Electronic Supplementary Information

Sustainable Electrochemical Decarboxylative Acetoxylation of Aminoacids in Batch and Continuous Flow

Manuel Köckinger,[ab] Paul Hanselmann,[c] Dominique M. Roberge,[c] Piero Geotti-Bianchini,[c] C. Oliver Kappe*[ab] and David Cantillo*[ab]

[a] Institute of Chemistry, University of Graz, NAWI Graz, Heinrichstrasse 28, 8010 Graz, Austria. Email: oliver.kappe@uni-graz.at, david.cantillo@uni-graz.at.

[b] Center for Continuous Flow Synthesis and Processing (CCFLOW), Research Center Pharmaceutical Engineering GmbH (RCPE), Inffeldgasse 13, 8010 Graz, Austria.

[c] Microreactor Technology, Lonza AG, CH-3930 Visp, Switzerland.

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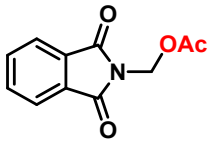
1. Materials and Methods

All solvents and chemicals were obtained from standard commercial vendors (Sigma-Aldrich/Merck, VWR, TCI and Fluorochem) and were used without any further purification, unless otherwise noted. ^{1}H NMR spectra were recorded on a Bruker 300 MHz instrument. ^{13}C NMR spectra were recorded on the same instrument at 75 MHz. ^{19}F NMR spectra were recorded at 282 MHz. Chemical shifts (δ) are expressed in ppm downfield from TMS as internal standard. The letters s, d, dd, t, q, and m are used to indicate singlet, doublet, doublet of doublets, triplet, quadruplet, and multiplet. Analytical HPLC analysis was carried out on Shimadzu instrument using a C18 reversed-phase (RP) analytical column (150 mm × 4.6 mm, particle size 5 µm) at 37 °C using mobile phases A (H2O/MeCN (90:10 v/v) + 0.1% TFA) and B (MeCN + 0.1% TFA) at a flow rate of 1.5 mL/min. The following gradient was applied: start at 3 % solvent B, increase to 5 % solvent B until 3 min, increase to 30 % solvent B until 7 min and finally increase to 100 % solvent B until 10 min. Melting points were obtained on a Stuart melting point apparatus in open capillary tubes. Column chromatography was carried out using a Biotage Isolera automated flash chromatography system. Phthalimide protected amino acids were prepared according to literature starting from commercially available amino acids.[S1,S2] 3-Carboxymethyl-5,5-diphenyl hydantoin was prepared according to literature.[S3] Graphite and impervious graphite electrodes were washed with MeOH, acetone and DCM under sonication and polished with h. After drying the electrodes were polished with a whetstone (3000 grit) prior the electrochemical experiments.

2. General Procedure A for the Preparation of acetates 2a-g, 3a-g and 5-7

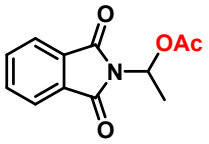
A 5 mL IKA Electrosyn vial equipped with a stirrer bar was charged with 3 mL of a solution of 100 mg NaOAc and substrate (0.6 mmol if not stated differently) in dry AcOH. After assembly of the electrochemical cell, equipped with a standard IKA graphite anode and an IKA stainless steel cathode, the solution was electrolyzed under a constant current of 20 mA. After a current of 3.5 – 10 F had been passed (vide infra) the reaction mixture was collected from the vial. The electrodes were washed with warm EtOAc to retrieve any product absorbed in the anode. The solutions were combined and concentrated under reduced pressure. The crude product was dissolved in 20 mL EtOAc and washed with a 20% aqueous solution of sodium citrate (2 × 20 mL). The organic phase was dried over Na_2SO_4 and concentrated under reduced pressure.

2.1. (1,3-Dioxoisoindolin-2-yl)methyl acetate (2a)



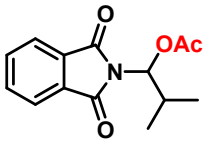
Product **2a** was obtained as a white solid (176 mg, 91% yield). Mp. 109-110 °C (lit.[4] 109-109 °C). ^{1}H NMR (300 MHz, Chloroform-d) δ = 7.85 (ddd, J = 42.9, 5.5, 3.1 Hz, 4H), 5.71 (s, 2H), 2.07 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ = 169.9, 166.9, 134.8, 131.9, 124.1, 60.9, 20.8. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{11}H_9NO_4$, 220.060434; found, 220.060184. These data are in agreement with those reported previously in the literature.[S4]

2.2. *rac*-1-(1,3-Dioxoisoindolin-2-yl)ethyl acetate (2b)



Product **2b** was obtained as a white solid (139 mg, 99% yield). Mp. 102-103 °C (lit.[S4] 101-102 °C). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.79 (ddd, J = 37.2, 5.5, 3.1 Hz, 4H), 6.72 (q, J = 6.5 Hz, 1H), 2.04 (s, 3H), 1.83 (d, J = 6.5 Hz, 3H). ^{13}C NMR (75 MHz, Chloroform-*d*) δ 169.6, 166.9, 134.5, 131.7, 123.8, 71.8, 20.9, 18.2. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{12}H_{11}NO_4$, 234.076084; found, 234.076425. These data are in agreement with those reported previously in the literature.[S4]

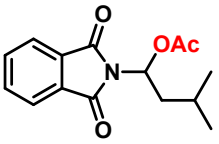
2.3. *rac*-1-(1,3-Dioxoisoindolin-2-yl)-2-methylpropyl acetate (2c)



Product **2c** was obtained as a colorless solid (133 mg, 85% yield). Mp. 90-91 °C (lit.[S4] 89-90 °C). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.80 (ddd, J = 37.8, 5.4, 3.0 Hz, 5H), 6.21 (d, J = 10.4 Hz, 1H), 2.88 (dp, J = 10.6, 6.7 Hz, 1H), 2.07 (s, 3H), 1.06 (d, J = 6.6 Hz, 3H), 0.87 (d, J = 6.9 Hz, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ = 169.9,

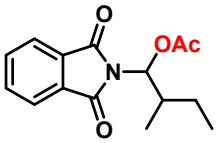
167.0, 134.5, 131.6, 123.8, 79.4, 29.6, 20.8, 19.0, 17.9. MS APPI (m/z): $[M]^-$ calcd. for $C_{14}H_{15}NO_4$, 261.1002; found, 261.1009. These data are in agreement with those reported previously in the literature.[S4]

2.4. *rac*-1-(1,3-Dioxoisoindolin-2-yl)-3-methylbutyl acetate (2d)



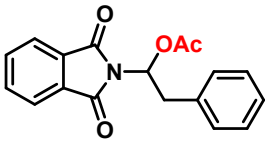
Product **2d** was obtained after flash column chromatography (EtOAc/petroleum ether) as a colorless solid (120 mg, 75% yield). Mp. 66-67 °C (lit.[S4] 64-65 °C). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.82 (ddd, J = 38.0, 5.5, 3.1 Hz, 4H), 6.71 (dd, J = 8.2, 6.7 Hz, 1H), 2.34 – 1.97 (m, 5H), 1.61 (dq, J = 7.9, 6.3 Hz, 1H), 0.97 (dd, J = 8.8, 6.6 Hz, 6H).^{13}C NMR (75 MHz, Chloroform-d) δ = 169.6, 166.9, 134.4, 131.6, 123.7, 73.7, 39.7, 24.7, 22.6, 22.1, 20.9. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{15}H_{17}NO_4$, 276.123034; found, 276.123517. These data are in agreement with those reported previously in the literature.[S4]

2.5. *rac*-1-(1,3-Dioxoisoindolin-2-yl)-2-methylbutyl acetate (2e)



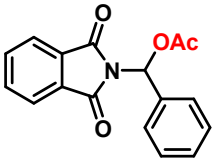
Product **2e** was isolated as a mixture of E/Z isomers as white solid (148 mg, 90% yield). Mp. 68-69 °C (lit.[S4] 70-71). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.78 (ddd, J = 36.2, 5.5, 3.1 Hz, 5H), 6.27 (dd, J = 10.5, 4.7 Hz, 1H), 2.88 – 2.51 (m, 1H), 2.06 (s, 3H), 1.49 (dddd, J = 100.9, 13.8, 7.6, 3.7 Hz, 1H), 1.05 – 0.78 (m, 7H).^{13}C NMR (75 MHz, Chloroform-d) δ = 169.9, 169.9, 167.0, 134.5, 131.5, 131.5, 123.8, 78.3, 78.1, 35.4, 35.3, 25.2, 24.4, 20.8, 20.8, 15.1, 14.1, 10.7, 10.5. MS APPI (m/z): $[M]^-$ calcd. for $C_{15}H_{17}NO_4$, 275.1158; found, 275.1166. These data are in agreement with those reported previously in the literature.[S4]

2.6. *rac*-1-(1,3-Dioxoisoindolin-2-yl)-2-phenylethyl acetate (2f)



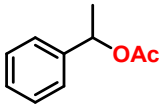
Product **2f** was obtained after flash column chromatography (EtOAc/petroleum ether) as a white solid (139 mg, 75% yield). Mp. 137-138 °C (lit.[S4] 137-138). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.76 (ddd, J = 33.9, 5.5, 3.1 Hz, 4H), 7.29 – 7.08 (m, 5H), 6.85 (dd, J = 8.7, 6.6 Hz, 1H), 3.74 – 3.47 (m, 2H), 2.07 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 169.6, 166.9, 135.1, 134.5, 131.5, 129.4, 128.8, 127.3, 123.8, 75.2, 37.4, 20.9. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{18}H_{15}NO_4$, 310.107384; found, 310.107374. These data are in agreement with those reported previously in the literature.[S4]

2.7. *rac*-(1,3-Dioxoisoindolin-2-yl)(phenyl)methyl acetate (2g)



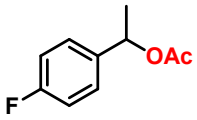
Product **2g** was obtained as a colorless solid (120 mg, 68% yield). Mp. 107-108 °C (lit.[S4] 106-107 °C). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.80 (ddd, J = 37.5, 5.5, 3.0 Hz, 4H), 7.68 (s, 1H), 7.61 – 7.51 (m, 2H), 7.43 – 7.31 (m, 3H), 2.21 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 169.4, 166.4, 135.1, 134.6, 131.7, 129.1, 128.6, 126.5, 123.9, 74.3, 20.9. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{17}H_{13}NO_4$, 296.091734; found, 296.092274. These data are in agreement with those reported previously in the literature.[S4]

2.8. *rac*-1-Phenylethyl acetate (4a)



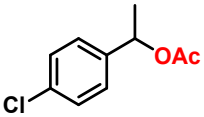
Product **4a** was obtained after flash column chromatography (EtOAc/petroleum ether) as a colorless oil (77 mg, 78% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.39 – 7.22 (m, 5H), 5.86 (q, J = 6.6 Hz, 1H), 2.05 (s, 3H), 1.52 (d, J = 6.6 Hz, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 170.5, 141.8, 128.6, 128.0, 126.2, 72.5, 22.4, 21.5. MS ESI (m/z): $[M-H]^-$ calcd. for $C_{10}H_{12}O_2$, 163.076453; found, 163.07617. These data are in agreement with those reported previously in the literature.[S5]

2.9. *rac*-1-(4-Fluorophenyl)ethyl acetate (4b)



Product **3b** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (106 mg, 97% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.36 – 7.29 (m, 2H), 7.07 – 6.99 (m, 2H), 5.85 (q, J = 6.6 Hz, 1H), 2.06 (s, 3H), 1.52 (d, J = 6.6 Hz, 3H).^{19}F NMR (282 MHz, Chloroform-d) δ -114.42 (tt, J = 8.5, 5.4 Hz).^{13}C NMR (75 MHz, Chloroform-d) δ 170.4, 162.4 (d, J = 246.0 Hz), 137.6 (d, J = 3.2 Hz), 128.0 (d, J = 8.2 Hz), 115.5 (d, J = 21.5 Hz), 71.8, 22.3, 21.5. MS ESI (m/z): $[M-H]^-$ calcd. for $C_{10}H_{11}FO_2$, 181.067031; found, 181.066767. These data are in agreement with those reported previously in the literature.[S6]

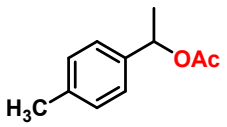
2.10. *rac*-1-(4-Chlorophenyl)ethyl acetate (4c)



Product **4c** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (119 mg, 99% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.34 – 7.28 (m, 4H), 5.83 (q, J = 6.6 Hz, 1H), 2.07 (s, 3H), 1.51 (d, J = 6.6 Hz, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 170.4, 140.3, 133.7, 128.8, 127.7, 71.7, 22.3, 21.4. MS APCI (m/z): $[M-H]^-$ calcd.

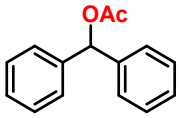
for $C_{10}H_{10}ClO_2$, 197.0369; found, 197.0377. These data are in agreement with those reported previously in the literature.[S6]

2.11. *rac*-1-(p-Tolyl)ethyl acetate (4d)



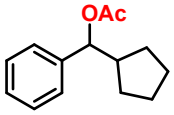
Product **4d** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (105 mg, 98% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.22 – 7.04 (m, 4H), 5.78 (q, J = 6.6 Hz, 1H), 2.27 (s, 3H), 1.99 (s, 3H), 1.45 (d, J = 6.6 Hz, 3H).^{13}C NMR (75 MHz, Chloroform-d) δ 170.6, 138.8, 137.8, 129.3, 126.3, 72.4, 22.2, 21.5, 21.3. MS APCI (m/z): $[M-H]^-$ calcd. for $C_{11}H_{13}O_2$, 177.0915; found, 177.0922. These data are in agreement with those reported previously in the literature.[S6]

2.12. Benzhydryl acetate (4e)



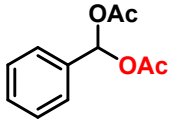
Product **4e** was obtained after flash column chromatography (EtOAc/petroleum ether) as a colorless oil (80 mg, 59% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.41 – 7.23 (m, 10H), 6.91 (s, 1H), 2.18 (s, 3H).^{13}C NMR (75 MHz, Chloroform-d) δ 170.2, 140.3, 128.6, 128.0, 127.2, 21.4. MS APCI (m/z): $[M+H]^+$ calcd. for $C_{15}H_{15}O_2$, 227.1072; found, 227.1065. These data are in agreement with those reported previously in the literature[S7]

2.13. *rac*-Cyclopentyl(phenyl)methyl acetate (4f)



Product **4f** was obtained as a colorless oil (120 mg, 92% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.36 – 7.24 (m, 5H), 5.54 (d, J = 9.1 Hz, 1H), 2.45 – 2.29 (m, 1H), 2.05 (s, 3H), 1.82 (m, 1H), 1.67 – 1.36 (m, 6H), 1.16 (m, 1H).^{13}C NMR (75 MHz, Chloroform-d) 13C NMR (75 MHz, Chloroform-d) δ 170.1, 169.5, 142.8, 60.6, 21.3, 20.9, 20.2.MS APCI (m/z): $[M-H]^-$ calcd. for $C_{14}H_{18}O_2$, 217.1228; found, 217.1222. These data are in agreement with those reported previously in the literature.[S5]

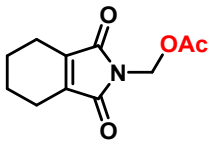
2.14. Phenylmethylene diacetate (4g)



Product **4g** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (109 mg, 87% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.68 (s, 1H), 7.56 – 7.48 (m, 2H), 7.45 – 7.39 (m, 3H), 2.13 (s, 6H).^{13}C NMR (75 MHz,

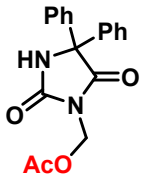
Chloroform-d) δ 168.9, 135.6, 129.9, 128.7, 126.8, 89.8, 21.0. MS APCI (m/z): $[M-H]^-$ calcd. for $C_{11}H_{11}O_4$, 207.0657; found, 207.0664. These data are in agreement with those reported previously in the literature.[S8]

2.15. (1,3-Dioxo-1,3,4,5,6,7-hexahydro-2H-isoindol-2-yl)methyl acetate (6)



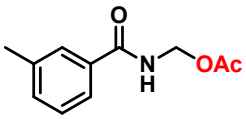
Product **6** was obtained after flash column chromatography (EtOAc/petroleum ether) as a white solid (98 mg, 73% yield). Mp. 64-67 °C. ^{1}H NMR (300 MHz, Chloroform-d) δ 5.50 (s, 2H), 2.37 (m, 4H), 2.04 (s, 3H), 1.86 – 1.71 (m, 4H). ^{13}C NMR (75 MHz, Chloroform-d) δ 170.1, 169.5, 142.8, 60.6, 21.3, 20.9, 20.2. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{11}H_{13}NO_4$, 224.091734; found, 224.091873.

2.16. (2,5-Dioxo-4,4-diphenylimidazolidin-1-yl)methyl acetate (8)



Product **8** was obtained after flash column chromatography (EtOAc/petroleum ether) as a white solid (79 mg, 81% yield). Mp. 158-165 °C (decomp.) (lit.[S9] 162-163 °C). ^{1}H NMR (300 MHz, DMSO-d6) δ 9.95 (s, 1H), 7.46 – 7.33 (m, 10H), 5.47 (s, 2H), 2.00 (s, 3H). ^{13}C NMR (75 MHz, DMSO-d6) δ = 172.5, 169.4, 153.6, 139.2, 128.7, 128.4, 126.7, 69.3, 61.7, 20.5.MS ESI (m/z): $[M+H]^+$ calcd. for $C_{18}H_{16}N_2O_4$, 325.118283; found, 325.118429. These data are in agreement with those reported previously in the literature.[S9]

2.17. (3-methylbenzamido)methyl acetate (10)



Product **10** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (112 mg, 90% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.63 – 7.37 (m, 3H), 7.29 – 7.27 (m, 1H), 5.39 (d, J = 7.3 Hz, 2H), 2.33 (s, 3H), 2.02 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 172.2, 167.9, 138.6, 133.2, 133.1, 128.6, 128.1, 124.4, 64.8, 21.4, 21.0. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{11}H_{13}NO_3$, 208.09682; found, 208.097444. These data are in agreement with those reported previously in the literature.[S10]

3. Description of the Flow Electrolysis Cell and Flow Setup

The flow electrolysis cell used in this work followed a typical parallel plates arrangement and has been described in detail in a previous publication (Figure S1).[S11] The two electrode plates were placed in parallel and separated by a Mylar film incorporating a reaction channel (6.4 cm2 contact area, 190 µL). Graphite (IG-15, GTD Graphit Technologie GmbH, 50 × 50 × 3 mm) or impervious graphite (FC-GR347B, Graphtek LLC, 50 × 50 × 5 mm) were used as anode. AISI 316L stainless steel plate (GoodFellow, 50 × 50 × 0.2 mm) was used as cathode. A thermocouple was installed between one of the aluminum end pates and electrode for temperature monitoring.

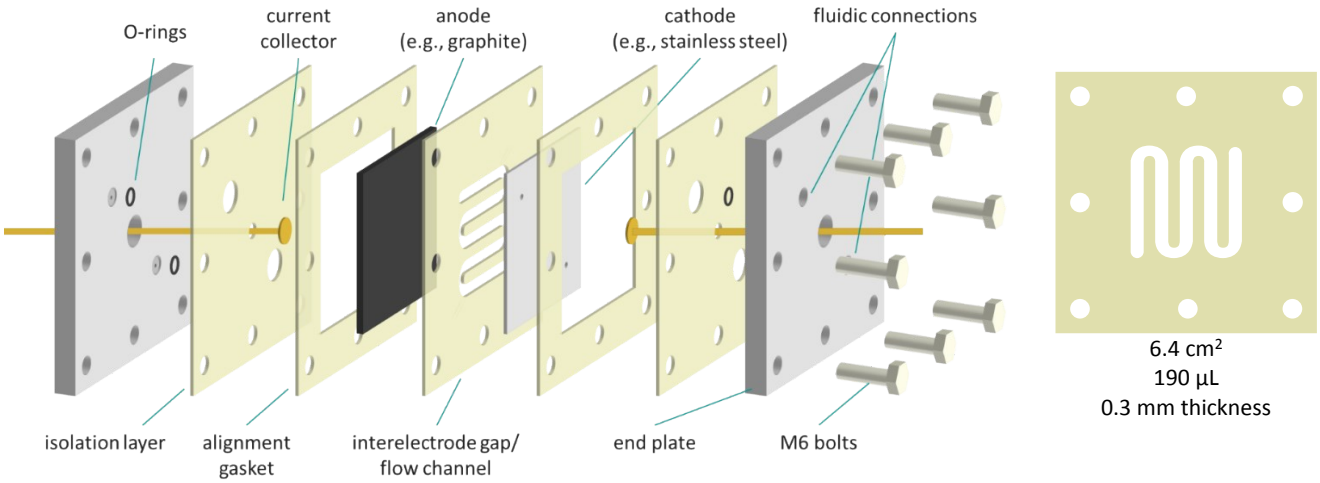


Fig. S1. Exploded view of the flow electrolysis cell and details on the interelectrode separator. Images reproduced from reference S11.

The setup for the flow electrolysis (Figure S2) utilized a syringe pump [B] to pass the reaction mixture [A] through the flow cell [C], either in a single-pass or with recirculation of the electrolyte. The flow cell was power using a DC power supply [D] (PeakTech 6225A). The flow cell was heated by simply placing it on a heating plate (E) and the temperature was monitored by a thermocouple (F). Further experimental details are provided in Section 4 (Page S11).

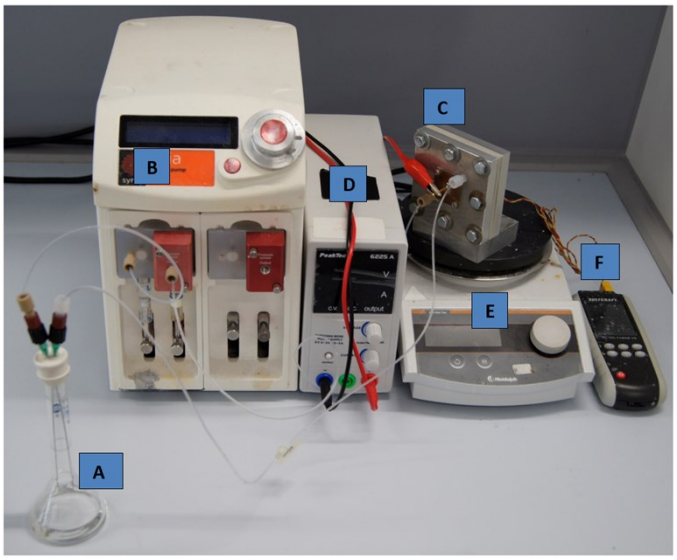


Fig. S2 Photograph of the continuous flow setup utilized for the electrolysis experiments

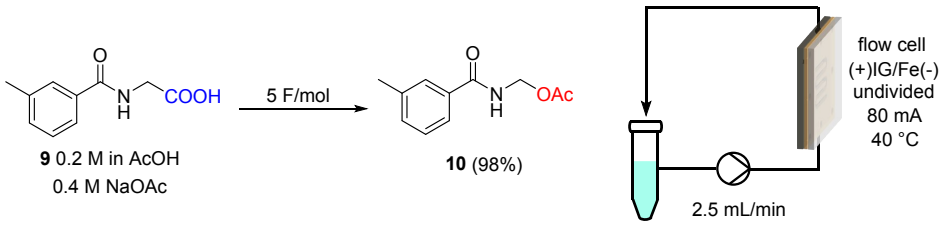
Table S1. Detailed optimization data for the single-pass continuous flow electrolysis of **9** (Fig. 5 in the manuscript). The setup described on Fig. S1 and S2 was used.

F/mol	μL/min	Current (mA)	Yield (%)	F/mol	μL/min	Current (mA)	Yield (%)
2	62	40	82	2.5	248	199	71
2.5	62	50	89	3	248	239	73
3	62	60	95	3.5	248	279	76
3.5	62	70	96	4	248	319	78
4	62	80	95	4.5	248	359	78
4.5	62	90	96	5	248	399	80
5	62	100	99	2	372	239	60
2	124	80	75	2.5	372	299	67
2.5	124	100	81	3	372	359	71
3	124	120	84	3.5	372	419	74
3.5	124	140	89	4	372	479	78
4	124	160	87	4.5	372	538	78
4.5	124	179	88	5	372	598	81
5	124	199	88	2	496	319	60
5.5	124	219	88	2.5	496	399	62
6	124	239	89	3	496	479	64
2	248	160	70	3.5	496	558	66

[a] Determined by HPLC peak integration area (215 nm)

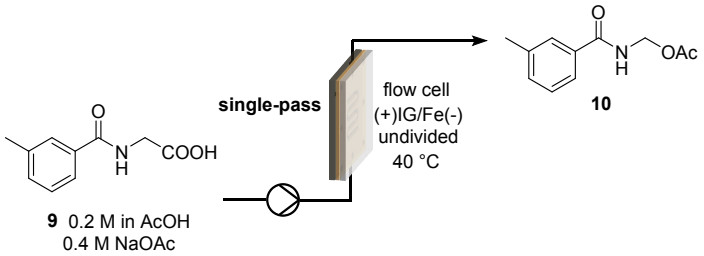
4. Flow Electrolysis

4.1. Recirculation



A dry 25 mL volumetric flask was charged with 966 mg (5 mmol) of methyl hippuric acid **9** and 820 mg (10 mmol) NaOAc and filled up to volume with dry AcOH. The solution was pumped through the flow cell with a flow rate of 2.5 mL/min, and outlet of the reactor was connected back to the solution reservoir. Once the flow of liquid had been stabilized (no air present in the flow cell) and the cell temperature reached 40 °C a current of 80 mA was applied. The power supply was turned off after 5 F/mol of charge had been applied (10 h). Then, the pump inlet was removed from the solution reservoir to let air pass through the reactor and push the remaining reaction mixture to the collection vessel. Product **10** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (1.012 g, 98% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.63 – 7.37 (m, 3H), 7.29 – 7.27 (m, 1H), 5.39 (d, J = 7.3 Hz, 2H), 2.33 (s, 3H), 2.02 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 172.2, 167.9, 138.6, 133.2, 133.1, 128.6, 128.1, 124.4, 64.8, 21.4, 21.0. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{11}H_{13}NO_3$, 208.09682; found, 208.097444. These data are in agreement with those reported previously in the literature.[S10] **Caution:** hydrogen gas and ethane are released during the hydrolysis. Thus, it should be conducted in a well-ventilated fume hood.

4.2. Single Pass Electrolysis



A stock solution containing methyl hippuric acid **9** (0.2 M) and NaOAc (0.4 M) in dry AcOH was pumped with a flow rate of 62 µL/min through the flow cell, which had been heated to 40 °C. Once the cell has been filled with reaction mixture, a current of 100 mA was applied. Under steady state conditions, the reaction mixture was collected from the reactor output for 12 h (20 mmol). Product **7** was obtained after extraction with CH_2Cl_2/20% aq. citrate as a colorless oil (1.74 g, 94% yield). ^{1}H NMR (300 MHz, Chloroform-d) δ 7.63 – 7.37 (m, 3H), 7.29 – 7.27 (m, 1H), 5.39 (d, J = 7.3 Hz, 2H), 2.33 (s, 3H), 2.02 (s, 3H). ^{13}C NMR (75 MHz, Chloroform-d) δ 172.2, 167.9, 138.6, 133.2, 133.1, 128.6, 128.1, 124.4, 64.8, 21.4, 21.0. MS ESI (m/z): $[M+H]^+$ calcd. for $C_{11}H_{13}NO_3$, 208.09682; found, 208.097444. These data are in agreement with those reported previously in the literature.[S10] **Caution:** hydrogen gas and ethane are released during the hydrolysis. Thus, it should be conducted in a well-ventilated fume hood.

5. Green Metrics

$$\%\ Yield = \frac{moles\ of\ product}{moles\ of\ limiting\ reactant} \times 100$$

$$\%\ Conversion = 100 - \frac{final\ moles\ of\ limiting\ reactant}{initial\ moles\ of\ limiting\ reactant} \times 100$$

$$\%\ Selectivity = \frac{\%\ Yield}{\%\ Selectivity} \times 100$$

$$AE = \frac{molecular\ weight\ of\ product}{total\ molecular\ weight\ of\ reactants} \times 100$$

$$RME = \frac{mass\ of\ isolated\ product}{total\ mass\ of\ reactants} \times 100$$

$$Process\ Mass\ Intensity\ (PMI) = \frac{total\ mass\ in\ a\ process\ or\ process\ step}{mass\ of\ product}$$

5.1. Amounts and quantities used for Green Metrics Calculations

Table S2. Values used for the assessment of the green metrics for the electrochemical recirculation flow protocol

Role	Chemical	Mass [g]	Volume [mL]	MW	Density [g/mL]	Mol
Reactant	Methylhippuric acid	0.966		193.20		0.005
Reactant	NaOAc	0.820		82.03		0.010
Solvent	AcOH	24.37	23.21		1.05	
	Reaction total	25.16				
Product	(3-methylbenzamido)methyl acetate	1.01		207.23		0.00488

Table S3. Values used for the assessment of the green metrics for the $Pb(OAc)_4$ batch protocol

Role	Chemical	Mass [g]	Volume [mL]	MW	Density [g/mL]	Mol
Reactant	Methylhippuric acid	10		193.20		0.051760
Reactant	$Pb(OAc)_4$	25.25		443.38		0.05695
Catalyst	$Cu(OAc)_2$	0.94		199.65		0.00471
Solvent	toluene					
	Reaction total					
Product	(3-methylbenzamido)methyl acetate	7.95		207.23		0.0384

6. Reaction Mechanism

The mechanism of the Hofer-Moest (also known as non-Kolbe) electrolysis is very well known.[S12] It starts with the anodic oxidation of the carboxylate group, generating a carboxyl radical that rapidly decomposes releasing CO_2. The resulting alkyl radical is again oxidized, generating the cation (in the case of amino acids, an iminium cation is formed[S13]), which is trapped by a nucleophile present in solution. Simultaneously, protons are reduced at the cathode, releasing H_2 gas.

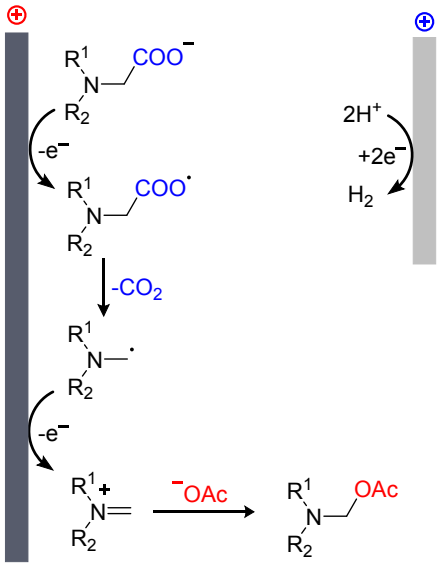


Figure S3. Suggested mechanism for the electrochemical decarboxylative acetoxylation of aminoacids

7. References

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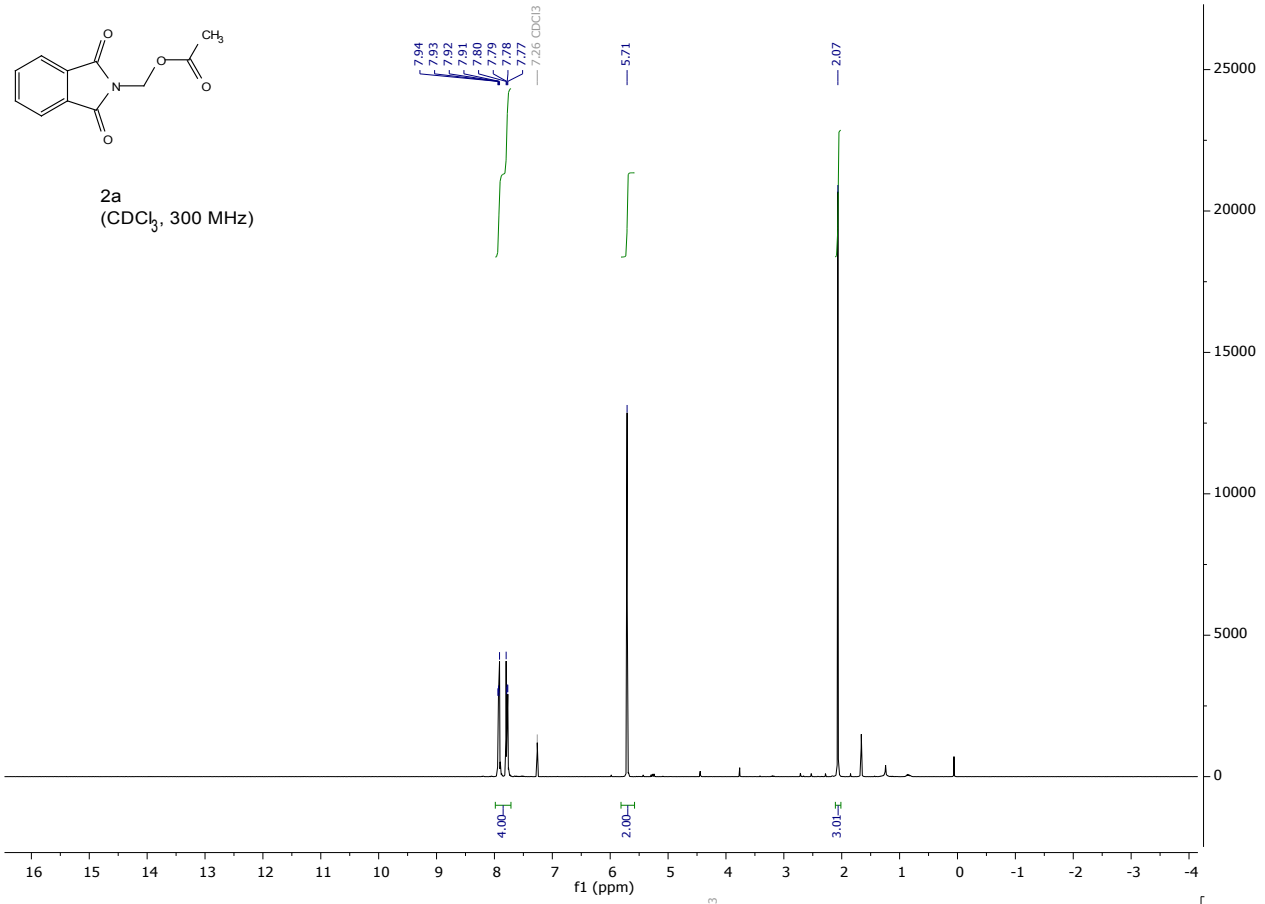
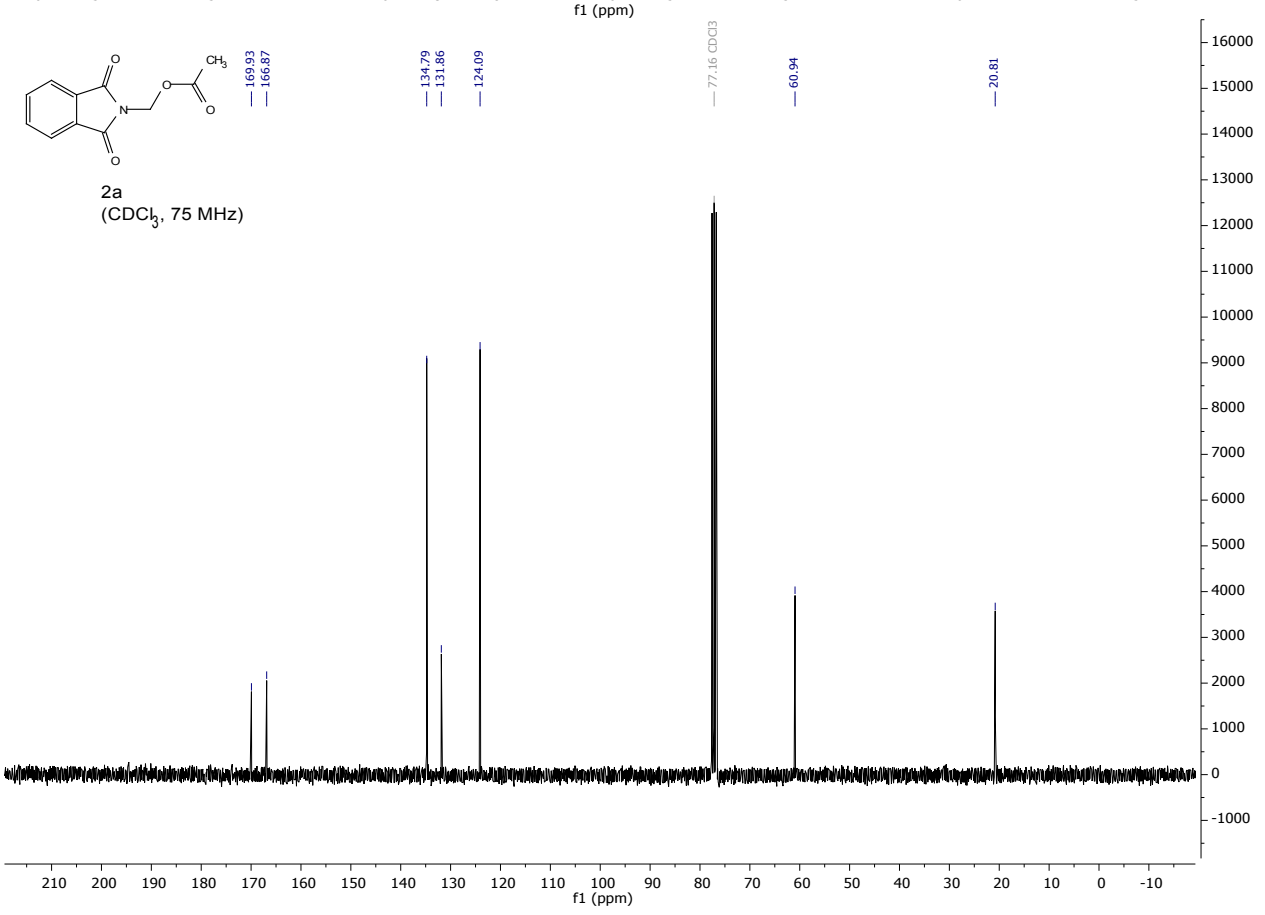
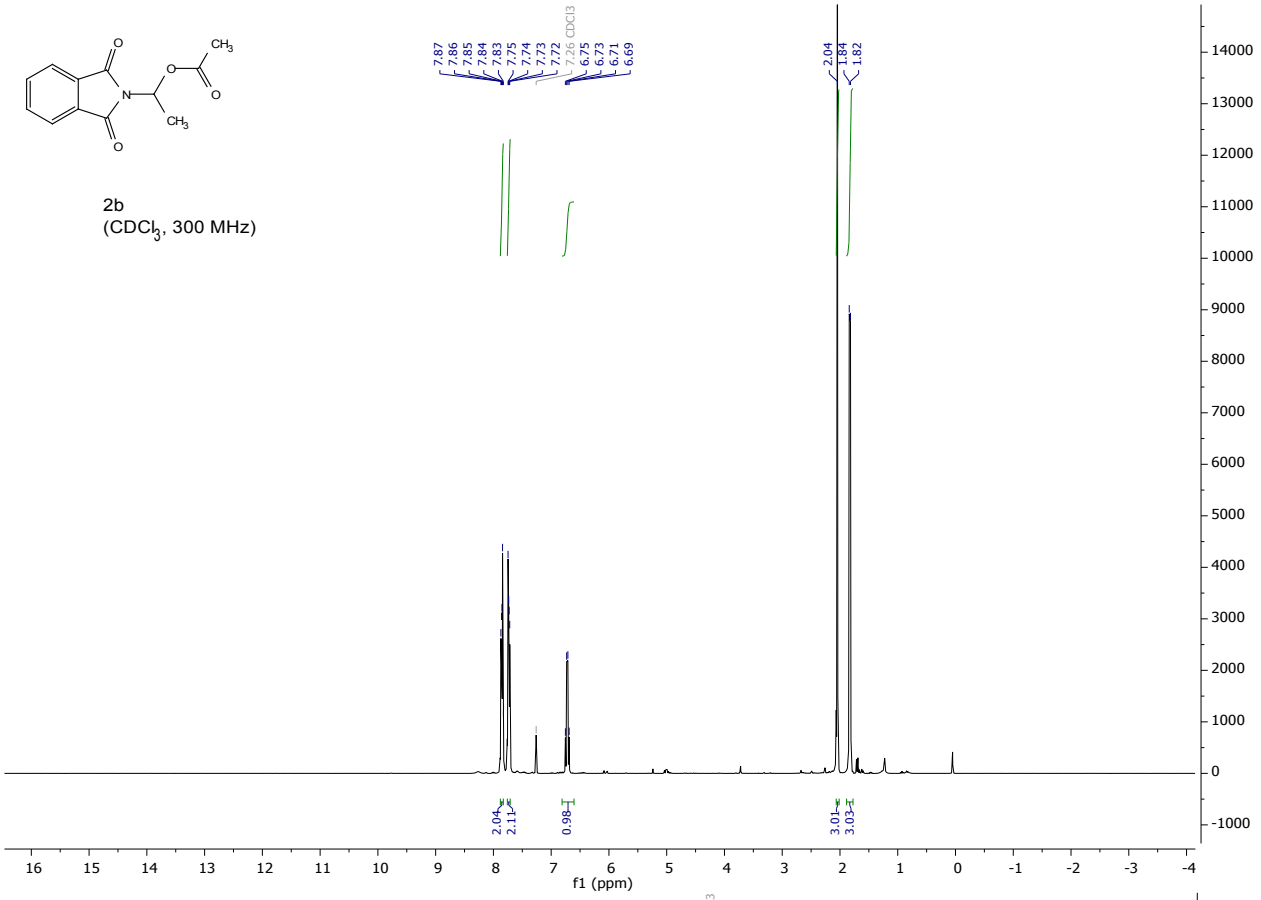
8. NMR spectra



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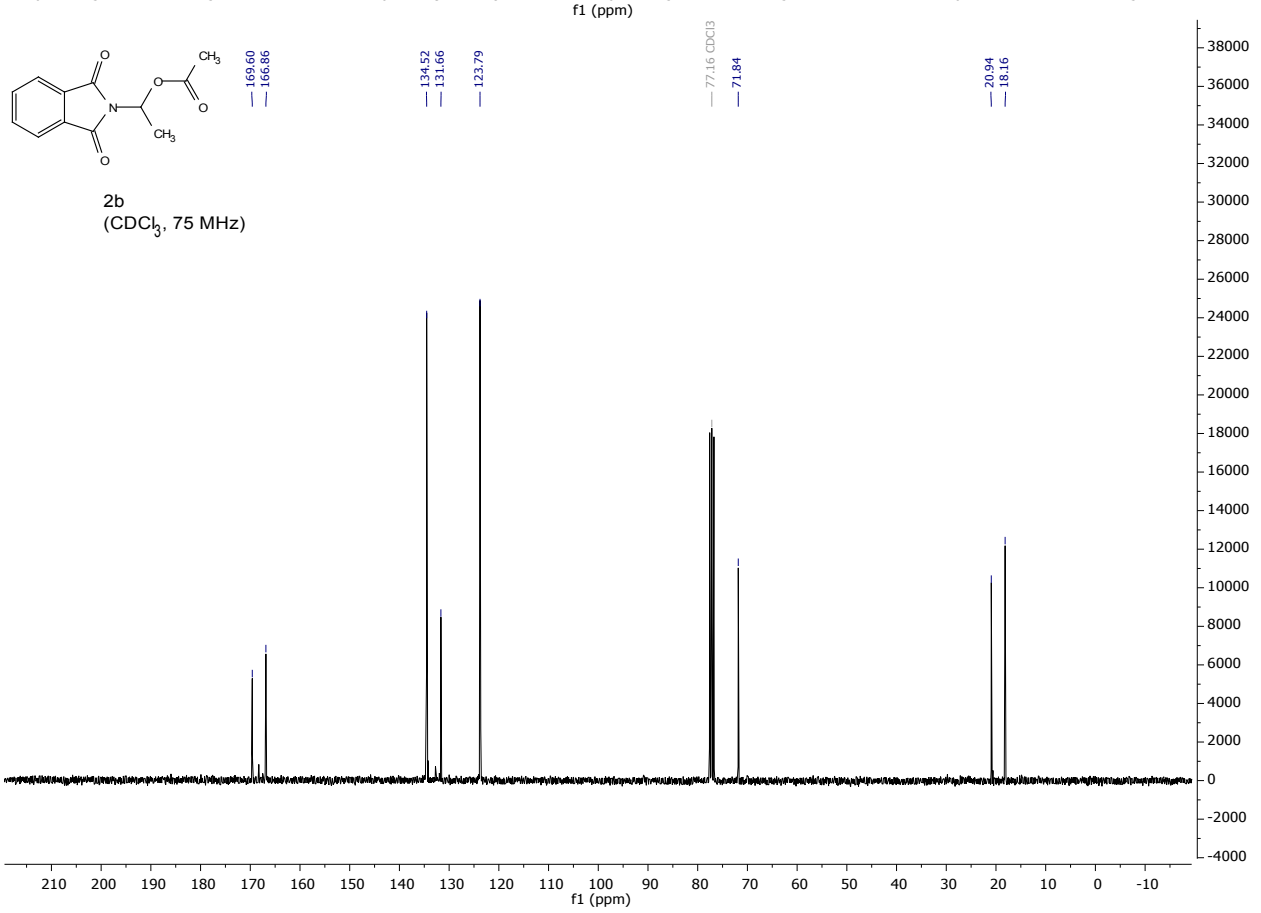
7.87
7.86
7.85
7.84
7.83
7.75
7.74
7.73
7.72
7.26 CDCl3
6.75
6.73
6.71
6.69
2.04
1.84
1.82
2.04
2.11
0.98
3.01
3.03
f1 (ppm)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134.52
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123.79
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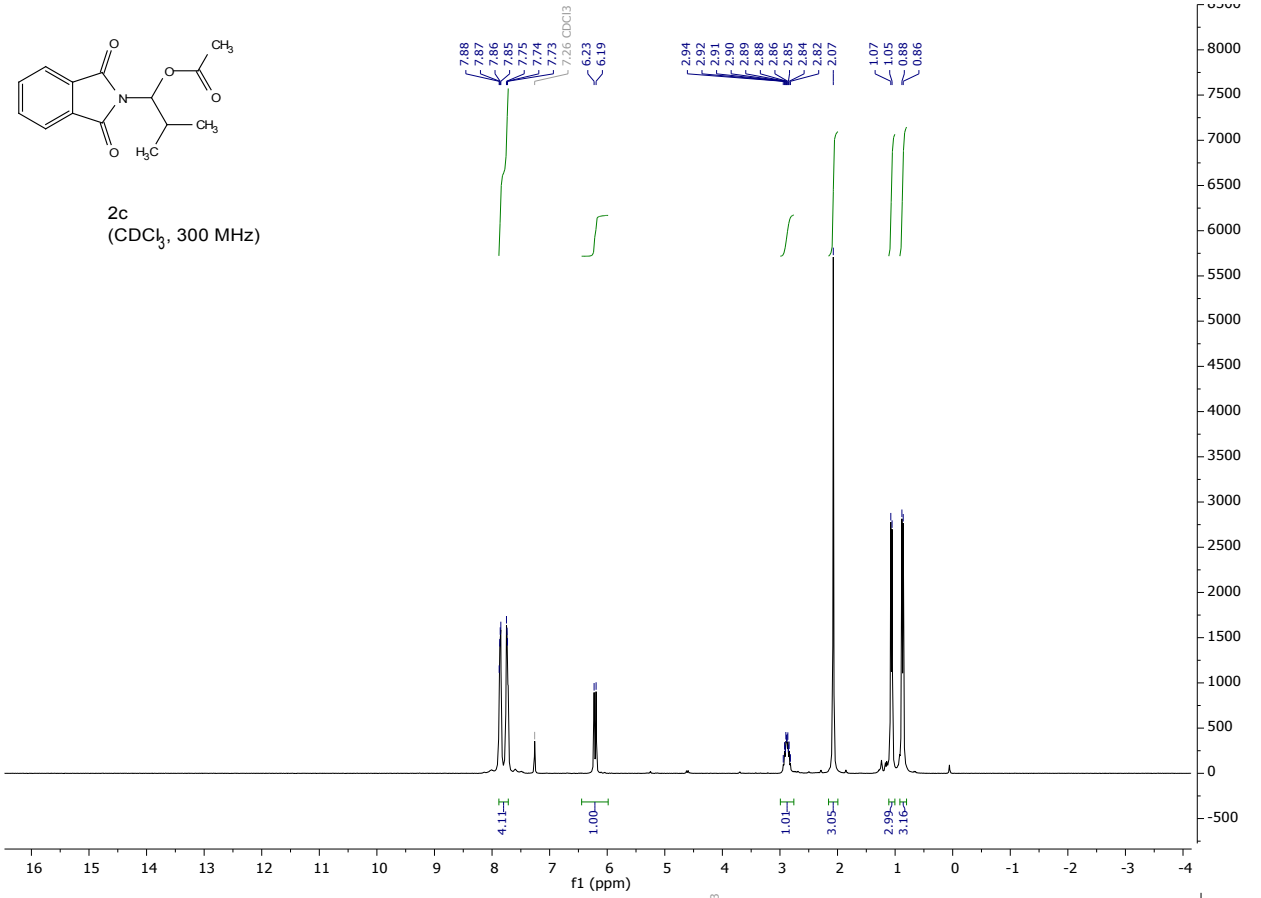
20.94
18.16
f1 (ppm)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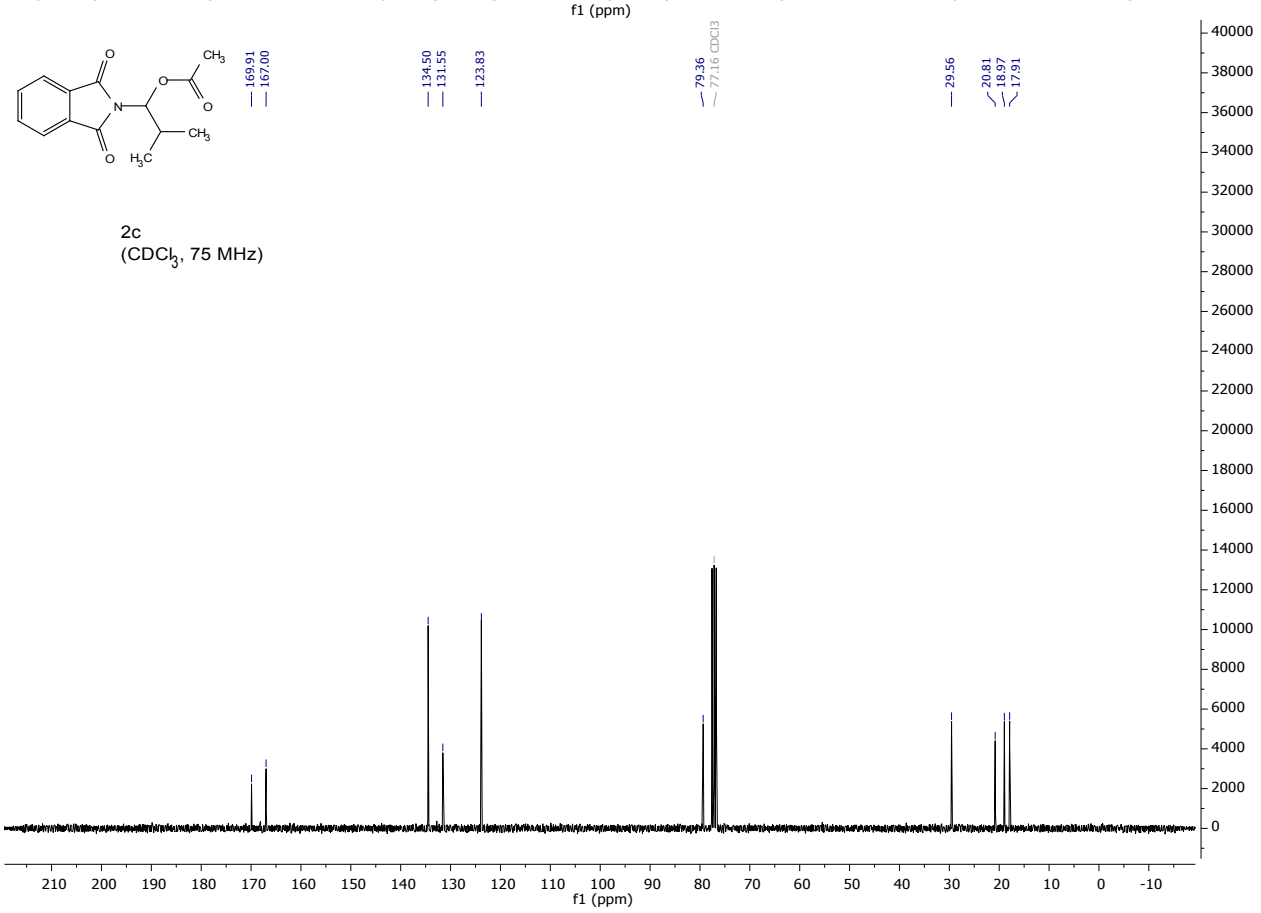
f1 (ppm)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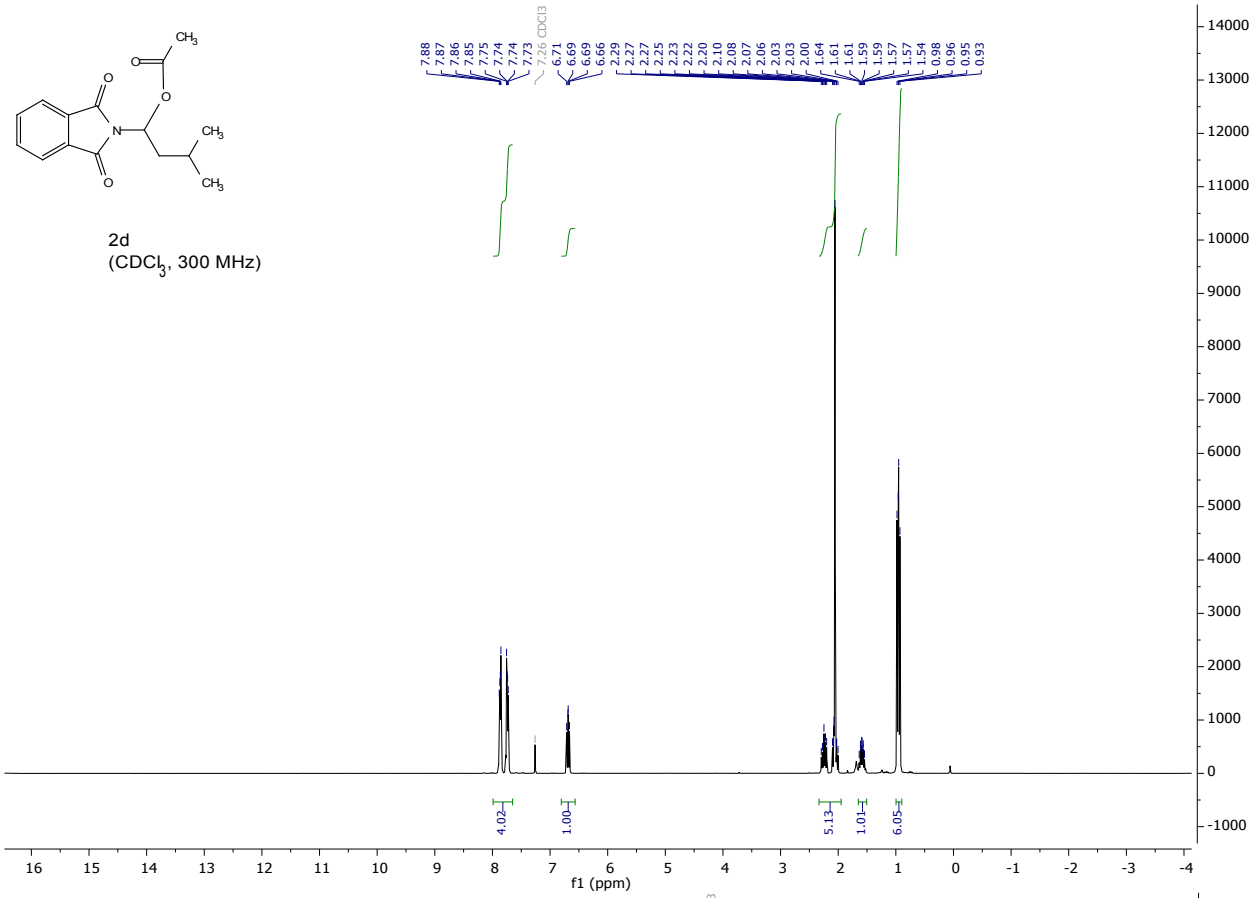
f1 (ppm)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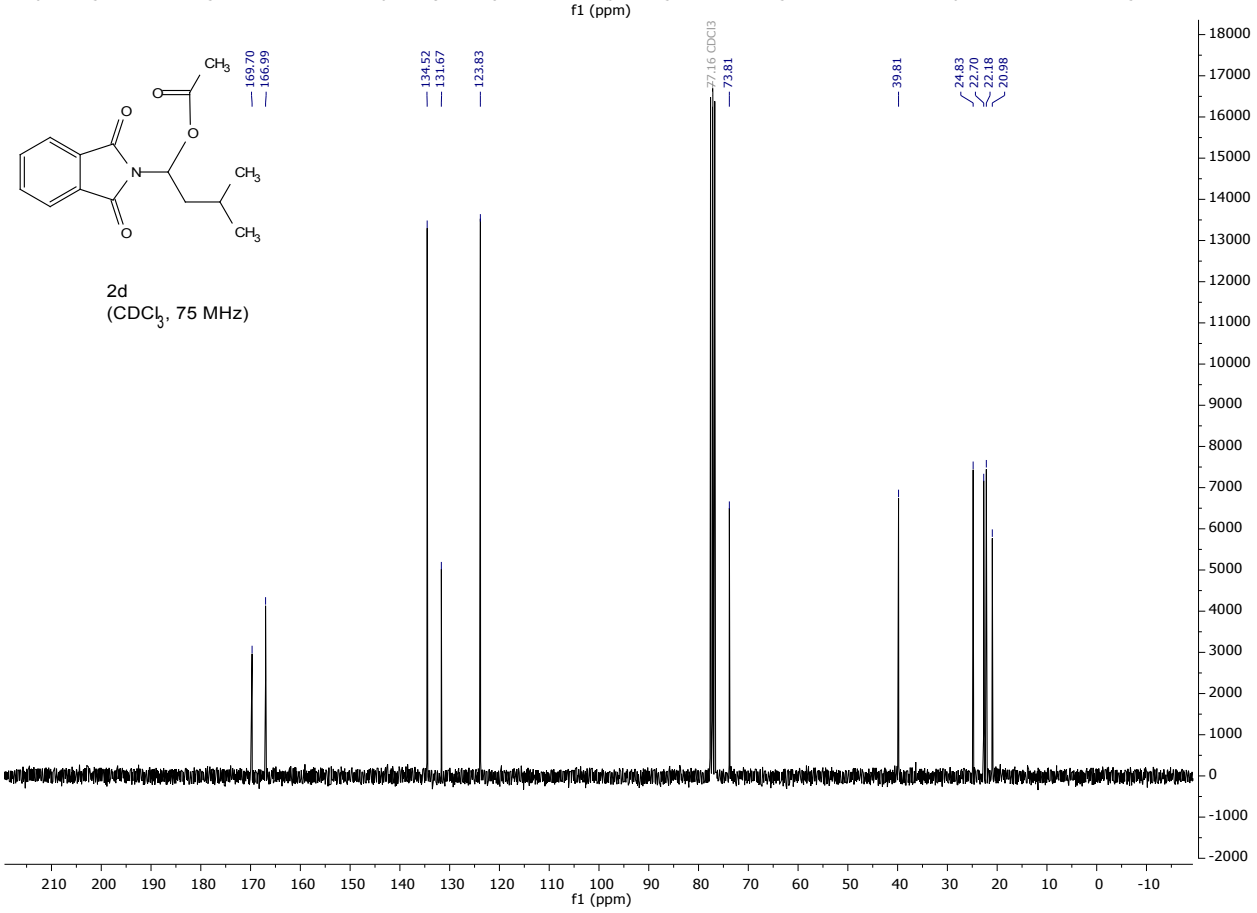
f1 (ppm)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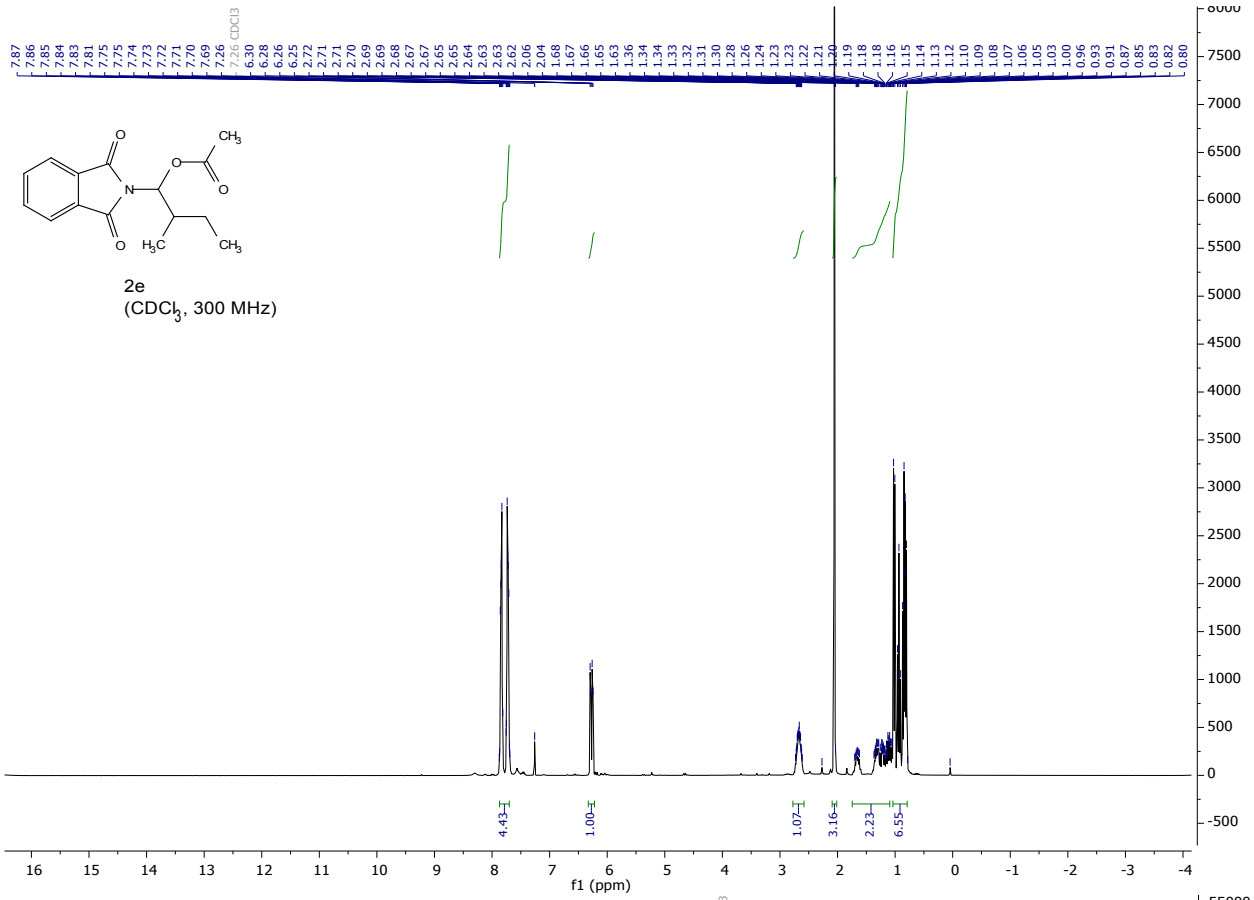
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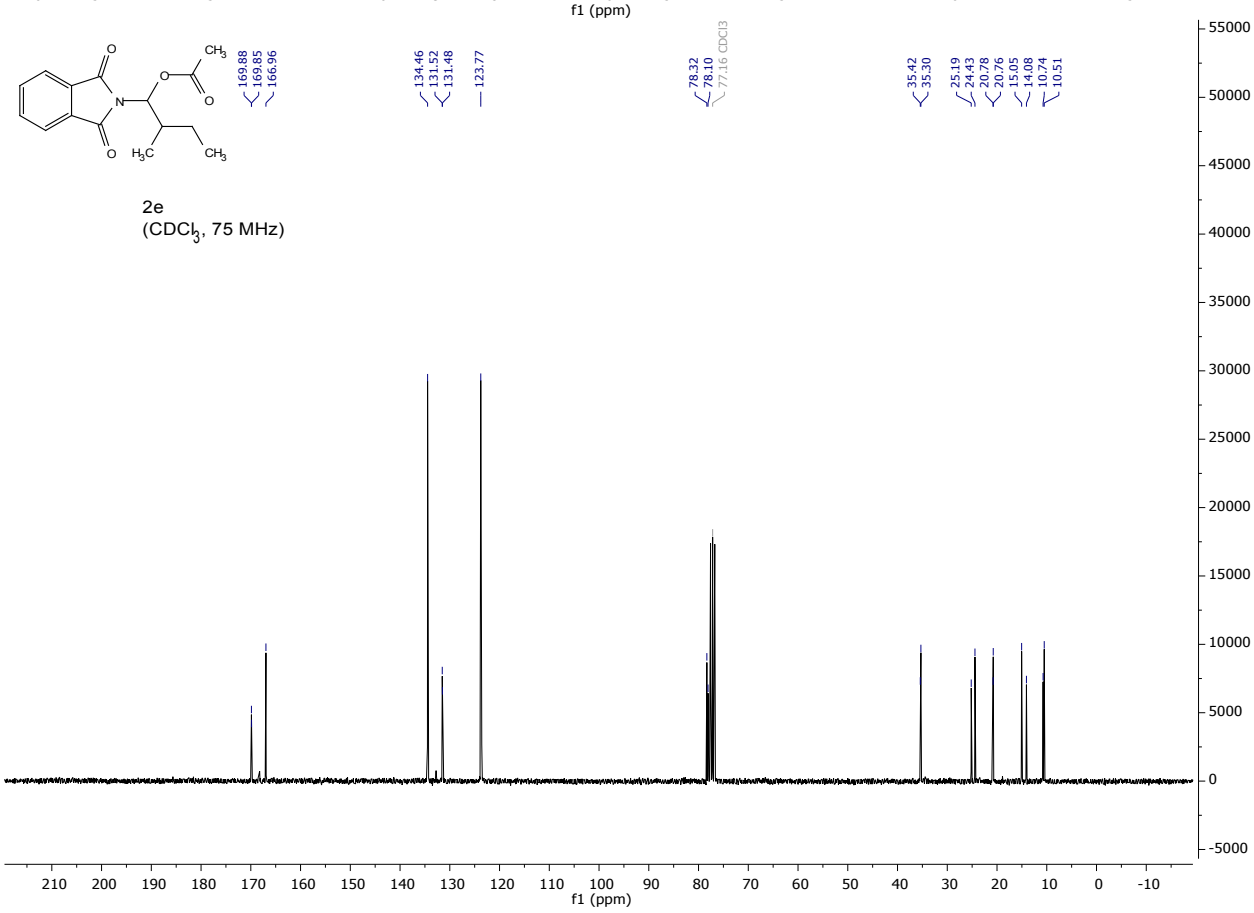
f1 (ppm)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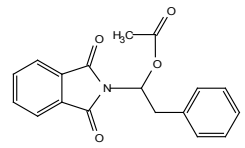
f1 (ppm)



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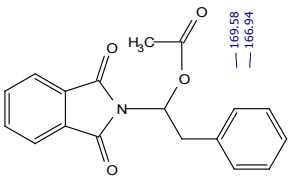

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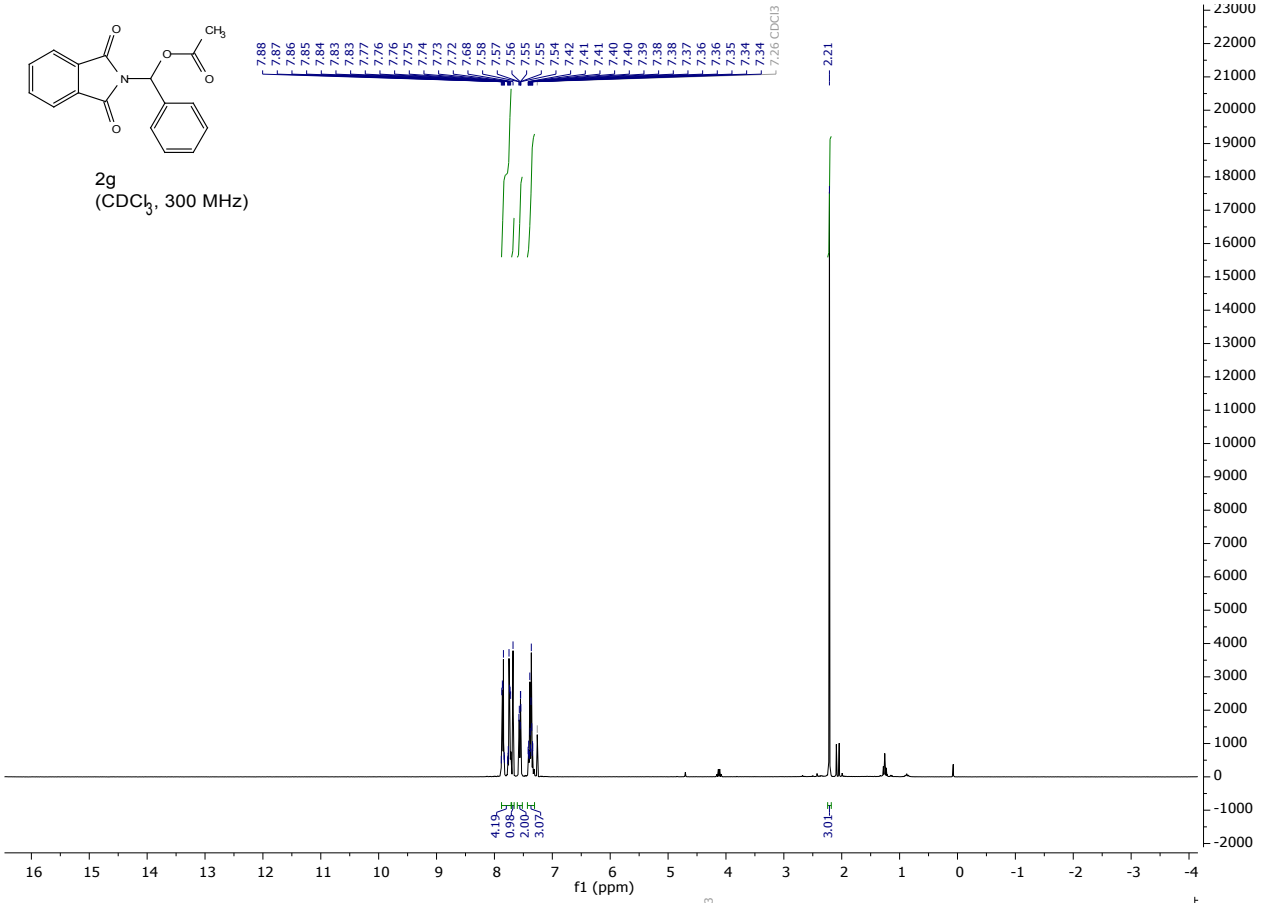
2g
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7.87
7.86
7.85
7.84
7.83
7.83
7.77
7.76
7.76
7.75
7.74
7.73
7.72
7.68
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7.38
7.38
7.37
7.36
7.36
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7.26 CDCl3
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3.07
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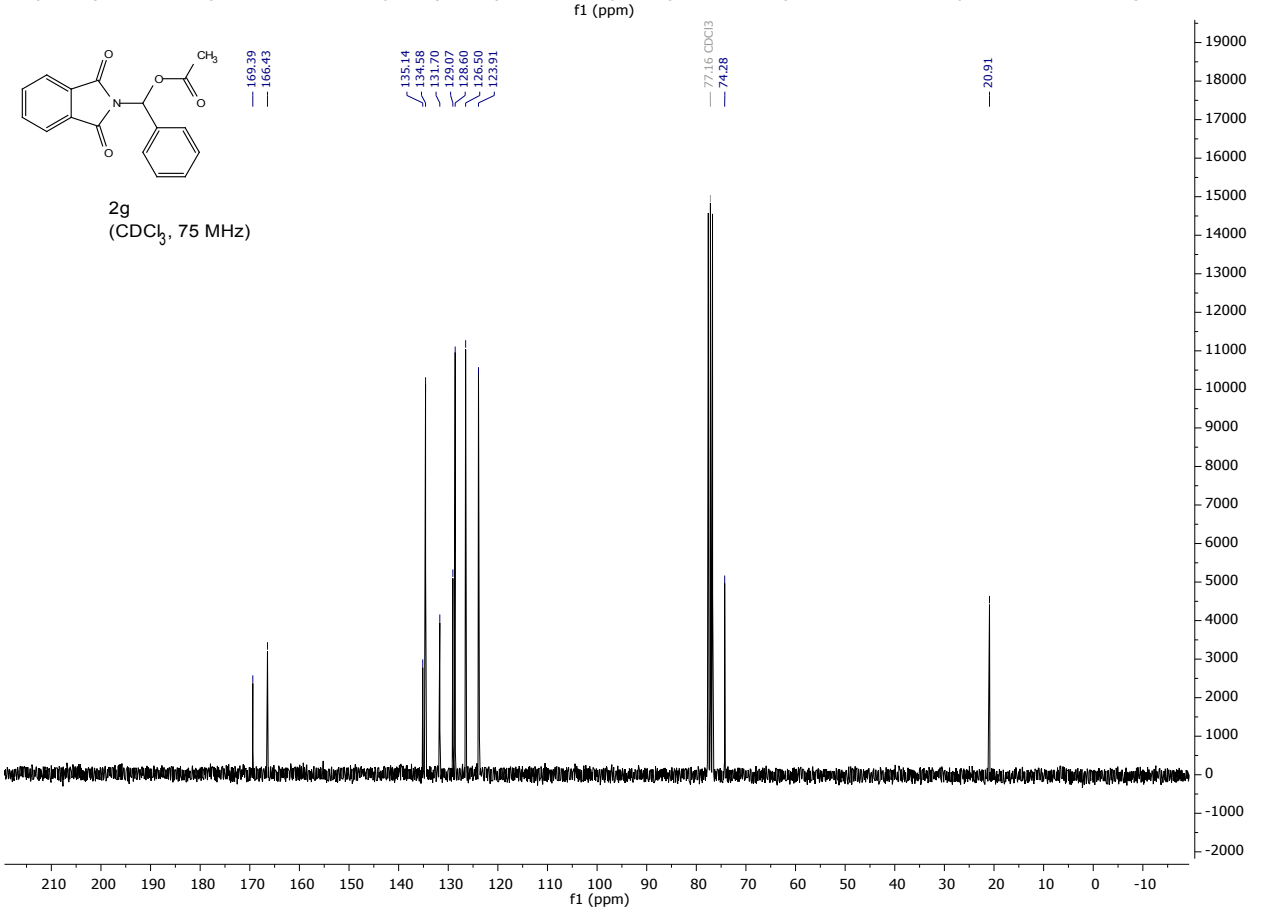
f1 (ppm)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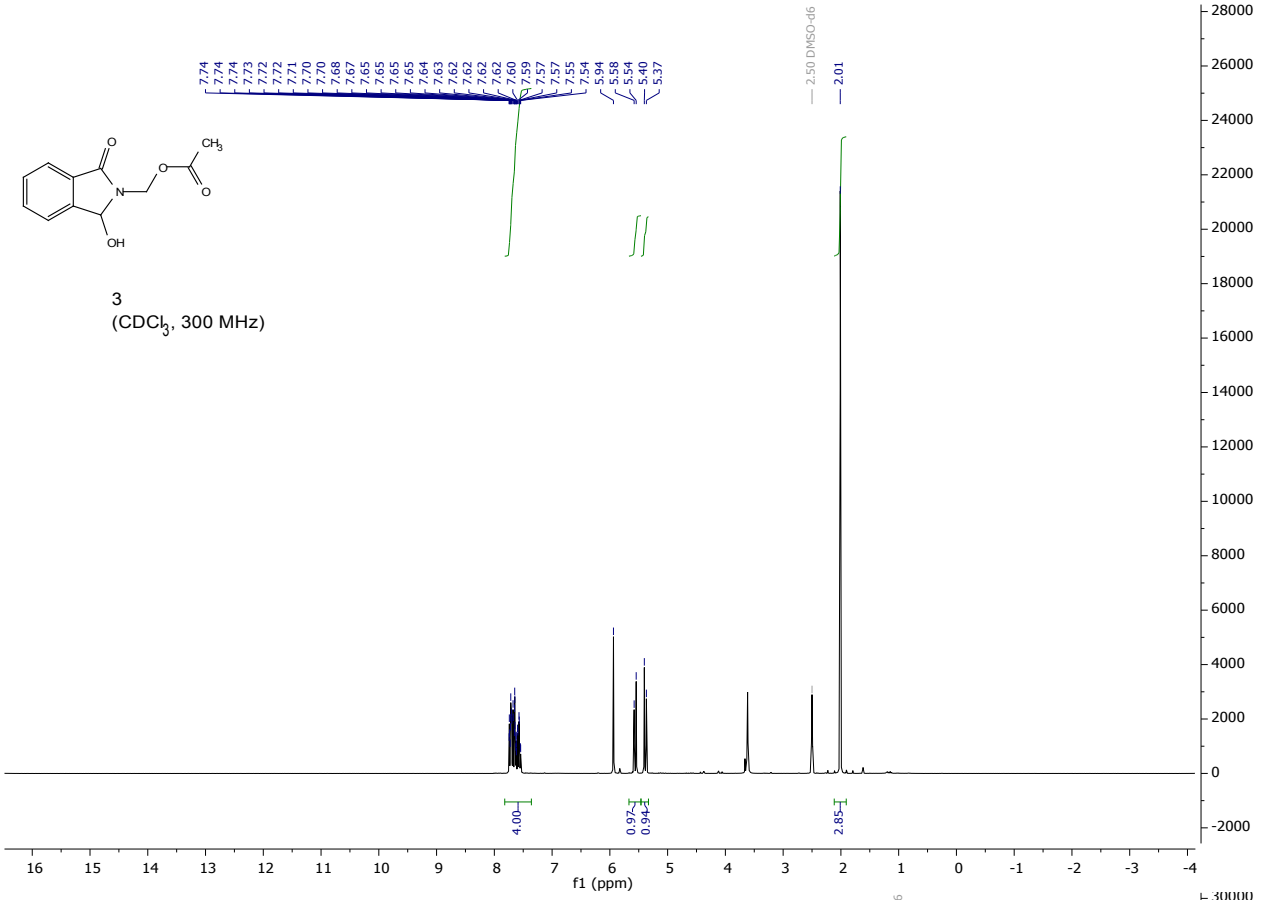
74.28
20.91
f1 (ppm)



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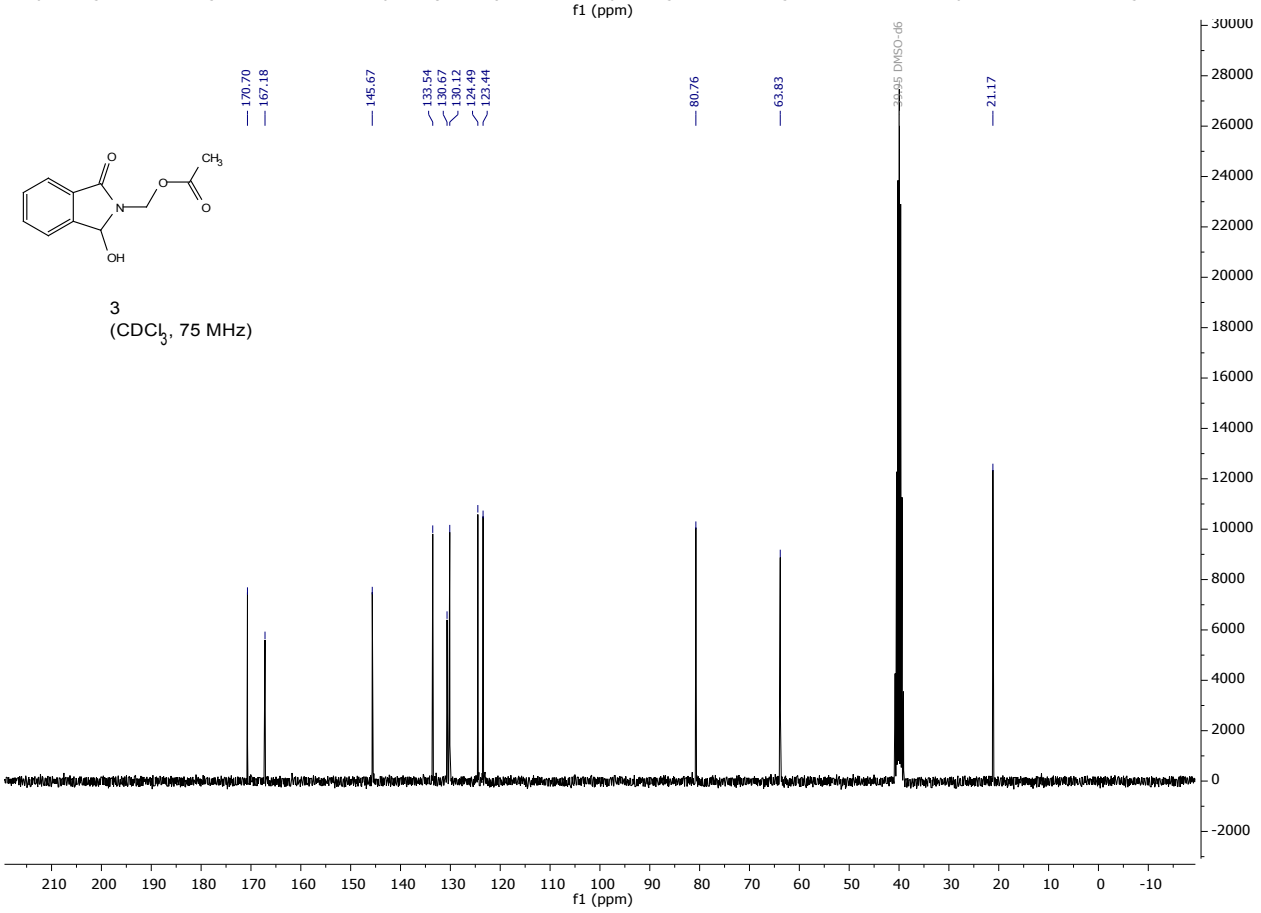

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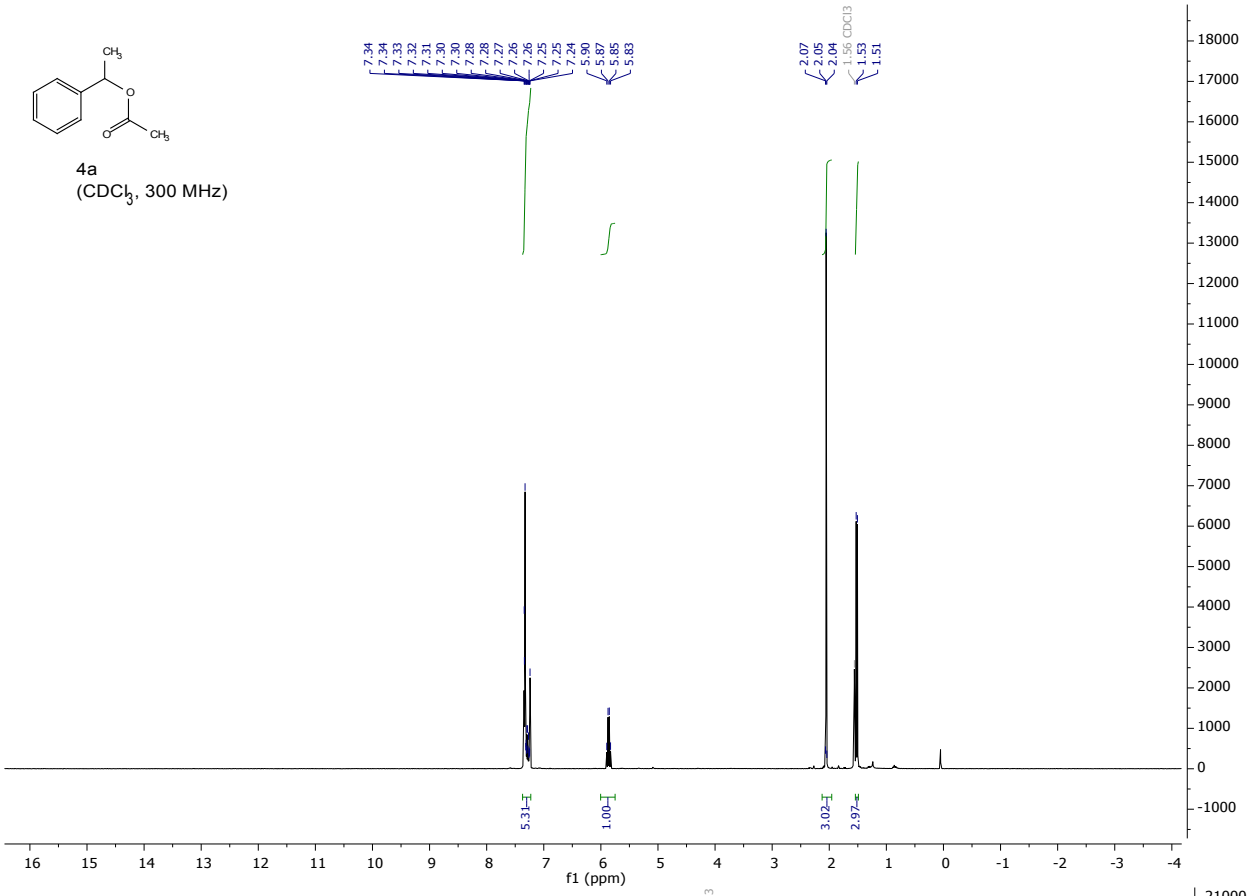
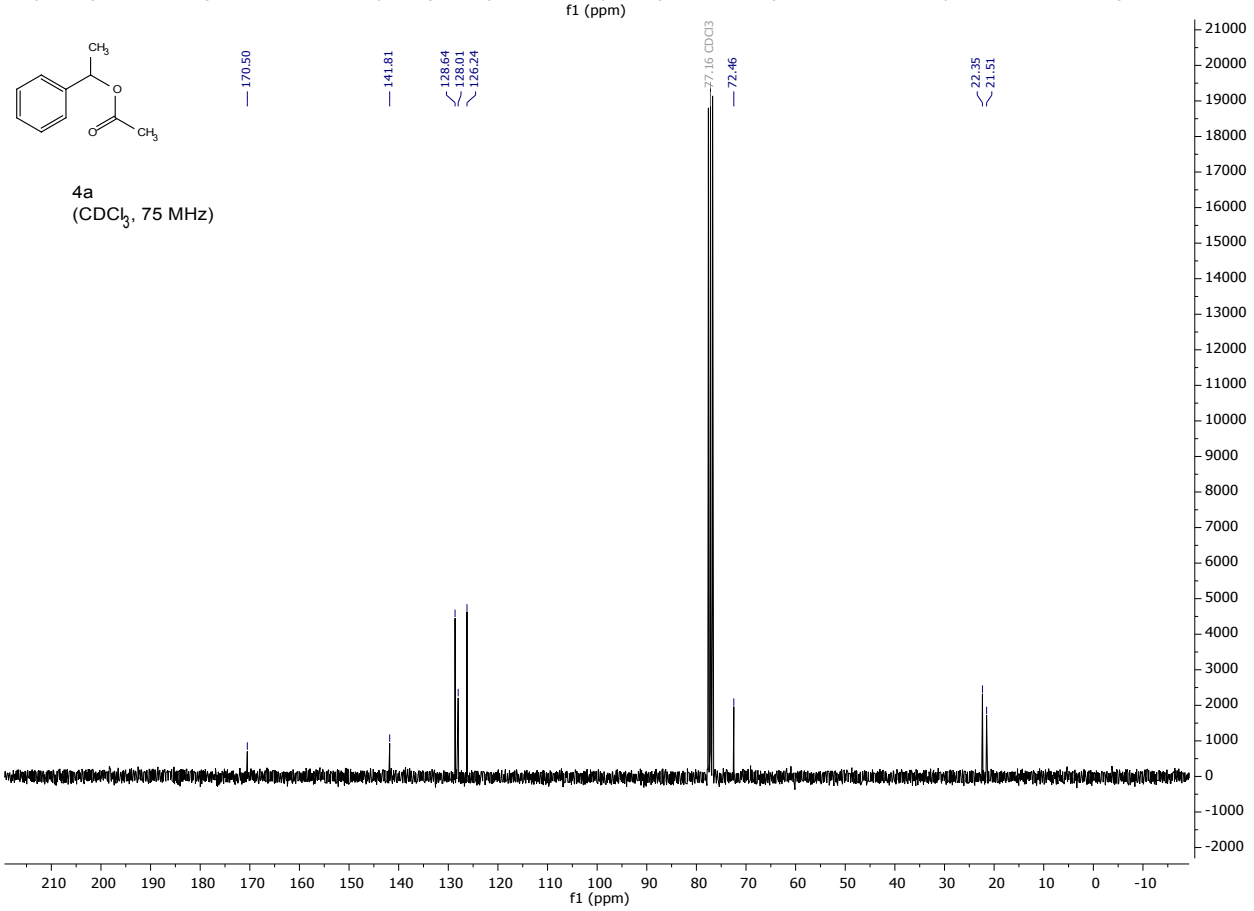

4a
(CDCl3, 300 MHz)
7.34
7.34
7.33
7.32
7.31
7.30
7.30
7.28
7.28
7.27
7.26
7.26
7.25
7.25
7.24
5.90
5.87
5.85
5.83
2.07
2.05
2.04
1.56 CDCl3
1.53
1.51
5.31
1.00
3.02
2.97
f1 (ppm)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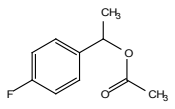
21.51
f1 (ppm)



4b
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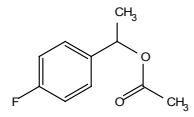

4b
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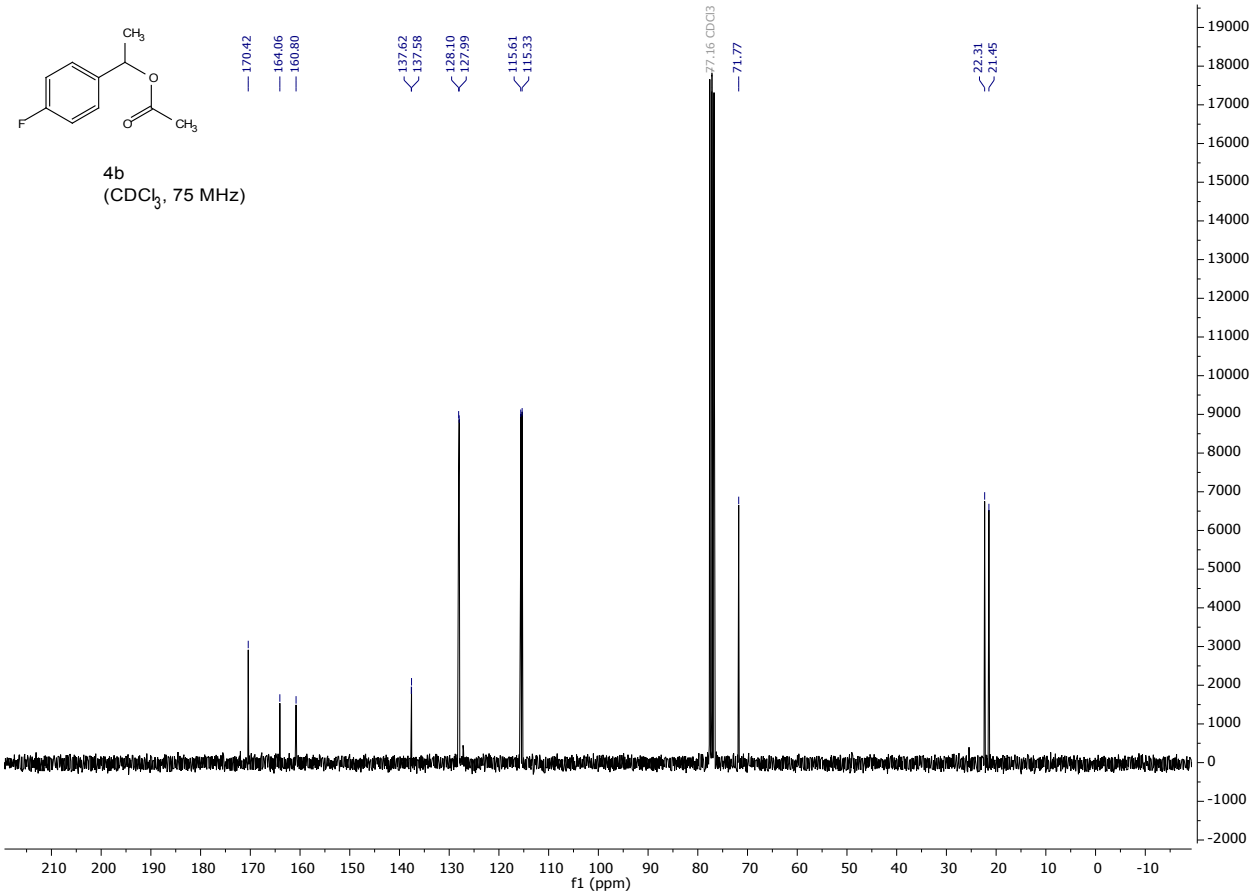
CH3
O
F
O
CH3
170.42
164.06
160.80
137.62
137.58
128.10
127.99
115.61
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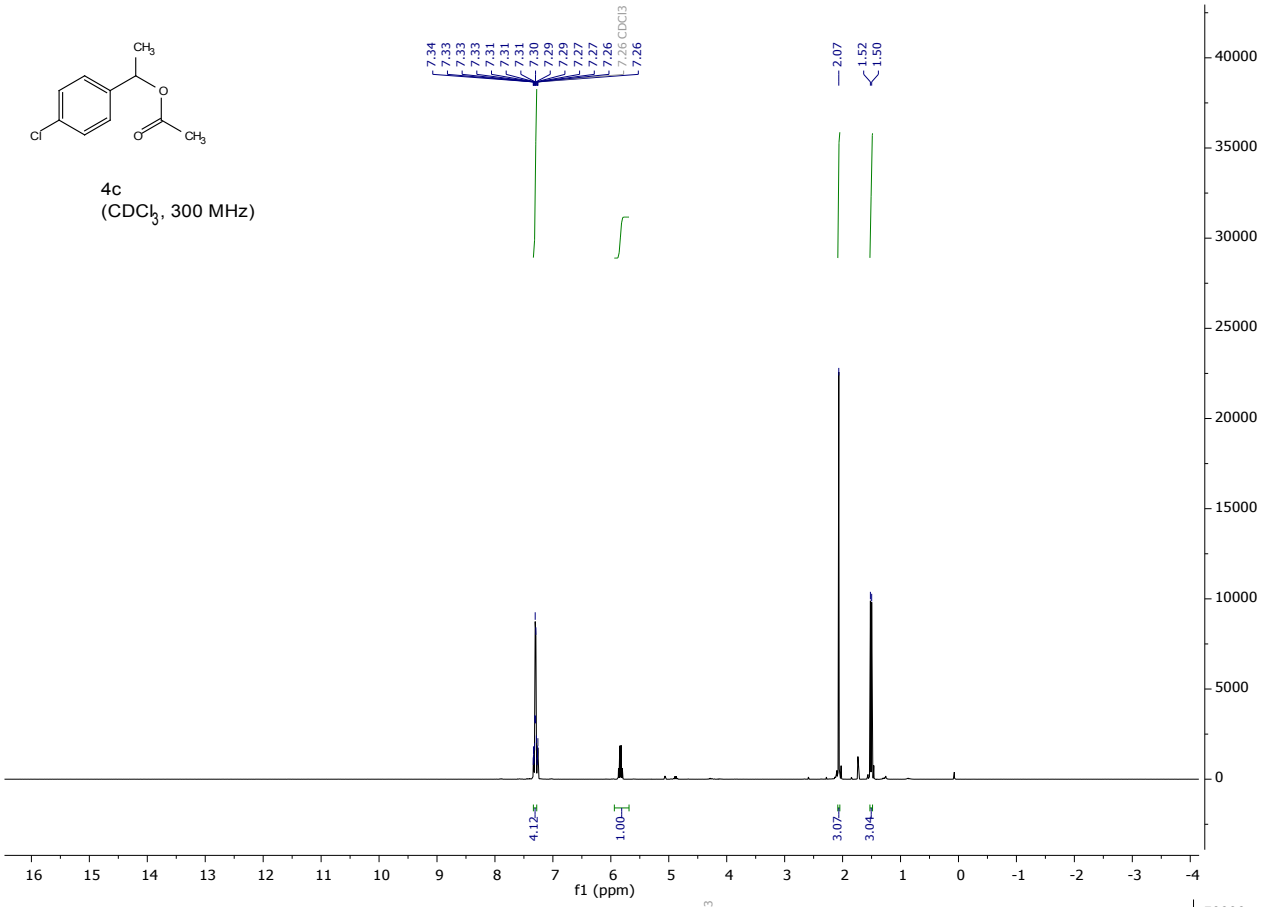
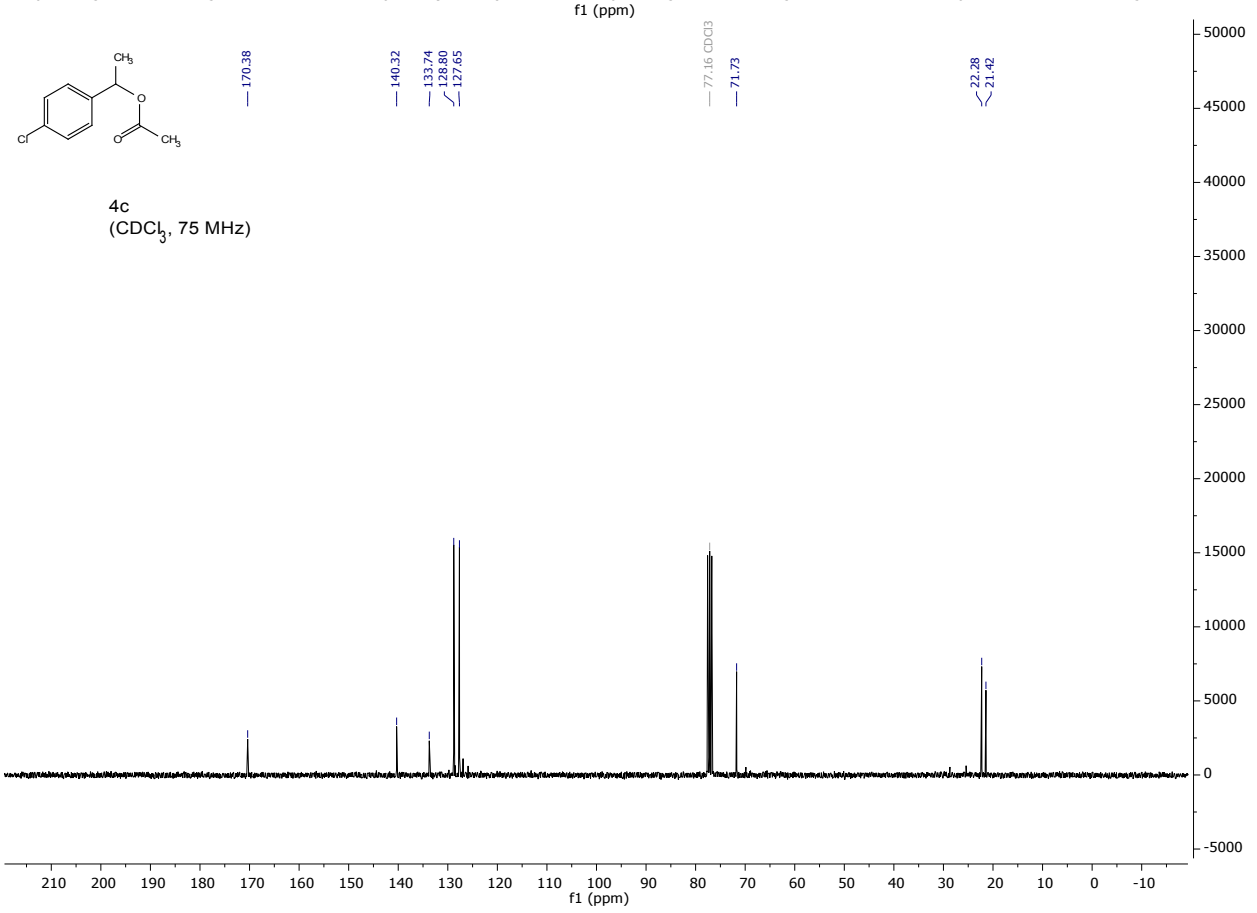
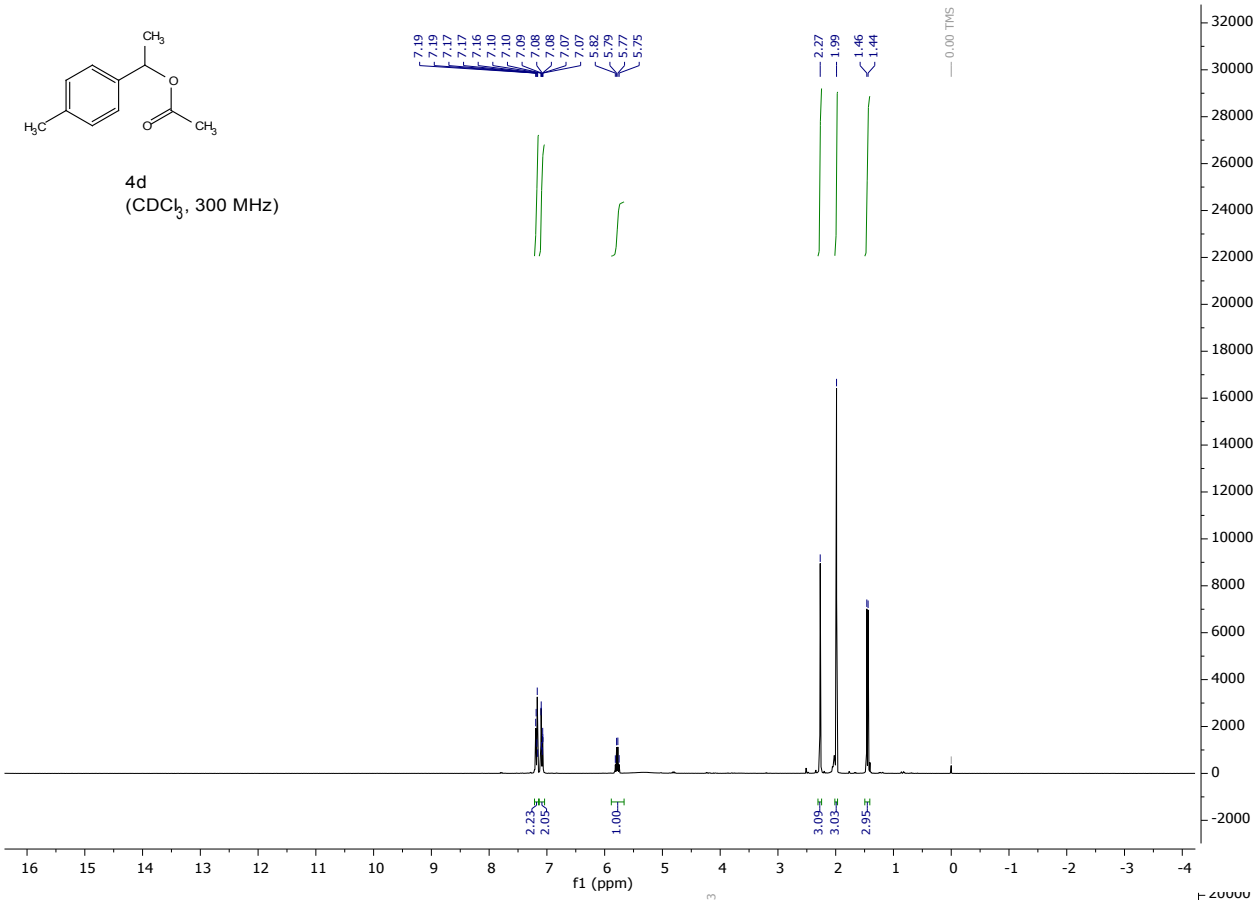
21.45
4b
(CDCl3, 75 MHz)
f1 (ppm)

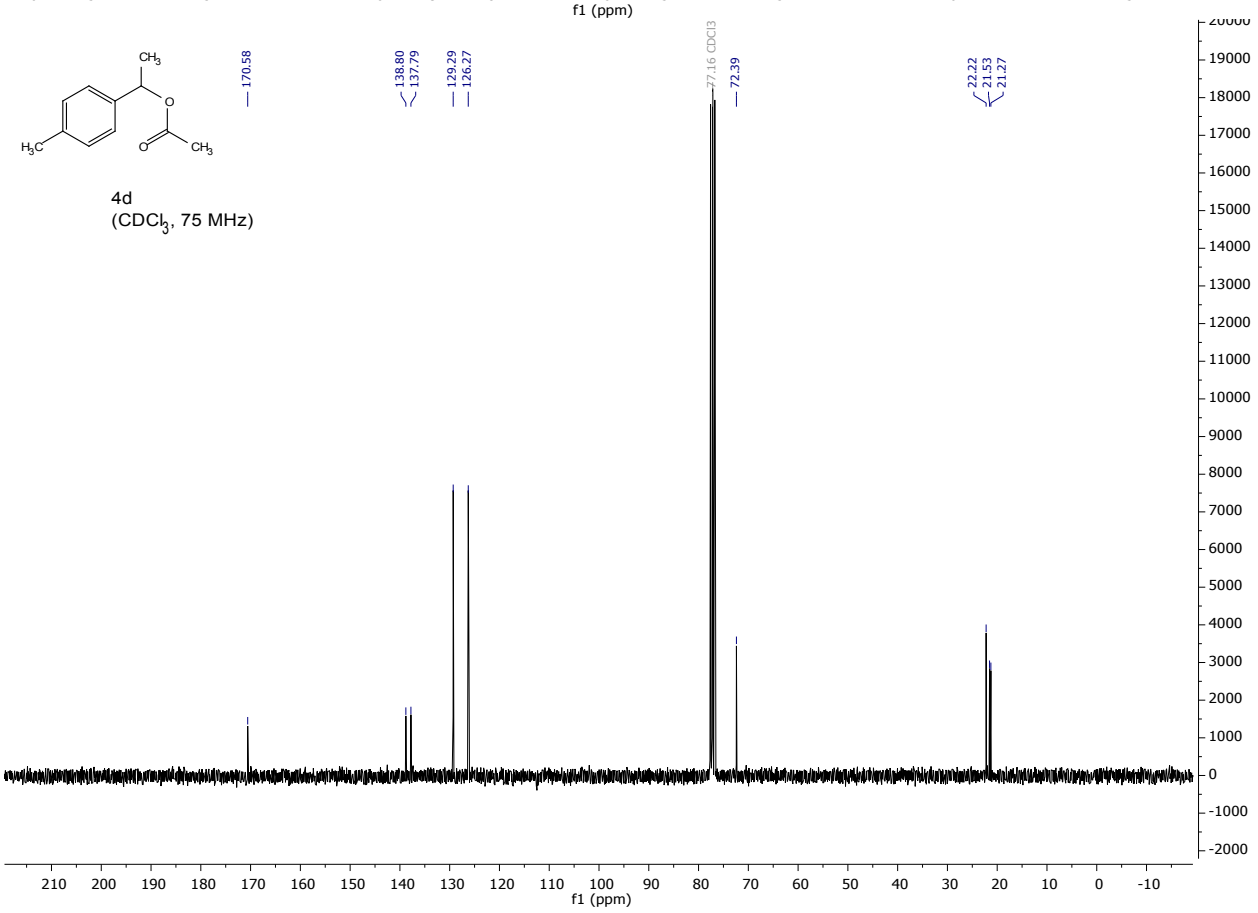


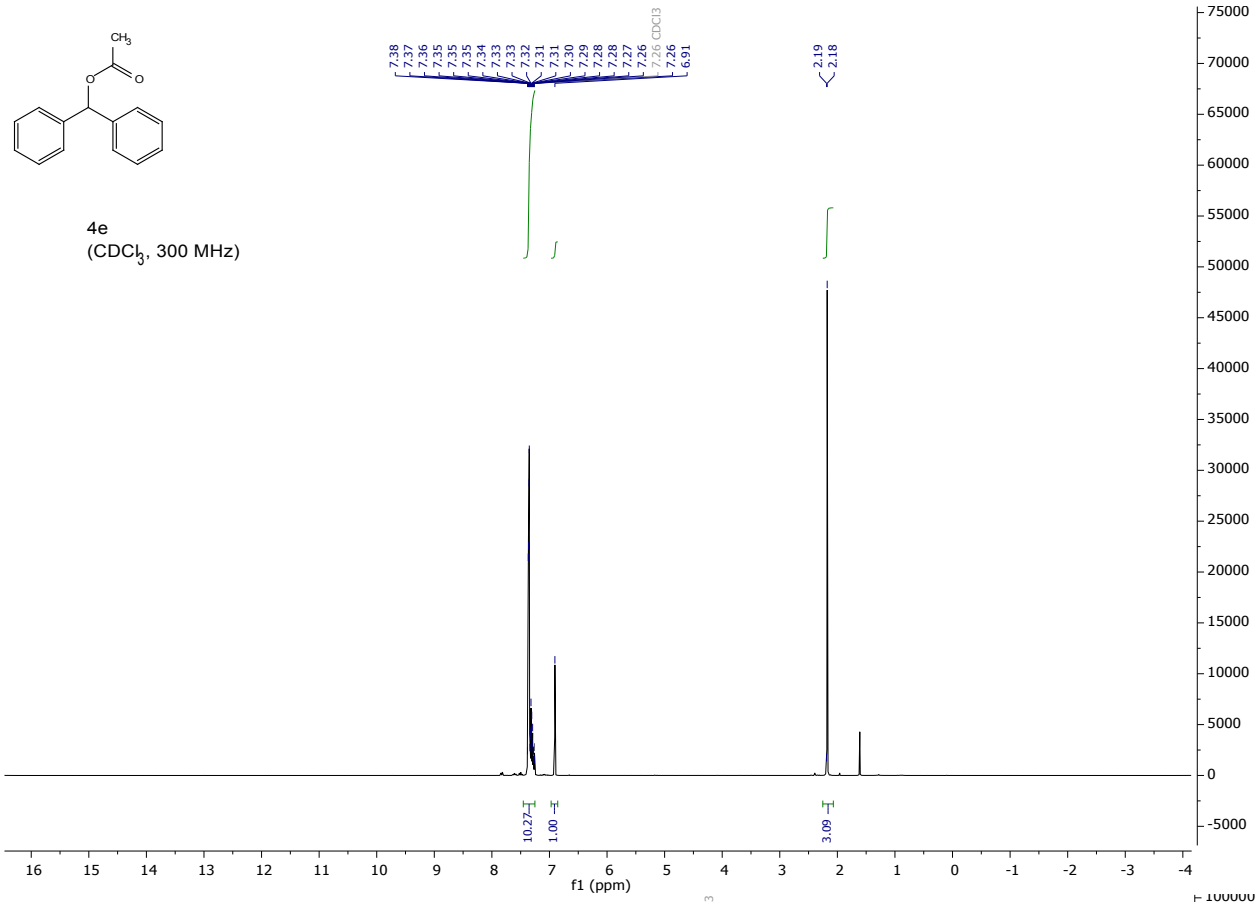
4c
($CDCl_3$, 300 MHz)

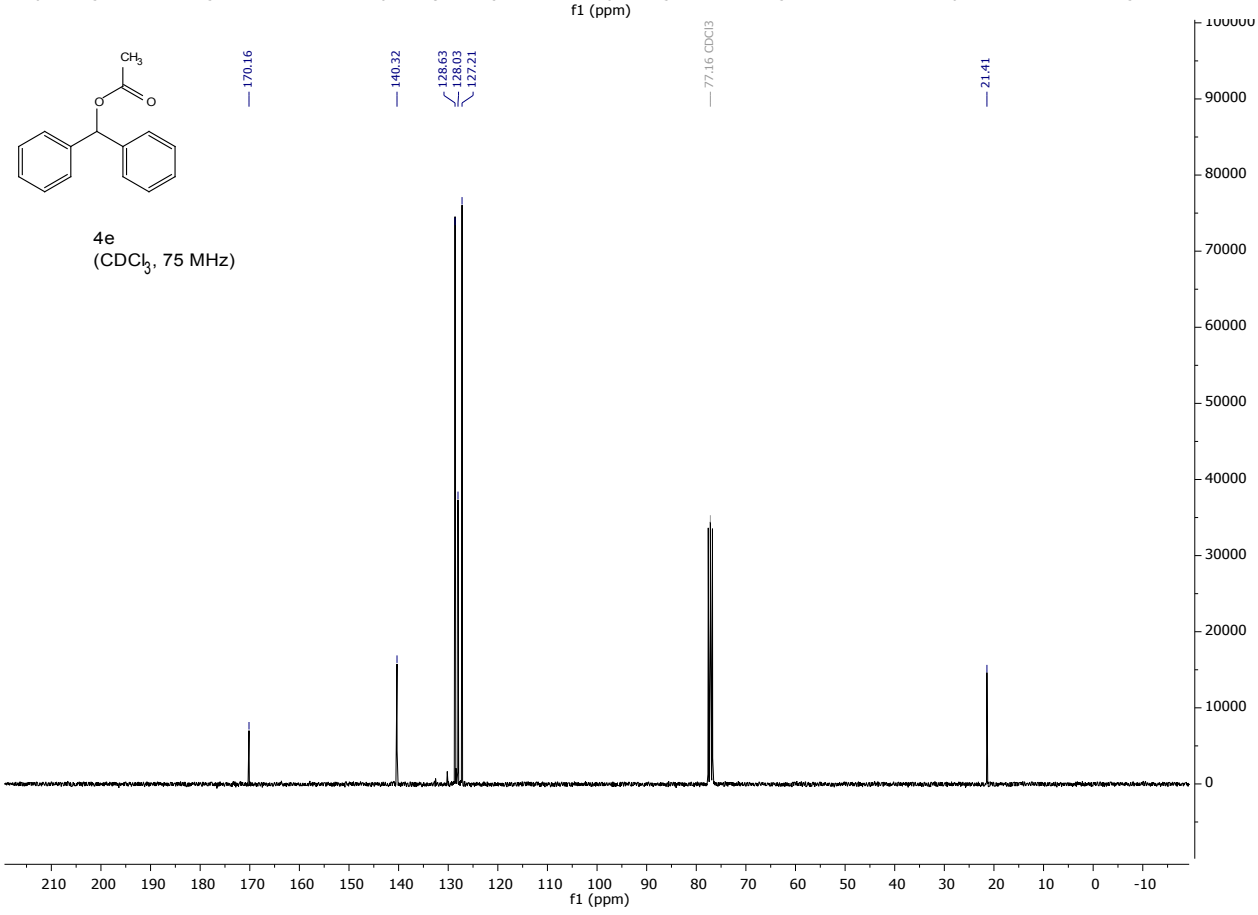


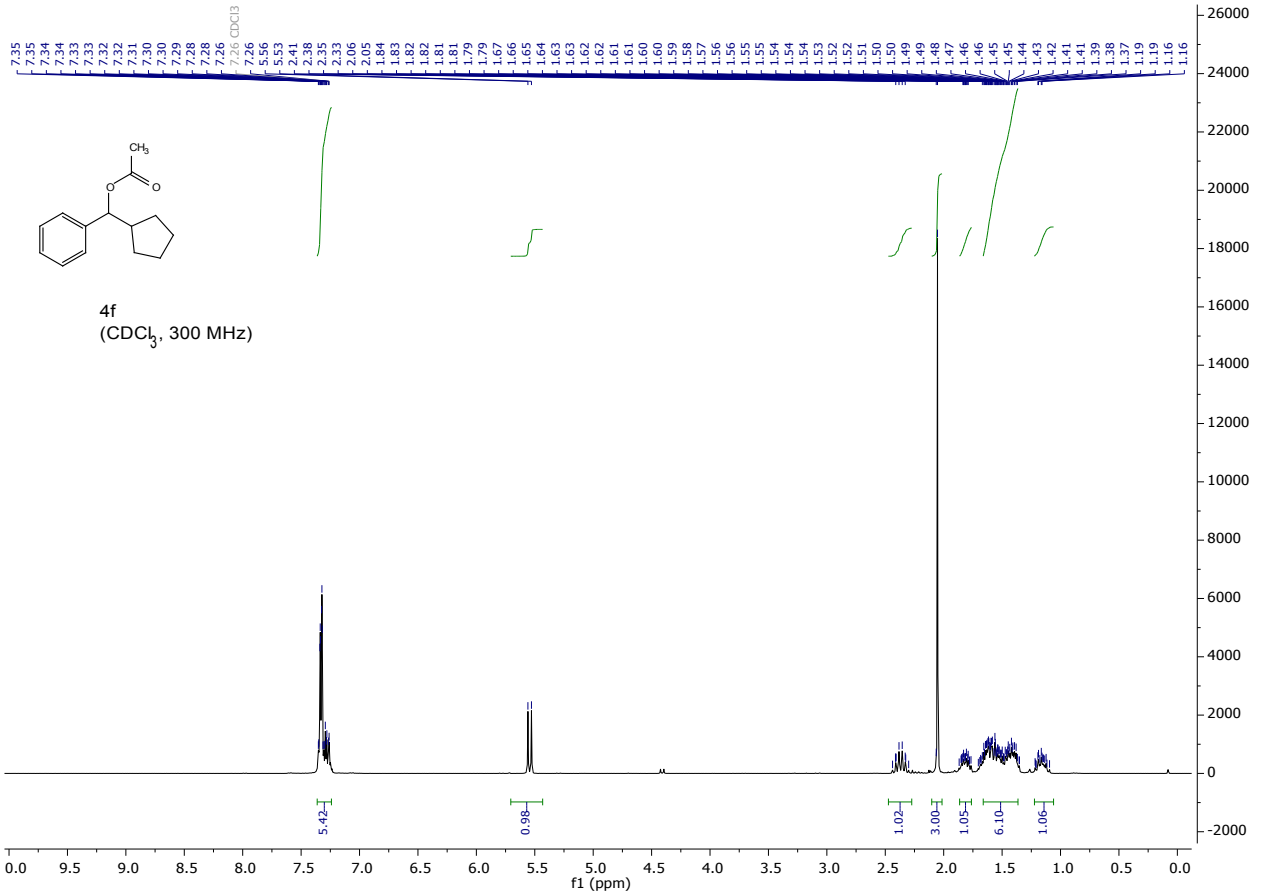
4c
($CDCl_3$, 75 MHz)


4d
(CDCl3, 300 MHz)
7.19
7.19
7.17
7.17
7.16
7.10
7.09
7.08
7.08
7.07
7.07
5.82
5.79
5.77
5.75
2.27
1.99
1.46
1.44
0.00 TMS
2.23
2.05
1.00
3.09
3.03
2.95
f1 (ppm)

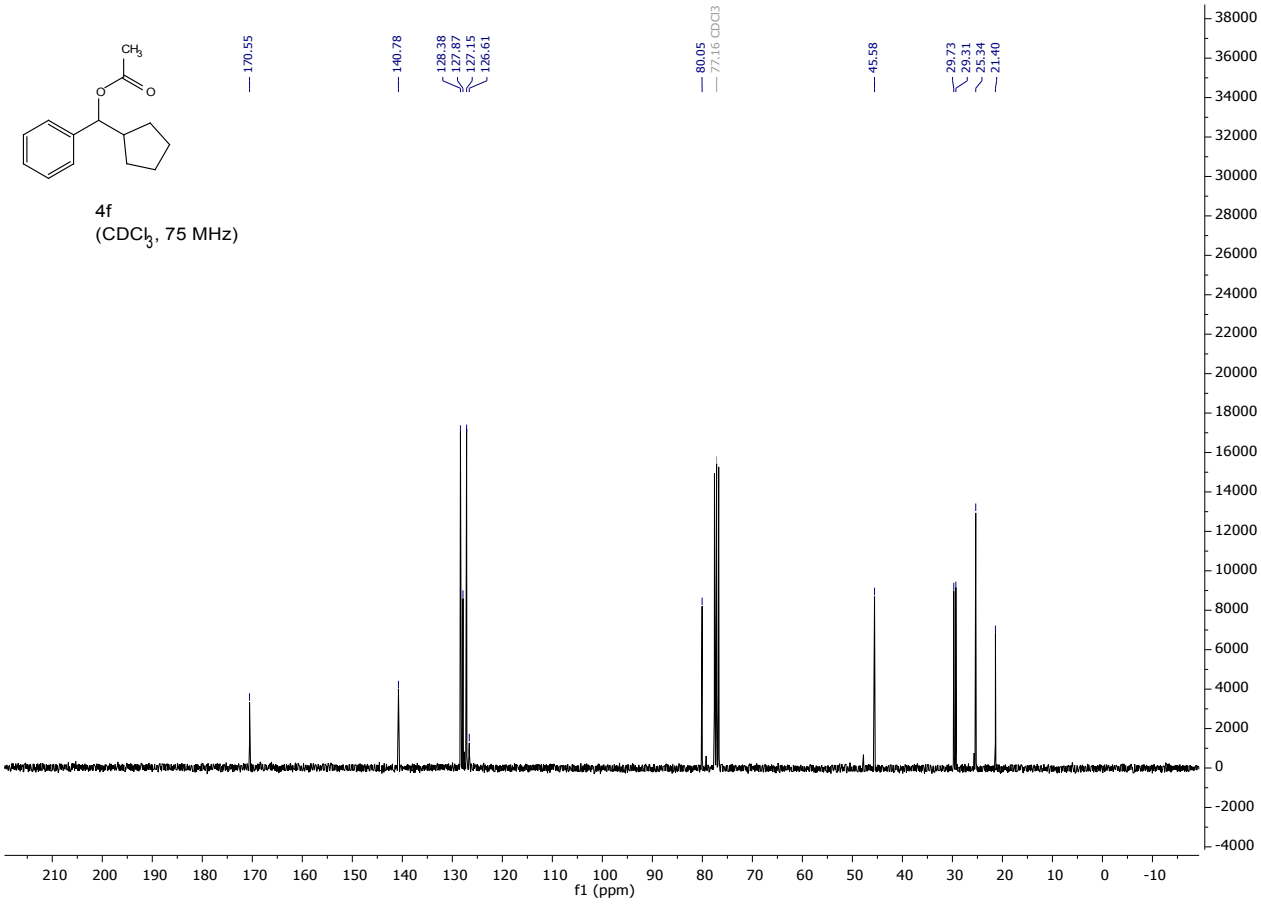

4d
(CDCl3, 75 MHz)
170.58
138.80
137.79
129.29
126.27
77.16 CDCl3
72.39
22.22
21.53
21.27
f1 (ppm)


4e
(CDCl3, 300 MHz)
f1 (ppm)

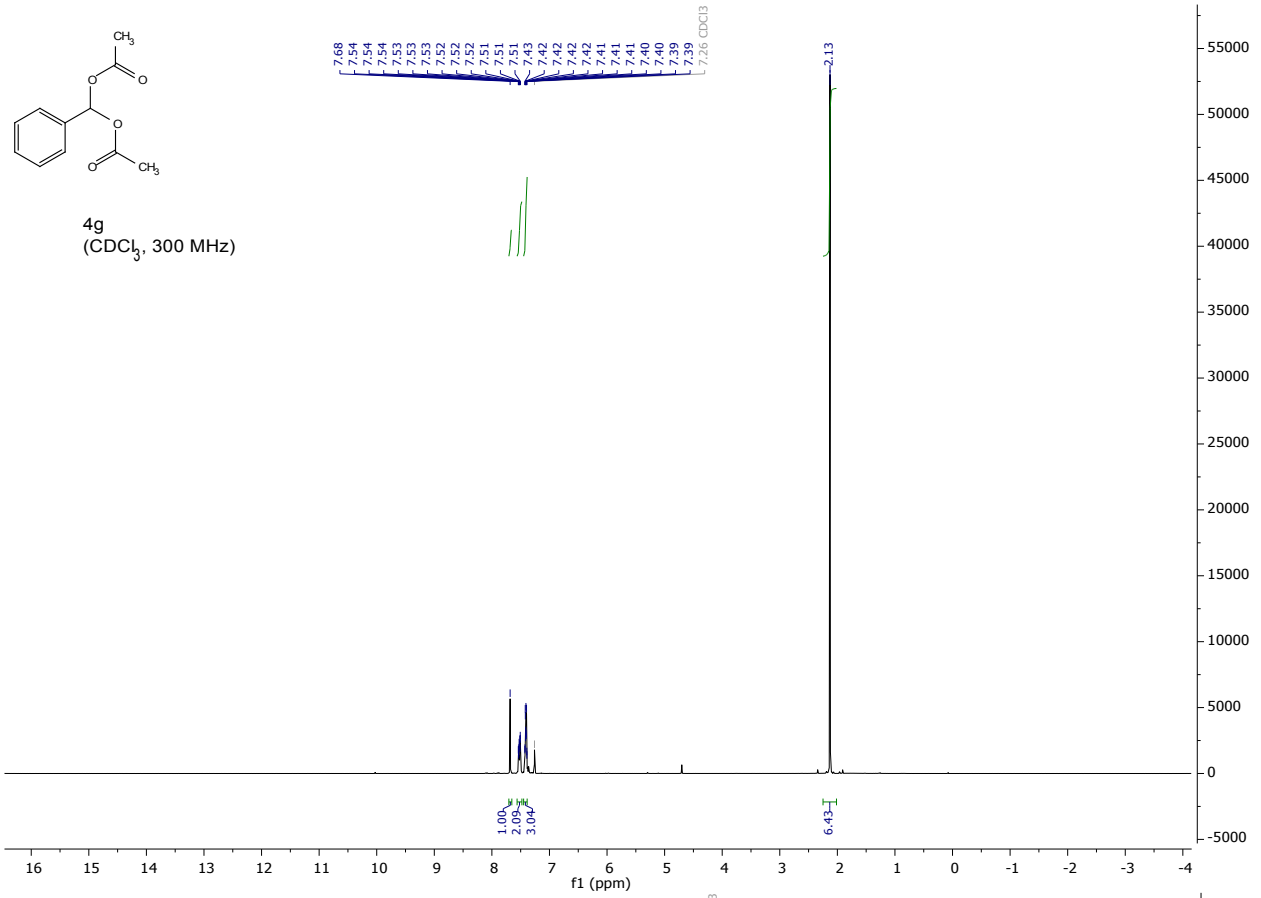

4e
(CDCl3, 75 MHz)
f1 (ppm)

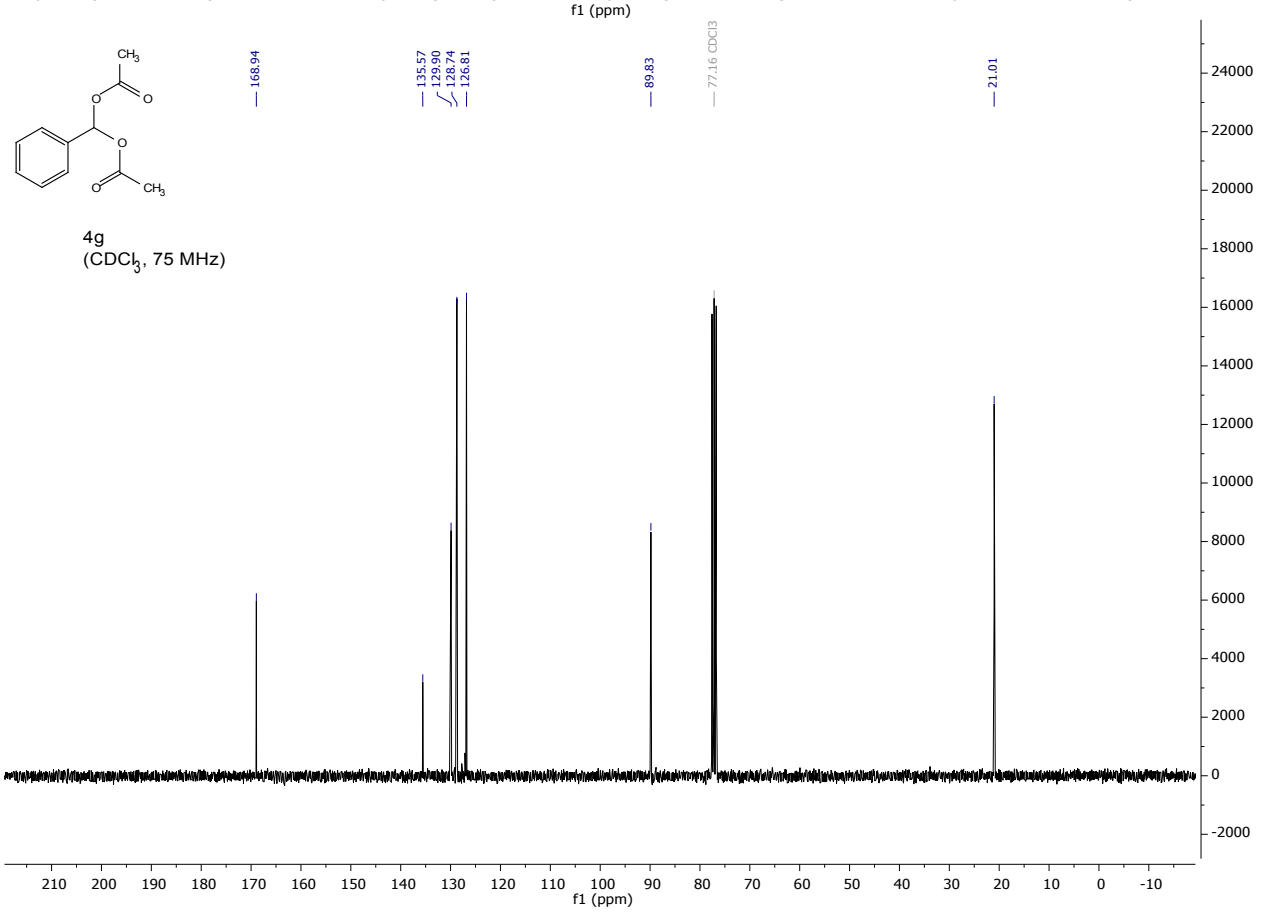


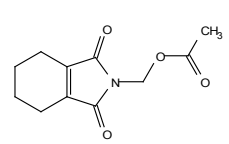
4f
($CDCl_3$, 300 MHz)



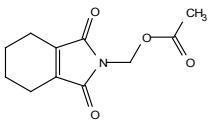
4f
($CDCl_3$, 75 MHz)


4g
(CDCl3, 300 MHz)
7.68
7.54
7.54
7.54
7.53
7.53
7.52
7.52
7.52
7.51
7.51
7.51
7.43
7.42
7.42
7.42
7.42
7.41
7.41
7.41
7.40
7.40
7.39
7.39
7.26 CDCl3
2.13
1.00
2.09
3.04
6.43
f1 (ppm)

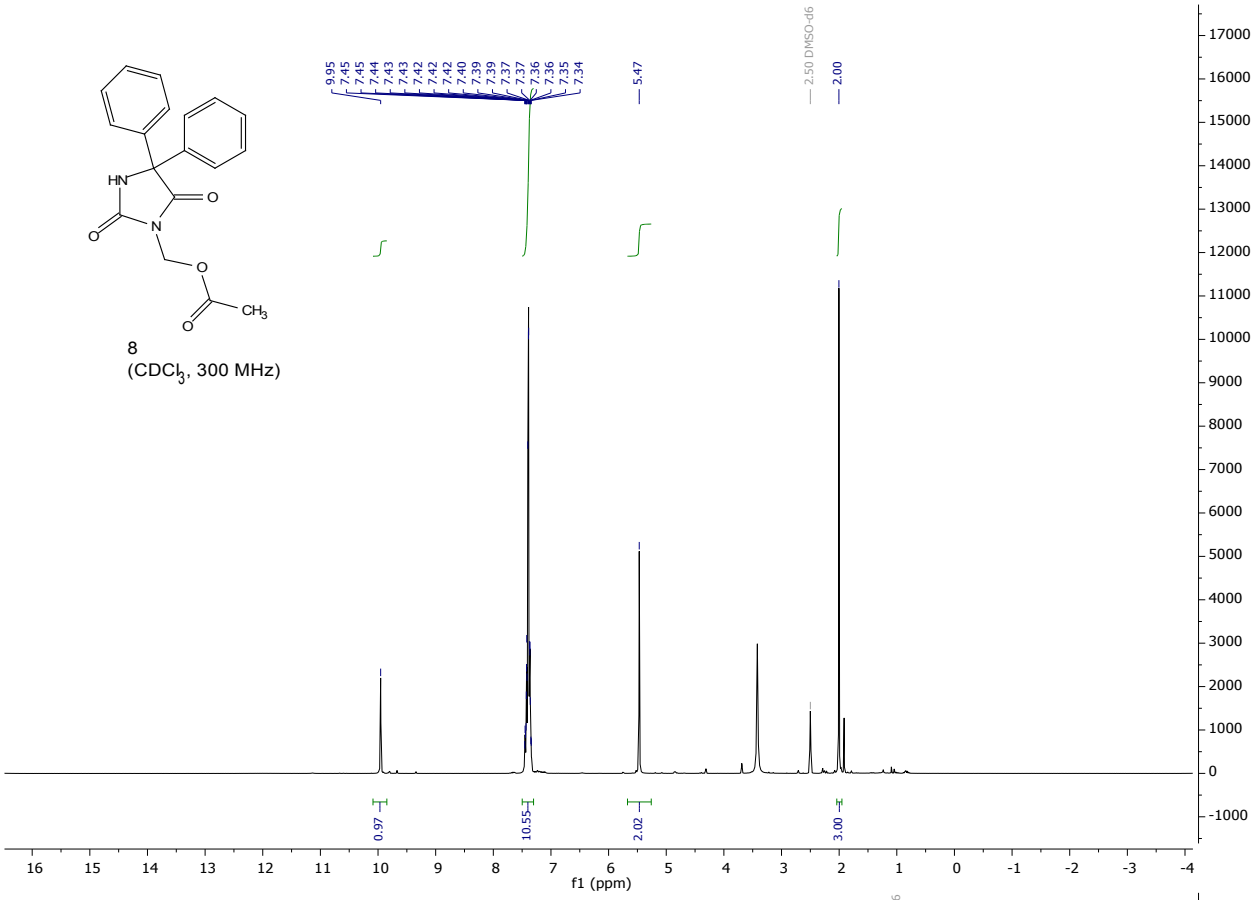

4g
(CDCl3, 75 MHz)
168.94
135.57
129.90
128.74
126.81
89.83
77.16 CDCl3
21.01
f1 (ppm)



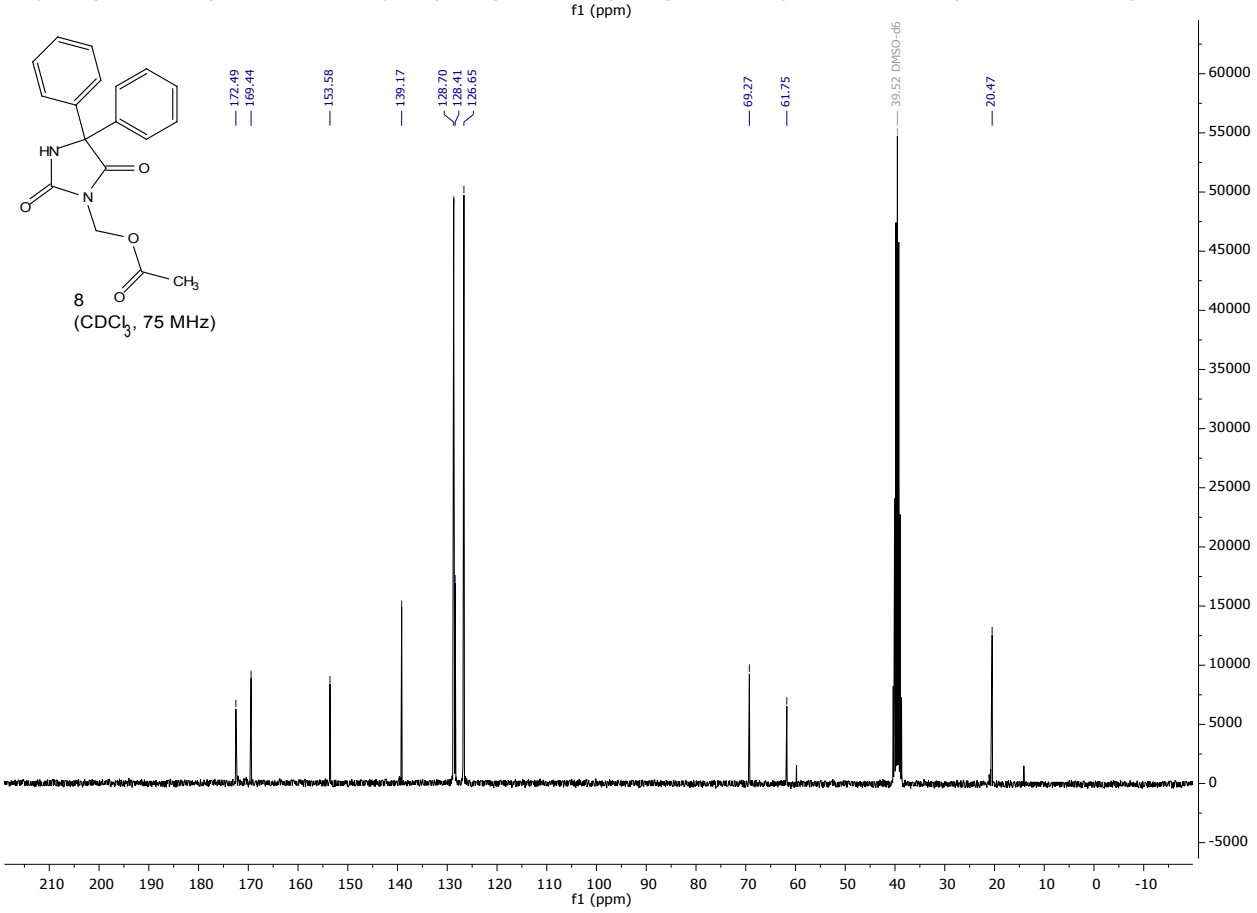
6
($CDCl_3$, 300 MHz)



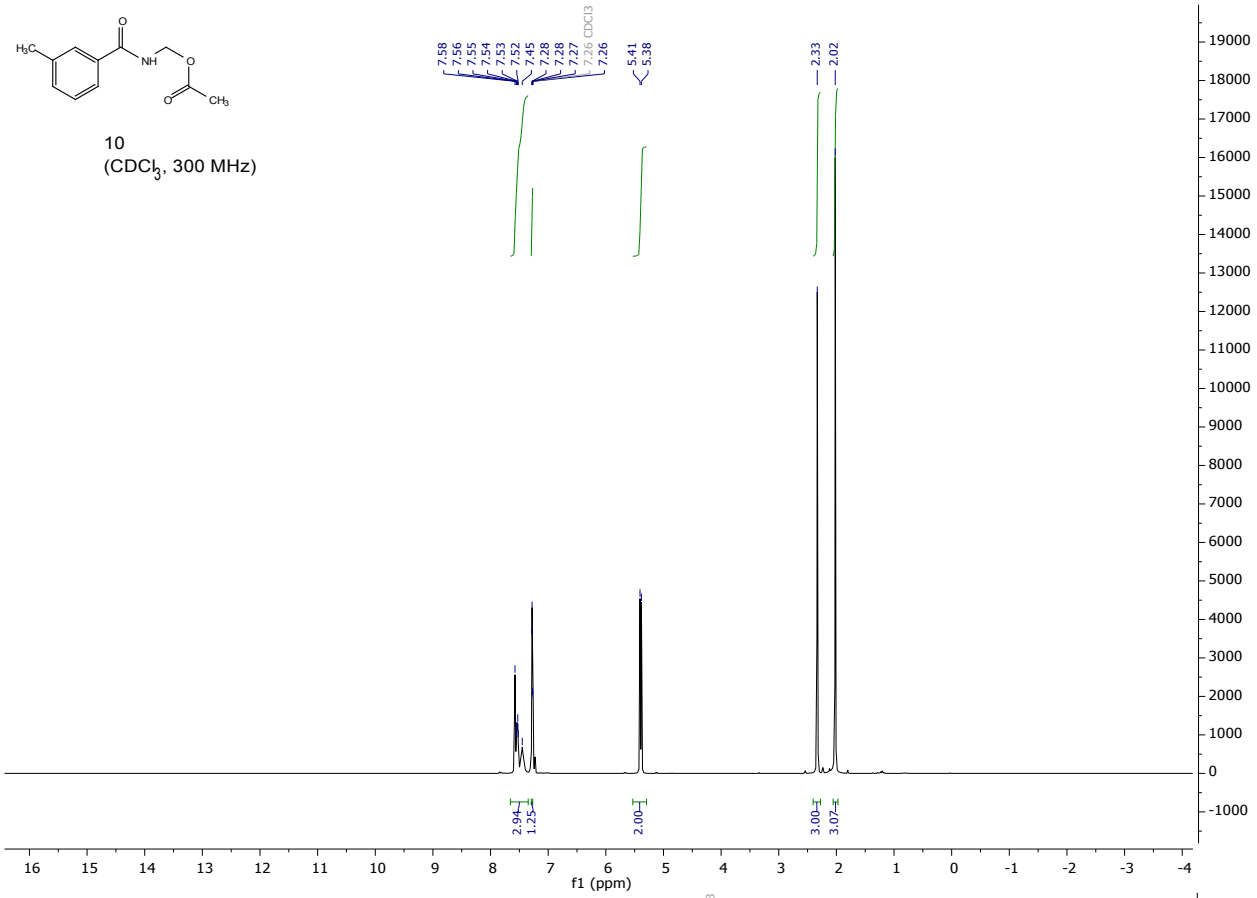
6
($CDCl_3$, 75 MHz)

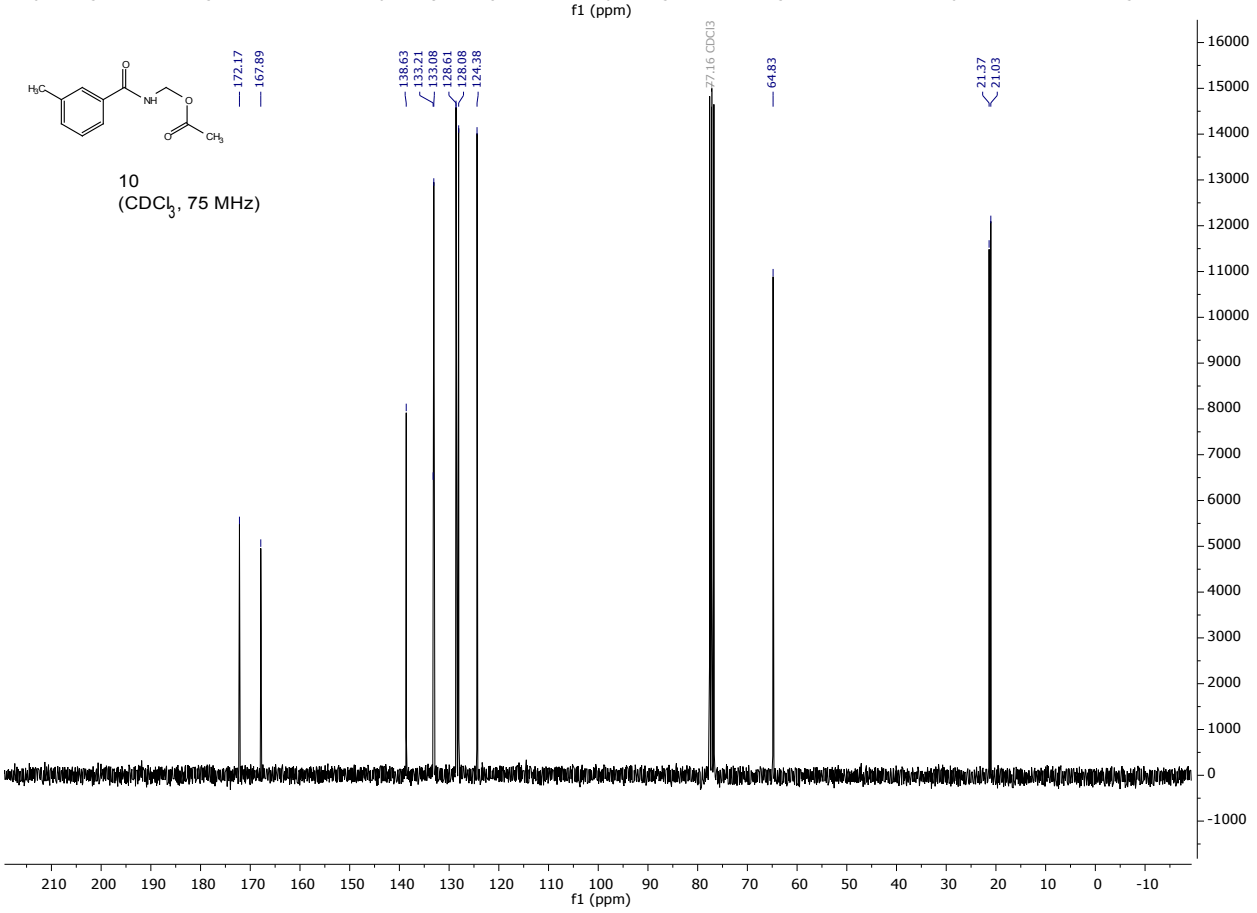


8
($CDCl_3$, 300 MHz)



8
($CDCl_3$, 75 MHz)


10
(CDCl3, 300 MHz)
7.58
7.56
7.55
7.54
7.53
7.52
7.45
7.28
7.28
7.27
7.26 CDCl3
7.26
5.41
5.38
2.33
2.02
2.94
1.25
2.00
3.00
3.07
f1 (ppm)


10
(CDCl3, 75 MHz)
172.17
167.89
138.63
133.21
133.08
128.61
128.08
124.38
77.16 CDCl3
64.83
21.37
21.03
f1 (ppm)