329, 2927, 2114, 1748, 1660, 1519, 1487, 1243, 1206, 713, 691. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.87–7.81 (m, 2H), 7.59–7.53 (m, 1H), 7.48 (t, *J* = 7.6 Hz, 2H), 7.30 (d, *J* = 7.0 Hz, 1H), 6.00 (d, *J* = 8.1 Hz, 1H), 4.36 (q, *J* = 7.3 Hz, 2H), 1.37 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.4, 167.1, 132.8, 132.6, 128.9, 127.5, 65.3, 63.4, 14.2. Exact mass calculated for $C_{11}H_{12}N_4NaO_3^+$[M+Na]$^+$: 271.0802; found: 271.0818.

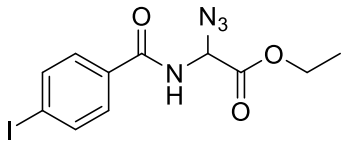


Ethyl 2-azido-2-(4-(*tert*-butyl)benzamido)acetate (2c): According to the general procedure, oxazole derivative (50 mg, 0.20 mmol) provided **2c** after flash column chromatography

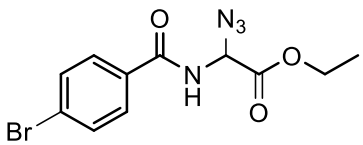
(10% ethyl acetate in petroleum ether) as a white solid (58 mg, 94%). R_f = 0.42 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3319, 2963, 2112, 1749, 1655, 1497, 1202, 851, 773. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.78 (d, *J* = 8.4 Hz, 2H), 7.48 (d, *J* = 8.4 Hz, 2H), 7.31 (s, 1H), 6.00 (d, *J* = 8.0 Hz, 1H), 4.34 (q, *J* = 7.2 Hz, 2H), 1.37 (t, *J* = 7.1 Hz, 3H), 1.34 (s, 9H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.3, 167.1, 156.4, 129.7, 127.4, 125.9, 65.2, 63.3, 35.2, 31.2, 14.2. Exact mass calculated for $C_{15}H_{21}N_4O_3^+$[M+Na]$^+$: 305.1608; found: 305.1611.



Ethyl 2-azido-2-(4-methoxybenzamido)acetate (2d): According to the general procedure, oxazole derivative (60 mg, 0.27 mmol) provided **2d** after flash column chromatography (30% ethyl acetate in petroleum ether) as a pale-yellow liquid (74 mg, 97%). R_f = 0.34 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3331, 2922, 2110, 1745, 1650, 1497, 1253, 1176, 1024, 767. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.80 (d, *J* = 8.8 Hz, 2H), 7.28 (d, *J* = 7.6 Hz, 1H), 6.93 (dd, *J* = 8.8, 1.9 Hz, 2H), 5.98 (d, *J* = 8.0 Hz, 1H), 4.32 (q, *J* = 7.1 Hz, 2H), 3.84 (s, 3H), 1.35 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.1, 166.8, 163.1, 129.4, 124.8, 114.1, 65.3, 63.3, 55.6, 14.1. Exact mass calculated for $C_{12}H_{14}N_4NaO_4^+$[M+Na]$^+$: 301.0913; found: 301.0914.

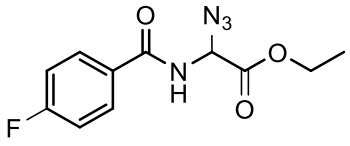


Ethyl 2-azido-2-(4-iodobenzamido)acetate (2e): According to the general procedure, oxazole derivative (50 mg, 0.16 mmol) provided **2e** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (51 mg, 86%). R_f = 0.58 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3300, 2955, 2107, 1744, 1647, 1514, 1209, 758. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.83 (d, *J* = 8.4 Hz, 2H), 7.56 (d, *J* = 8.5 Hz, 2H), 7.24 (s, 1H), 5.96 (d, *J* = 7.9 Hz, 1H), 4.35 (q, *J* = 7.1 Hz, 2H), 1.37 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.9, 166.7, 138.2, 132.0, 128.9, 100.1, 65.3, 63.5, 14.2. Exact mass calculated for $C_{11}H_{10}N_4O_3^-$ [M−H]$^-$: 372.9803; found: 372.9798.

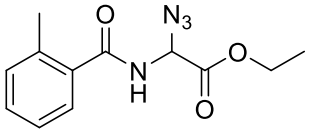


Ethyl 2-azido-2-(4-bromobenzamido)acetate (2f): According to the general procedure, oxazole derivative (50 mg, 0.18 mmol) provided **2f** after flash column chromatography (20% ethyl acetate

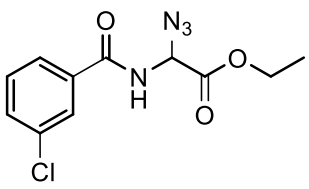
in petroleum ether) as a colorless liquid (40 mg, 66%). R_f = 0.34 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3304, 2922, 2106, 1745, 1647, 1514, 1209, 846, 761. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.71 (d, *J* = 8.5 Hz, 2H), 7.61 (d, *J* = 8.5 Hz, 2H), 7.31 (d, *J* = 7.7 Hz, 1H), 5.97 (d, *J* = 7.9 Hz, 1H), 4.35 (q, *J* = 7.1 Hz, 2H), 1.37 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.9, 166.5, 132.2, 131.4, 129.1, 127.6, 65.3, 63.5, 14.2. Exact mass calculated for $C_{11}H_{10}BrN_4O_3^-$[M−H]$^-$: 324.9942; found: 324.9922.



Ethyl 2-azido-2-(4-fluorobenzamido)acetate (2g): According to the general procedure, oxazole derivative (50 mg, 0.24 mmol) provided **2g** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (41 mg, 64%). R_f = 0.54 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3327, 2963, 2104, 1746, 1645, 1526, 1248, 854, 765. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.87 (dd, *J* = 8.8, 5.2 Hz, 2H), 7.23 (d, *J* = 6.6 Hz, 1H), 7.15 (t, *J* = 8.5 Hz, 2H), 5.97 (d, *J* = 7.9 Hz, 1H), 4.36 (q, *J* = 7.2 Hz, 2H), 1.38 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.03, 166.27, 165.52 (d, *J* = 253.8 Hz), 129.97 (d, *J* = 9.1 Hz), 128.8 (d, *J* = 2.6 Hz), 116.1 (d, *J* = 22.1 Hz), 65.3, 63.5, 14.2. Exact mass calculated for $C_{11}H_{10}FN_4O_3^-$[M−H]$^-$: 265.0742; found: 265.0746.

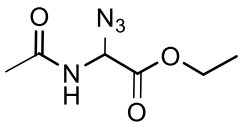


Ethyl 2-azido-2-(2-methylbenzamido)acetate (2h): According to the general procedure, oxazole derivative (50 mg, 0.23 mmol) provided **2h** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (28 mg, 43%). R_f = 0.32 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3300, 2925, 2112, 1737, 1458, 1166, 832. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.45 (d, *J* = 7.5 Hz, 1H), 7.37 (t, *J* = 7.5 Hz, 1H), 7.26–7.22 (m, 2H), 7.01 (d, *J* = 7.6 Hz, 1H), 5.97 (d, *J* = 8.3 Hz, 1H), 4.33 (q, *J* = 7.1 Hz, 2H), 2.48 (s, 3H), 1.37 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100MHz, Chloroform-*d*) δ 169.7, 166.8, 137.0, 134.1, 131.5, 131.1, 127.2, 126.0, 64.9, 63.3, 20.1, 14.2. Exact mass calculated for $C_{12}H_{14}N_4NaO_3^+$[M+Na]$^+$: 285.0958; found: 285.0962.

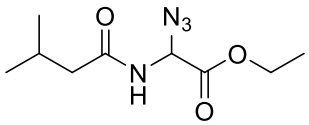


Ethyl 2-azido-2-(3-chlorobenzamido)acetate (2i): According to the general procedure, oxazole derivative (50 mg, 0.22 mmol) provided **2i** after flash column chromatography (15% ethyl acetate in petroleum

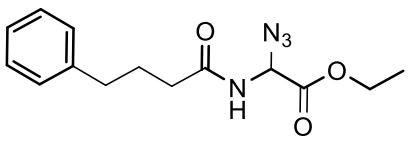
ether) as a white solid (39 mg, 62%). R_f = 0.38 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3312, 2920, 2111, 1748, 1664, 1518, 1242, 1097, 804, 748. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.83 (t, *J* = 1.9 Hz, 1H), 7.73–7.68 (m, 1H), 7.53 (dt, *J* = 7.8, 1.2 Hz, 1H), 7.41 (t, *J* = 7.8 Hz, 1H), 7.30 (d, *J* = 7.7 Hz, 1H), 5.97 (d, *J* = 7.9 Hz, 1H), 4.35 (q, *J* = 7.2 Hz, 2H), 1.38 (t, *J* = 7.1 Hz, 3H^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.9, 166.1, 135.2, 134.4, 132.8, 130.3, 127.9, 125.5, 65.3, 63.5, 14.2. Exact mass calculated for $C_{11}H_{11}ClN_4NaO_3^+$[M+Na]$^+$: 305.0417; found: 305.0412.



Ethyl 2-acetamido-2-azidoacetate (2j): According to the general procedure, oxazole derivative (50 mg, 0.39 mmol) provided **2j** after flash column chromatography (15% ethyl acetate in petroleum ether) as a white solid (50 mg, 68%). R_f = 0.26 (30% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3301, 2924, 2112, 1748, 1674, 1520, 1373, 1203, 1023. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 6.65–6.55 (m, 1H), 5.78 (d, *J* = 8.2 Hz, 1H), 4.32 (q, *J* = 7.1 Hz, 2H), 2.11 (s, 3H), 1.35 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 170.3, 166.9, 64.7, 63.3, 23.1, 14.2. Exact mass calculated for $C_6H_{10}N_4NaO_3^+$[M+Na]$^+$: 206.0645; found: 206.0650.

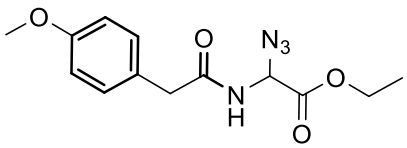


Ethyl 2-azido-2-(3-methylbutanamido)acetate (2k): According to the general procedure, oxazole derivative (50 mg, 0.18 mmol) provided **2k** after flash column chromatography (15% ethyl acetate in petroleum ether) as a colorless liquid (36 mg, 59%). R_f = 0.46 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3295, 2925, 1735, 1458, 1260, 1092, 799. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 6.56 (d, *J* = 7.1 Hz, 1H), 5.81 (d, *J* = 8.3 Hz, 1H), 4.31 (q, *J* = 7.1 Hz, 2H), 2.19–2.13 (m, 3H), 1.35 (t, *J* = 7.2 Hz, 3H), 0.99 (dt, *J* = 6.3, 3.7 Hz, 6H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 172.8, 166.9, 64.6, 63.2, 45.6, 26.1, 22.5, 22.5, 14.2. Exact mass calculated for $C_9H_{16}N_4NaO_3^+$[M+Na]$^+$: 251.1115; found: 251.114.

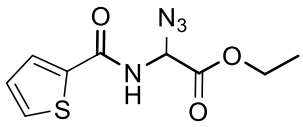


Ethyl 2-azido-2-(4-phenylbutanamido)acetate (2l): According to the general procedure, oxazole derivative (50 mg, 0.22 mmol) provided **2l** after flash column chromatography (15% ethyl acetate in petroleum ether) as a white solid (27 mg, 43%). R_f = 0.50 (35% ethyl

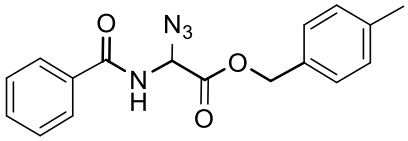
acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3313, 2925, 2111, 1748, 1693, 1496, 1200, 1019, 700. ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.28 (t, *J* = 7.4 Hz, 2H), 7.23 – 7.14 (m, 3H), 6.56 (d, *J* = 7.8 Hz, 1H), 5.78 (d, *J* = 8.2 Hz, 1H), 4.29 (q, *J* = 7.2 Hz, 2H), 2.66 (t, *J* = 7.5 Hz, 2H), 2.32 – 2.25 (m, 2H), 2.00 (p, *J* = 7.9 Hz, 2H), 1.33 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (125 MHz, Chloroform-*d*) δ 173.0, 166.9, 141.2, 128.6, 128.6, 126.2, 64.6, 63.2, 35.3, 35.0, 26.7, 14.1.Exact mass calculated for $C_{14}H_{18}N_4NaO_3^+$[M+Na]$^+$: 313.1277; found: 313.1277.



Ethyl 2-azido-2-(2-(4-methoxyphenyl)acetamido)acetate (2m): According to the general procedure, oxazole derivative (50 mg, 0.21 mmol) provided **2m** after flash column chromatography (20% ethyl acetate in petroleum ether) as a pale yellow liquid (50 mg, 80%). R_f = 0.38 (30% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3299, 2924, 2111, 1747, 1693, 1512, 1178, 801. ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.18 (d, *J* = 8.6 Hz, 2H), 6.89 (d, *J* = 8.7 Hz, 2H), 6.54 (d, *J* = 7.7 Hz, 1H), 5.74 (d, *J* = 8.2 Hz, 1H), 4.24 (q, *J* = 7.2 Hz, 2H), 3.80 (s, 3H), 3.60 (s, 2H), 1.29 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*D*) δ 171.7, 166.6, 159.2, 130.6, 125.5, 114.7, 64.6, 63.2, 55.4, 42.5, 14.1. Exact mass calculated for $C_{13}H_{16}N_4NaO_4^+$[M+Na]$^+$: 315.1064; found: 315.1077.

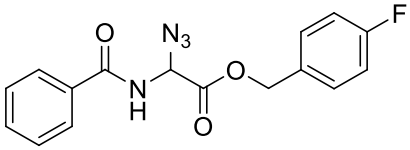


Ethyl 2-azido-2-(thiophene-2-carboxamido)acetate (2n): According to the general procedure, oxazole derivative (50 mg, 0.17 mmol) provided **2n** after flash column chromatography (15% ethyl acetate in petroleum ether) as a white solid (47 mg, 72%). R_f = 0.25 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3316, 2924, 2112, 1746, 1646, 1530, 1244, 720. ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.64 – 7.54 (m, 2H), 7.11 (dd, *J* = 5.0, 3.8 Hz, 2H), 5.95 (d, *J* = 8.0 Hz, 1H), 4.34 (q, *J* = 7.1 Hz, 2H), 1.36 (t, *J* = 7.1 Hz, 3H).^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.9, 161.8, 136.9, 131.9, 129.7, 128.1, 65.3, 63.5, 14.2. Exact mass calculated for $C_9H_{10}N_4NaO_3S^+$[M+Na]$^+$: 277.0371; found: 277.0379.

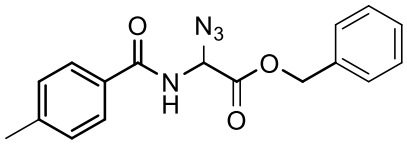


4-Methylbenzyl 2-azido-2-benzamidoacetate (2o): According to the general procedure, oxazole derivative (50 mg,

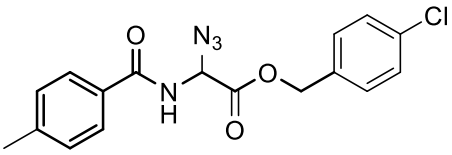
0.18 mmol) provided **2o** after flash column chromatography (15% ethyl acetate in petroleum ether) as a colorless liquid (36 mg, 59%). R_f = 0.46 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3319, 2924, 2111, 1748, 1660, 1518, 1242, 1181, 804. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.83 (d, *J* = 7.4 Hz, 2H), 7.57 (t, *J* = 7.5 Hz, 1H), 7.47 (t, *J* = 7.6 Hz, 2H), 7.29 (d, *J* = 8.0 Hz, 3H), 7.20 (d, *J* = 7.9 Hz, 2H), 6.03 (d, *J* = 8.0 Hz, 1H), 5.27 (d, *J* = 2.8 Hz, 3H), 2.37 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.3, 166.9, 139.1, 132.7, 132.6, 131.4, 129.6, 128.9, 128.8, 127.5, 68.9, 65.4, 21.4. Exact mass calculated for $C_{17}H_{16}N_4NaO_3^+$[M+Na]$^+$: 347.1115; found: 347.1121.



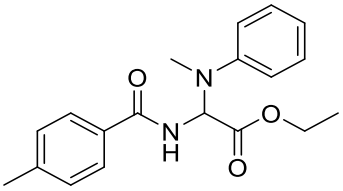
4-fluorobenzyl 2-azido-2-benzamidoacetate (2p): According to the general procedure, oxazole derivative (75 mg, 0.28 mmol) provided **2r** after flash column chromatography (15% ethyl acetate in petroleum ether) as a colorless liquid (64 mg, 70%). R_f = 0.25 (20% ethyl acetate in petroleum ether). ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.81 (dd, *J* = 8.3, 1.2 Hz, 2H), 7.57 – 7.52 (m, 1H), 7.45 (t, *J* = 7.7 Hz, 2H), 7.36 (dd, *J* = 8.6, 5.3 Hz, 3H), 7.06 (t, *J* = 8.7 Hz, 2H), 6.03 (d, *J* = 8.1 Hz, 1H), 5.25 (s, 2H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.3 , 166.6 , 163.1 (d, *J* = 248.0 Hz), 132.7 , 132.4 , 130.7 (d, *J* = 8.2 Hz), 130.2 , 128.1 (d, *J* = 145.0 Hz), 116.0 , 115.7 , 68.0 , 65.3 . Exact mass calculated for $C_{16}H_{13}FN_4NaO_3^+$ [M+Na]$^+$: 351.0864; found: 351.0860.



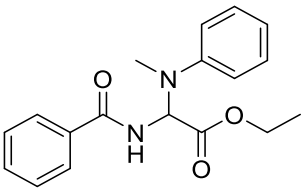
Benzyl 2-azido-2-(4-methylbenzamido)acetate (2q): According to the general procedure, oxazole derivative (60 mg, 0.23 mmol) provided **2p** after flash column chromatography (20% ethyl acetate in petroleum ether) as a colorless liquid (51 mg, 70%). R_f = 0.34 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3321, 2956, 2111, 1752, 1660, 1498, 1190, 750, 697. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.73 (d, *J* = 8.3 Hz, 2H), 7.39 (d, *J* = 3.2 Hz, 5H), 7.26 (d, *J* = 8.1 Hz, 2H), 6.05 (d, *J* = 8.0 Hz, 1H), 5.30 (s, 2H), 2.41 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.3, 167.0, 143.4, 134.4, 129.9, 129.7, 129.6, 129.0, 128.9, 128.6, 128.0, 127.5, 68.8, 65.3, 21.7. Exact mass calculated for $C_{17}H_{16}N_4NaO_3^+$[M+Na]$^+$: 347.1115; found: 347.1122.



4-Chlorobenzyl 2-azido-2-(4-methylbenzamido)acetate (2r): According to the general procedure, oxazole derivative (50 mg, 0.17 mmol) provided **2q** after flash column chromatography (15% ethyl acetate in petroleum ether) as a white solid (47 mg, 79%). R_f = 0.25 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3321, 2925, 1752, 1657, 1494, 1189, 1092, 808. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.72 (d, *J* = 8.2 Hz, 2H), 7.38–7.30 (m, 4H), 7.28–7.23 (m, 3H), 6.04 (d, *J* = 8.0 Hz, 1H), 5.26 (s, 2H), 2.41 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 167.3, 166.9, 143.5, 135.1, 132.9, 129.9, 129.7, 129.6, 129.2, 127.5, 67.9, 65.3, 21.7. Exact mass calculated for $C_{17}H_{14}N_4ClO_3^-[M-H]^-$: 357.0760; found: 357.0751.

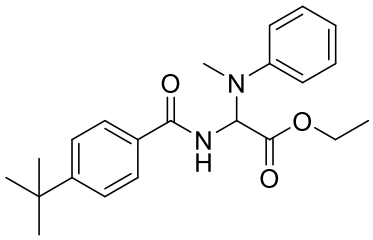


Ethyl 2-(methyl(phenyl)amino)-2-(4-methylbenzamido)acetate (5a): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5a** after flash column chromatography (15% ethyl acetate in petroleum ether) as an off white solid (74 mg, 92%). R_f = 0.38 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3323, 2980, 1739, 1643, 1600, 1326, 1210, 752, 694. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.73 (d, *J* = 8.1 Hz, 2H), 7.33–7.26 (m, 3H), 7.24 (s, 1H), 7.08 (d, *J* = 8.0 Hz, 2H), 6.86 (d, *J* = 7.3 Hz, 1H), 6.24 (d, *J* = 6.9 Hz, 1H), 4.31–4.20 (m, 2H), 2.91 (s, 3H), 2.40 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.7, 167.3, 148.5, 142.7, 130.8, 129.4, 129.3, 127.3, 119.7, 115.3, 68.0, 62.4, 34.1, 21.6, 14.3. Exact mass calculated for $C_{19}H_{23}N_2O_3^+[M+H]^+$: 327.1703; found: 327.1707.

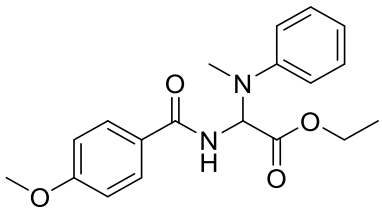


Ethyl 2-benzamido-2-(methyl(phenyl)amino)acetate (5b): According to the general procedure, oxazole derivative (50mg, 0.26 mmol) provided **5b** after flash column chromatography (15% ethyl acetate in petroleum ether) as an off white solid (50 mg, 61%). R_f = 0.40 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3317, 2927, 1741, 1664, 1504, 1311, 1212, 751, 693. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.83 (d, *J* = 7.5 Hz, 2H), 7.53 (t, *J* = 7.3 Hz, 1H), 7.45 (t, *J* = 7.5 Hz, 2H), 7.36 (d, *J* = 6.4 Hz, 1H), 7.29 (t, *J* = 7.9 Hz, 2H), 7.08 (d, *J*

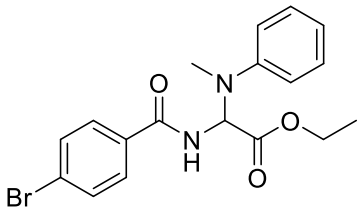
= 8.3 Hz, 2H), 6.87 (t, *J* = 7.3 Hz, 1H), 6.25 (d, *J* = 6.9 Hz, 1H), 4.31–4.20 (m, 2H), 2.92 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.7, 167.4, 148.4, 133.7, 132.2, 129.3, 128.8, 127.4, 119.7, 115.3, 68.1, 62.4, 34.2, 14.3. Exact mass calculated for $C_{18}H_{21}N_2O_3^+$[M+H]$^+$: 313.1547; found: 313.1558.



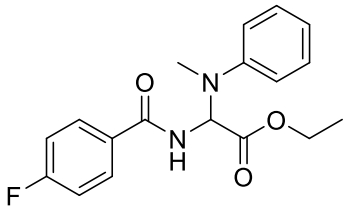
Ethyl 2-(4-(*tert*-Butyl)benzamido)-2-(methyl(phenyl)amino) acetate (5c): According to the general procedure, oxazole derivative (50 mg, 0.20 mmol) provided **5c** after flash column chromatography (15% ethyl acetate in petroleum ether) as a pale yellow solid (70 mg, 93%). R_f = 0.45 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3321, 2962, 1741, 1650, 1494, 1266, 750. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.78 (d, *J* = 8.4 Hz, 2H), 7.46 (d, *J* = 8.4 Hz, 2H), 7.34 (d, *J* = 6.7 Hz, 1H), 7.29 (d, *J* = 8.6 Hz, 1H), 7.08 (d, *J* = 8.1 Hz, 2H), 6.87 (t, *J* = 7.4 Hz, 1H), 6.25 (d, *J* = 7.0 Hz, 1H), 4.31–4.19 (m, 2H), 2.92 (s, 3H), 1.34 (s, 9H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.7, 167.3, 155.8, 148.5, 130.8, 129.3, 127.40, 127.2, 125.7, 119.7, 115.4, 68.0, 62.4, 35.1, 34.2, 31.3, 14.3. Exact mass calculated for $C_{22}H_{29}N_2O_3^+$[M+H]$^+$: 369.2173; found: 369.2176.



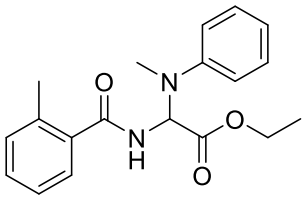
Ethyl 2-(4-methoxybenzamido)-2-(methyl(phenyl)amino) acetate (5d): According to the general procedure, oxazole derivative (50 mg, 0.23 mmol) provided **5d** after flash column chromatography (25% ethyl acetate in petroleum ether) as a white solid (76 mg, 97%). R_f = 0.42 (35% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3313, 2925, 1741, 1605, 1257, 1176, 845, 800, 752. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.81 (d, *J* = 8.8 Hz, 2H), 7.32–7.27 (m, 2H), 7.09 (d, *J* = 8.1 Hz, 2H), 6.93 (d, *J* = 8.7 Hz, 2H), 6.87 (t, *J* = 7.3 Hz, 1H), 6.24 (d, *J* = 7.0 Hz, 1H), 4.32–4.18 (m, 2H), 3.85 (s, 3H), 2.91 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.8, 166.9, 162.7, 148.5, 129.3, 129.2, 125.9, 119.6, 115.3, 113.9, 68.0, 62.4, 55.6, 34.1, 14.3. Exact mass calculated for $C_{19}H_{23}N_2O_4^+$[M+H]$^+$: 343.1652; found: 343.1657.



Ethyl 2-(4-bromobenzamido)-2-(methyl(phenyl)amino)acetate (5e): According to the general procedure, oxazole derivative (50 mg, 0.19 mmol) provided **5f** after flash column chromatography (15% ethyl acetate in petroleum ether) as an off white solid (34 mg, 47%). R_f = 0.38 (25% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3316, 2923, 1732, 1650, 1504, 1209, 1011, 753. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.70 (d, *J* = 8.3 Hz, 2H), 7.58 (d, *J* = 8.3 Hz, 2H), 7.35 (d, *J* = 6.1 Hz, 1H), 7.29 (t, *J* = 7.9 Hz, 2H), 7.08 (d, *J* = 8.1 Hz, 2H), 6.89 (t, *J* = 7.2 Hz, 1H), 6.21 (d, *J* = 6.8 Hz, 1H), 4.32–4.19 (m, 2H), 2.92 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (126 MHz, Chloroform-*d*) δ 169.6, 166.4, 148.3, 132.0, 129.3, 128.9, 126.9, 119.8, 115.3, 68.2, 62.5, 34.3, 14.3. Exact mass calculated for $C_{18}H_{20}BrN_2O_3^+[M+H]^+$: 391.0652; found: 391.0655.

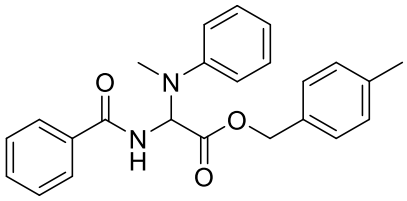


Ethyl 2-(4-fluorobenzamido)-2-(methyl(phenyl)amino)acetate (5f): According to the general procedure, oxazole derivative (50 mg, 0.26 mmol) provided **5f** after flash column chromatography (15% ethyl acetate in petroleum ether) as an off white solid (36 mg, 41%). R_f = 0.38 (30% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3316, 2925, 1740, 1650, 1601, 1498, 1229, 851, 751, 694. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.85 (dd, *J* = 8.7, 5.3 Hz, 2H), 7.32–7.26 (m, 3H), 7.13 (d, *J* = 8.6 Hz, 2H), 7.10–7.06 (m, 2H), 6.88 (t, *J* = 7.3 Hz, 1H), 6.22 (d, *J* = 6.8 Hz, 1H), 4.30–4.21 (m, 2H), 2.92 (s, 3H), 1.24 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.6, 166.3, 148.3, 129.7 (d, *J* = 9.3 Hz), 129.3, 117.8 (d, *J* = 382.3 Hz), 115.7, 115.3, 77.4, 77.1, 76.8, 68.1, 62.5, 34.2, 14.27. Exact mass calculated for $C_{18}H_{20}FN_2O_3^+[M+H]^+$: 331.1452; found: 331.1456.

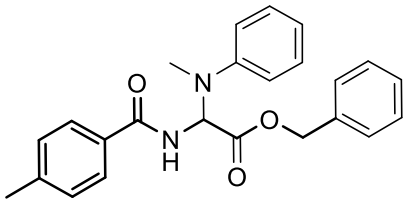


Ethyl 2-(methyl(phenyl)amino)-2-(2-methylbenzamido)acetate (5g): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5g** after flash column chromatography (15% ethyl acetate in petroleum ether) as a pale yellow solid (37 mg, 47%). R_f = 0.34 (25% ethyl acetate in petroleum ether). ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.42 (d, *J* = 7.5 Hz, 1H), 7.36–7.31 (m, 1H), 7.31–7.26 (m, 2H), 7.22 (d, *J* = 7.7 Hz, 2H), 7.05 (d, *J* = 8.3 Hz, 2H), 6.95 (d, *J* = 7.4 Hz, 1H), 6.88 (t, *J* = 7.3 Hz, 1H), 6.25 (d, *J* = 7.4 Hz, 1H), 4.32–4.19

(m, 2H), 2.94 (s, 3H), 2.44 (s, 3H), 1.25 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.8, 169.5, 148.3, 136.6, 135.4, 131.3, 130.5, 129.3, 127.2, 125.9, 119.7, 115.3, 67.8, 62.4, 34.7, 20.1, 14.3. Exact mass calculated for $C_{19}H_{23}N_2O_3^+$[M+H]$^+$: 327.1703; found: 327.1705.

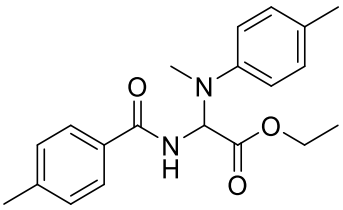


4-Methylbenzyl 2-benzamido-2-(methyl(phenyl)amino) acetate (5h): According to the general procedure, oxazole derivative (50 mg, 0.19 mmol) provided **5h**after flash column chromatography (15% ethyl acetate in petroleum ether) as a pale yellow liquid (53 mg, 72%). R_f = 0.39 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3318, 2923, 1743, 1665, 1326, 1206, 752, 694. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.86–7.81 (m, 2H), 7.52 (dt, *J* = 6.5, 1.7 Hz, 1H), 7.45 (t, *J* = 7.4 Hz, 2H), 7.34 (d, *J* = 6.7 Hz, 1H), 7.28 (dd, *J* = 7.0, 1.7 Hz, 1H), 7.25 (s, 1H), 7.13 (s, 3H), 7.05 (d, *J* = 7.9 Hz, 2H), 6.88 (t, *J* = 7.3 Hz, 1H), 6.29 (d, *J* = 6.9 Hz, 1H), 5.25–5.10 (m, 2H), 2.83 (s, 3H), 2.34 (s, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.6, 167.4, 148.4, 138.6, 133.7, 132.2, 129.4, 128.8, 128.6, 127.4, 119.77, 115.5, 68.2, 67.9, 34.2, 21.4. Exact mass calculated for $C_{24}H_{25}N_2O_3^+$[M+H]$^+$: 389.1860; found: 389.1865.

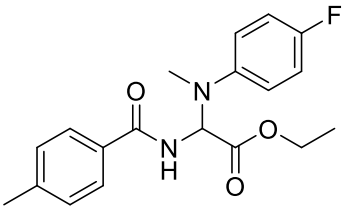


Benzyl 2-(methyl(phenyl)amino)-2-(4-methylbenzamido) acetate (5i): According to the general procedure, oxazole derivative (50 mg, 0.19 mmol) provided **5i** after flash column chromatography (10% ethyl acetate in petroleum ether) as a pale-yellow liquid (51 mg, 70%). R_f = 0.39 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3320, 2924, 1740, 1660, 1496, 1325, 1188, 750, 695. ^{1}H NMR (500 MHz, Chloroform-*d*) δ 7.86 – 7.78 (m, 2H), 7.51 (d, *J* = 7.4 Hz, 1H), 7.44 (t, *J* = 7.6 Hz, 2H), 7.28 – 7.25 (m, 2H), 7.24 (s, 1H), 7.12 (d, *J* = 1.3 Hz, 4H), 7.04 (d, *J* = 8.7 Hz, 2H), 6.90 – 6.83 (m, 1H), 6.27 (d, *J* = 6.9 Hz, 1H), 5.20 (d, *J* = 12.1 Hz, 1H), 5.13 (d, *J* = 12.1 Hz, 1H), 2.82 (s, 3H), 2.33 (s, 3H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 169.6, 167.4, 148.4, 138.6, 133.7, 132.2, 132.0, 129.4, 129.3, 128.8, 128.6, 127.4, 119.8, 115.5, 68.2, 67.9, 34.2, 21.4. Exact mass calculated for $C_{24}H_{25}N_2O_3^+$[M+H]$^+$: 389.1860; found: 389.1863.

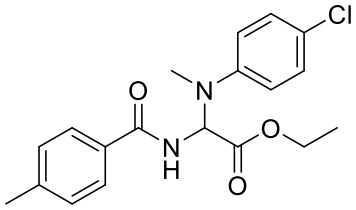
Gram Scale reaction: To a 250 mL round bottom flask, Rose Bengal (38 mg, 0.038 mmol, 1 mol%), oxazole derivative (1g, 3.77 mmol, 1 equiv) and aniline derivative (1.37 g, 11.31 mmol, 3 equiv) and dioxane (40 mL) were added. The reaction mixture was irradiated with a green LED and stirred for 24 h under air atmosphere. After the completion of reaction (Monitored by TLC), the solvent was removed, and the product was purified by flash column chromatography (10% Ethyl Acetate: Petroleum Ether) to afford **5i** as a pale-yellow liquid (916 mg, 63%).



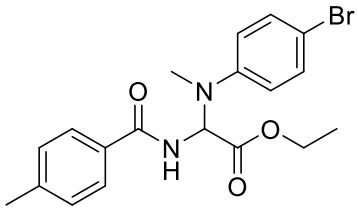
Ethyl 2-(methyl(p-tolyl)amino)-2-(4-methylbenzamido)acetate (5j): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5j** after flash column chromatography (15% ethyl acetate in petroleum ether) as a pale brown solid (55 mg, 66%). R_f = 0.34 (20% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3318, 2923, 1742, 1667, 1329, 1264, 807, 753, 724. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.73 (d, *J* = 8.1 Hz, 2H), 7.32–7.28 (m, 1H), 7.23 (dd, *J* = 14.5, 8.0 Hz, 2H), 7.12–7.04 (m, 2H), 7.01 (d, *J* = 8.6 Hz, 2H), 6.18 (d, *J* = 7.1 Hz, 1H), 4.30–4.19 (m, 2H), 2.88 (s, 3H), 2.40 (s, 3H), 2.27 (s, 3H), 1.23 (d, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.8, 167.3, 146.3, 142.7, 130.3, 129.8, 129.5, 129.4, 129.3, 127.5, 127.4, 125.5, 122.7, 116.0, 68.4, 62.3, 34.4, 21.6, 20.6, 14.4. Exact mass calculated for $C_{20}H_{25}N_2O_3^+$[M+H]$^+$: 341.1860; found: 341.1865.



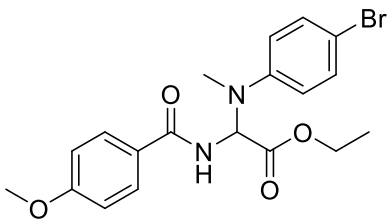
Ethyl 2-((4-fluorophenyl)(methyl)amino)-2-(4-methyl benzamido)acetate (5k): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5k** after flash column chromatography (15% ethyl acetate in petroleum ether) as a white solid (17 mg, 21%). R_f = 0.30 (15% ethyl acetate in petroleum ether). ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.74 (d, *J* = 8.2 Hz, 2H), 7.36 (d, *J* = 6.2 Hz, 1H), 7.26 (d, *J* = 7.9 Hz, 2H), 7.10 (dd, *J* = 9.0, 4.4 Hz, 2H), 6.98 (t, *J* = 8.7 Hz, 2H), 6.11 (d, *J* = 6.9 Hz, 1H), 4.25 (dddd, *J* = 17.9, 10.8, 7.2, 3.6 Hz, 2H), 2.85 (s, 3H), 2.41 (s, 3H), 1.23 (d, *J* = 7.2 Hz, 3H). ^{13}C NMR (125 MHz, Chloroform-*d*) δ 168.3 (d, *J* = 269.3 Hz), 157.4 (d, *J* = 238.6 Hz), 145.2, 142.7, 130.8, 130.0, 129.4, 127.3, 117.6 (d, *J* = 7.6 Hz), 115.6 (d, *J* = 22.6 Hz), 68.8, 62.3, 34.2, 21.6, 14.3. Exact mass calculated for $C_{19}H_{21}FNaN_2O_3^+$[M+H]$^+$: 367.1428; found: 367.1414.



Ethyl 2-((4-chlorophenyl)(methyl)amino)-2-(4-methylbenzamido)acetate (5l): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5l** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (47 mg, 53%). R_f = 0.32 (15% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3318, 2925, 1740, 1650, 1496, 1305, 1020, 815. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.73 (d, *J* = 8.2 Hz, 2H), 7.34 (d, *J* = 6.6 Hz, 1H), 7.24 (s, 2H), 7.23–7.20 (m, 2H), 7.05–7.01 (m, 2H), 6.16 (d, *J* = 6.7 Hz, 1H), 4.32–4.16 (m, 2H), 2.85 (s, 3H), 2.40 (s, 3H), 1.23 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.4, 167.4, 147.3, 142.9, 130.6, 129.5, 129.1, 127.4, 124.6, 116.6, 68.1, 62.5, 33.8, 21.6, 14.4. Exact mass calculated for $C_{19}H_{22}ClN_2O_3^+[M+H]^+$: 361.1313; found: 361.1310.

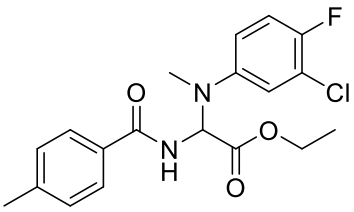


Ethyl 2-((4-bromophenyl)(methyl)amino)-2-(4-methylbenzamido)acetate (5m): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5m** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (47 mg, 48%). R_f = 0.32 (15% ethyl acetate in petroleum ether). **IR** (neat): ν_{max}/cm^{-1} 3319, 2924, 1739, 1649, 1493, 1328, 812. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.73 (d, *J* = 8.2 Hz, 2H), 7.37 (s, 1H), 7.36–7.33 (m, 2H), 7.25 (d, *J* = 7.9 Hz, 2H), 7.02–6.94 (m, 2H), 6.16 (d, *J* = 6.7 Hz, 1H), 4.25 (qq, *J* = 10.8, 7.1 Hz, 2H), 2.85 (s, 3H), 2.40 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (125 MHz, Chloroform-*d*) δ 169.4, 167.4, 147.7, 142.8, 132.0, 130.6, 129.5, 127.3, 116.9, 111.9, 67.9, 62.5, 33.8, 21.6, 14.3. Exact mass calculated for $C_{19}H_{22}BrN_2O_3^+[M+H]^+$: 405.0808; found: 405.0815.



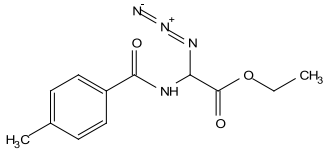
Ethyl 2-((4-bromophenyl)(methyl)amino)-2-(4-methoxybenzamido)acetate (5n): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5n** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (37 mg, 48%). R_f = 0.33 (15% ethyl acetate in petroleum ether).**IR** (neat): ν_{max}/cm^{-1} 3318, 2963, 1738, 1606, 1493, 1259, 1024,

607. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.83–7.77 (m, 2H), 7.38–7.33 (m, 2H), 7.29 (d, *J* = 5.6 Hz, 1H), 7.00–6.96 (m, 2H), 6.96–6.91 (m, 2H), 6.16 (d, *J* = 6.6 Hz, 1H), 4.32–4.19 (m, 2H), 3.85 (s, 3H), 2.85 (s, 3H), 1.24 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.5, 166.9, 162.9, 147.8, 132.0, 129.3, 125.7, 116.9, 114.0, 111.9, 67.9, 62.6, 55.6, 33.8, 14.4. Exact mass calculated for $C_{19}H_{22}BrN_2O_4^+[M+H]^+$: 421.0757; found: 421.0761.

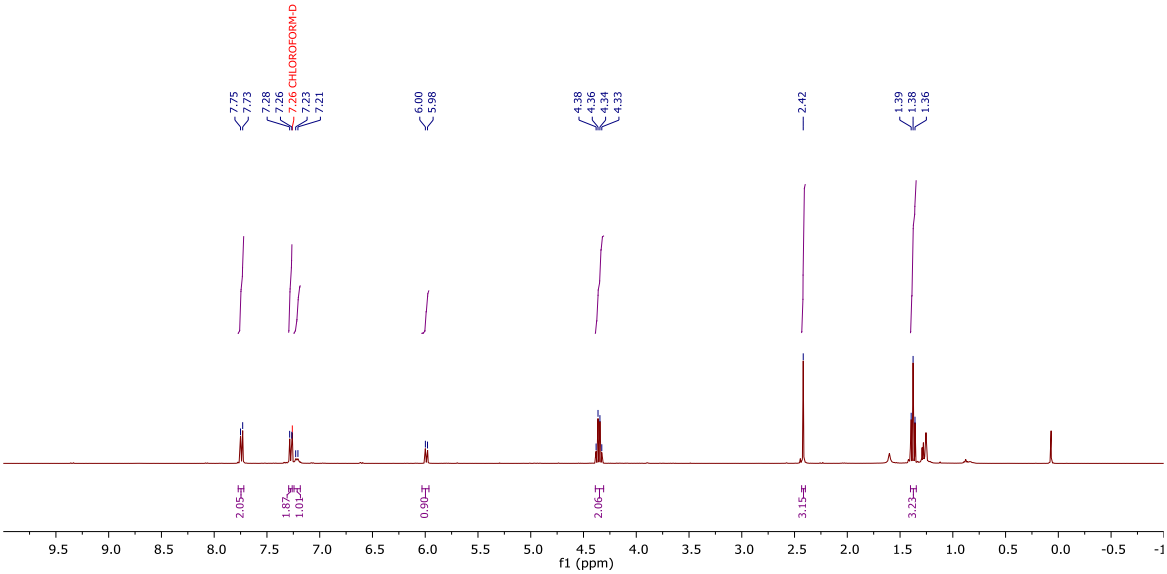


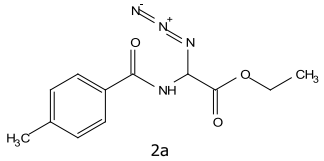
Ethyl 2-((3-chloro-4-fluorophenyl)(methyl)amino)-2-(4-methylbenzamido)acetate (5o): According to the general procedure, oxazole derivative (50 mg, 0.25 mmol) provided **5o** after flash column chromatography (10% ethyl acetate in petroleum ether) as a white solid (25 mg, 25%). R_f = 0.32 (15% ethyl acetate in petroleum ether).**IR** (neat): ν_{max}/cm^{-1} 3420, 2924, 1738, 1669, 1512, 1316, 741. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 7.73 (d, *J* = 8.1 Hz, 2H), 7.35 (d, *J* = 6.4 Hz, 1H), 7.26 (d, *J* = 8.0 Hz, 2H), 7.09–7.03 (m, 3H), 6.08 (d, *J* = 6.5 Hz, 1H), 4.27 (qq, *J* = 10.6, 7.1 Hz, 2H), 2.81 (s, 3H), 2.41 (s, 3H), 1.26 (t, *J* = 7.2 Hz, 3H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 169.2, 167.4, 152.4 (d, *J* = 240.8 Hz), 145.9, 142.9, 130.5, 129.5, 127.3, 121.0 (d, *J* = 18.5 Hz), 117.4, 116.8 (d, *J* = 21.9 Hz), 115.5 (d, *J* = 6.4 Hz), 68.4, 62.6, 33.6, 21.6, 14.3. Exact mass calculated for $C_{19}H_{21}ClFN_2O_3^+[M+H]^+$: 379.1219; found: 379.1226.

4. ^{1}H and ^{13}C NMR spectra:

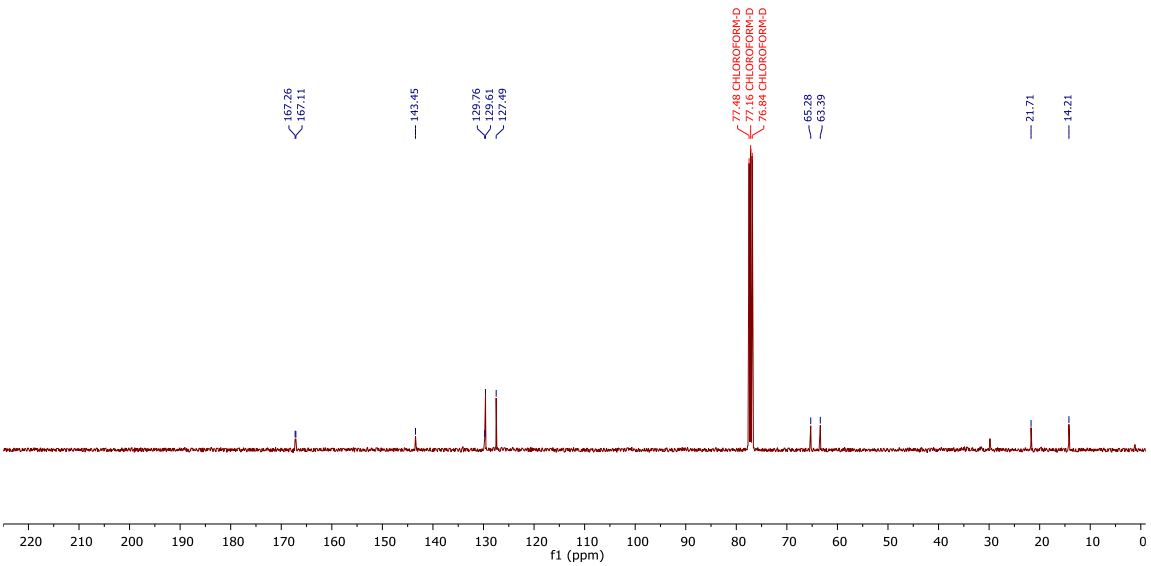


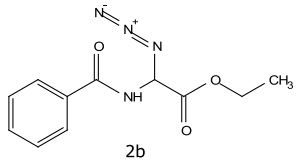
2a



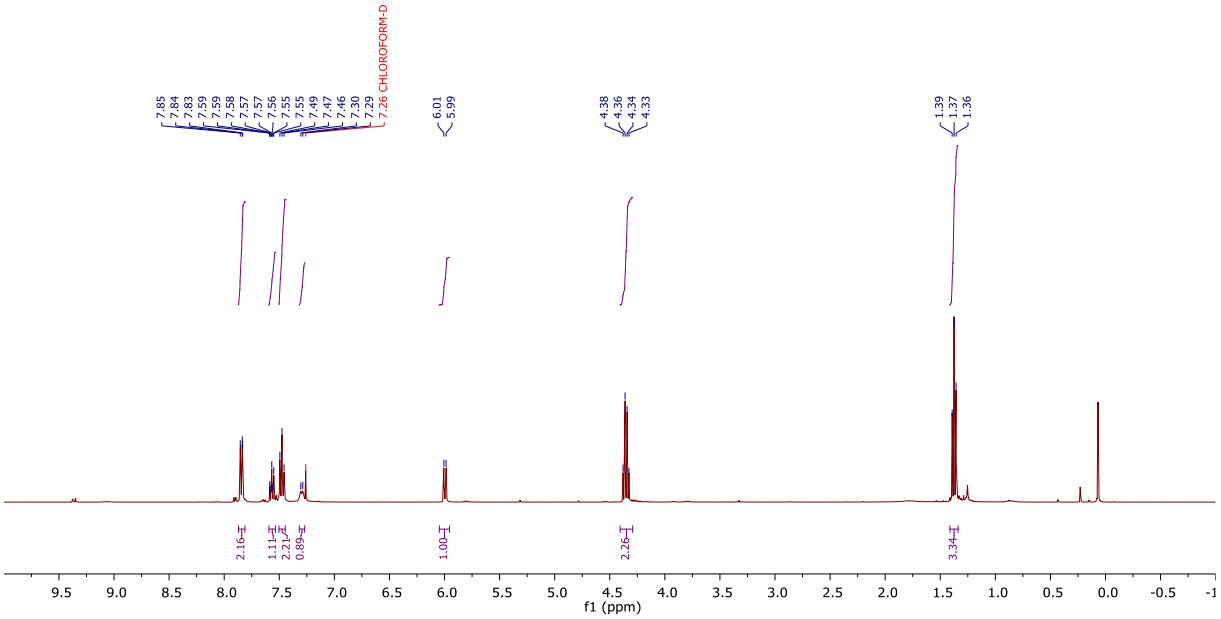


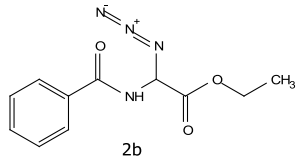
2a



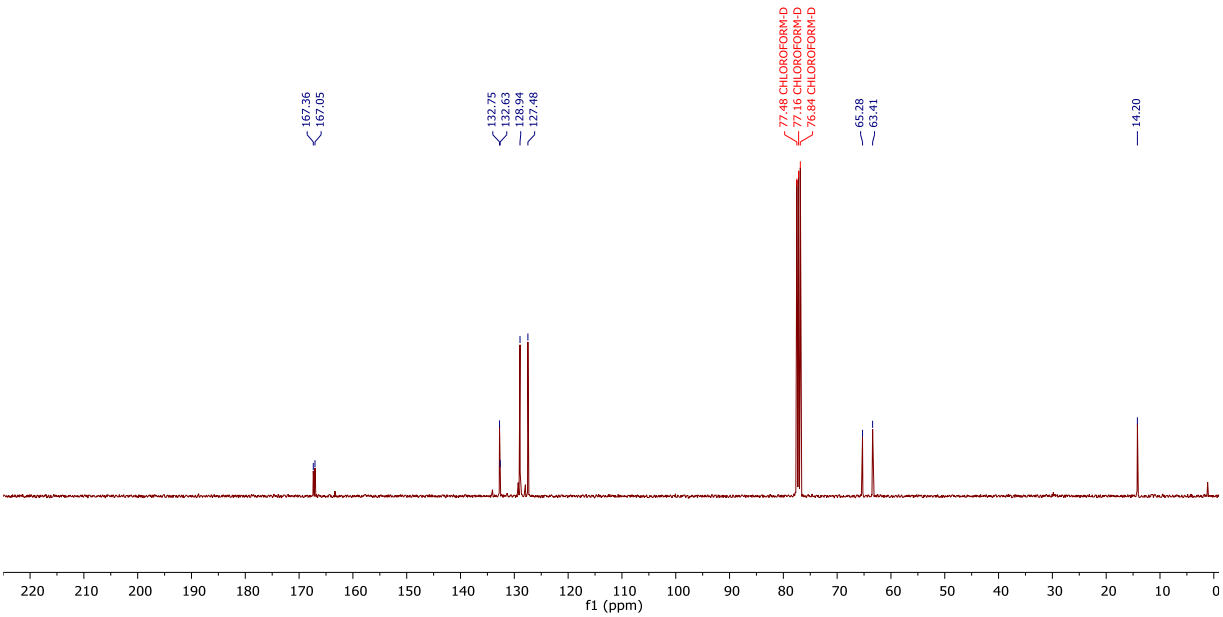

O
N
NH
O
O
CH3
O

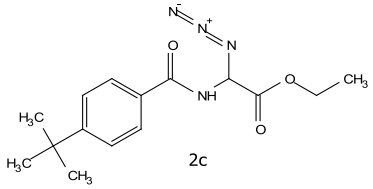
2b


7.85
7.84
7.83
7.59
7.59
7.58
7.57
7.57
7.56
7.55
7.55
7.49
7.47
7.46
7.30
7.29
7.26 CHLOROFORM-D
6.01
5.99
4.38
4.36
4.34
4.33
1.39
1.37
1.36
2.16
1.11
2.21
0.89
1.00
2.26
3.34
f1 (ppm)


O
N
NH
O
O
CH3
O

2b


167.36
167.05
132.75
132.63
128.94
127.48
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.28
63.41
14.20
f1 (ppm)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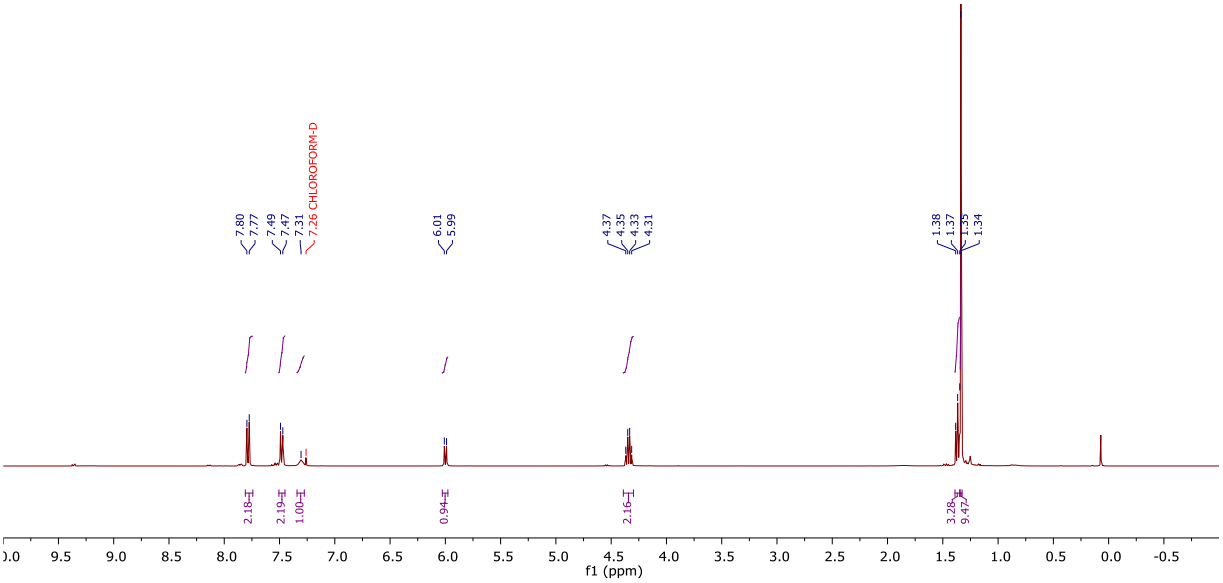
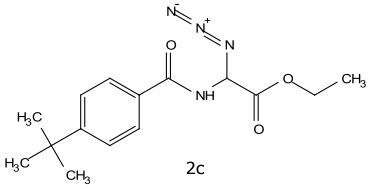
N
N
O
NH
O
O
CH3
H3C
H3C
CH3

2c


7.80
7.77
7.49
7.47
7.31
7.26 CHLOROFORM-D
6.01
5.99
4.37
4.35
4.33
4.31
1.38
1.37
1.35
1.34
2.18
2.19
1.00
0.94
2.16
3.28
9.47
f1 (ppm)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N
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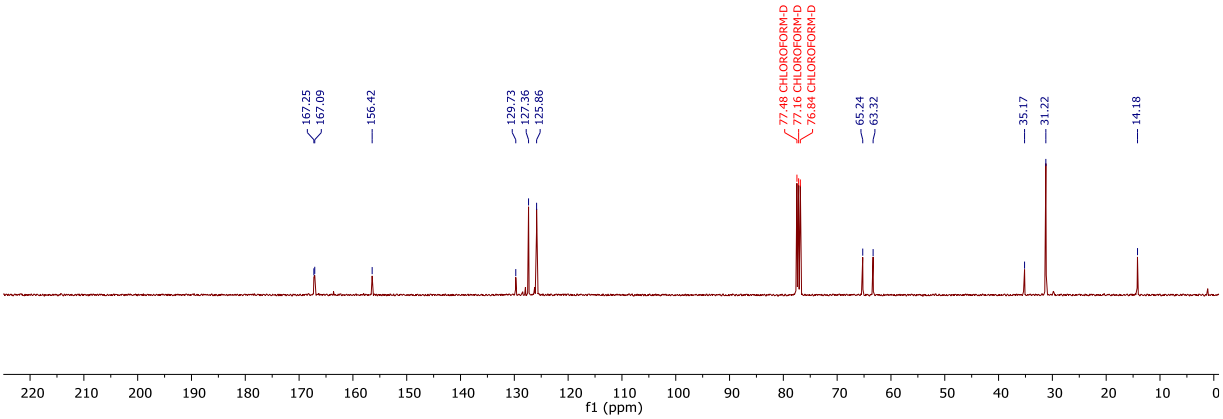
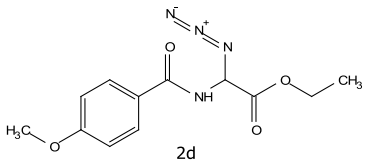
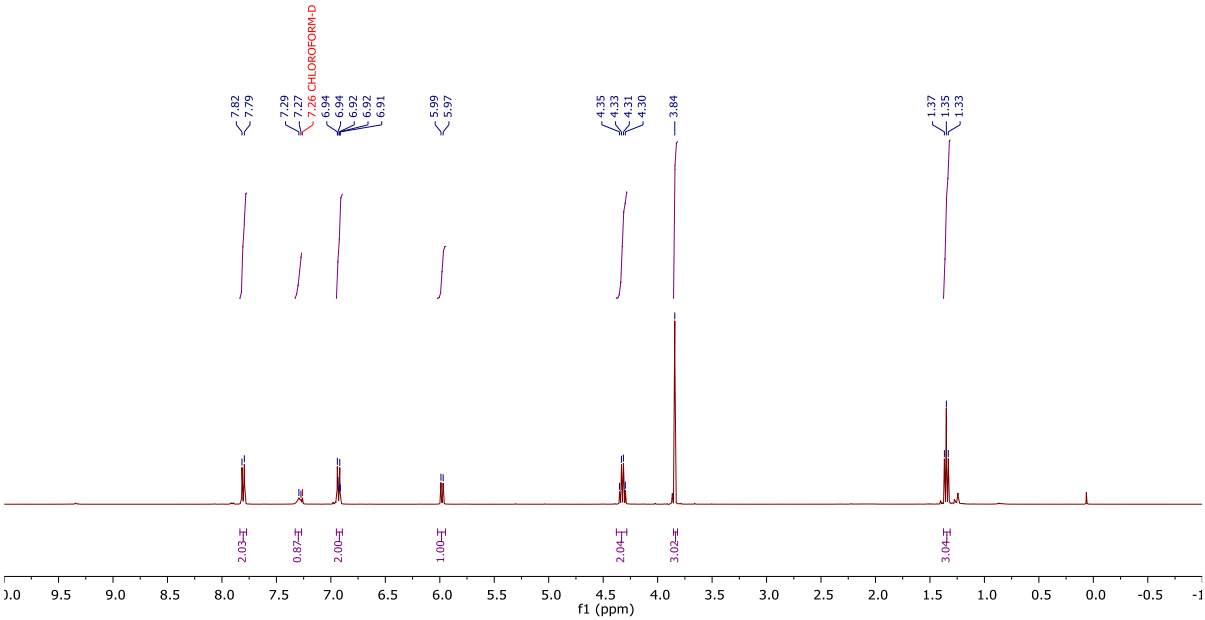
O
NH
O
O
CH3
H3C
H3C
CH3

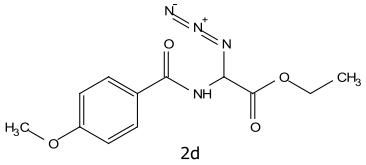
2c


167.25
167.09
156.42
129.73
127.36
125.86
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.24
63.32
35.17
31.22
14.18
f1 (ppm)

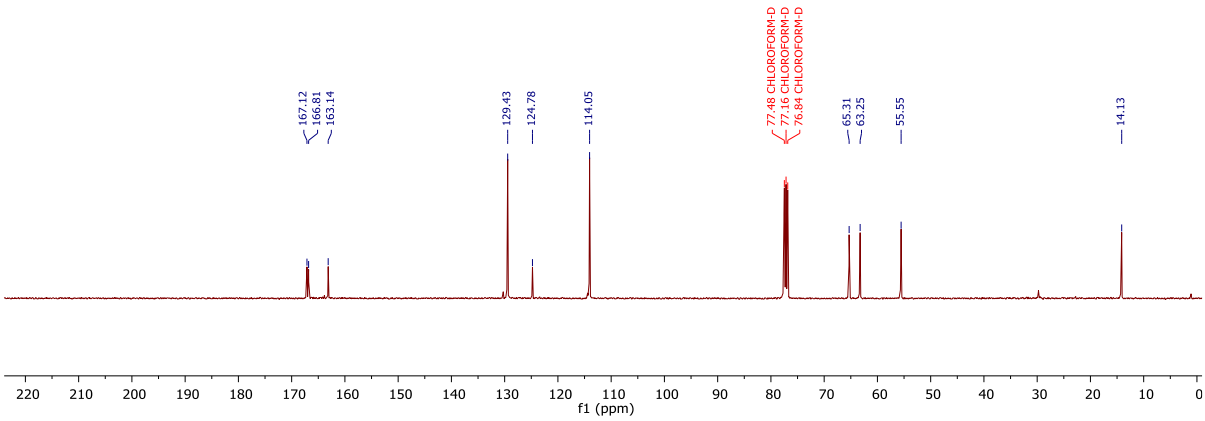

N
N
N
O
NH
O
CH3
H3C
O
O

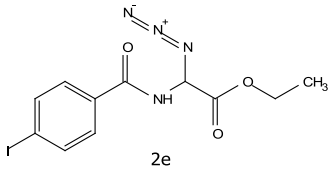
2d


7.82
7.79
7.29
7.27
7.26 CHLOROFORM-D
6.94
6.94
6.92
6.92
6.91
5.99
5.97
4.35
4.33
4.31
4.30
3.84
1.37
1.35
1.33
2.03
0.87
2.00
1.00
2.04
3.02
3.04
f1 (ppm)

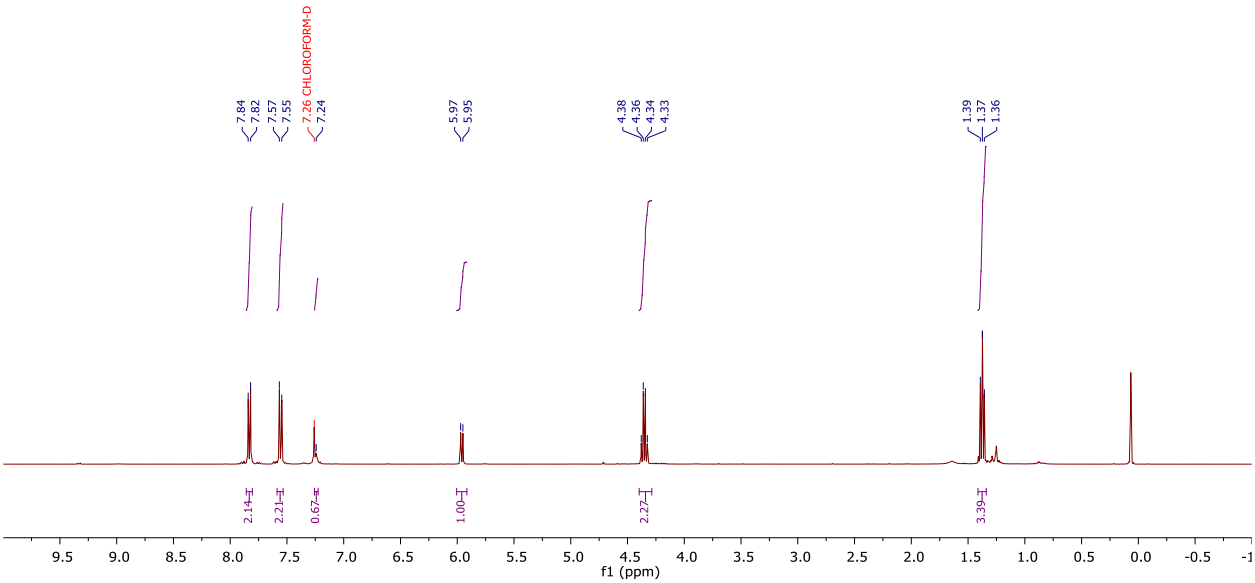

N
N
N
O
NH
O
CH3
H3C
O
O

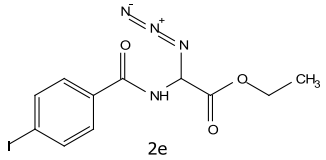
2d


167.12
166.81
163.14
129.43
124.78
114.05
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.31
63.25
55.55
14.13
f1 (ppm)

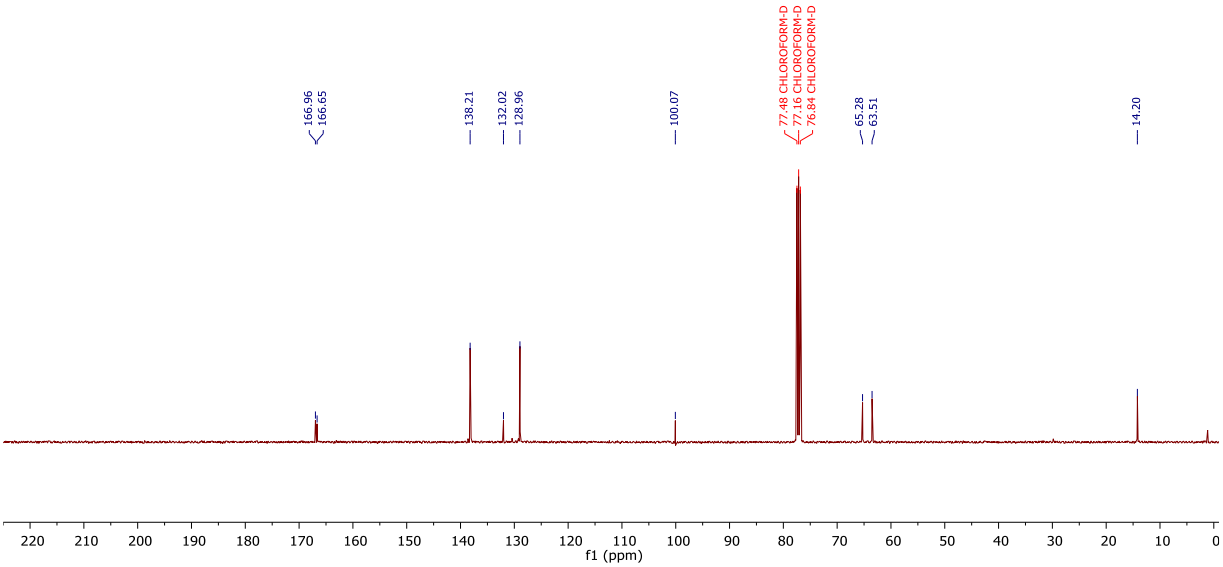

O
NH
O
O
CH3
I

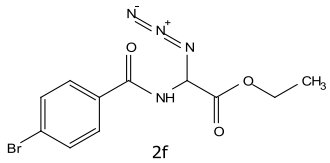
2e


7.84
7.82
7.57
7.55
7.26 CHLOROFORM-D
7.24
5.97
5.95
4.38
4.36
4.34
4.33
1.39
1.37
1.36
2.14
2.21
0.67
1.00
2.27
3.39
f1 (ppm)

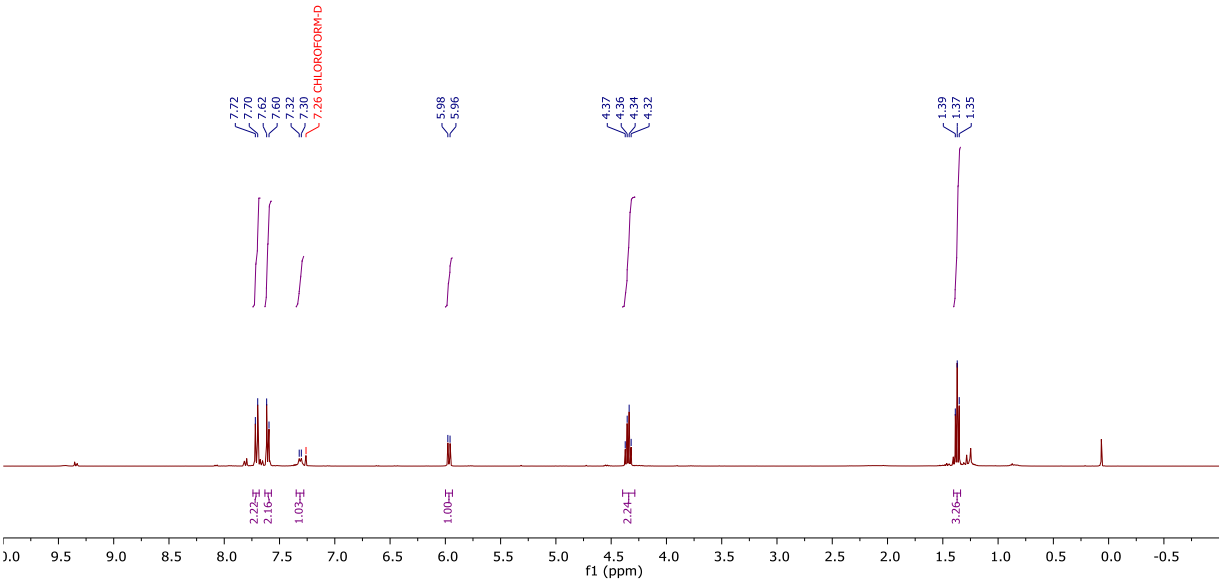

O
NH
O
O
CH3
I

2e


166.96
166.65
138.21
132.02
128.96
100.07
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.28
63.51
14.20
f1 (ppm)


N
N
N
O
NH
O
O
CH3
Br

2f


7.72
7.70
7.62
7.60
7.32
7.30
7.26 CHLOROFORM-D
5.98
5.96
4.37
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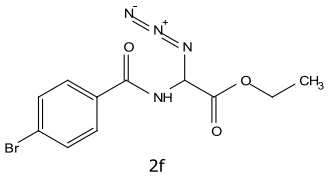
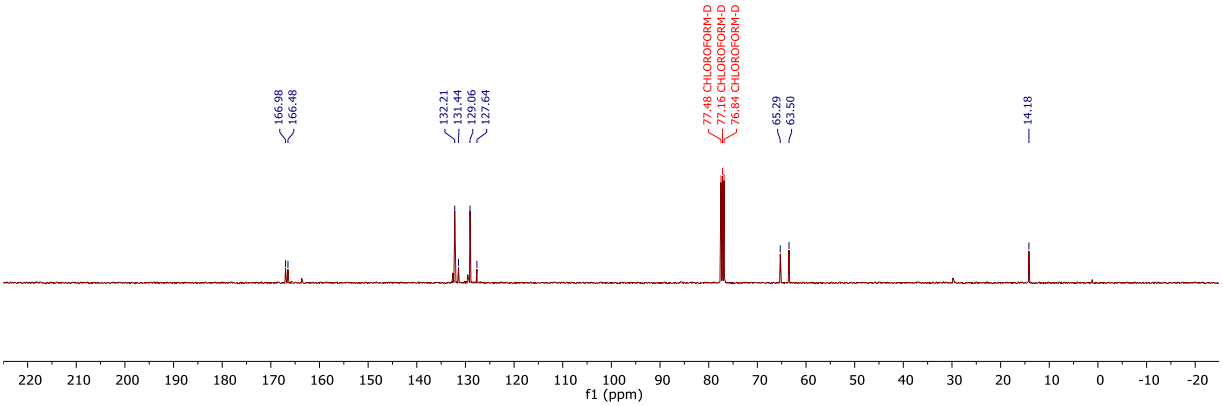
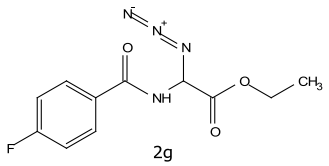
1.03
1.00
2.24
3.26
f1 (ppm)

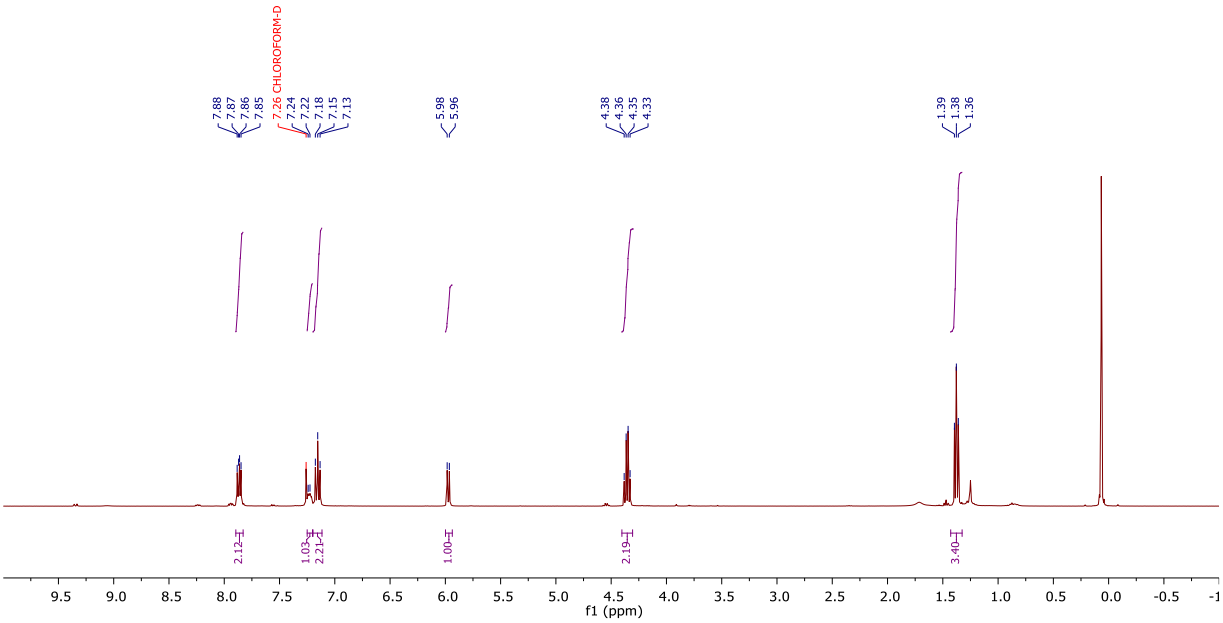

N
N
N
O
NH
O
O
CH3
Br

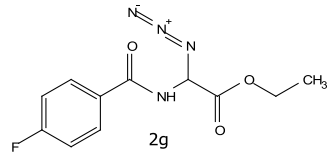
2f


166.98
166.48
132.21
131.44
129.06
127.64
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.29
63.50
14.18
f1 (ppm)

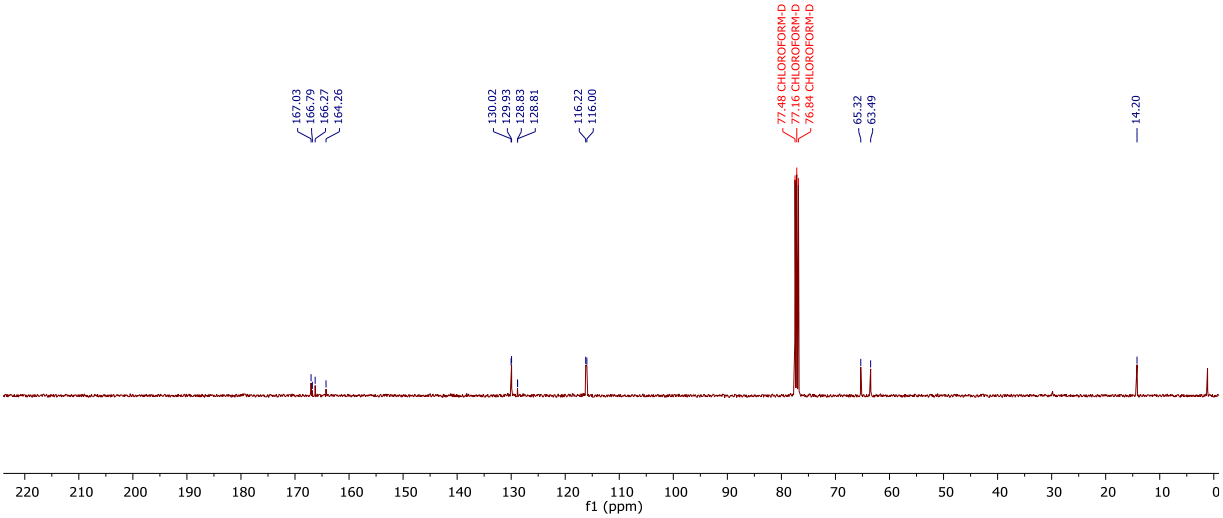

O
NH
O
O
CH3
F

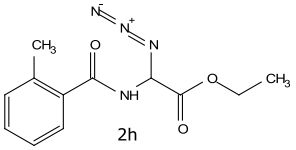
2g

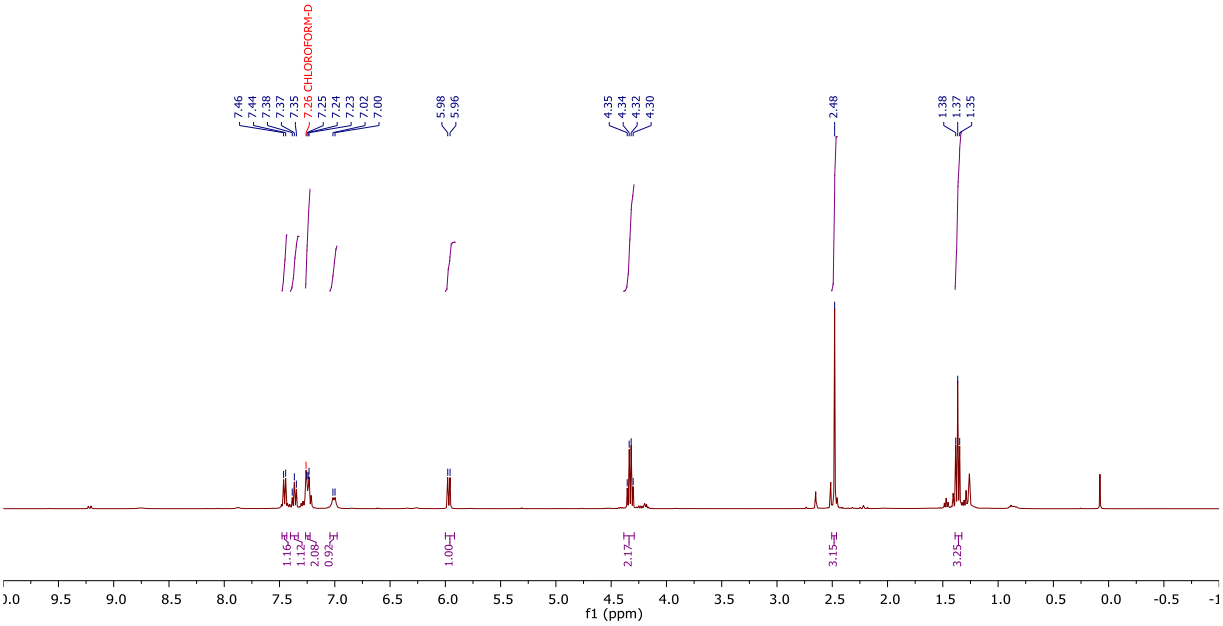

7.88
7.87
7.86
7.85
7.26 CHLOROFORM-D
7.24
7.22
7.18
7.15
7.13
5.98
5.96
4.38
4.36
4.35
4.33
1.39
1.38
1.36
2.12
1.03
2.21
1.00
2.19
3.40
f1 (ppm)

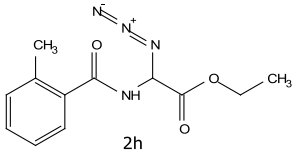

O
NH
O
O
CH3
F

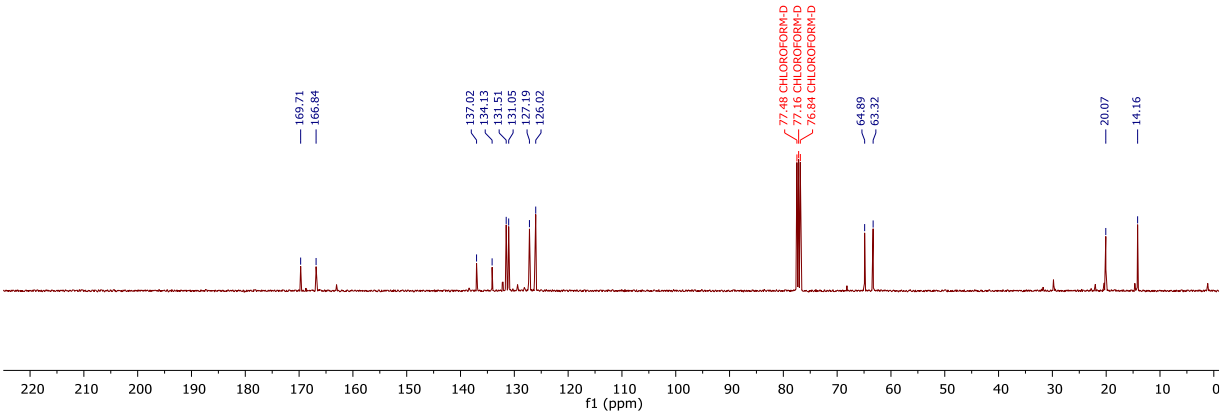
2g

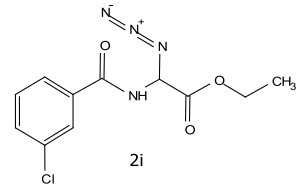

167.03
166.79
166.27
164.26
130.02
129.93
128.83
128.81
116.22
116.00
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.32
63.49
14.20
f1 (ppm)

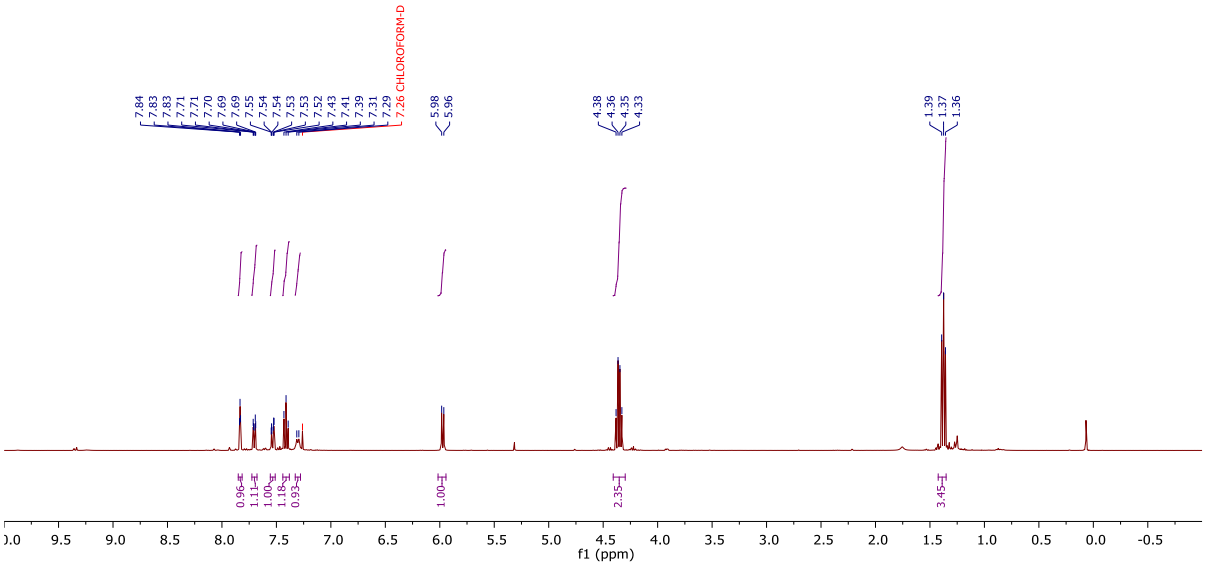

CH3
O
NH
N
N
O
O
CH3
O
2h

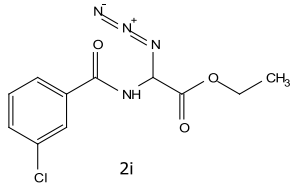

7.46
7.44
7.38
7.37
7.35
7.26 CHLOROFORM-D
7.25
7.24
7.23
7.02
7.00
5.98
5.96
4.35
4.34
4.32
4.30
2.48
1.38
1.37
1.35
1.16
1.12
2.08
0.92
1.00
2.17
3.15
3.25
f1 (ppm)

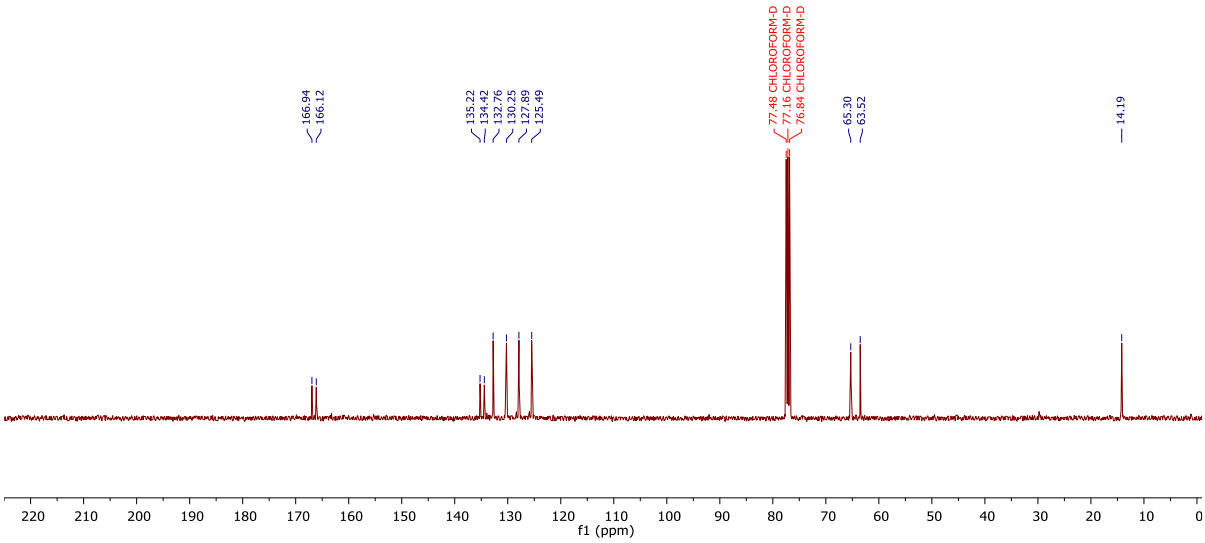

CH3
O
NH
N
N
O
O
CH3
O
2h

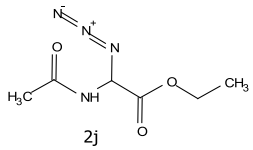

169.71
166.84
137.02
134.13
131.51
131.05
127.19
126.02
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
64.89
63.32
20.07
14.16
f1 (ppm)

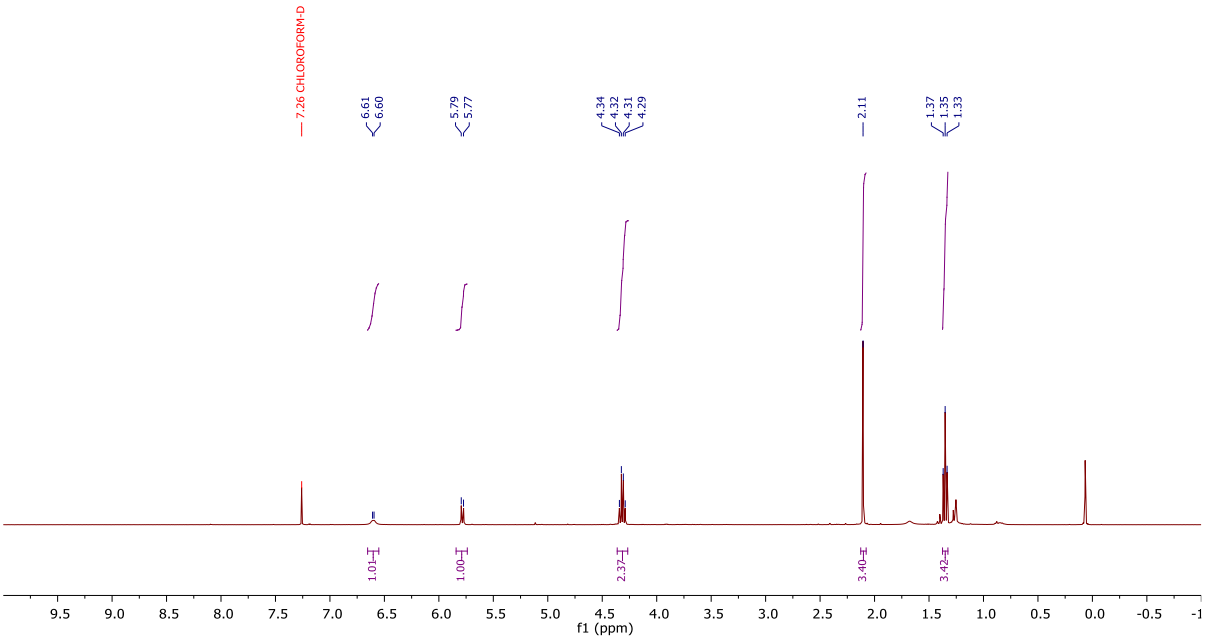

2i

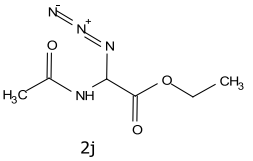

7.84
7.83
7.83
7.71
7.71
7.70
7.69
7.69
7.55
7.54
7.54
7.53
7.53
7.52
7.43
7.41
7.39
7.31
7.29
7.26 CHLOROFORM-D
5.98
5.96
4.38
4.36
4.35
4.33
1.39
1.37
1.36
0.96
1.11
1.00
1.18
0.93
1.00
2.35
3.45
f1 (ppm)

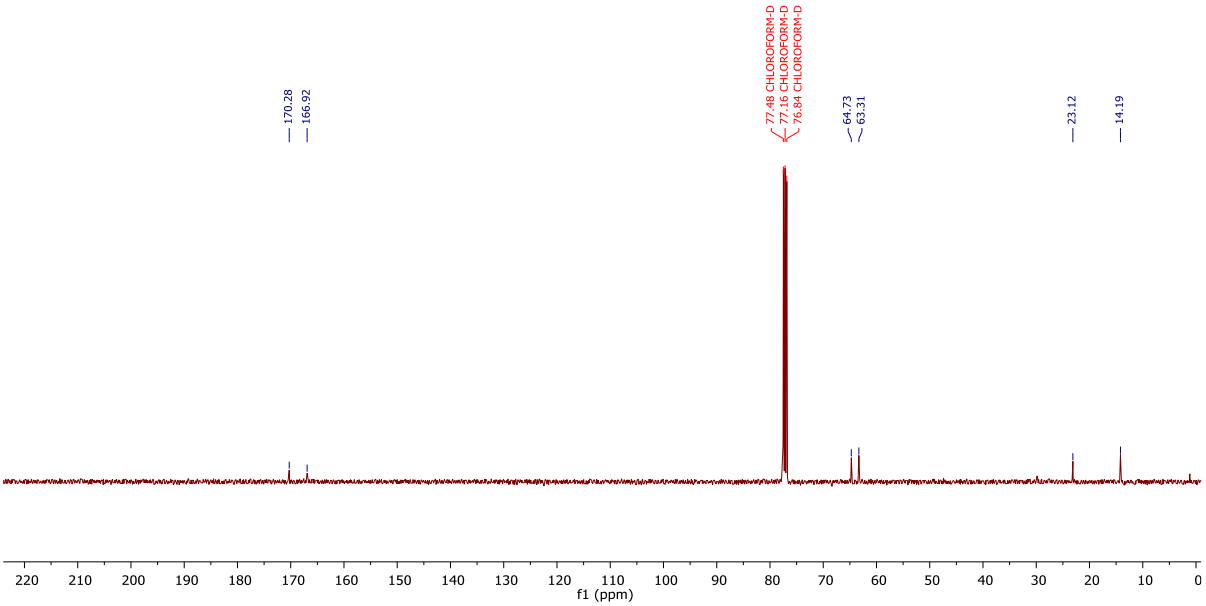

2i

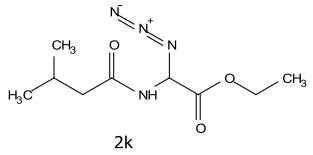

166.94
166.12
135.22
134.42
132.76
130.25
127.89
125.49
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.30
63.52
14.19
f1 (ppm)


2j

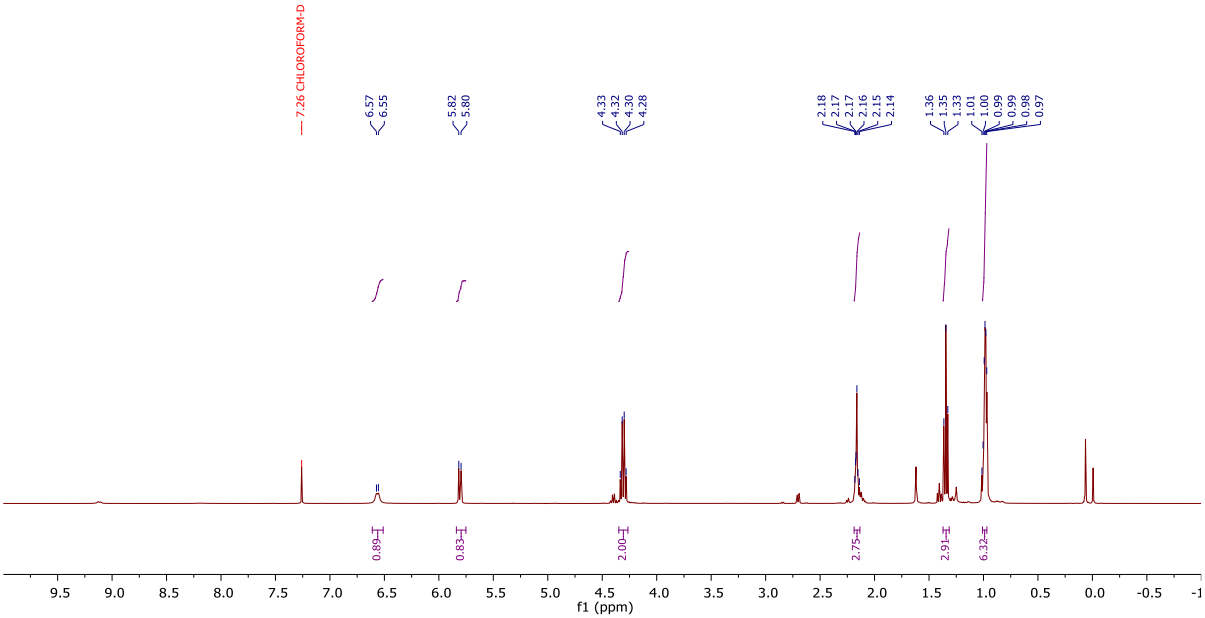

7.26 CHLOROFORM-D
6.61
6.60
5.79
5.77
4.34
4.32
4.31
4.29
2.11
1.37
1.35
1.33
1.01
1.00
2.37
3.40
3.42
f1 (ppm)

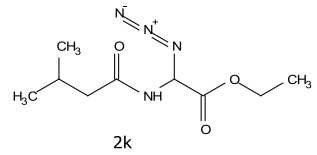

2j


170.28
166.92
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
64.73
63.31
23.12
14.19
f1 (ppm)

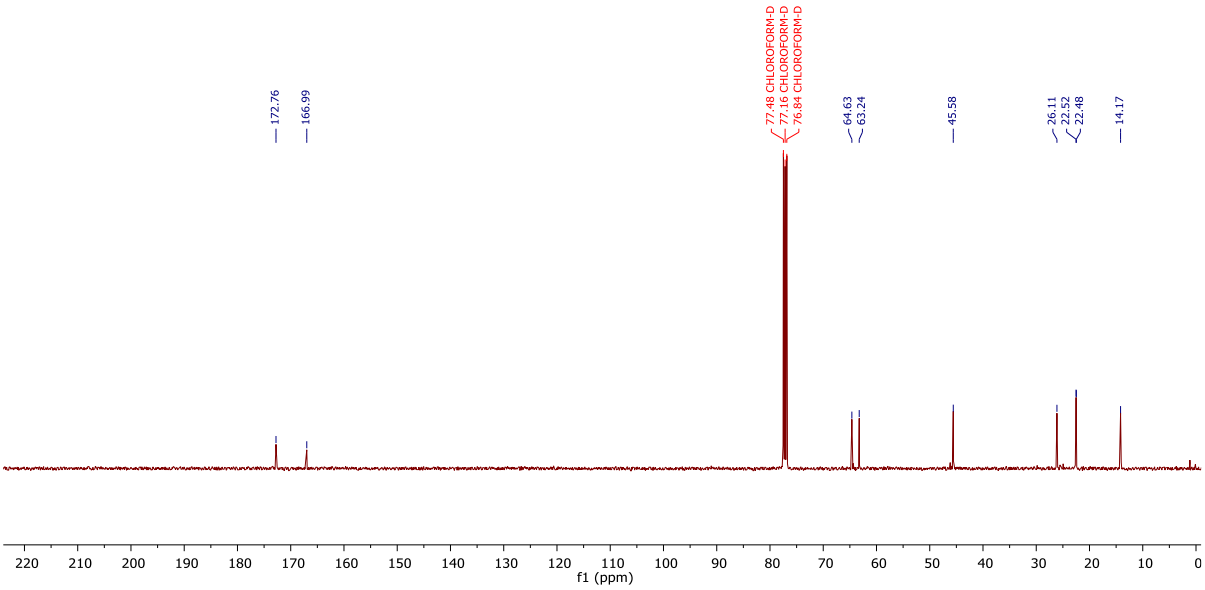

CH3
O
N
N
NH
O
CH3
H3C
O

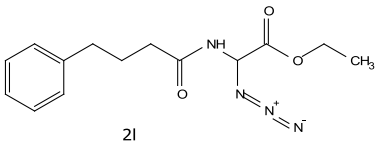
2k


7.26 CHLOROFORM-D
6.57
6.55
5.82
5.80
4.33
4.32
4.30
4.28
2.18
2.17
2.17
2.16
2.15
2.14
1.36
1.35
1.33
1.01
1.00
0.99
0.99
0.98
0.97
0.89
0.83
2.00
2.75
2.91
6.32
f1 (ppm)

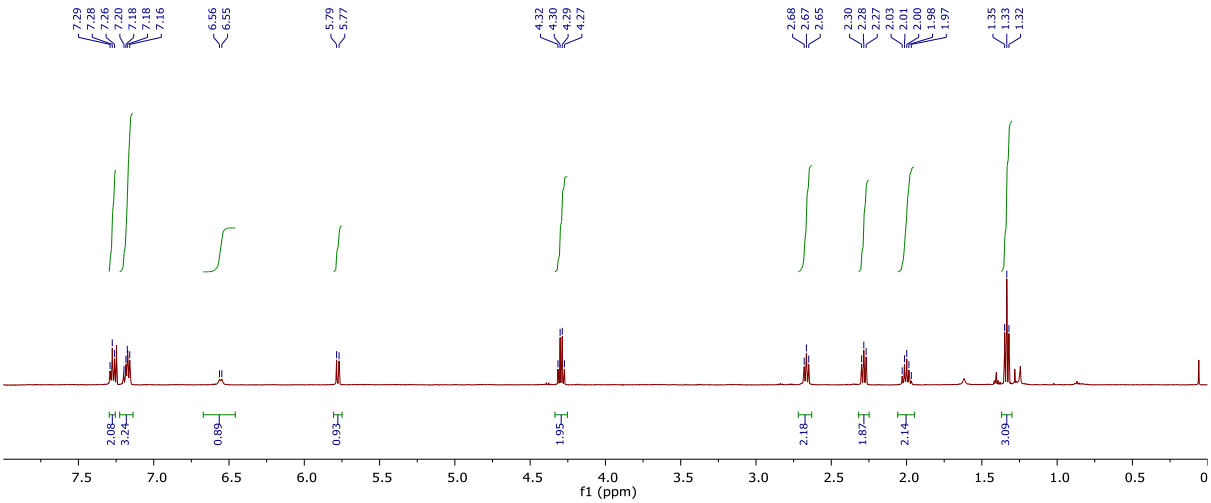

CH3
O
N
N
NH
O
CH3
H3C
O

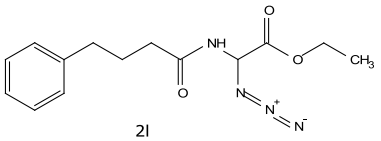
2k


172.76
166.99
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
64.63
63.24
45.58
26.11
22.52
22.48
14.17
f1 (ppm)

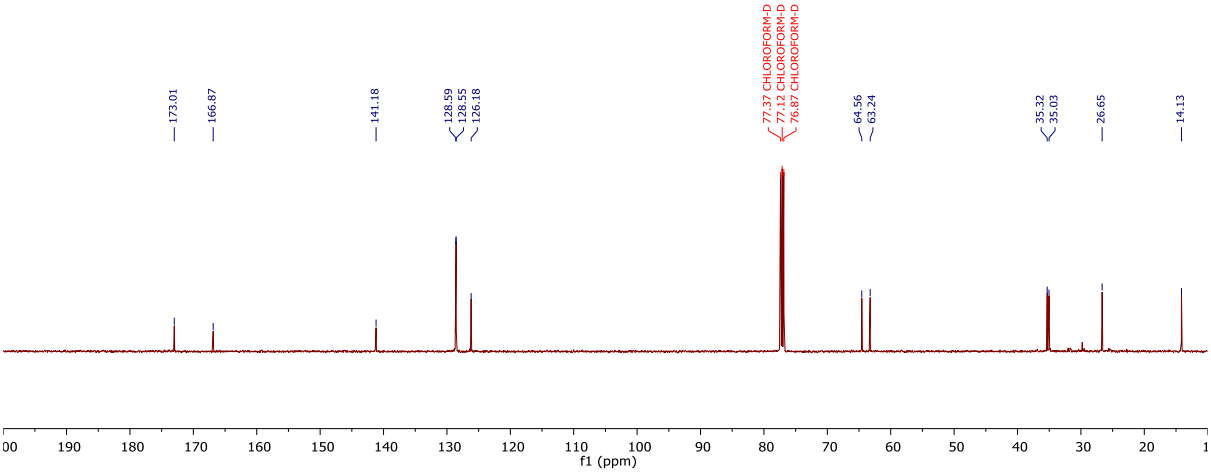

O
NH
O
O
CH3
N
N+
N-

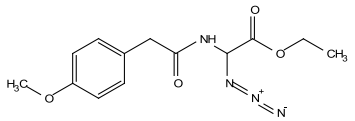
2l


7.29
7.28
7.26
7.20
7.18
7.18
7.16
6.56
6.55
5.79
5.77
4.32
4.30
4.29
4.27
2.68
2.67
2.65
2.30
2.28
2.27
2.03
2.01
2.00
1.98
1.97
1.35
1.33
1.32
2.08
3.24
0.89
0.93
1.95
2.18
1.87
2.14
3.09
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)

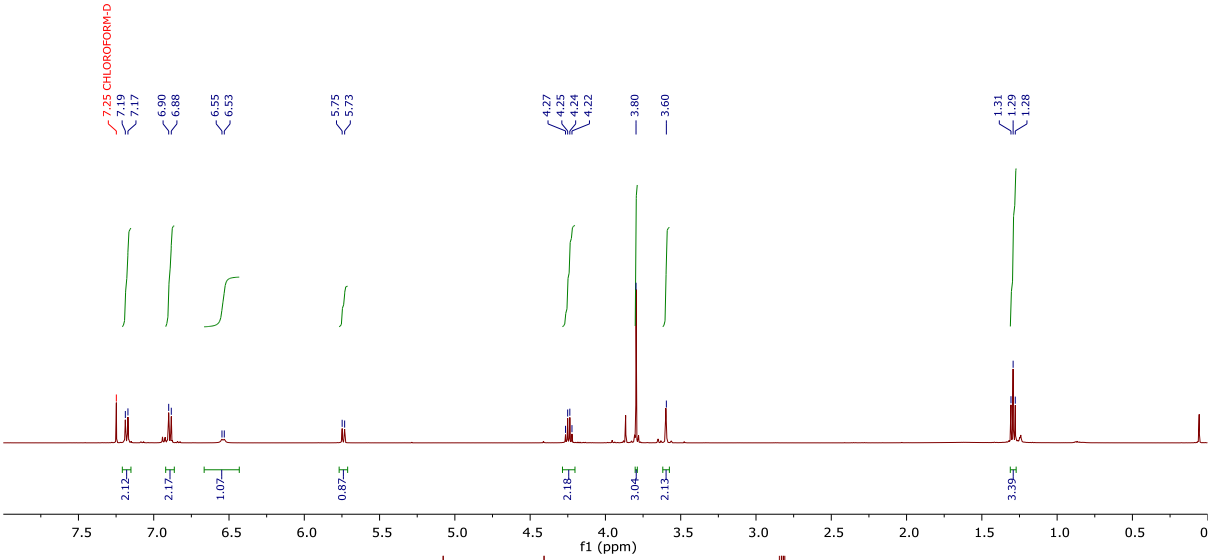

O
NH
O
O
CH3
N
N+
N-

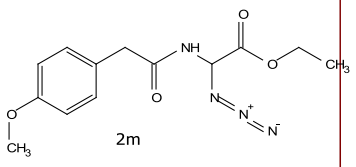
2l


173.01
166.87
141.18
128.59
128.55
126.18
77.37 CHLOROFORM-D
77.12 CHLOROFORM-D
76.87 CHLOROFORM-D
64.56
63.24
35.32
35.03
26.65
14.13
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
f1 (ppm)


O
NH
O
O
CH3
H3C
O
O
N
N+
N-

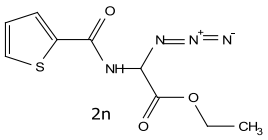
2m

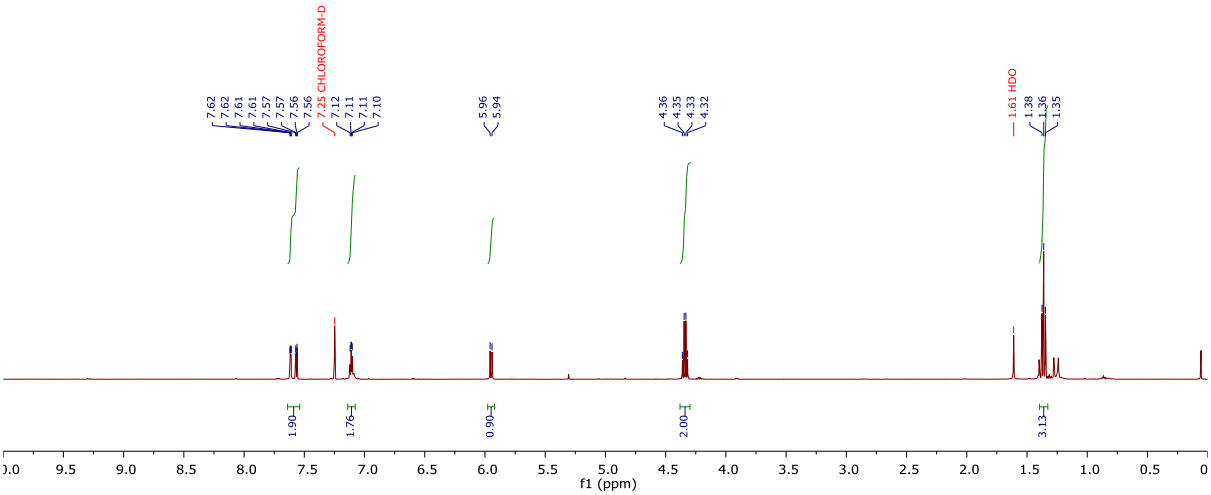

7.25 CHLOROFORM-D
7.19
7.17
6.90
6.88
6.55
6.53
5.75
5.73
4.27
4.25
4.24
4.22
3.80
3.60
1.31
1.29
1.28
2.12
2.17
1.07
0.87
2.18
3.04
2.13
3.39
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
f1 (ppm)

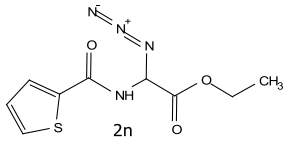

O
NH
O
O
CH3
O
CH3
N
N+
N-

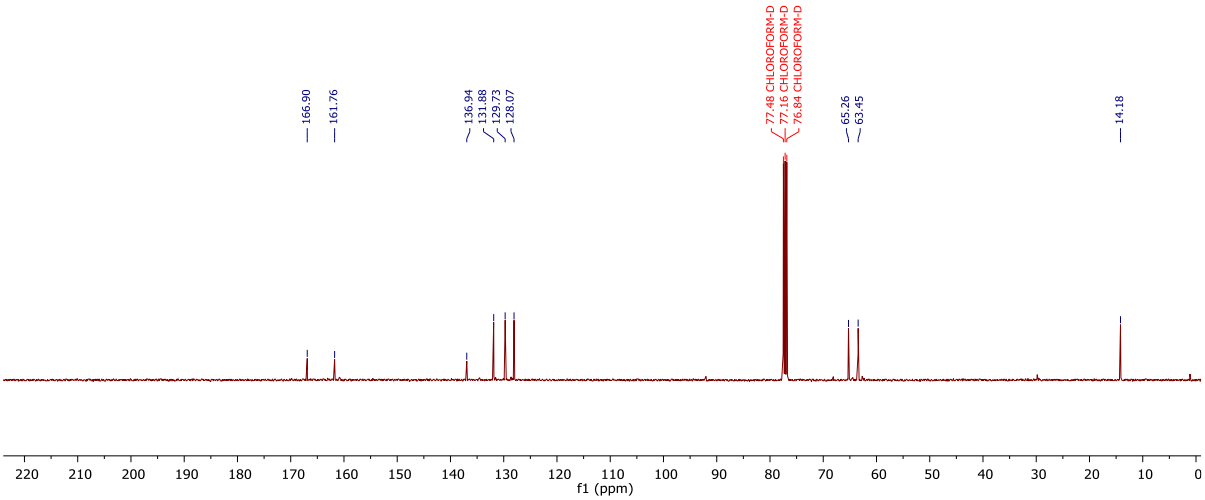
2m

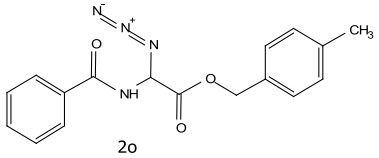
171.72
166.63
159.21
130.60
125.51
114.68
64.62
63.17
55.37
42.51
14.07
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
1
f1 (ppm)


O
N
N
N
S
NH
O
O
O
CH3
2n

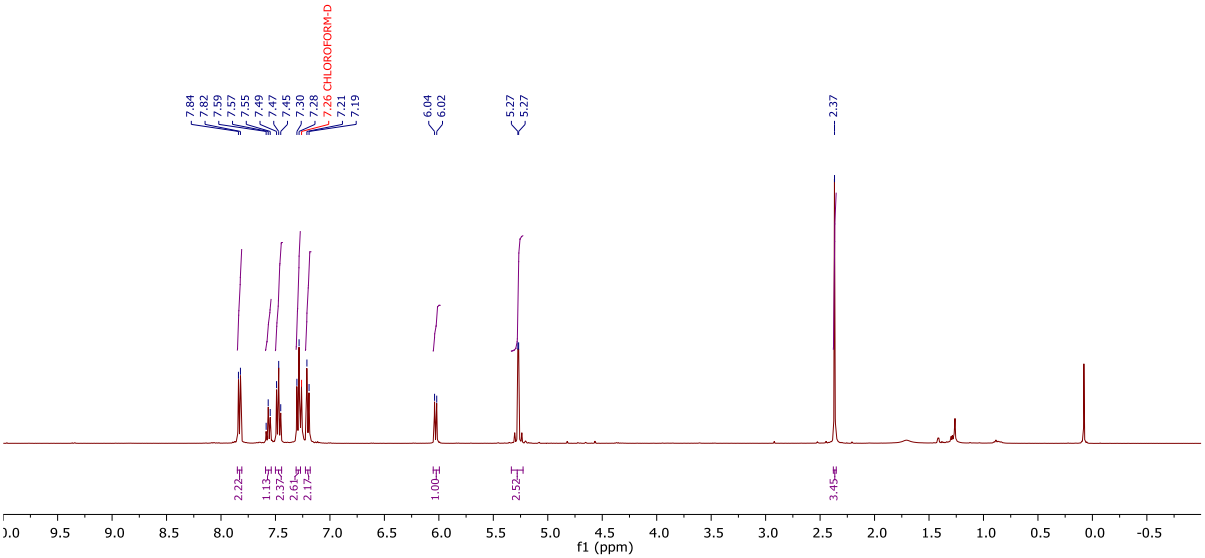

7.62
7.62
7.61
7.61
7.57
7.57
7.56
7.56
7.25 CHLOROFORM-D
7.12
7.11
7.11
7.10
5.96
5.94
4.36
4.35
4.33
4.32
1.61 HDO
1.38
1.36
1.35
1.90
1.76
0.90
2.00
3.13
f1 (ppm)

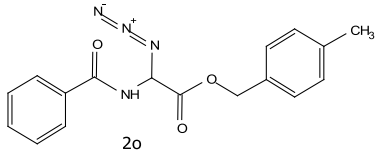

N
N
N
O
NH
O
CH3
S
2n
O


166.90
161.76
136.94
131.88
129.73
128.07
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
65.26
63.45
14.18
f1 (ppm)

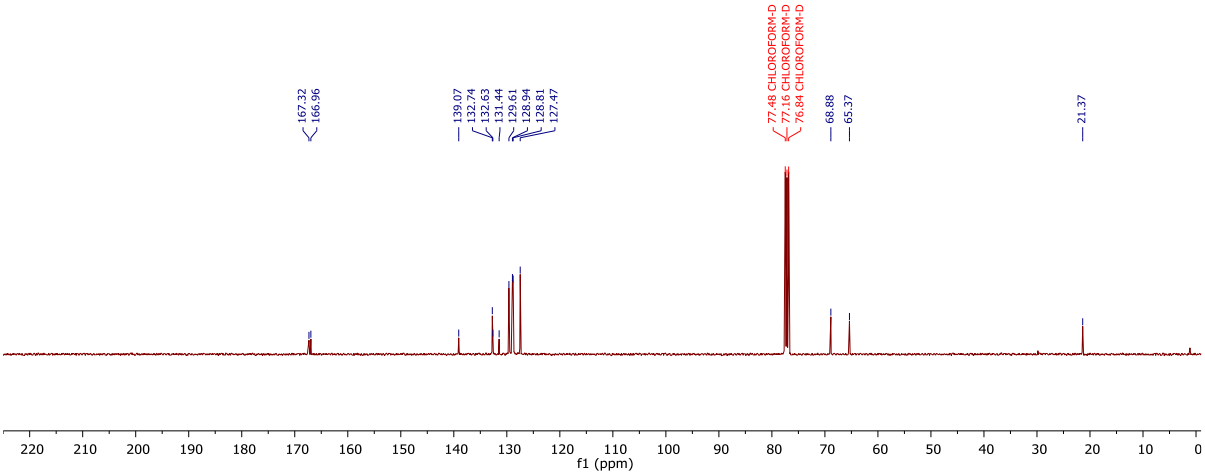

N
N
N
O
NH
O
O
O
CH3

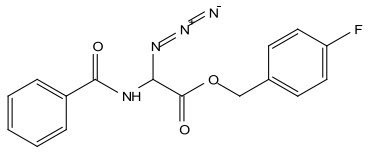
2o


7.84
7.82
7.59
7.57
7.55
7.49
7.47
7.45
7.30
7.28
7.26 CHLOROFORM-D
7.21
7.19
6.04
6.02
5.27
5.27
2.37
2.22
1.13
2.37
2.61
2.17
1.00
2.52
3.45
f1 (ppm)

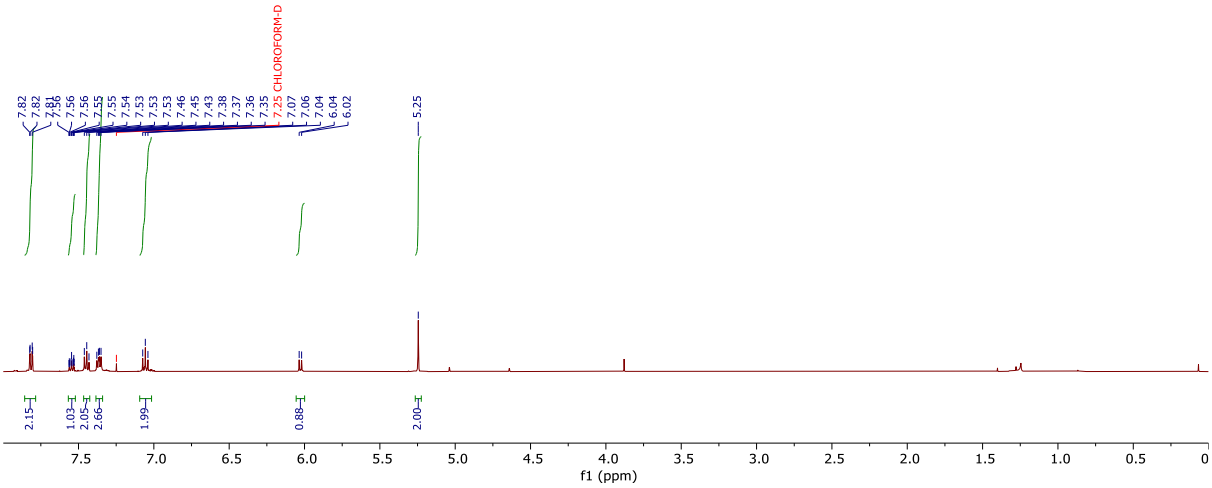

N
N
N
O
NH
O
O
O
CH3

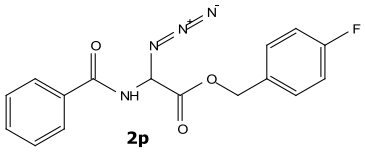
2o


167.32
166.96
139.07
132.74
132.63
131.44
129.61
128.94
128.81
127.47
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.88
65.37
21.37
f1 (ppm)

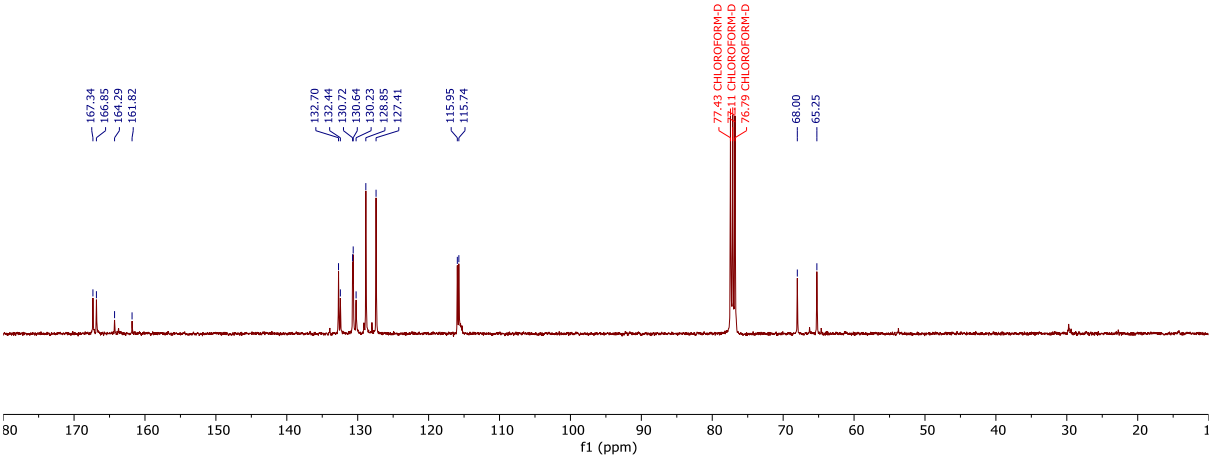

O
N
N
N
NH
O
O
F

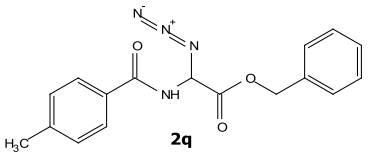
2p


7.82
7.82
7.81
7.81
7.56
7.56
7.55
7.55
7.54
7.53
7.53
7.53
7.46
7.45
7.43
7.38
7.37
7.36
7.35
7.25 CHLOROFORM-D
7.07
7.06
7.04
6.04
6.02
5.25
2.15
1.03
2.05
2.66
1.99
0.88
2.00
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)

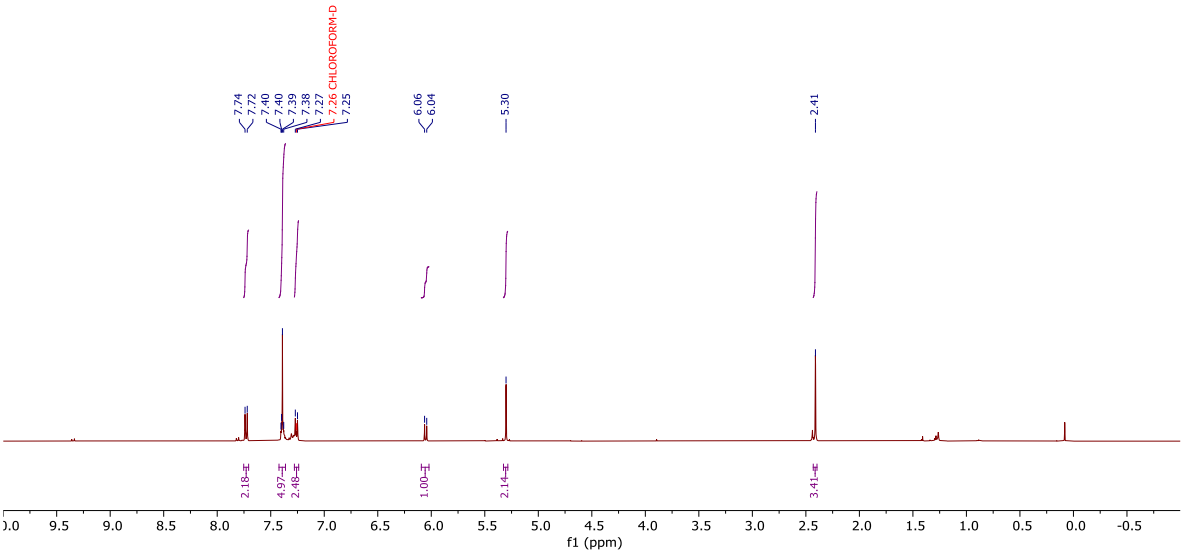

O
N
N
N
NH
O
O
F

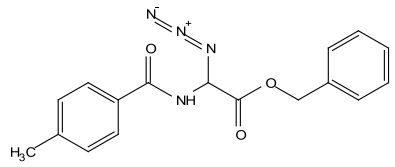
2p


167.34
166.85
164.29
161.82
132.70
132.44
130.72
130.64
130.23
128.85
127.41
115.95
115.74
77.43 CHLOROFORM-D
77.11 CHLOROFORM-D
76.79 CHLOROFORM-D
68.00
65.25
80
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
1
f1 (ppm)

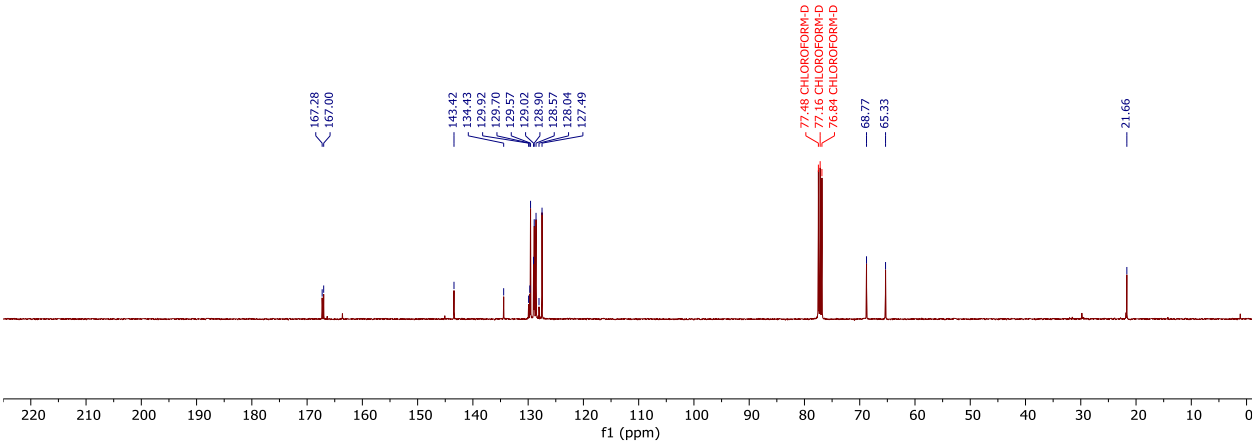


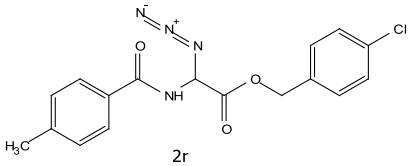
2q


7.74
7.72
7.40
7.40
7.39
7.38
7.27
7.26 CHLOROFORM-D
7.25
6.06
6.04
5.30
2.41
2.18
4.97
2.48
1.00
2.14
3.41
f1 (ppm)

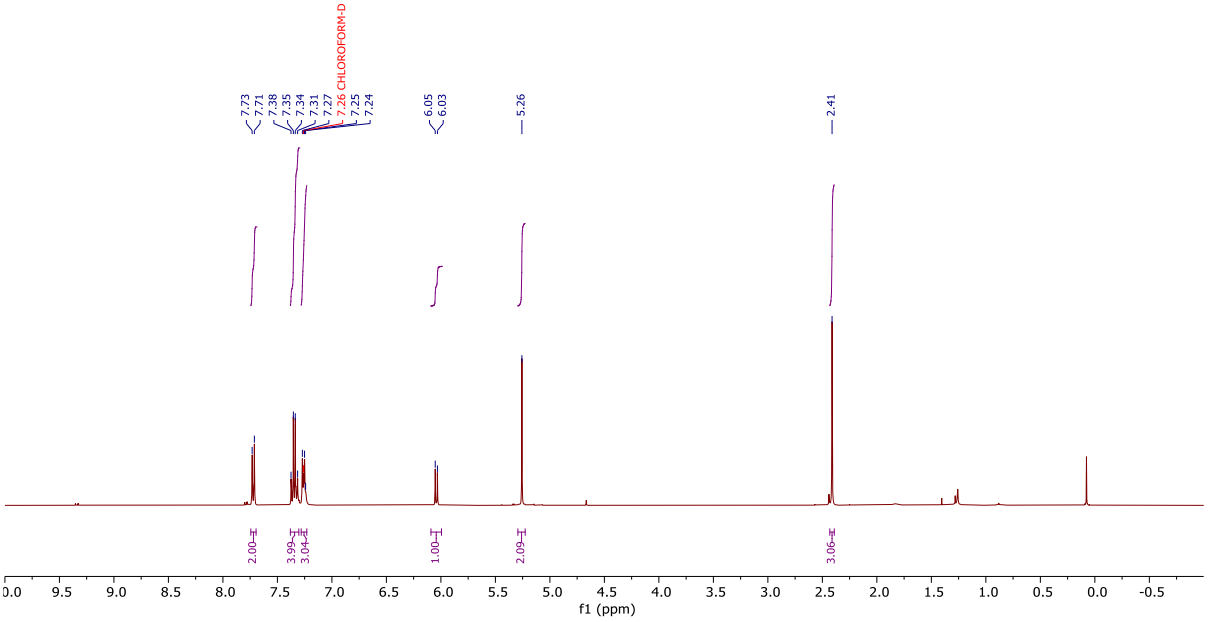


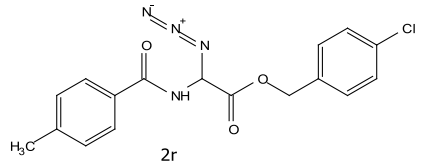
2q


167.28
167.00
143.42
134.43
129.92
129.70
129.57
129.02
128.90
128.57
128.04
127.49
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.77
65.33
21.66
f1 (ppm)

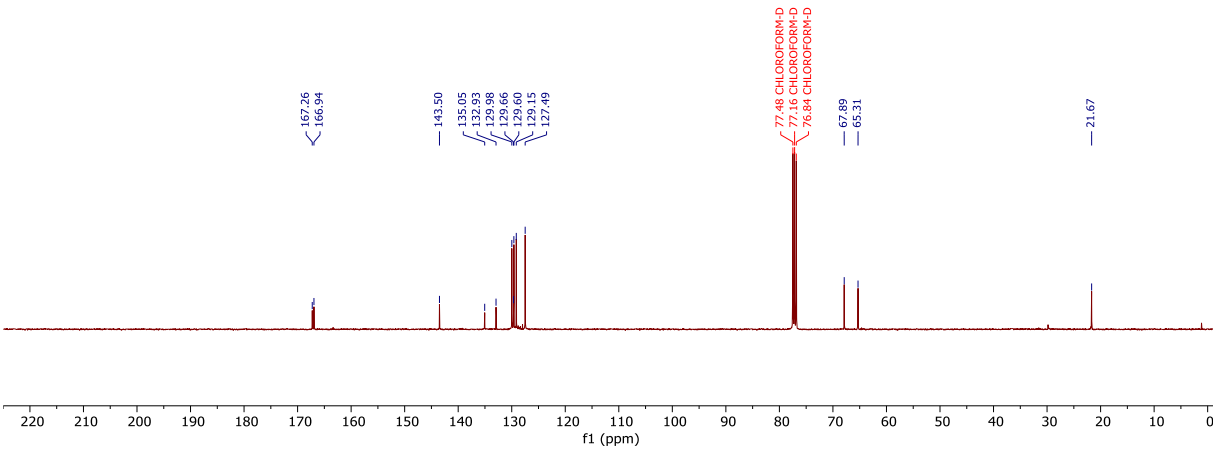

N
N
N
O
NH
O
O
O
Cl
H3C

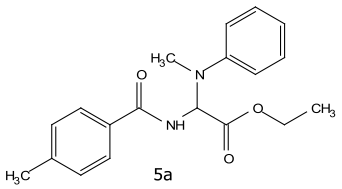
2r


7.73
7.71
7.38
7.35
7.34
7.31
7.27
7.26 CHLOROFORM-D
7.25
7.24
6.05
6.03
5.26
2.41
2.00
3.99
3.04
1.00
2.09
3.06
f1 (ppm)

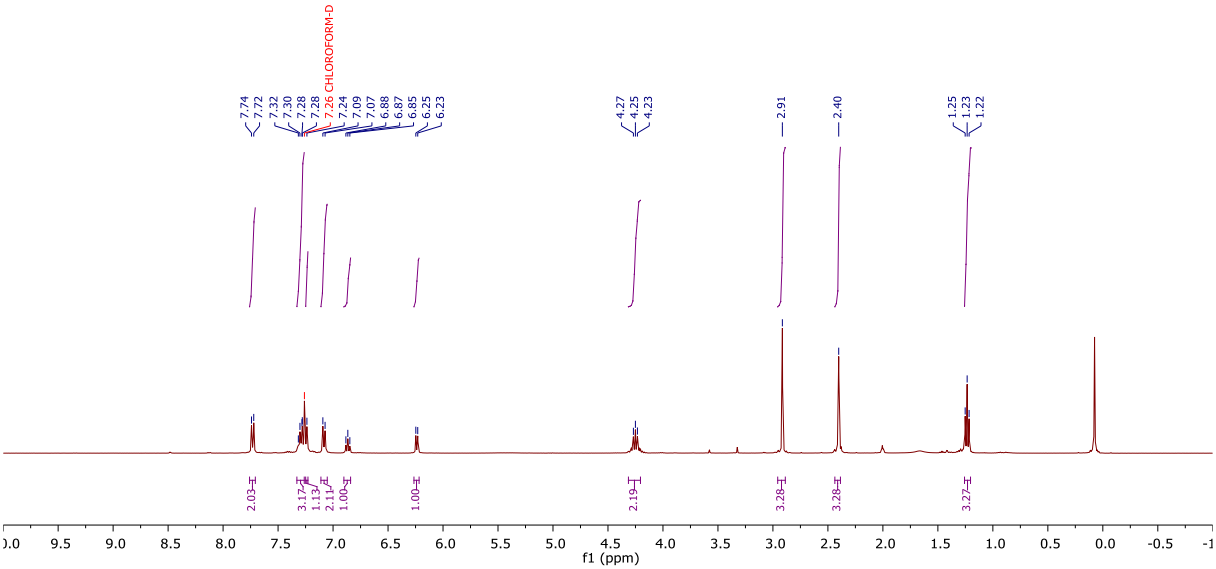

N
N
N
O
NH
O
O
O
Cl
H3C

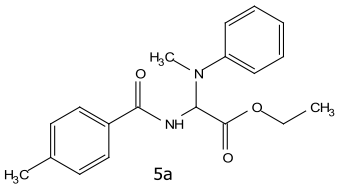
2r


167.26
166.94
143.50
135.05
132.93
129.98
129.66
129.60
129.15
127.49
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
67.89
65.31
21.67
f1 (ppm)

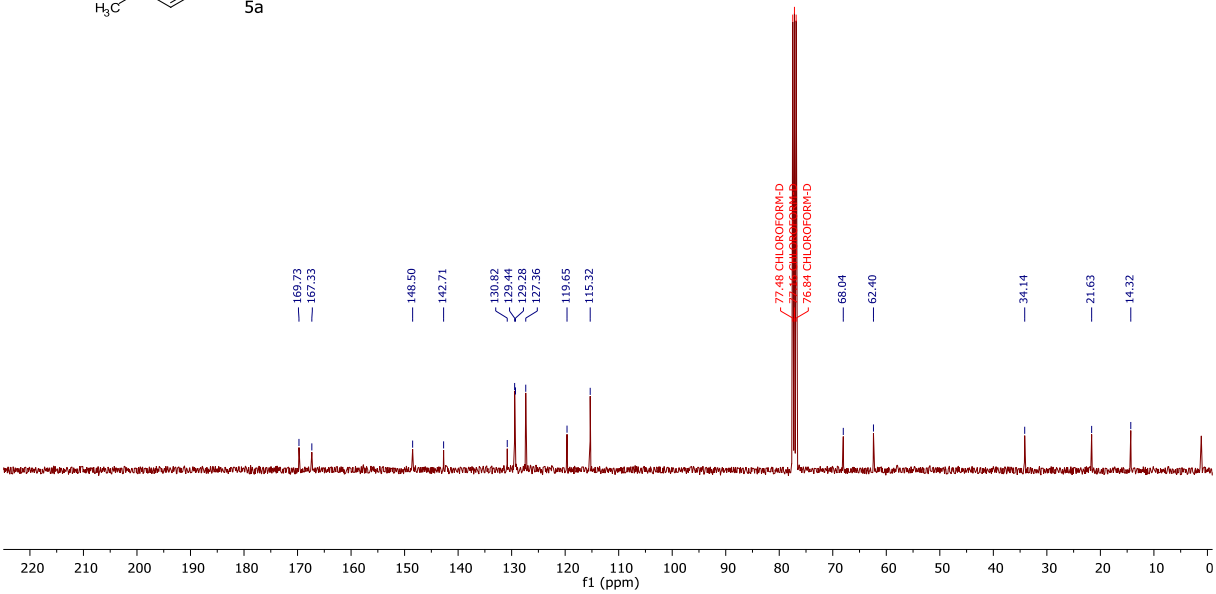

H3C
N
O
NH
O
O
CH3
H3C

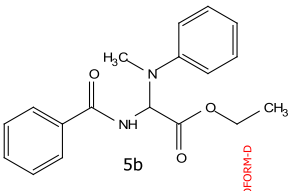
5a


7.74
7.72
7.32
7.30
7.28
7.28
7.26 CHLOROFORM-D
7.24
7.09
7.07
6.89
6.87
6.85
6.25
6.23
4.27
4.25
4.23
2.91
2.40
1.25
1.23
1.22
2.03
3.17
1.13
2.11
1.00
1.00
2.19
3.28
3.28
3.27
f1 (ppm)

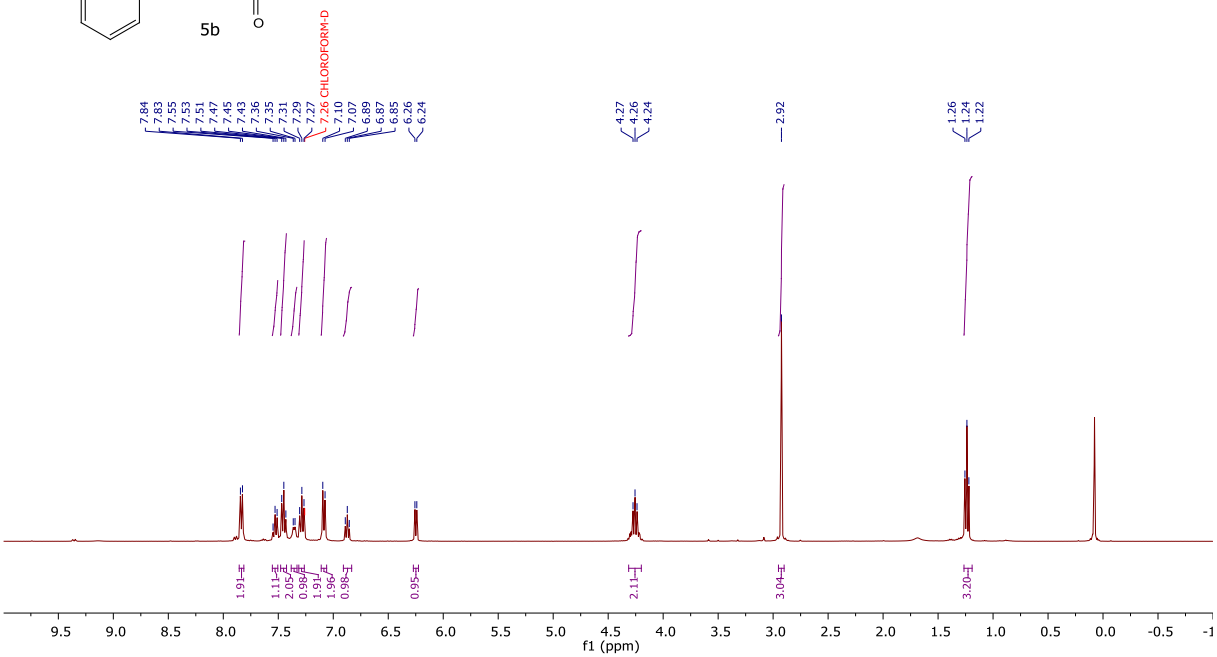

H3C
N
O
NH
O
O
CH3
H3C

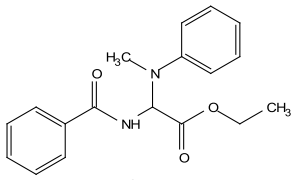
5a


169.73
167.33
148.50
142.71
130.82
129.44
129.28
127.36
119.65
115.32
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.04
62.40
34.14
21.63
14.32
f1 (ppm)

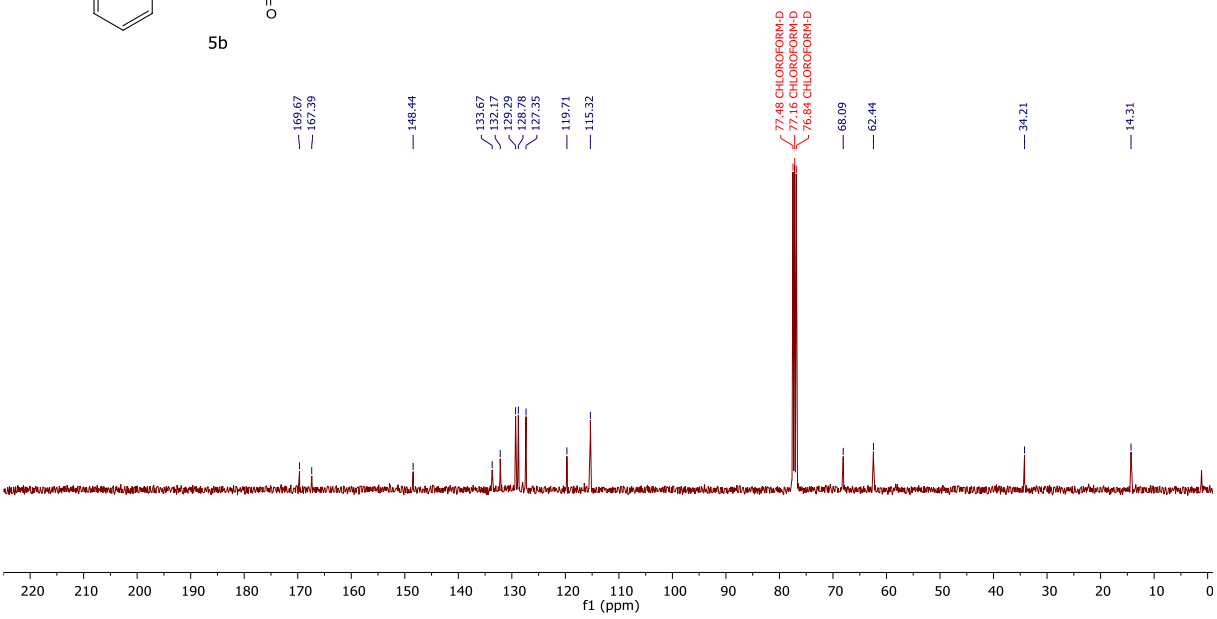

H3C
N
O
NH
O
O
CH3
O

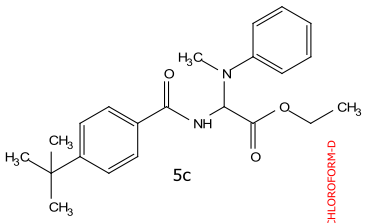
5b

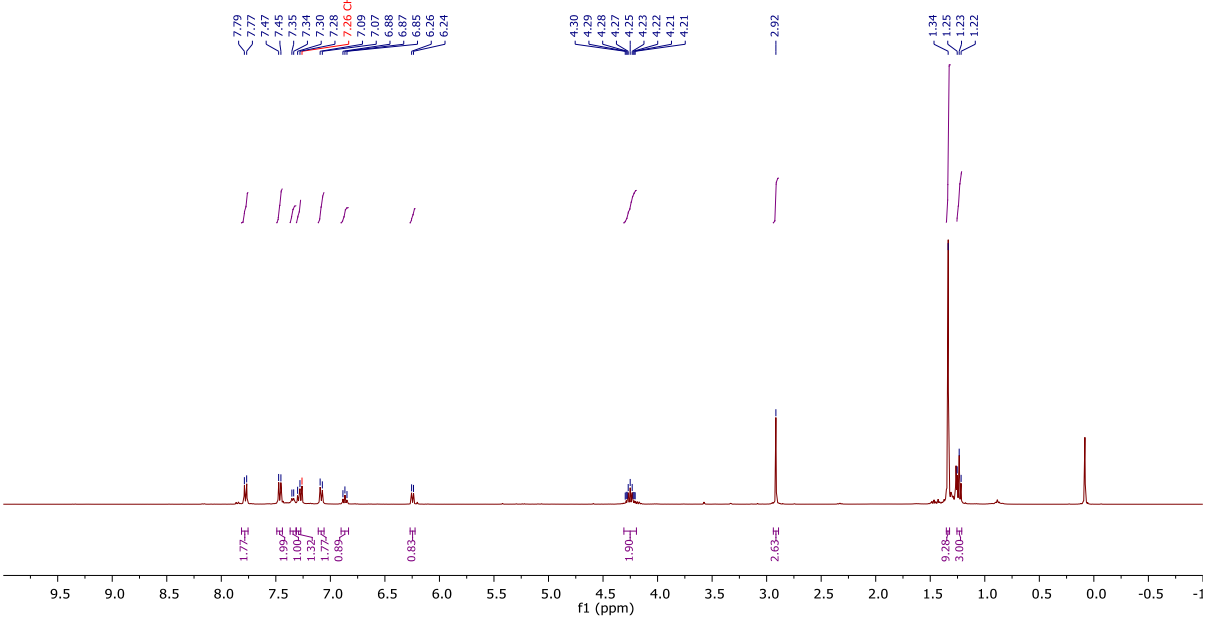

7.84
7.83
7.55
7.53
7.51
7.47
7.45
7.43
7.36
7.35
7.31
7.29
7.27
7.26 CHLOROFORM-D
7.10
7.07
6.89
6.87
6.65
6.26
6.24
4.27
4.26
4.24
2.92
1.26
1.24
1.22
1.91
1.11
2.05
0.98
1.91
1.96
0.98
0.95
2.11
3.04
3.20
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

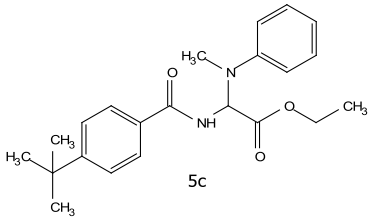

H3C
N
O
NH
O
O
CH3

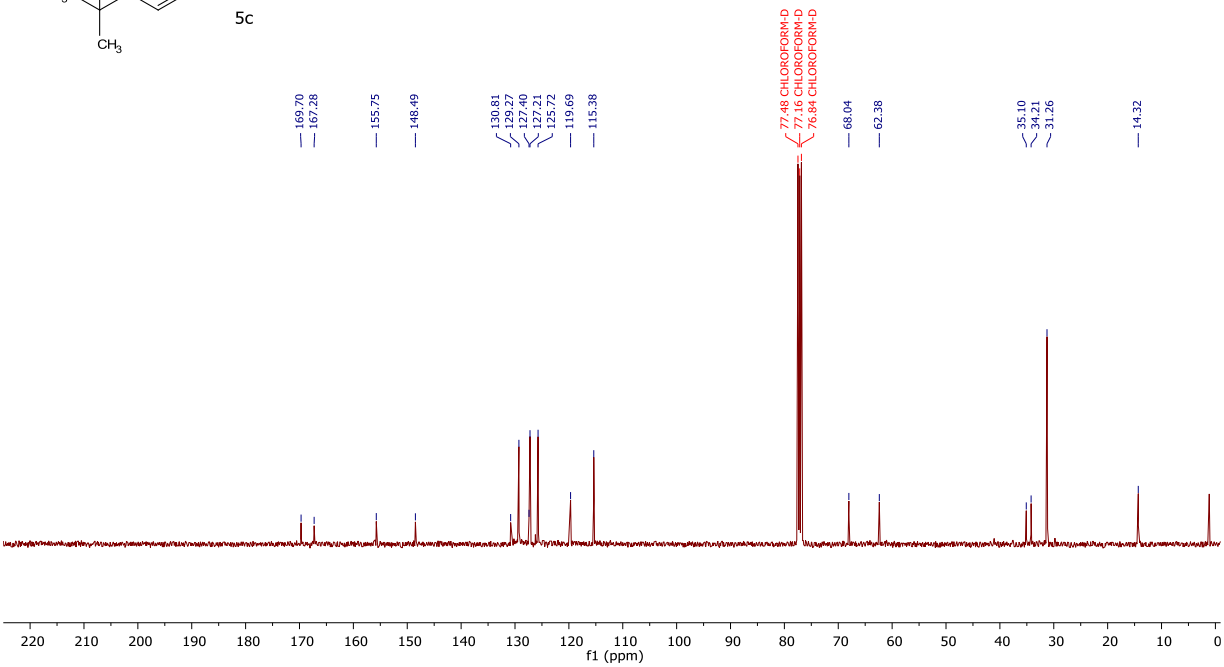
5b

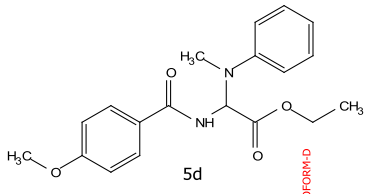

169.67
167.39
148.44
133.67
132.17
129.29
128.78
127.35
119.71
115.32
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.09
62.44
34.21
14.31
220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)


5c

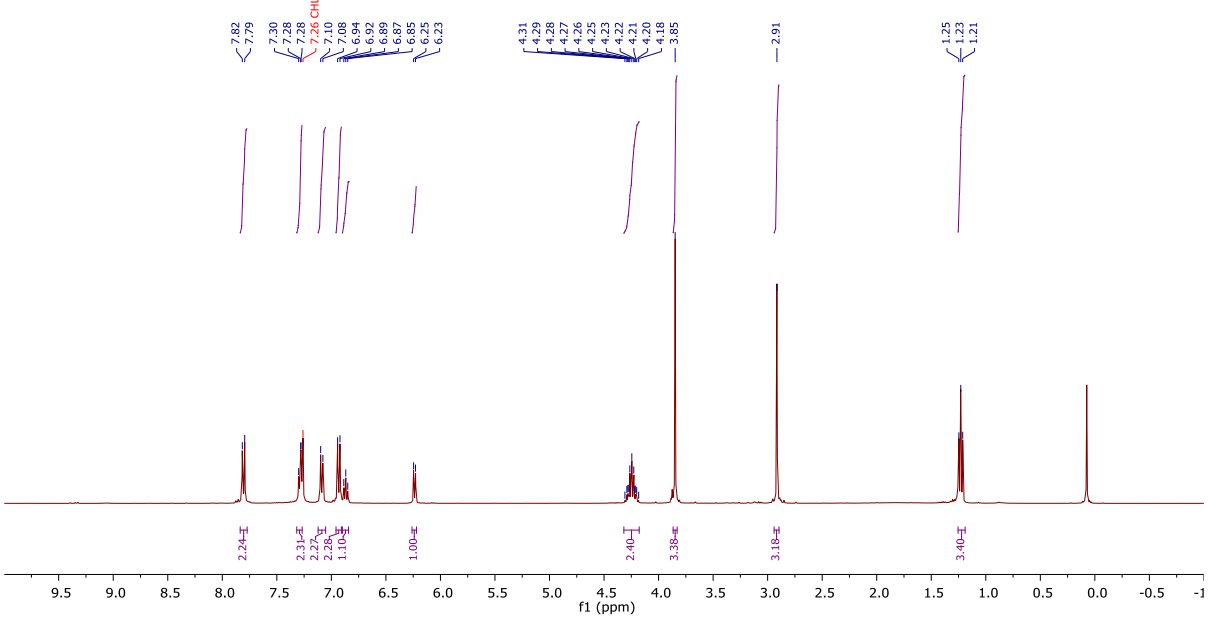

7.79
7.77
7.47
7.45
7.35
7.34
7.30
7.28
7.26 CHLOROFORM-D
7.09
7.07
6.88
6.87
6.85
6.26
6.24
4.30
4.29
4.28
4.27
4.25
4.23
4.22
4.21
4.21
2.92
1.34
1.25
1.23
1.22
1.77
1.99
1.00
1.32
1.77
0.89
0.83
1.90
2.63
9.28
3.00
f1 (ppm)

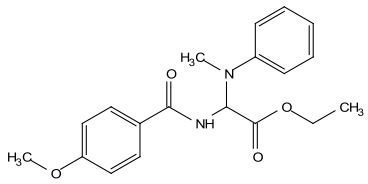

5c


169.70
167.28
155.75
148.49
130.81
129.27
127.40
127.21
125.72
119.69
115.38
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.04
62.38
35.10
34.21
31.26
14.32
f1 (ppm)

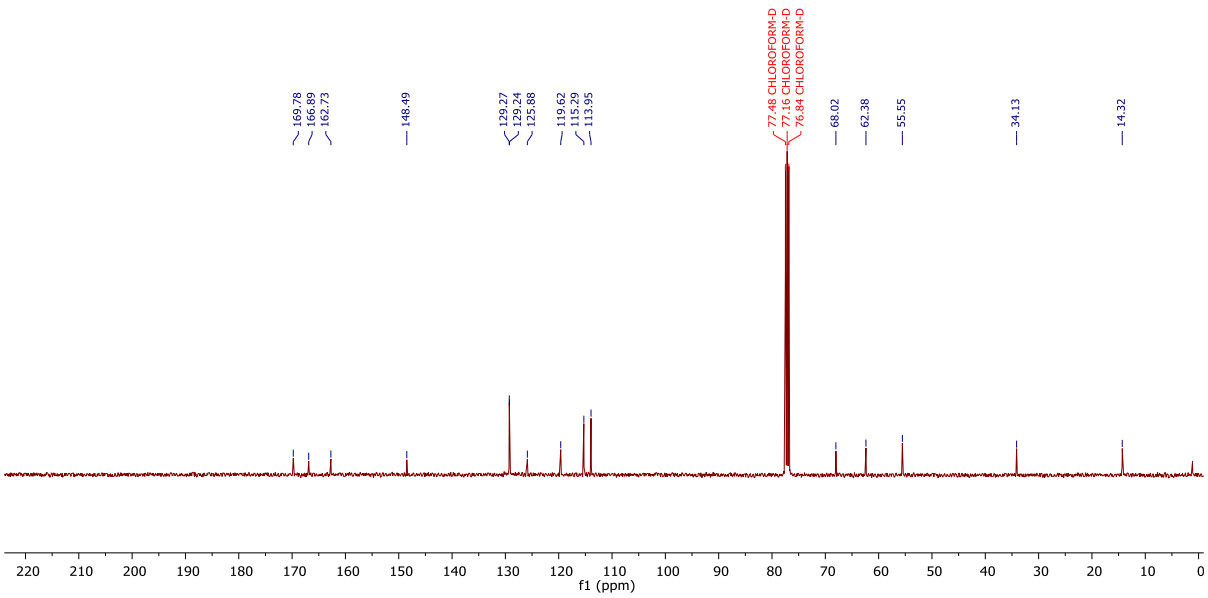

H3C
N
O
NH
O
CH3
O
H3C
O
O

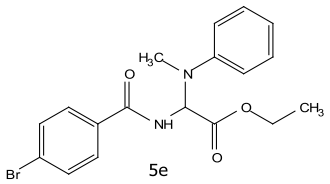
5d


7.82
7.79
7.30
7.28
7.28
7.26 CHLOROFORM-D
7.10
7.08
6.94
6.92
6.89
6.87
6.85
6.25
6.23
4.31
4.29
4.28
4.27
4.26
4.25
4.23
4.22
4.21
4.20
4.18
3.85
2.91
1.25
1.23
1.21
2.24
2.31
2.27
2.28
1.10
1.00
2.40
3.38
3.18
3.40
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1
f1 (ppm)

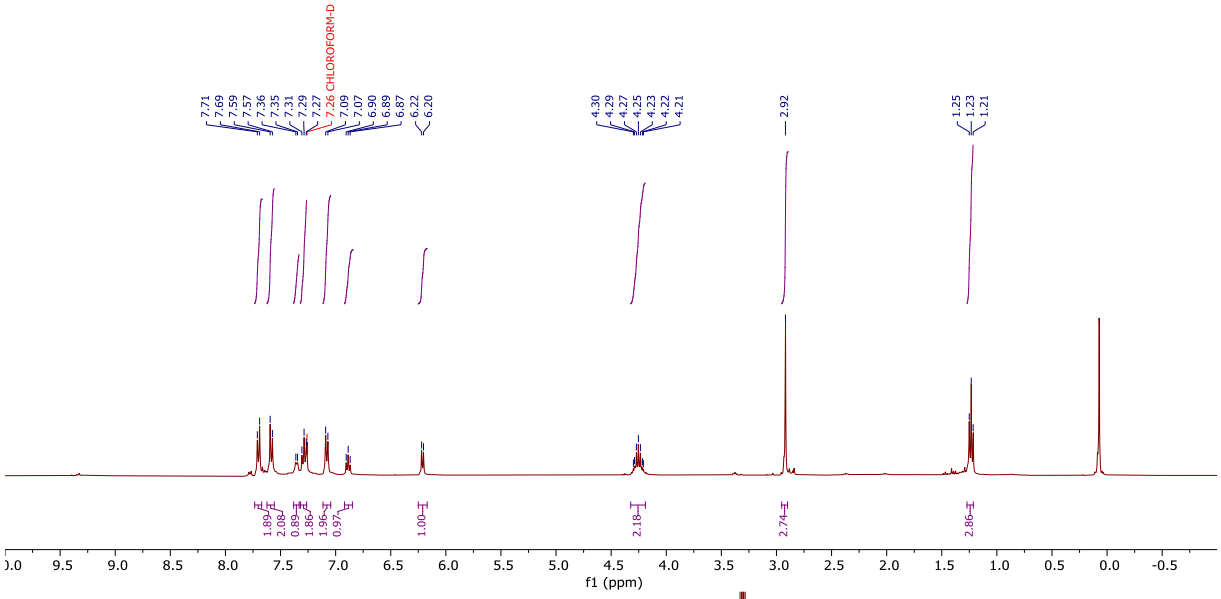

H3C
N
O
NH
O
CH3
O
H3C
O

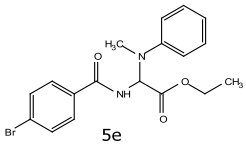
5d


169.78
166.89
162.73
148.49
129.27
129.24
125.88
119.62
115.29
113.95
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.02
62.38
55.55
34.13
14.32
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)


H3C
N
O
NH
O
O
CH3
Br

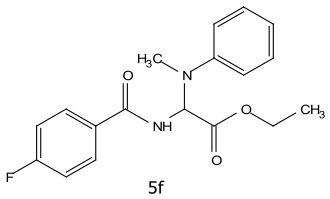
5e


7.71
7.69
7.59
7.57
7.36
7.35
7.31
7.29
7.27
7.26 CHLOROFORM-D
7.09
7.07
6.90
6.89
6.87
6.22
6.20
4.30
4.29
4.27
4.25
4.23
4.22
4.21
2.92
1.25
1.23
1.21
1.89
2.08
0.89
1.86
1.96
0.97
1.00
2.18
2.74
2.86
f1 (ppm)

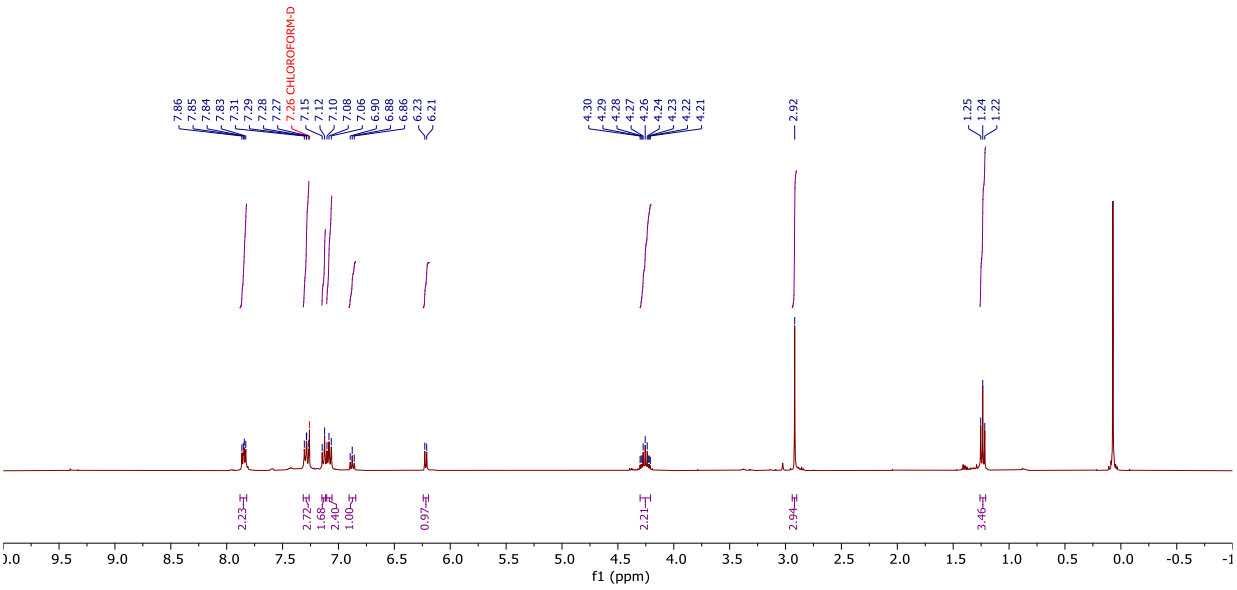

H3C
N
O
NH
O
O
CH3
Br

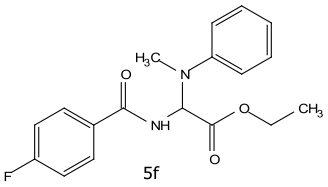
5e

169.57
166.38
148.32
132.01
129.27
128.90
126.91
119.80
115.31
68.17
62.49
34.25
14.26
f1 (ppm)

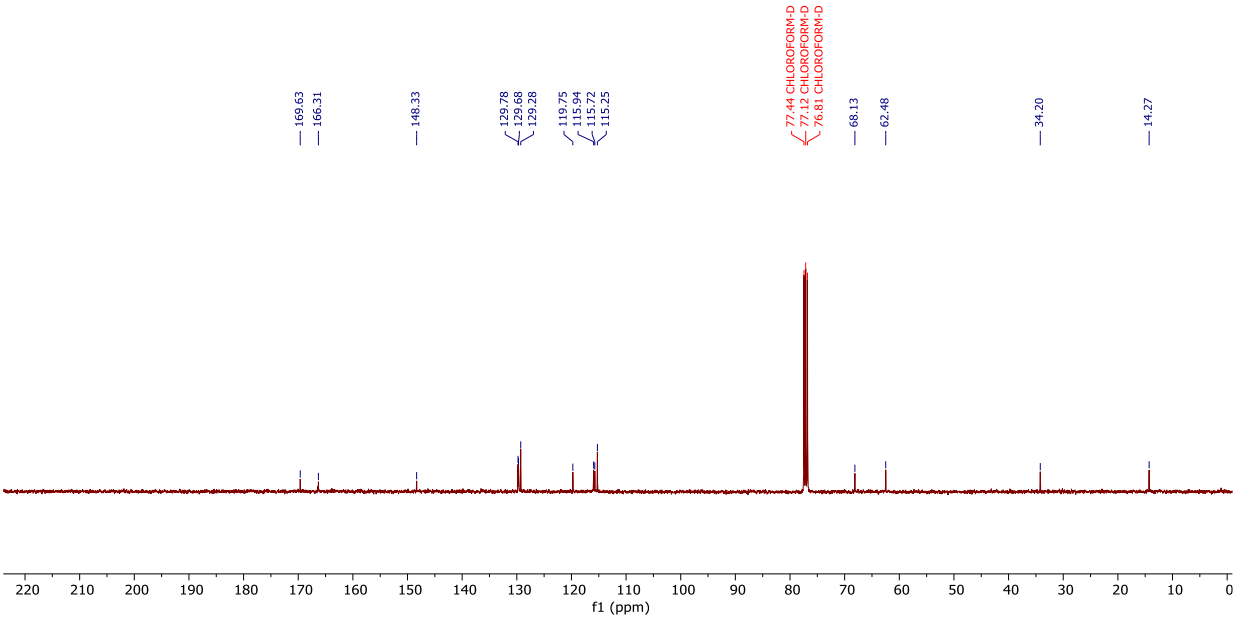

H3C
N
O
NH
O
O
CH3
F

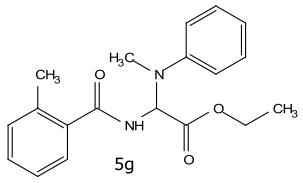
5f


7.86
7.85
7.84
7.83
7.31
7.29
7.28
7.27
7.26 CHLOROFORM-D
7.15
7.12
7.10
7.08
7.06
6.90
6.88
6.86
6.23
6.21
4.30
4.29
4.28
4.27
4.26
4.24
4.23
4.22
4.21
2.92
1.25
1.24
1.22
2.23
2.72
1.68
2.40
1.00
0.97
2.21
2.94
3.46
f1 (ppm)

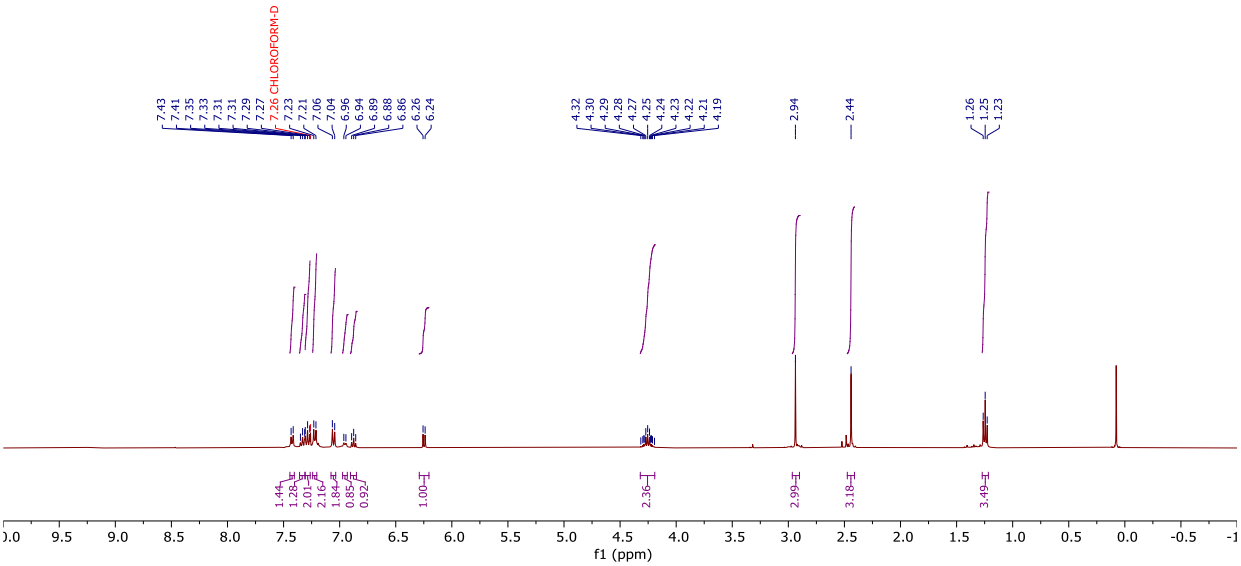

H3C
N
O
NH
O
O
CH3
F

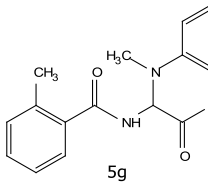
5f


169.63
166.31
148.33
129.78
129.68
129.28
119.75
115.94
115.72
115.25
77.44 CHLOROFORM-D
77.12 CHLOROFORM-D
76.81 CHLOROFORM-D
68.13
62.48
34.20
14.27
f1 (ppm)

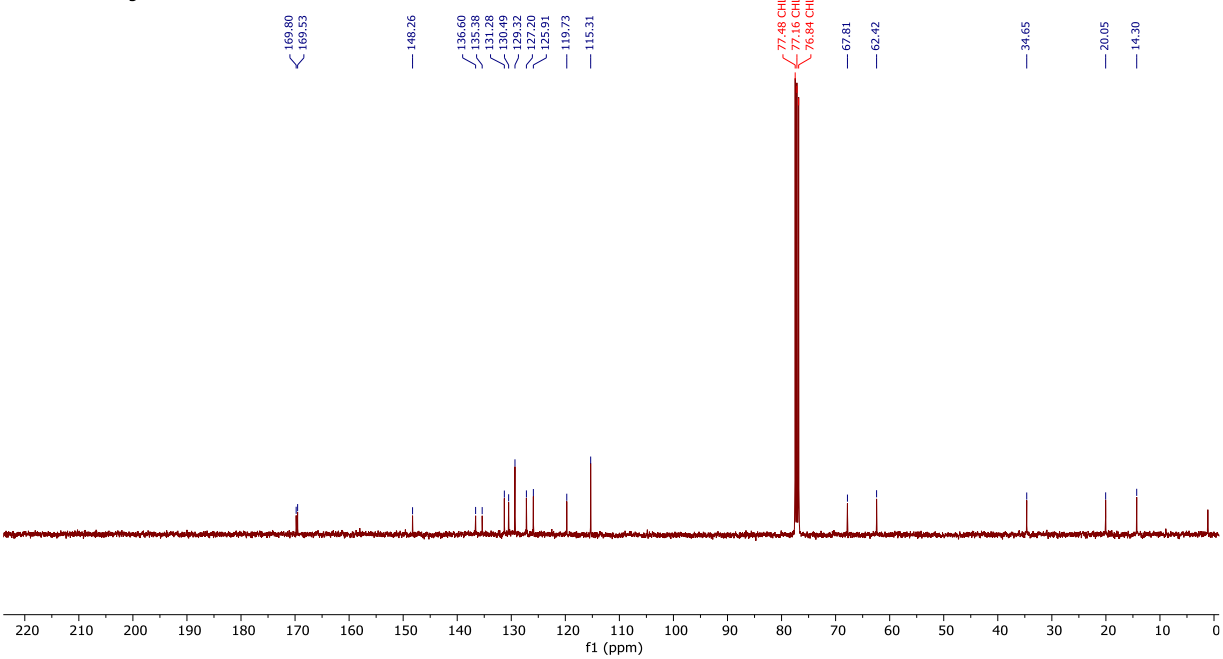

CH3
O
H3C
N
NH
O
O
CH3
O

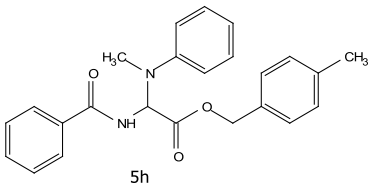
5g


7.43
7.41
7.35
7.33
7.31
7.31
7.29
7.27
7.26 CHLOROFORM-D
7.23
7.21
7.06
7.04
6.96
6.94
6.89
6.88
6.86
6.26
6.24
4.32
4.30
4.29
4.28
4.27
4.25
4.24
4.23
4.22
4.21
4.19
2.94
2.44
1.26
1.25
1.23
1.44
1.28
2.01
2.16
1.84
0.85
0.92
1.00
2.36
2.99
3.18
3.49
f1 (ppm)

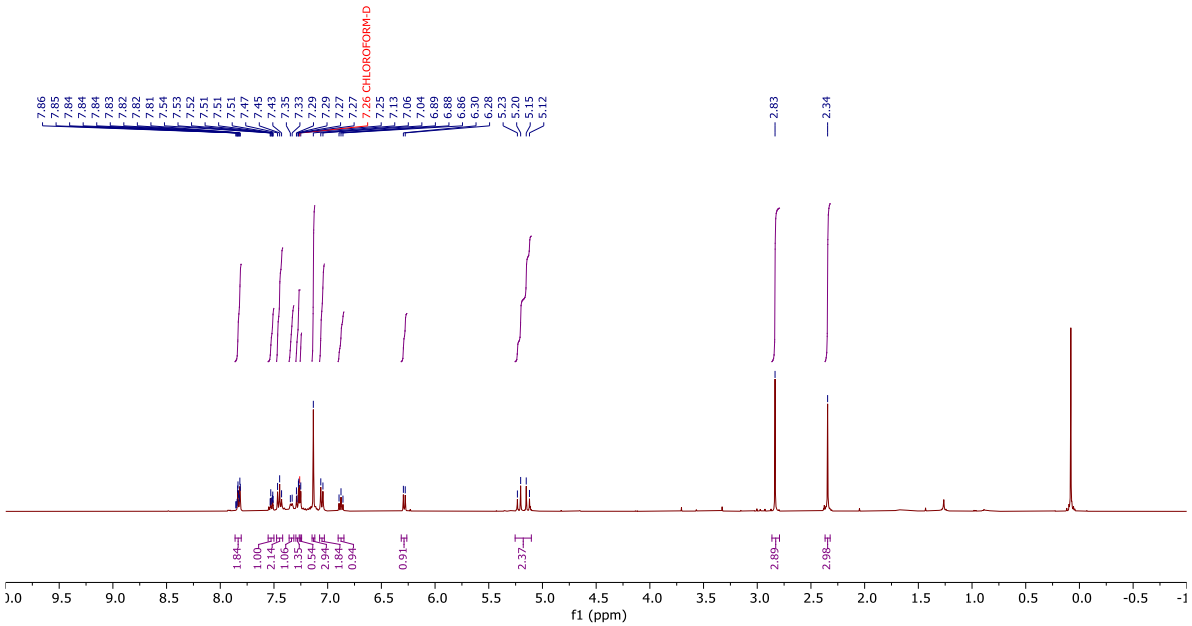

CH3
O
H3C
N
NH
O
O
CH3
O

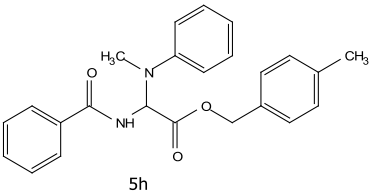
5g


169.80
169.53
148.26
136.60
135.38
131.28
130.49
129.32
127.20
125.91
119.73
115.31
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
67.81
62.42
34.65
20.05
14.30
f1 (ppm)


H3C
N
O
NH
O
O
O
CH3

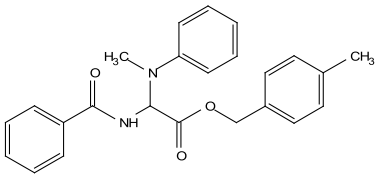
5h


7.86
7.85
7.84
7.84
7.84
7.84
7.83
7.82
7.82
7.81
7.54
7.53
7.52
7.51
7.51
7.51
7.47
7.45
7.43
7.35
7.33
7.29
7.29
7.27
7.26 CHLOROFORM-D
7.25
7.13
7.06
7.04
6.89
6.88
6.86
6.30
6.28
5.23
5.20
5.15
5.12
2.83
2.34
1.84
1.00
2.14
1.06
1.35
2.64
2.94
1.84
0.94
0.91
2.37
2.89
2.98
f1 (ppm)

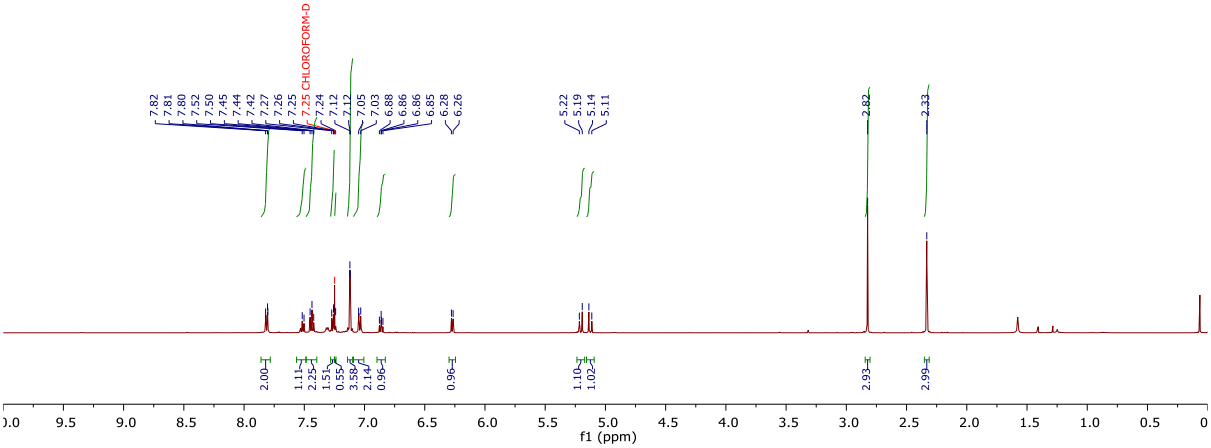

H3C
N
O
NH
O
O
O
CH3

5h

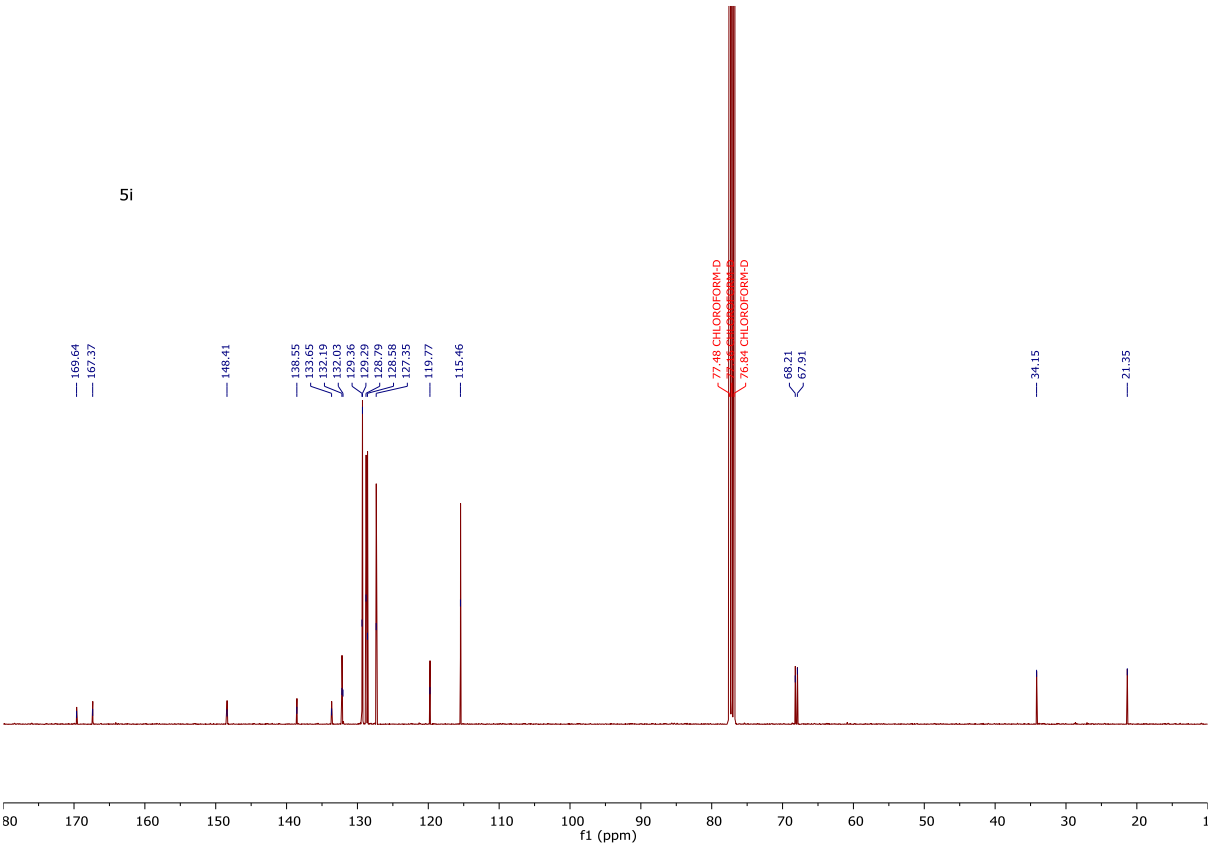
169.64
167.37
148.41
138.55
133.65
132.19
129.36
128.79
128.58
127.35
119.77
115.46
77.48 CHLOROFORM-D
76.84 CHLOROFORM-D
68.21
67.91
34.15
21.35
f1 (ppm)

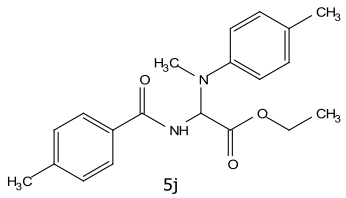

H3C
N
O
NH
O
O
CH3

5i

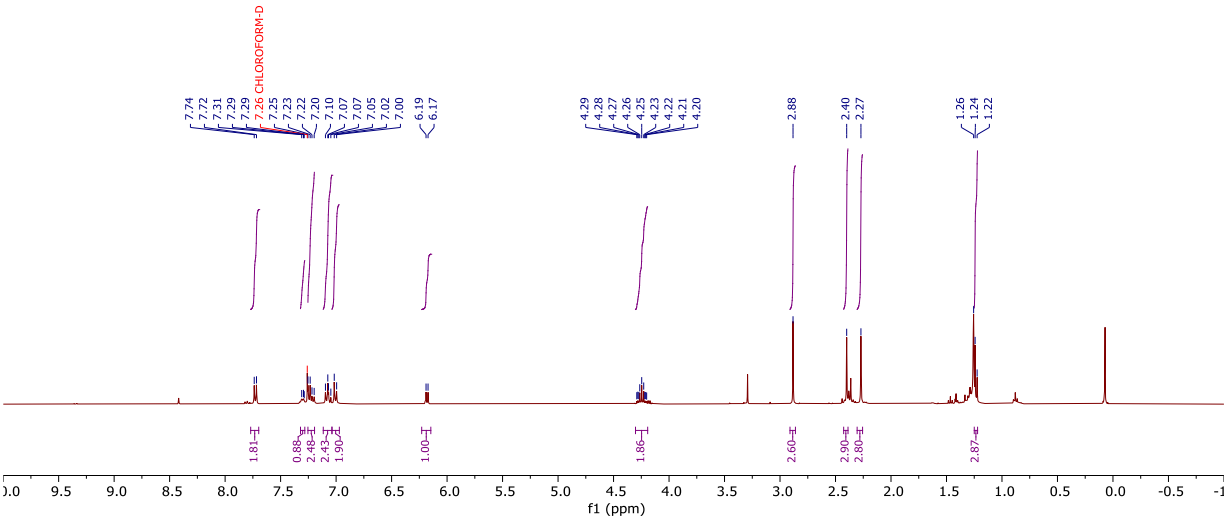

7.82
7.81
7.80
7.52
7.50
7.45
7.44
7.42
7.27
7.26
7.25
7.25 CHLOROFORM-D
7.24
7.12
7.12
7.05
7.03
6.88
6.86
6.86
6.85
6.28
6.26
5.22
5.19
5.14
5.11
2.82
2.33
2.00
1.11
2.25
1.51
0.55
3.58
2.14
0.96
0.96
1.10
1.02
2.93
2.99
f1 (ppm)

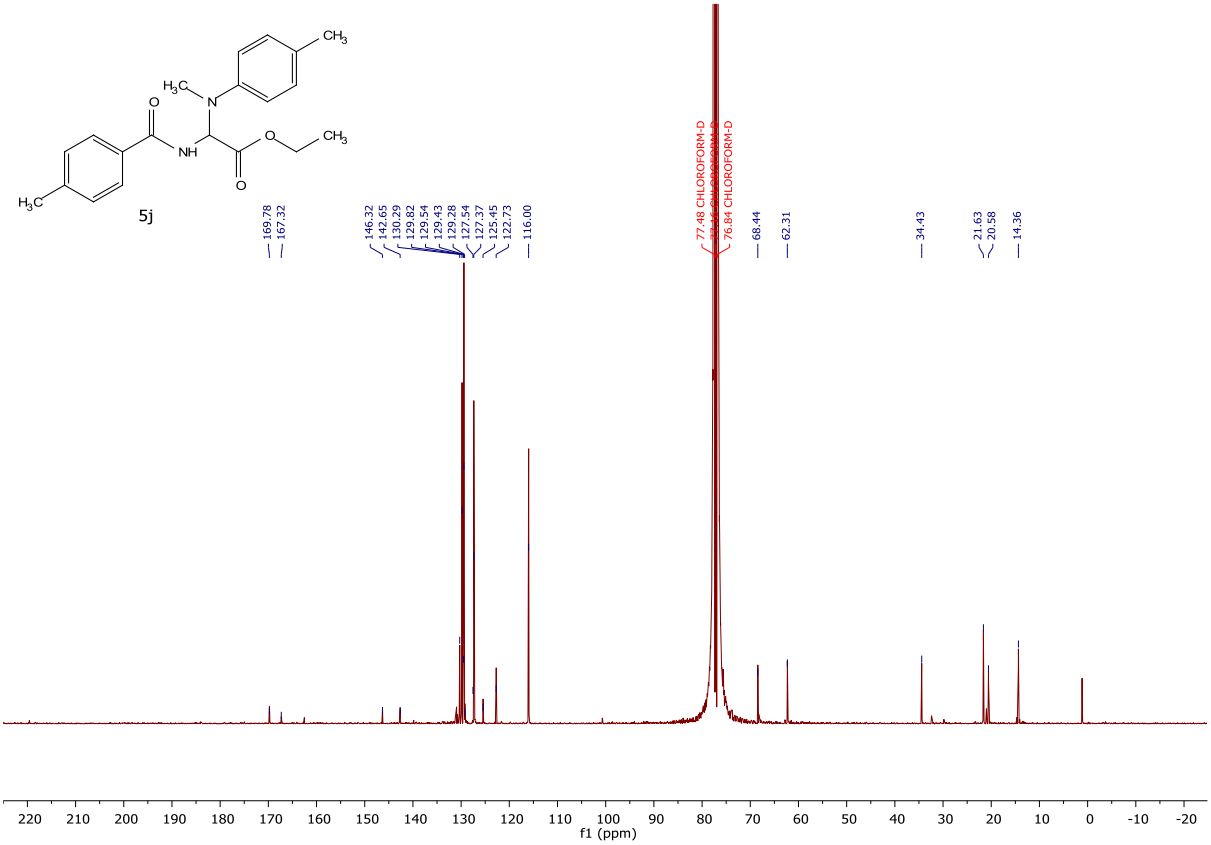
5i

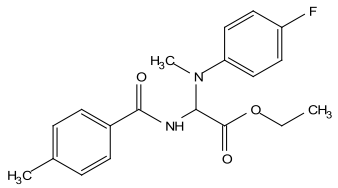

169.64
167.37
148.41
138.55
133.65
132.19
132.03
129.36
129.29
128.79
128.58
127.35
119.77
115.46
77.48 CHLOROFORM-D
76.84 CHLOROFORM-D
68.21
67.91
34.15
21.35
f1 (ppm)


CH3
H3C
N
O
NH
O
O
CH3
H3C

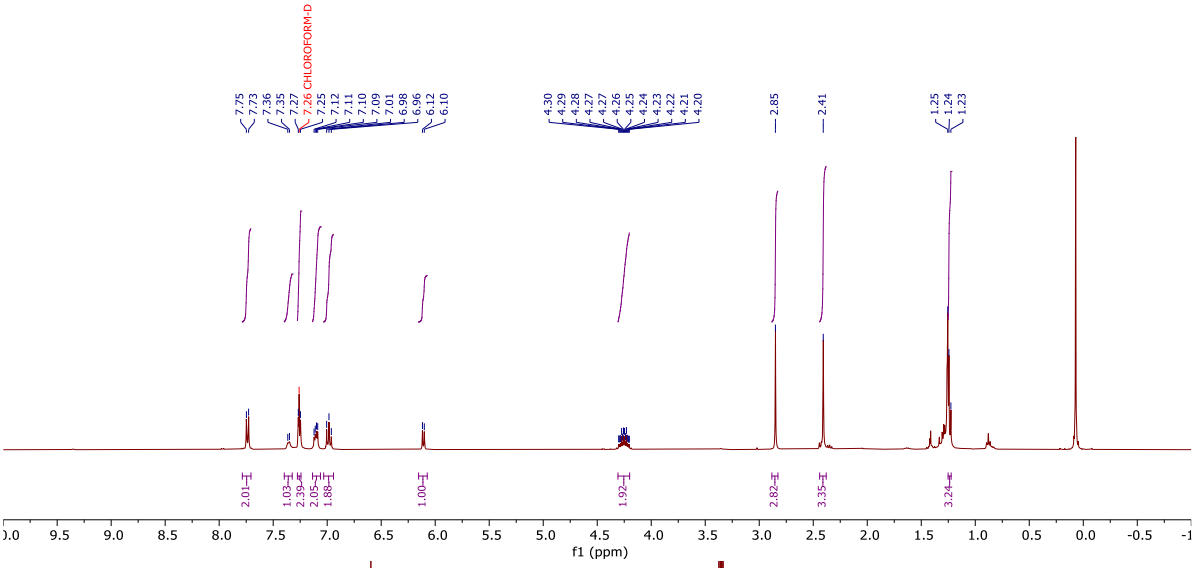
5j

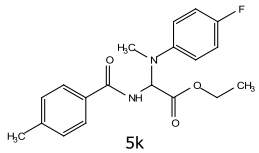

7.74
7.72
7.31
7.29
7.29
7.26 CHLOROFORM-D
7.25
7.23
7.22
7.20
7.10
7.07
7.07
7.05
7.02
7.00
6.19
6.17
4.29
4.28
4.27
4.26
4.25
4.23
4.22
4.21
4.20
2.88
2.40
2.27
1.26
1.24
1.22
1.81
0.88
2.48
2.43
1.90
1.00
1.86
2.60
2.90
2.80
2.87
f1 (ppm)


CH3
H3C
N
O
NH
O
O
CH3
H3C
5j
169.78
167.32
146.32
142.65
130.29
129.82
129.54
129.43
129.28
127.54
127.37
125.45
122.73
116.00
77.48 CHLOROFORM-D
76.84 CHLOROFORM-D
68.44
62.31
34.43
21.63
20.58
14.36
f1 (ppm)


F
H3C
N
O
NH
O
O
CH3
H3C
O

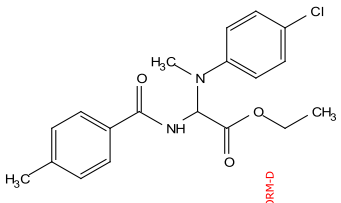
5k


7.75
7.73
7.36
7.35
7.27
7.26 CHLOROFORM-D
7.25
7.12
7.11
7.10
7.09
7.01
6.98
6.96
6.12
6.10
4.30
4.29
4.28
4.27
4.27
4.26
4.25
4.24
4.23
4.22
4.21
4.20
2.85
2.41
1.25
1.24
1.23
2.01
1.03
2.39
2.05
1.88
1.00
1.92
2.82
3.35
3.24
f1 (ppm)

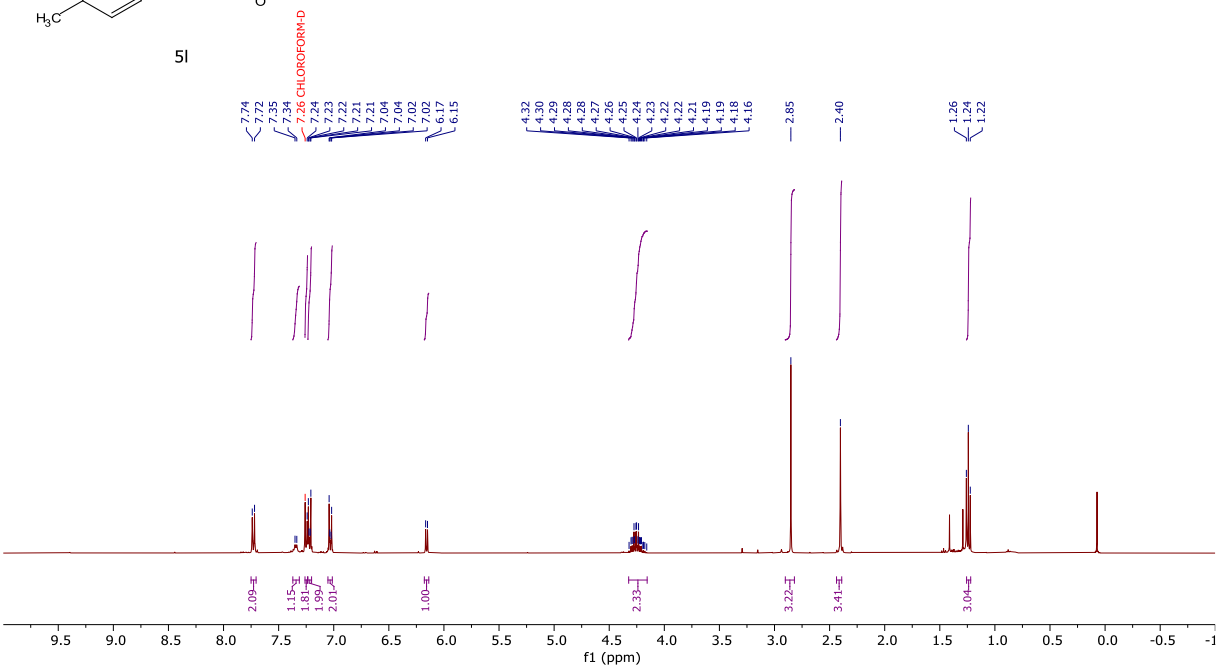

F
H3C
N
O
NH
O
O
CH3
H3C
O

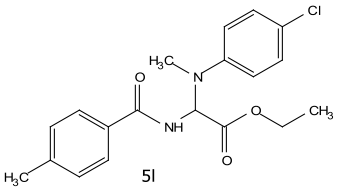
5k

169.43
167.29
158.30
156.40
145.23
142.74
130.75
129.95
129.43
127.29
117.59
117.53
115.72
115.54
68.84
62.33
34.17
21.57
14.31
f1 (ppm)

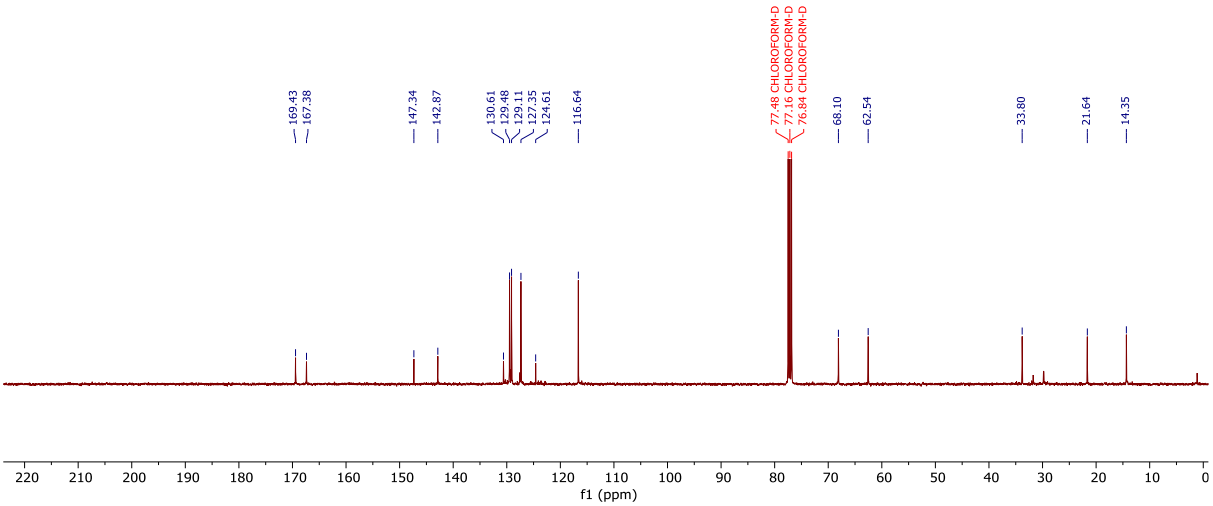

Cl
H3C
N
O
NH
O
O
CH3
H3C
O

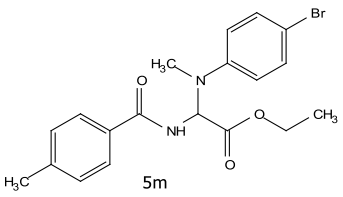
5l

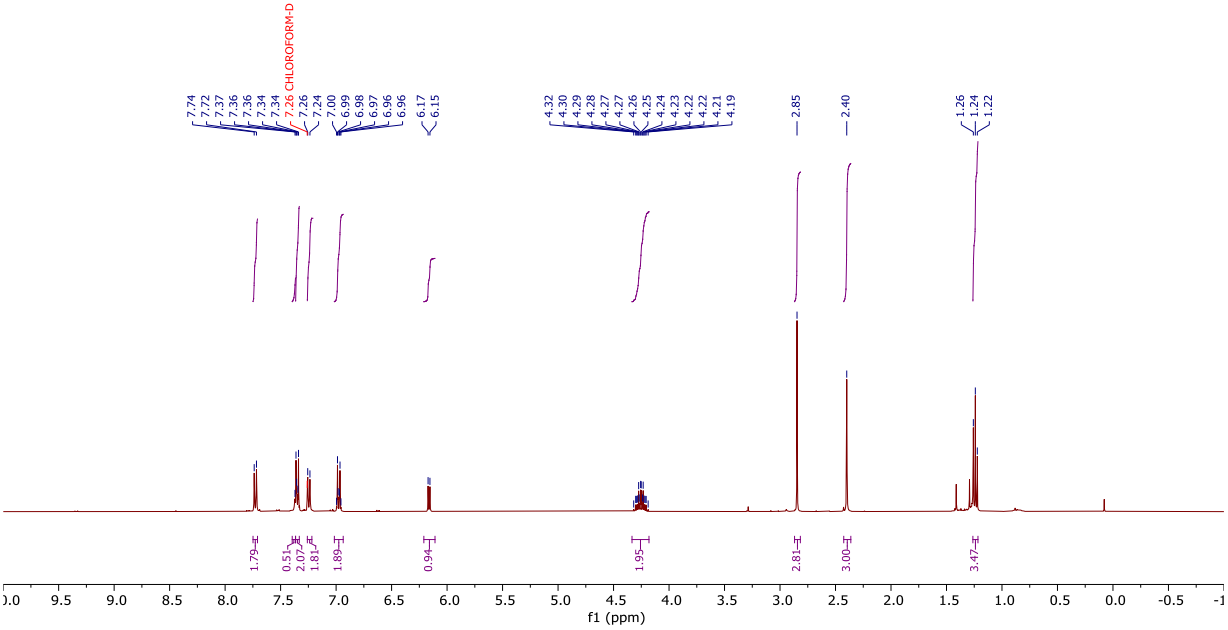

7.74
7.72
7.35
7.34
7.26 CHLOROFORM-D
7.24
7.23
7.22
7.21
7.21
7.04
7.04
7.02
7.02
6.17
6.15
4.32
4.30
4.29
4.28
4.28
4.27
4.26
4.25
4.24
4.23
4.22
4.22
4.21
4.19
4.19
4.18
4.16
2.85
2.40
1.26
1.24
1.22
2.09
1.15
1.81
1.99
2.01
1.00
2.33
3.22
3.41
3.04
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)

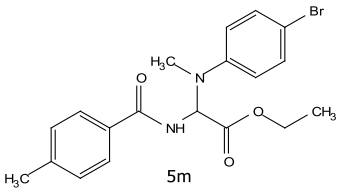

Cl
H3C
N
O
NH
O
O
CH3
H3C
O

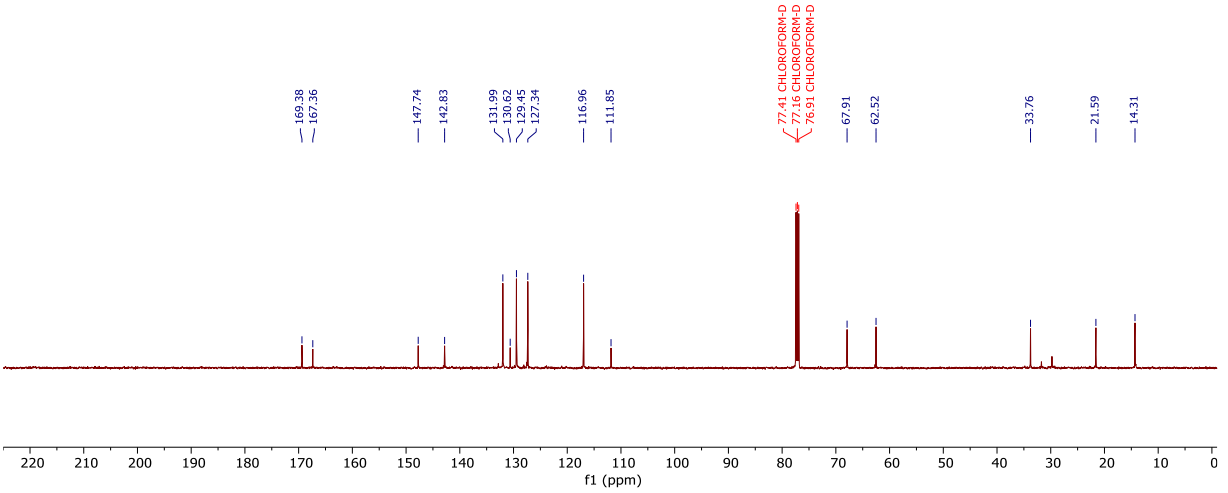
5l

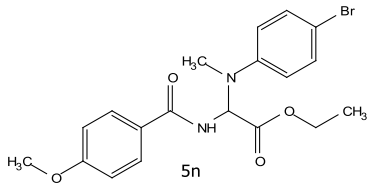

169.43
167.38
147.34
142.87
130.61
129.48
129.11
127.35
124.61
116.64
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
68.10
62.54
33.80
21.64
14.35
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


Br
H3C
N
O
NH
O
O
CH3
H3C
5m

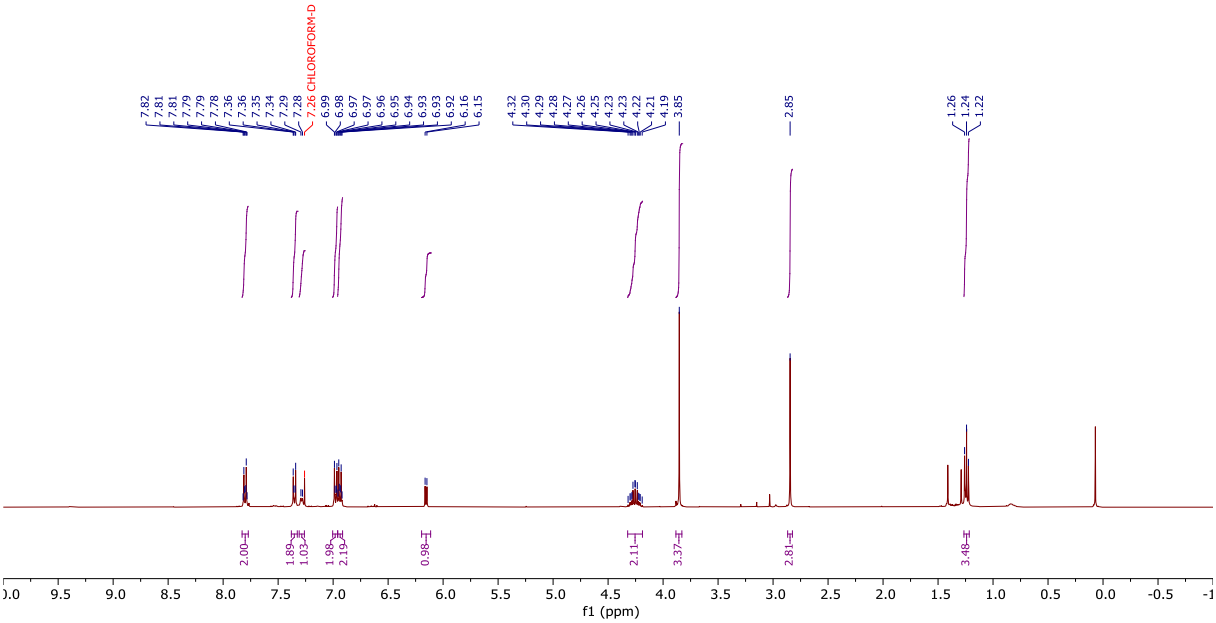

CHLOROFORM-D
7.74
7.72
7.37
7.36
7.36
7.34
7.34
7.26
7.26
7.24
7.00
6.99
6.98
6.97
6.96
6.96
6.17
6.15
4.32
4.30
4.29
4.28
4.27
4.27
4.26
4.25
4.24
4.23
4.22
4.22
4.21
4.19
2.85
2.40
1.26
1.24
1.22
1.79
0.51
2.07
1.81
1.89
0.94
1.95
2.81
3.00
3.47
f1 (ppm)

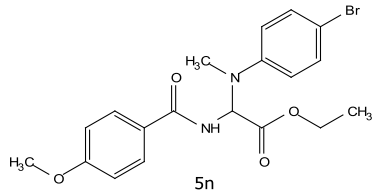

Br
H3C
N
O
NH
O
O
CH3
H3C
5m


169.38
167.36
147.74
142.83
131.99
130.62
129.45
127.34
116.96
111.85
77.41 CHLOROFORM-D
77.16 CHLOROFORM-D
76.91 CHLOROFORM-D
67.91
62.52
33.76
21.59
14.31
f1 (ppm)

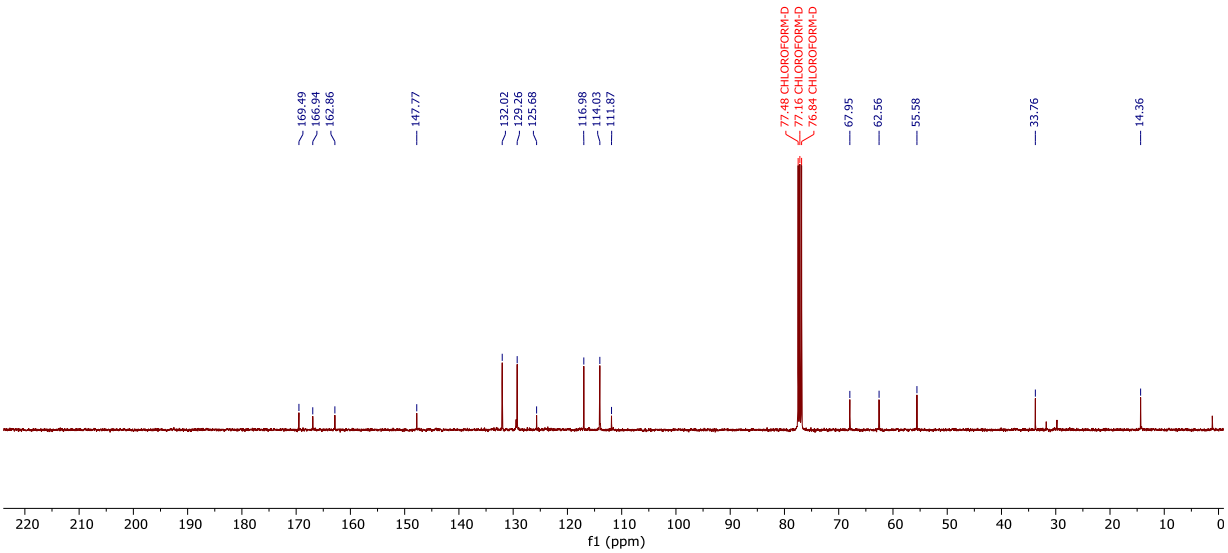

Br
H3C
N
O
NH
O
CH3
H3C
O
O

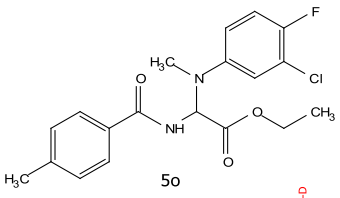
5n


7.82
7.81
7.81
7.79
7.79
7.78
7.36
7.35
7.34
7.29
7.28
7.26 CHLOROFORM-D
6.99
6.98
6.97
6.97
6.96
6.95
6.94
6.93
6.93
6.92
6.16
6.15
4.32
4.30
4.29
4.28
4.27
4.26
4.25
4.23
4.23
4.22
4.21
4.19
3.85
2.85
1.26
1.24
1.22
2.00
1.89
1.03
1.98
2.19
0.98
2.11
3.37
2.81
3.48
f1 (ppm)

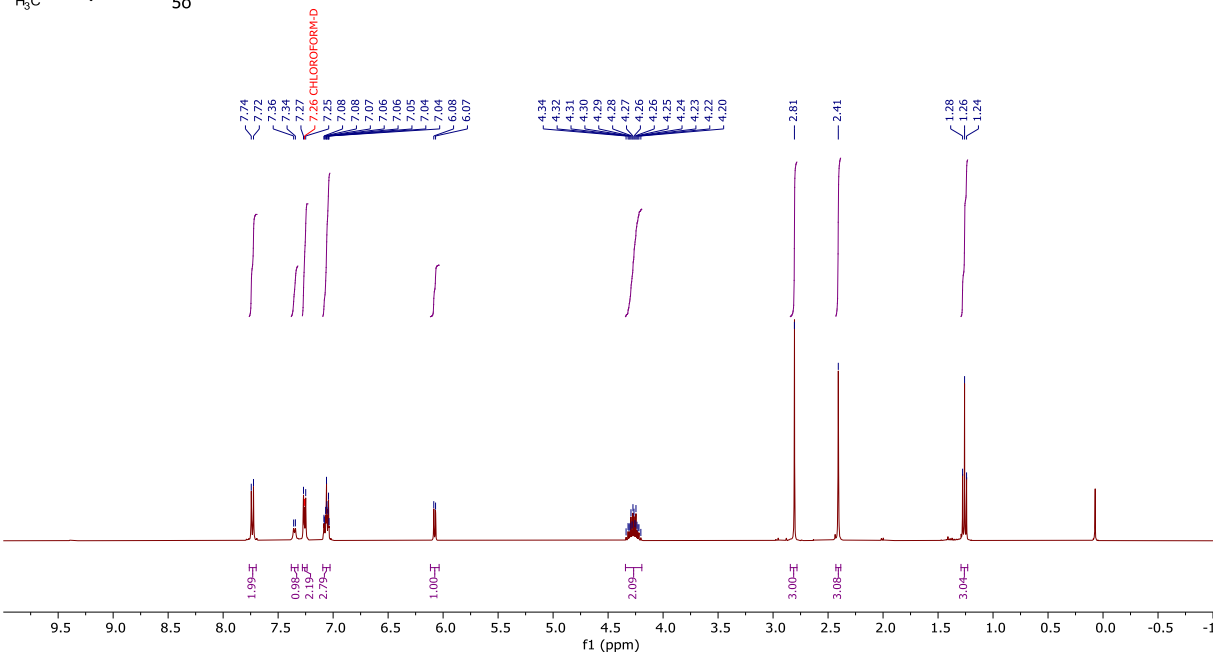

Br
H3C
N
O
NH
O
CH3
H3C
O
O

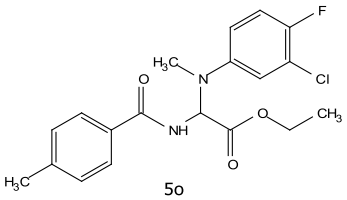
5n


169.49
166.94
162.86
147.77
132.02
129.26
125.68
116.98
114.03
111.87
77.48 CHLOROFORM-D
77.16 CHLOROFORM-D
76.84 CHLOROFORM-D
67.95
62.56
55.58
33.76
14.36
f1 (ppm)

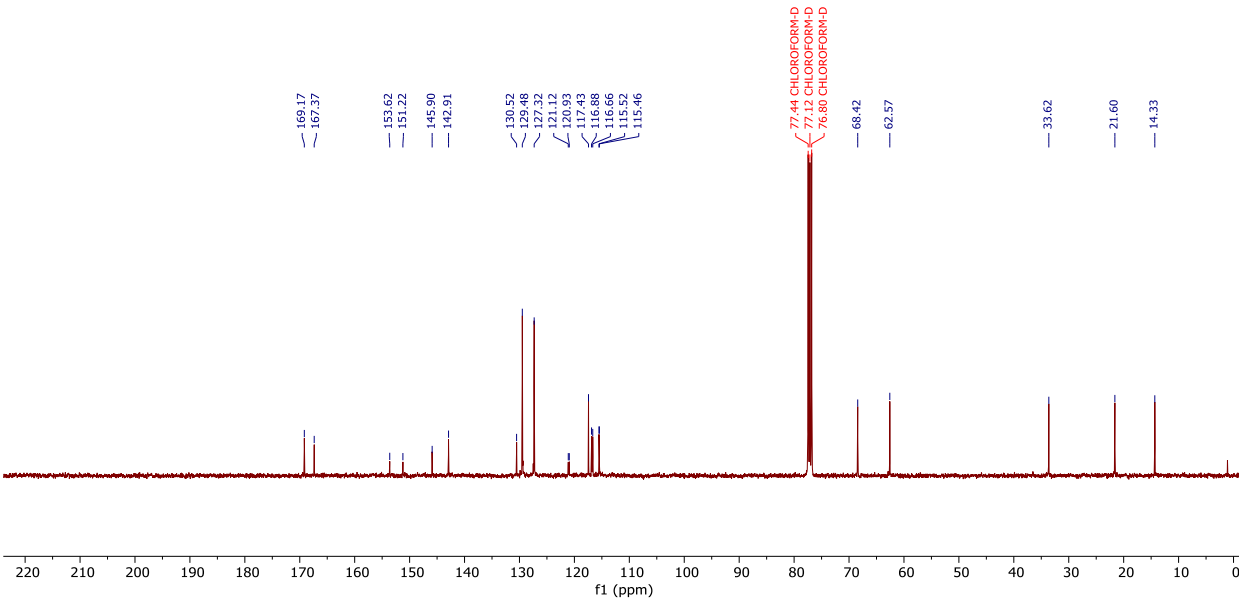

F
Cl
H_3C
N
O
NH
O
CH_3
O
H_3C

5o


7.74
7.72
7.36
7.34
7.27
7.26 CHLOROFORM-D
7.25
7.08
7.08
7.07
7.06
7.06
7.05
7.04
7.04
6.08
6.07
4.34
4.32
4.31
4.30
4.29
4.28
4.27
4.26
4.26
4.25
4.24
4.23
4.22
4.20
2.81
2.41
1.28
1.26
1.24
1.99
0.98
2.19
2.79
1.00
2.09
3.00
3.08
3.04
f1 (ppm)


F
Cl
H_3C
N
O
NH
O
CH_3
O
H_3C

5o


169.17
167.37
153.62
151.22
145.90
142.91
130.52
129.48
127.32
121.12
120.93
117.43
116.88
116.66
115.52
115.46
77.44 CHLOROFORM-D
77.12 CHLOROFORM-D
76.80 CHLOROFORM-D
68.42
62.57
33.62
21.60
14.33
f1 (ppm)