Supporting Information

Intramolecular Trapping of Ammonium Ylides with N-Benzoylbenzotriazoles in Aqueous Medium: Direct Access to Pseudoindoxyl Scaffold

Lalita Devi,[a,b] Rashmi Shukla,[a] Namrata Rastogi[*,a,b]*

[a]Medicinal & Process Chemistry Division, CSIR-Central Drug Research Institute, B.S. 10/1, Sector 10, Jankipuram extension, Sitapur Road, Lucknow 226031, India
[b]Academy of Scientific and Innovative Research, New Delhi 110001, India

* Corresponding author's e-mail: namrata.rastogi@cdri.res.in

Table of Contents

1. Experimental Section

1.1 General experimental information

All reactions were monitored by TLC, visualization was effected with UV and/or by developing in iodine. Melting points were recorded on a Precision melting point apparatus and are uncorrected. NMR spectra were recorded on a BruckerAvance spectrometer at 300, 400 or 500 MHz (^{1}H) and 75, 100 or 125 MHz (^{13}C). Chemical shifts are reported in δ (ppm) relative to TMS as the internal standard. To describe spin multiplicity, standard abbreviations such as s, d, t, q, m, dd referring to singlet, doublet, triplet, quartet, multiplet and doublet of doublet respectively, are used. The ESI-HRMS spectra were recorded on Agilent 6520-Q-Tof LC/MS system. The NMR yields of products were calculated through ^{1}H NMR of crude reaction mixture using dibromo methane as internal standard and isolated yields were calculated after purification by column chromatography.

All the chemicals and catalysts were purchased from commercial sources and used as received. The o-amino benzoylbenzotriazoles **1a-1m** were prepared from corresponding *N*-alkyl anthranilic acids following the procedure reported by Çelic et al[1] and data for new compounds (**1b-1m**) is reported below. Further, all the aryldiazoacetates **2** are known compounds and were synthesized following the literature protocols.[2]

1.2 General procedure for the synthesis of 2,2-disubstituted indolin-3-ones 3

In a round bottom flask equipped with a magnetic stirring bar, the o-amino benzoylbenzotriazole **1** (0.5 mmol), aryldiazoacetate **2** (1.0 mmol, 2.0 equiv) and catalyst $Rh_2(OAc)_4$ (0.002 g, 0.005 mmol, 0.5 mol% w.r.t. **2**) were taken in distilled water (5 mL). The resulting reaction mixture was refluxed until completion of the reaction (1-2 h; TLC monitoring) and then cooled to the room temperature. After cooling, the reaction mixture was diluted with water (10 mL) and extracted with ethyl acetate (3 x 10 mL). The combined organic layers were dried (Na_2SO_4) and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel using hexane/ethyl acetate as eluent to afford the pure product **3**.

2. Spectroscopic Data

(1H-benzo[d][1,2,3]triazol-1-yl)(5-methyl-2-(methylamino)phenyl)methanone (1b)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 79-80 ^{o}C; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.06-8.13 (m, 2H), 7.74 (d, *J* = 1.0 Hz, 1H), 7.55-7.60 (m, 1H), 7.40-7.46 (m, 2H), 7.27 (dd, *J* = 8.7 Hz, 2.0 Hz, 1H), 6.68 (d, *J* = 8.7 Hz, 1H), 2.92 (d, *J* = 5.1 Hz, 3H), 2.19 (s, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 167.59, 151.91, 145.71, 137.54, 134.38, 132.85, 129.61, 125.69,

123.70, 120.06, 114.28, 111.40, 110.64, 29.90, 20.29; **HRMS** for $C_{15}H_{14}N_4O$: calcd. $(M+H)^+$: 267.1240, found: 267.1242

(1H-benzo[d][1,2,3]triazol-1-yl)(4-fluoro-2-(methylamino)phenyl)methanone (1c)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 147-148 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.07-8.12 (m, 3H), 7.89 (br s, 1H), 7.58 (t, *J* = 7.9 Hz, 1H), 7.44 (t, *J* = 8.0 Hz, 1H), 6.33-6.40 (m, 2H), 2.91 (d, *J* = 5.0 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 168.19 (d, *J* = 253.9 Hz), 166.68, 156.15 (d, *J* = 13.1 Hz), 145.66, 138.26 (d, *J* = 12.2 Hz),132.77, 129.77, 125.82, 120.13, 114.32, 107.53, 103.21 (d, *J* = 23.2 Hz), 97.40 (d, *J* = 25.6 Hz), 29.85; **HRMS** for $C_{14}H_{11}FN_4O$: calcd. $(M+H)^+$: 271.0990, found: 271.0983

(1H-benzo[d][1,2,3]triazol-1-yl)(4-chloro-2-(methylamino)phenyl)methanone (1d)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 144-145 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.13-8.15 (m, 1H), 8.08-8.11 (m, 1H), 8.01 (d, *J* = 8.8 Hz, 1H), 7.58-7.62 (m, 1H), 7.44-7.48 (m, 1H), 6.74 (d, *J* = 2.0 Hz, 1H), 6.63 (dd, *J* = 8.8 Hz, 2.0 Hz, 1H), 2.94 (s, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.92, 154.14, 145.67, 142.89, 136.40, 132.68, 129.86, 125.90, 120.17, 115.32, 114.35, 111.03, 109.29, 29.82; **HRMS** for $C_{14}H_{11}ClN_4O$: calcd. $(M+H)^+$: 287.0694, found: 287.0691

(1H-benzo[d][1,2,3]triazol-1-yl)(5-bromo-2-(methylamino)phenyl)methanone (1e)

Yellow solid; R_f 0.50 (20% EtOAc/hexane); Mp 133-134 °C; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.10-8.17 (m, 3H), 7.59-7.64 (m, 2H), 7.45-7.53 (m, 2H), 6.66 (d, *J* = 9.1 Hz, 1H), 2.94 (d, *J* = 5.0 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.52, 152.33, 145.73, 138.65, 136.71, 132.67, 129.99, 126.03, 120.25, 114.38, 113.16, 112.12, 106.17, 29.91; **HRMS** for $C_{14}H_{11}BrN_4O$: calcd. $(M+H)^+$: 331.0189, found: 331.0187

(1H-benzo[d][1,2,3]triazol-1-yl)(4-bromo-2-(methylamino)phenyl)methanone (1f)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 158-159 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.13 (d, *J* = 8.3 Hz, 1H), 8.08 (d, *J* = 8.3 Hz, 1H), 7.90 (d, *J* = 8.7 Hz, 1H),7.69 (br s, 1H), 7.57-7.61 (m, 1H), 7.43-7.47 (m, 1H), 6.90 (d, *J* = 1.7 Hz, 1H), 6.77(dd, *J* = 8.7 Hz, 1.8 Hz, 1H), 2.92 (d, *J* = 5.0 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 167.09, 153.98, 145.68, 136.26, 132.67, 131.95, 129.90, 125.93, 120.19, 118.16, 114.37, 114.18, 109.66, 29.84; **HRMS** for $C_{14}H_{11}BrN_4O$: calcd. $(M+H)^+$: 331.0189, found: 331.0190

(1H-benzo[d][1,2,3]triazol-1-yl)(5-iodo-2-(methylamino)phenyl)methanone (1g)

Yellow solid; R_f 0.50 (10% EtOAc/hexane); Mp 123-124 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.27 (d, *J* = 2.1 Hz, 1H), 8.13 (d, *J* = 8.3 Hz, 1H), 8.10 (d, *J* = 8.3 Hz, 1H), 7.59-7.66 (m, 3H), 7.45-7.49 (m, 1H), 6.55 (d, *J* = 9.0 Hz, 1H), 2.93 (d, *J* = 4.2 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.37, 152.65, 145.72, 144.02, 142.60, 132.64, 129.96, 126.01, 120.24,

114.33, 113.62, 113.01, 74.35, 29.80; **HRMS** for $C_{14}H_{11}IN_4O$: calcd. $(M+H)^+$: 379.0050, found: 379.0048

(1H-benzo[d][1,2,3]triazol-1-yl)(2-(methylamino)-5-trifluoromethoxy)phenyl)methanone (1h)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 94-95 °C; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.15 (d, *J* = 8.3 Hz, 1H), 8.10 (d, *J* = 8.3 Hz, 1H), 8.01 (d, *J* = 2.5 Hz, 1H), 7.66 (br s, 1H), 7.58-7.64 (m, 1H), 7.44-7.49 (m, 1H), 7.33 (dd, *J* = 9.3 Hz, 2.2 Hz, 1H),6.73 (d, *J* = 9.3 Hz, 1H), 2.95 (d, *J* = 5.0 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 166.59, 152.25, 145.70, 137.59, 132.62, 130.02, 129.85, 127.67, 126.05, 122.44, 120.26, 114.43, 112.20, 110.29, 29.98; **HRMS** for $C_{15}H_{11}F_3N_4O_2$: calcd. $(M+H)^+$: 337.0907, found: 337.0906

(1H-benzo[d][1,2,3]triazol-1-yl)(2-(ethylamino)phenyl)methanone (1i)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 103-104 °C; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.12-8.15 (m, 1H), 8.06-8.10 (m, 1H), 7.96 (dd, *J* = 8.3 Hz, 1.5 Hz, 1H), 7.54-7.61 (m, 2H), 7.38-7.46 (m, 2H), 6.75 (d, *J* = 8.6 Hz, 1H), 6.60-6.65 (m, 1H), 3.23-3.31 (m, 2H), 1.30 (t, *J* = 7.2 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 167.55, 152.73, 145.71, 136.12, 135.09, 132.80, 129.65, 125.73, 120.10, 114.64, 114.31, 111.68, 110.51, 37.66, 14.50; **HRMS** for $C_{15}H_{14}N_4O$: calcd. $(M+H)^+$: 267.1240, found: 267.1243

(1H-benzo[d][1,2,3]triazol-1-yl)(2-(benzylamino)phenyl)methanone (1j)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 116-117 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.15-8.17 (m, 1H), 8.09-8.11 (m, 1H), 7.99-8.02 (m, 2H), 7.58-7.62 (m, 1H), 7.44-7.48 (m, 1H), 7.29-7.40 (m, 5H), 7.22-7.26 (m, 1H), 6.74 (d, *J* = 8.3 Hz, 1H), 6.66-6.70 (m, 1H), 4.48 (d, *J* = 5.6 Hz, 2H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 167.67, 152.48, 145.75, 138.15, 136.10, 135.13, 132.80, 129.77, 128.85, 127.48, 127.21, 125.83, 120.15, 115.28, 114.40, 112.19, 111.22,47.28; **HRMS** for $C_{20}H_{16}N_4O$: calcd. $(M+H)^+$: 329.1397, found: 329.1397

(1H-benzo[d][1,2,3]triazol-1-yl)(2-(cyclopropylamino)phenyl)methanone (1k)

Yellow liquid; R_f 0.50 (10% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.10-8.13 (m, 1H), 8.04-8.08 (m, 1H), 7.94 (dd, *J* = 8.2 Hz, 1.4 Hz, 1H), 7.66 (br s, 1H), 7.54-7.59 (m, 1H), 7.39-7.46 (m, 2H), 7.18-7.21 (m, 1H), 6.65-6.70 (m, 1H), 2.46-2.53 (m, 1H), 0.75-0.82 (m, 2H), 0.52-0.57 (m, 2H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 167.48, 153.35, 145.69, 135.76, 134.73, 132.73, 129.72, 125.78, 120.09, 115.44, 114.33, 113.30, 111.03, 24.47, 7.72; **HRMS** for $C_{14}H_{16}N_4O$: calcd. $(M+H)^+$: 279.1240, found: 279.1239

(1H-benzo[d][1,2,3]triazol-1-yl)(2-fluoro-6-(methylamino)phenyl)methanone (1l)

Yellow solid; R_f 0.50 (20% EtOAc/hexane); Mp 126-127 °C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.19 (d, *J* = 8.2 Hz, 1H), 8.06 (d, *J* = 8.3 Hz, 1H), 7.58-7.62 (m, 1H), 7.42-7.46 (m, 1H),

7.31-7.37 (m, 1H), 6.47 (d, J = 8.6 Hz, 1H), 6.35-6.40 (m, 1H), 6.00 (br s, 1H), 2.84 (d, J = 5.0 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 165.37, 162.32 (d, J = 250.7 Hz), 151.58 (d, J = 4.8 Hz), 146.16, 135.58 (d, J = 11.8 Hz), 131.46, 130.08, 126.11, 120.32, 114.03, 106.86 (d, J = 2.7 Hz), 104.06 (d, J = 16.2 Hz), 102.92 (d, J = 22.6 Hz), 30.26; **HRMS** for $C_{14}H_{11}FN_4O$: calcd. $(M+H)^+$: 271.0990, found: 271.0984

(1H-benzo[d][1,2,3]triazol-1-yl)(2-chloro-6-(methylamino)phenyl)methanone (1m)

Yellow solid; R_f 0.50 (15% EtOAc/hexane); Mp 133-134 ^{o}C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 8.25-8.27 (m, 1H), 8.07-8.09 (m, 1H), 7.62-7.66 (m, 1H), 7.46-7.50 (m, 1H), 7.28 (t, J = 8.3 Hz, 1H), 6.74 (d, J = 8.6 Hz, 1H), 6.63 (d, J = 8.5 Hz, 1H), 4.71 (d, J = 4.4 Hz, 1H), 2.77 (d, J = 5.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 166.67, 149.28, 146.37, 133.43, 133.21, 131.15, 130.45, 126.45, 120.41, 117.79, 117.16, 114.20, 109.59, 30.39; **HRMS** for $C_{14}H_{11}ClN_4O$: calcd. $(M+H)^+$: 287.0694, found: 287.0695

Ethyl 1-methyl-3-oxo-2-phenylindoline-2-carboxylate (3a)

Yellow liquid; yield 86% (127 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.51 (d, J = 7.7 Hz, 1H), 7.43-7.49 (m, 1H), 7.27-7.32 (m, 5H), 6.80 (d, J = 8.3 Hz, 1H), 6.72 (t, J = 7.5 Hz, 1H), 4.15-4.26 (m, 2H), 2.97 (s, 3H), 1.18 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 194.35, 167.13, 161.31, 138.00, 133.83, 128.66, 128.53, 127.39, 125.87, 118.41, 118.16, 108.44, 79.96, 62.38, 30.10, 14.17; **HRMS** for $C_{18}H_{17}NO_3$: calcd. $(M+H)^+$: 296.1281, found: 296.1272

Ethyl 1,5-dimethyl-3-oxo-2-phenylindoline-2-carboxylate (3b)

Yellow liquid; yield 65% (100 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.25-7.32 (m, 7H), 6.72-6.74 (m, 1H), 4.13-4.26 (m, 2H), 2.95 (s, 3H), 2.20 (s, 3H), 1.17 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (125 MHz, $CDCl_3$) δ 194.38, 167.28, 159.93, 139.36, 134.01, 128.59, 128.44, 127.63, 127.39, 125.25, 118.48, 108.36, 80.21, 62.28, 30.16, 20.36, 14.18; **HRMS** for $C_{19}H_{19}NO_3$: calcd. $(M+H)^+$: 310.1438, found: 310.1437

Ethyl 6-fluoro-1-methyl-3-oxo-2-phenylindoline-2-carboxylate (3c)

Yellow solid; yield 35% (55 mg); R_f 0.50 (15% EtOAc/hexane); Mp 107-108 ^{o}C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.49-7.52 (m, 1H), 7.27-7.31 (m, 5H), 6.40-6.46 (m, 2H), 4.16-4.28 (m, 2H), 2.95 (s, 3H), 1.20 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 192.37, 170.13 (d, J = 255.0 Hz), 166.75, 162.92 (d, J = 14.0 Hz), 133.55, 128.75, 128.69, 128.20 (d, J = 12.6 Hz), 127.31, 114.95, 106.75 (d, J = 24.6 Hz), 95.30 (d, J = 26.6 Hz), 80.62, 62.54, 30.24, 14.15; **HRMS** for $C_{18}H_{16}FNO_3$: calcd. $(M+H)^+$: 314.1187, found: 314.1178

Ethyl 6-chloro-1-methyl-3-oxo-2-phenylindoline-2-carboxylate (3d)

Yellow solid; yield 58% (95 mg); R_f 0.50 (15% EtOAc/hexane); Mp 94-95 ^oC; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.50 (d, J = 8.2 Hz, 1H), 7.34-7.38 (m, 5H), 6.88 (d, J = 1.5 Hz, 1H), 6.76 (dd, J = 8.2 Hz, 1.6 Hz, 1H), 4.25-4.33 (m, 2H), 3.03 (s, 3H), 1.27 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 192.93, 166.69, 161.48, 144.72, 133.40, 128.77, 128.73, 127.28, 126.80, 118.95, 116.95, 108.60, 80.39, 62.65, 30.19, 14.15; **HRMS** for $C_{18}H_{16}ClNO_3$: calcd. $(M+H)^+$: 330.0891, found: 330.0892

Ethyl 5-bromo-1-methyl-3-oxo-2-phenylindoline-2-carboxylate (3e)

Yellow solid; yield 67% (125 mg); R_f 0.50 (15% EtOAc/hexane); Mp 74-75 ^oC; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.61 (s, 1H), 7.52 (dd, J = 8.7 Hz, 1.6 Hz, 1H), 7.26-7.31 (m, 5H), 6.72 (d, J = 8.7 Hz, 1H), 4.17-4.26 (m, 2H), 2.97 (s, 3H), 1.19 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 192.97, 166.66, 159.88, 140.40, 133.29, 128.77, 128.14, 127.28, 120.00, 110.23, 110.13, 80.33, 62.59, 30.20, 14.16; **HRMS** for $C_{18}H_{16}BrNO_3$: calcd. $(M+H)^+$: 374.0386, found: 374.0384

Ethyl 6-bromo-1-methyl-3-oxo-2-phenylindoline-2-carboxylate (3f)

Yellow solid; yield 71% (132 mg); R_f 0.50 (15% EtOAc/hexane); Mp 113-114 ^oC; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.43 (d, J = 8.1 Hz, 1H), 7.34-7.38 (m, 5H), 7.07 (s, 1H), 6.92 (dd, J = 8.2 Hz, 1.0 Hz, 1H), 4.25-4.33 (m, 2H), 3.03 (s, 3H), 1.27 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 193.15, 166.64, 161.44, 133.68, 133.34, 128.77, 128.74, 127.28, 126.81, 121.73, 117.32, 111.70, 80.27, 62.59, 30.18, 14.15; **HRMS** for $C_{18}H_{16}BrNO_3$: calcd. $(M+H)^+$: 374.0386, found: 374.0388

Ethyl 5-iodo-1-methyl-3-oxo-2-phenylindoline-2-carboxylate (3g)

Yellow liquid; yield 56% (118 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.80 (d, J = 1.7 Hz, 1H), 7.67 (dd, J = 8.6 Hz, 1.9 Hz, 1H), 7.25-7.31 (m, 5H), 6.63 (d, J = 8.6 Hz, 1H), 4.16-4.28 (m, 2H), 2.95 (s, 3H), 1.20 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 192.67, 166.64, 160.27, 145.81, 134.28, 133.28, 128.78, 127.29, 120.79, 110.71, 80.06, 78.79, 62.60, 30.13, 14.17; **HRMS** for $C_{18}H_{16}INO_3$: calcd. $(M+H)^+$: 422.0248, found: 422.0247

Ethyl 1-methyl-3-oxo-2-phenyl-5-(trifluoromethoxy)indoline-2-carboxylate (3h)

Yellow liquid; yield 66% (125 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.37 (br s, 1H), 7.26-7.34 (m, 6H), 6.80 (d, J = 8.8 Hz, 1H), 4.19-4.27 (m, 2H), 2.99 (s, 3H), 1.20 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (125 MHz, $CDCl_3$) δ 193.47, 166.64, 159.57, 141.06, 133.27, 131.71, 128.80, 127.29, 120.62 (q, J = 254.6 Hz), 118.54, 118.23, 109.20,

80.71, 62.65, 30.28, 14.14; **HRMS** for $C_{19}H_{16}F_3NO_4$: calcd. $(M+H)^+$: 380.1104, found: 380.1104

Ethyl 1-ethyl-3-oxo-2-phenylindoline-2-carboxylate (3i)

Yellow liquid; yield 57% (88 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.52 (br d, J = 7.7 Hz, 1H), 7.42-7.48 (m, 1H), 7.21-7.29 (m, 5H), 6.81 (d, J = 8.3 Hz, 1H), 6.71 (t, J = 7.3 Hz, 1H), 4.16-4.27 (m, 2H), 3.40-3.53 (m, 2H), 1.20 (t, J = 7.1 Hz, 3H), 1.03 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.90, 168.06, 160.40, 137.91, 134.52, 128.69, 128.53, 127.51, 126.05, 118.47, 117.93, 108.63, 79.69, 62.39, 39.07, 14.05, 13.05; **HRMS** for $C_{19}H_{19}NO_3$: calcd. $(M+H)^+$: 310.1438, found: 310.1429

Ethyl 1-benzyl-3-oxo-2-phenylindoline-2-carboxylate (3j)

Yellow solid; yield 60% (111 mg); R_f 0.50 (15% EtOAc/hexane); Mp 129-130 ^{o}C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.58 (d, J = 7.7 Hz, 1H), 7.34-7.38 (m, 1H), 7.27-7.30 (m, 3H), 7.21-7.24 (m, 2H), 7.13-7.20 (m, 3H), 7.03-7.05 (m, 2H), 6.75 (t, J = 7.5 Hz, 1H), 6.61 (d, J = 8.3 Hz, 1H), 4.68, 4.59 (AB_q, J = 17.0 Hz, 2H), 3.90-4.05 (m, 2H), 1.05 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.51, 167.60, 160.90, 137.89, 137.11, 134.33, 128.89, 128.65, 128.54, 127.57, 127.18, 126.46, 125.89, 118.78, 118.67, 109.57, 80.24, 62.40, 48.45, 13.82; **HRMS** for $C_{24}H_{21}NO_3$: calcd. $(M+H)^+$: 372.1594, found: 372.1594

Ethyl 1-cyclopropyl-3-oxo-2-phenylindoline-2-carboxylate (3k)

Yellow liquid; yield 24% (39 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.46-7.53 (m, 2H), 7.31-7.35 (m, 2H), 7.20-7.26 (m, 4H), 6.78-6.83 (m, 1H), 4.16-4.23 (m, 2H), 2.43-2.50 (m, 1H), 1.18 (t, J = 7.1 Hz, 3H), 0.68-0.86 (m, 2H), 0.51-0.61 (m, 2H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 195.43, 167.44, 162.88, 137.65, 135.42, 128.41, 128.31, 127.84, 125.64, 119.57, 119.44, 11.32, 80.96, 62.22, 26.97, 14.17, 6.73, 5.15; **HRMS** for $C_{20}H_{19}NO_3$: calcd. $(M+H)^+$: 322.1438, found: 322.1436

Ethyl 2-(3-methoxyphenyl)-1-methyl-3-oxoindoline-2-carboxylate (3l)

Yellow liquid; yield 63% (102 mg); R_f 0.50 (20% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.51 (d, J = 7.7 Hz, 1H), 7.46 (t, J = 7.4 Hz, 1H), 7.21 (t, J = 7.9 Hz, 1H), 6.79-6.90 (m, 4H), 6.72 (t, J = 7.4 Hz, 1H), 4.15-4.27 (m, 2H), 3.72 (s, 3H), 2.98 (s, 3H), 1.19 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.13, 167.01, 161.25, 159.74, 138.00, 135.25, 129.65, 125.87, 119.64, 118.34, 118.16, 113.72, 113.57, 108.43, 79.82, 62.38, 55.31, 30.13, 14.17; **HRMS** for $C_{19}H_{19}NO_4$: calcd. $(M+H)^+$: 326.1387, found: 326.1383

Ethyl 2-(4-methoxyphenyl)-1-methyl-3-oxoindoline-2-carboxylate (3m)

Yellow liquid; yield 65% (106 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.51 (br d, J = 7.7 Hz, 1H), 7.43-7.48 (m, 1H), 7.21-7.26 (m, 2H), 6.78-6.85 (m, 2H

& br s, 1H merged), 6.68-6.74 (m, 1H), 4.14-4.25 (m, 2H), 3.72 (s, 3H), 2.96 (s, 3H), 1.18 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.77, 167.33, 161.24, 159.78, 137.95, 128.69, 125.84, 125.77, 118.38, 118.07, 114.13, 108.40, 79.57, 62.33, 55.31, 30.01, 14.17; **HRMS** for $C_{19}H_{19}NO_4$: calcd. $(M+H)^+$: 326.1387, found: 326.1388

Ethyl 2-(4-fluorophenyl)-1-methyl-3-oxoindoline-2-carboxylate (3n)

Yellow liquid; yield 59% (92 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.45-7.52 (m, 2H), 7.32-7.36 (m, 2H), 6.99 (t, *J* = 8.3 Hz, 2H), 6.82 (d, *J* = 8.2 Hz, 1H), 6.73 (t, *J* = 7.2 Hz, 1H), 4.15-4.25 (m, 2H), 3.73 (s, 3H), 2.97 (s, 3H), 1.17 (t, *J* = 6.8 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 194.24, 167.04, 162.91 (d, *J* = 246.1 Hz), 161.36, 138.11, 129.46 (d, *J* = 3.1 Hz), 129.30 (d, *J* = 8.2 Hz), 125.93, 118.45, 118.35, 115.57 (d, *J* = 21.5 Hz), 108.59, 79.39, 62.50, 30.19, 14.16; **HRMS** for $C_{18}H_{16}FNO_3$: calcd. $(M+H)^+$: 314.1187, found: 314.1182

Ethyl 2-(benzo[d][1,3]dioxol-5-yl)-1-methyl-3-oxoindoline-2-carboxylate (3o)

Yellow solid; yield 68% (115 mg); R_f 0.50 (15% EtOAc/hexane); Mp 87-88 ^{o}C; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.44-7.52 (m, 2H), 6.70-6.83 (m, 5H), 5.88 (s, 2H), 4.14-4.25 (m, 2H), 2.96 (s, 3H), 1.18 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 194.45, 167.16, 161.17, 147.99, 147.93, 137.99, 127.31, 125.89, 120.84, 118.33, 118.22, 108.43, 108.29, 108.18 101.29, 79.59, 62.39, 30.04, 14.16; **HRMS** for $C_{19}H_{17}NO_5$: calcd. $(M+H)^+$: 340.1179, found: 340.1175

Ethyl 2-(4-methoxyphenyl)-1,5-dimethyl-3-oxoindoline-2-carboxylate (3p)

Yellow liquid; yield 69% (117 mg); R_f 0.50 (20% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.27-7.30 (m, 2H), 7.22-7.25 (m, 2H), 6.80-6.83 (m, 2H), 6.72 (d, *J* = 8.2 Hz, 1H), 4.14-4.23 (m, 2H), 3.72 (s, 3H), 2.93 (s, 3H), 2.21 (s, 3H), 1.17 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.81, 167.47, 159.86, 159.72, 139.32, 128.68, 127.52, 125.94, 125.22, 118.45, 114.07, 108.31, 79.82, 62.24, 55.30, 30.08, 20.37, 14.19; **HRMS** for $C_{20}H_{21}NO_4$: calcd. $(M+H)^+$: 340.1543, found: 340.1541

Ethyl 2-(benzo[d][1,3]dioxol-5-yl)-1,5-dimethyl-3-oxoindoline-2-carboxylate (3q)

Yellow liquid; yield 72% (127 mg); R_f 0.50 (20% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.28-7.30 (m, 2H), 6.83 (d, *J* = 1.8 Hz, 1H), 6.76-6.78 (m, 1H), 6.70-6.73 (m, 2H), 5.87 (s, 2H), 4.12-4.25 (m, 2H), 2.93 (s, 3H), 2.20 (s, 3H), 1.17 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.50, 167.31, 159.78, 147.94, 147.85, 139.37, 127.70, 127.48, 125.27, 120.81, 118.38, 108.36, 108.24, 108.20, 101.26, 79.83, 62.31, 30.10, 20.37, 14.18; **HRMS** for $C_{20}H_{19}NO_5$: calcd. $(M+H)^+$: 354.1336, found: 354.1337

Ethyl 4-fluoro-2-(4-methoxyphenyl)-1-methyl-3-oxoindoline-2-carboxylate (3r)

Yellow solid; yield 42% (72 mg); R_f 0.50 (25% EtOAc/hexane); Mp 83-84 ^oC; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.37-7.41 (m, 1H), 7.23 (d, *J* = 8.8 Hz, 2H), 6.83 (d, *J* = 8.8 Hz, 2H), 6.54 (d, *J* = 8.3 Hz, 1H), 6.32 (t, *J* = 8.6 Hz, 1H), 4.18-4.25 (m, 2H), 3.73 (s, 3H), 2.96 (s, 3H), 1.20 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 190.78, 166.90, 161.97 (d, *J* = 5.7 Hz), 160.28 (d, *J* = 261.9 Hz), 159.92, 139.50 (d, *J* = 10.2 Hz), 128.71, 125.31, 114.19, 107.03 (d, *J* = 17.4 Hz), 104.33 (d, *J* = 19.0 Hz), 104.15, 79.93, 62.54, 55.33, 30.38, 14.16; **HRMS** for $C_{19}H_{18}FNO_4$: calcd. $(M+H)^+$: 344.1293, found: 344.1284

Ethyl 2-(benzo[d][1,3]dioxol-5-yl)-4-fluoro-1-methyl-3-oxoindoline-2-carboxylate (3s)

Yellow liquid; yield 42% (75 mg); R_f 0.50 (25% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.36-7.42 (m, 1H), 6.82 (s, 1H), 6.70-6.76 (m, 2H), 6.54 (d, *J* = 8.2 Hz, 1H), 6.32 (t, *J* = 8.5 Hz, 1H), 5.88 (s, 2H), 4.17-4.24 (m, 2H), 2.95 (s, 3H), 1.19 (t, *J* = 7.0 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 190.48, 166.74, 161.90 (d, *J* = 6.0 Hz), 160.30 (d, *J* = 262.0 Hz), 148.08, 148.06, 139.57 (d, *J* = 10.4 Hz), 126.82, 120.85, 108.31, 108.18, 106.96 (d, *J* = 17.2 Hz), 104.49 (d, *J* = 18.8 Hz),104.18 (d, *J* = 3.6 Hz), 101.36, 79.93, 62.61, 30.40, 14.15; **HRMS** for $C_{19}H_{16}FNO_5$: calcd. $(M+H)^+$: 358.1085, found: 358.1085

Ethyl 4-chloro-2-(4-methoxyphenyl)-1-methyl-3-oxoindoline-2-carboxylate (3t)

Yellow solid; yield 44% (79 mg); R_f 0.50 (25% EtOAc/hexane); Mp 109-110 ^oC; **^{1}H NMR** (400 MHz, $CDCl_3$) δ7.32 (t, *J* = 8.1 Hz, 1H), 7.23-7.26 (m, 2H), 6.81-6.85 (m, 2H), 6.67 (d, *J* = 8.3 Hz, 1H), 6.64 (d, *J* = 7.7 Hz, 1H), 4.14-4.27 (m, 2H), 3.73 (s, 3H), 2.96 (s, 3H), 1.19 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 191.72, 166.92, 162.31, 159.90, 137.83, 133.70, 128.68, 125.38, 119.26, 115.06, 114.15, 106.62, 79.85, 62.52, 55.33, 30.27, 14.17; **HRMS** for $C_{19}H_{18}ClNO_4$: calcd. $(M+H)^+$: 360.0997, found: 360.0988

Ethyl 6-chloro-2-(4-methoxyphenyl)-1-methyl-3-oxoindoline-2-carboxylate (3u)

Yellow solid; yield 50% (90 mg); R_f 0.50 (20% EtOAc/hexane); Mp 116-117 ^oC; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.40 (d, *J* = 8.2 Hz, 1H), 6.18 (d, *J* = 8.8 Hz, 2H), 6.80 (d, *J* = 8.9 Hz, 2H), 6.76 (d, *J* = 1.2 Hz, 1H), 6.66 (dd, *J* = 8.2 Hz, 1.4 Hz, 1H), 4.12-4.24 (m, 2H), 3.70 (s, 3H), 2.91 (s, 3H), 1.17 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz,$CDCl_3$) δ 193.34, 166.88, 161.41, 159.92, 144.66, 128.61, 126.77, 125.33, 118.84, 116.93, 114.23, 108.55, 80.04, 62.52, 55.32, 30.09, 14.15; **HRMS** for $C_{19}H_{18}ClNO_4$: calcd. $(M+H)^+$: 360.0997, found: 360.0988

Ethyl 2-(benzo[d][1,3]dioxol-5-yl)-6-bromo-1-methyl-3-oxoindoline-2-carboxylate (3v)

Yellow solid; yield 48% (100 mg); R_f 0.50 (20% EtOAc/hexane); Mp 161-162 ^oC; **^{1}H NMR** (500 MHz, $CDCl_3$) δ 7.34 (d, *J* = 7.6 Hz, 1H), 6.97 (s, 1H), 6.84 (d, *J* = 7.4 Hz, 1H), 6.79 (s,

1H), 6.71 (s, 2H), 5.88 (s, 2H), 4.20 (t, *J* = 6.6 Hz, 2H), 2.93 (s, 3H), 1.18 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz,$CDCl_3$) δ 193.25, 166.67, 161.30, 148.10, 133.68, 126.82, 126.78, 121.78, 120.76, 117.23, 111.70, 108.36, 108.05, 101.38, 79.91, 62.61, 30.11, 14.15; **HRMS** for $C_{19}H_{16}BrNO_5$: calcd. $(M+H)^+$: 418.0285, found: 418.0291

Ethyl 2-(benzo[d][1,3]dioxol-5-yl)-1-methyl-3-oxo-5-(trifluoromethoxy)indoline-2-carboxylate (3w)

Yellow liquid; yield 72% (152 mg); R_f 0.50 (20% EtOAc/hexane); **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.36 (br s, 1H), 7.30-7.33 (m, 1H), 6.71-6.79 (m, 4H), 5.88 (s, 2H), 4.17-4.25 (m, 2H), 2.97 (s, 3H), 1.19 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz,$CDCl_3$) δ 193.58, 166.67, 159.43, 148.13, 141.07, 131.71, 126.67, 120.78, 120.61 (q, *J* = 255.2 Hz), 118.45, 118.25, 109.20,108.38, 108.03, 101.40, 80.34, 62.66, 30.21, 14.13; **HRMS** for $C_{20}H_{16}F_3NO_6$: calcd. $(M+H)^+$: 424.1002, found: 424.1000

tert-Butyl 3-(2-(ethoxycarbonyl)-1-methyl-3-oxoindolin-2-yl)-1H-indole-1-carboxylate (3x)

Yellow liquid; yield 50% (108 mg); R_f 0.50 (20% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.07 (d, *J* = 8.3 Hz, 1H), 7.92 (s, 1H), 7.58 (d, *J* = 7.7 Hz, 1H), 7.49-7.55 (m, 1H), 7.15-7.21 (m, 1H, merged with solvent peak), 6.91-7.00 (m, 2H), 6.81 (d, *J* = 8.3 Hz, 1H), 6.76 (t, *J* = 7.6 Hz, 1H), 4.25 (q, *J* = 7.2 Hz, 2H), 2.89 (s, 3H), 1.60 (s, 9H), 1.23 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz,$CDCl_3$) δ 193.94, 166.25, 161.20, 149.32, 138.47, 135.55, 127.90, 127.58, 125.75, 124.72, 122.98, 119.76, 118.44, 118.08, 115.35, 113.34, 108.54, 84.11, 62.63, 29.53, 28.17, 14.17; **HRMS** for $C_{25}H_{26}N_2O_5$: calcd. $(M+H)^+$: 435.1914, found: 435.1912

Ethyl 1-ethyl-2-(3-methoxyphenyl)-3-oxoindoline-2-carboxylate (3y)

Yellow liquid; yield 68% (115 mg); R_f 0.50 (20% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.51-7.54 (m, 1H), 7.43-7.48 (m, 1H), 7.18-7.23 (m, 1H, merged with solvent peak), 6.78-6.84 (m, 4H), 6.69-6.74 (m, 1H), 4.16-4.26 (m, 2H), 3.72 (s, 3H), 3.43-3.52 (m, 2H), 1.21 (t, *J* = 7.1 Hz, 3H), 1.05 (t, *J* = 7.1 Hz, 3H); **^{13}C NMR** (125 MHz,$CDCl_3$) δ 194.64, 167.92, 160.37, 159.74, 137.89, 135.93, 129.68, 126.05, 119.83, 118.46, 117.94, 113.69, 108.65, 79.56, 62.37, 55.30, 39.14, 14.05, 13.08; **HRMS** for $C_{20}H_{21}NO_4$: calcd. $(M+H)^+$: 340.1543, found: 340.1549

Ethyl 1-benzyl-2-(4-methoxyphenyl)-3-oxoindoline-2-carboxylate (3z)

Yellow solid; yield 54% (108 mg); R_f 0.50 (20% EtOAc/hexane); Mp 141-142 ^{o}C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.57 (d, *J* = 7.6 Hz, 1H), 7.35 (t, *J* = 7.8 Hz, 1H), 7.14-7.18 (m, 4H), 7.05 (d, *J* = 6.9 Hz, 2H), 6.82 (d, *J* = 8.7 Hz, 2H), 6.74 (t, *J* = 7.4 Hz, 1H), 6.59 (d, *J* = 8.2

Hz, 1H), 4.65, 4.57 (AB_q, J = 17.0 Hz, 2H), 3.89-4.05 (m, 2H), 3.72 (s, 3H), 1.05 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 194.94, 167.79, 160.86, 159.85, 137.84, 137.20, 128.93, 128.55, 127.18, 126.54, 126.23, 125.86, 118.79, 118.58, 114.39, 109.55, 79.90, 62.36, 55.34, 48.40, 13.85; **HRMS** for $C_{25}H_{23}NO_4$: calcd. $(M+H)^+$: 402.1700, found: 402.1700

Ethyl 2-(benzo[d][1,3]dioxol-5-yl)-1-benzyl-3-oxoindoline-2-carboxylate (3za)

Yellow solid; yield 53% (110 mg); R_f 0.50 (20% EtOAc/hexane); Mp 118-119 ^{o}C; **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.57 (d, J = 7.4 Hz, 1H), 7.35 (t, J = 7.6 Hz, 1H), 7.14-7.19 (m, 3H), 7.06 (d, J = 7.0 Hz, 2H), 6.77-6.70 (m, 4H), 6.60 (d, J = 8.2 Hz, 1H), 5.87 (d, J = 3.5 Hz, 2H), 4.66, 4.58 (AB_q, J = 17.1 Hz, 2H), 3.86-4.02 (m, 2H), 1.03 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 194.61, 167.60, 160.76, 148.12, 148.01, 137.92, 137.09, 128.56, 127.72, 127.20, 126.48, 125.92, 121.19, 118.69, 118.65, 109.53, 108.55, 108.22, 101.36, 79.82, 62.43, 48.29, 13.81; **HRMS** for $C_{25}H_{21}NO_5$: calcd. $(M+H)^+$: 416.1492, found: 416.1502

Ethyl 1,2-dimethyl-3-oxoindoline-2-carboxylate (3zb)

Yellow liquid; yield 17% (20 mg); R_f 0.50 (15% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.50-7.53 (m, 1H), 7.40-7.45 (m, 1H), 6.66-6.74 (m, 2H), 4.04-4.15 (m, 2H), 2.90 (s, 3H), 1.50 (s, 3H), 1.13 (t, J = 7.1 Hz, 3H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 196.55, 167.88, 161.11, 137.88, 125.47, 118.60, 117.72, 108.58, 74.01, 62.07, 28.80, 17.58, 14.14; **HRMS** for $C_{13}H_{15}NO_3$: calcd. $(M+H)^+$: 234.1125, found: 234.1121

Diethyl 1-methyl-3-oxoindoline-2,2-dicarboxylate (3zc)

Yellow liquid; yield 15% (22 mg); R_f 0.50 (25% EtOAc/hexane); **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.50-7.54 (m, 1H), 7.41-7.47 (m, 1H), 6.70-6.78 (m, 2H), 4.23 (q, J = 7.1 Hz, 4H), 3.08 (s, 3H), 1.22 (t, J = 7.1 Hz, 6H); **^{13}C NMR** (75 MHz, $CDCl_3$) δ 188.38, 163.87, 161.40, 138.23, 125.77, 118.58, 118.48, 108.93, 79.43, 62.86, 39.48, 14.03; **HRMS** for $C_{15}H_{17}NO_5$: calcd. $(M+H)^+$: 292.1179, found: 292.1180

3. References

[1] (a) N. Kanişkan, Ş. Kökten and İ. Çelic, *ARKIVOC*, 2012, **8**, 198-213; (b) Ş. Kökten and İ. Çelic, *Synthesis*, 2013, **45**, 2551-2556.

[2] (a) S. Bachmann, D. Fielenbach and K. A. Jorgensen, *Org. Biomol. Chem.,* 2004, **2**, 3044-3049; (b) Q. Lefebvre, E. Fava, P. Nikolaienko and M. Rueping, *Chem. Commun.,* 2014, **50**, 6617-6619; (c) S. M. Nicolle, W. Lewis, C. J. Hayes and C. J. Moody, *Angew. Chem., Int. Ed.*, 2016, **55**, 3749-3753; (d) X. Luo, G. Chen, L. He and X. Huang, *J. Org. Chem.,* 2016, **81**, 2943-2949; (e) G.-F. Zha, J.-B. Han, X.-Q. Hu, H.-L. Qin, W.-Y.Fang and C.-P. Zhang, *Chem. Commun.,* 2016, **52**, 7458-7461; (f) V. Kanchupalli and S. Katukojvala, *Angew. Chem., Int. Ed.,* 2018, **57**, 5433-5437.

4. Copies of ^{1}H and ^{13}C NMR Spectra

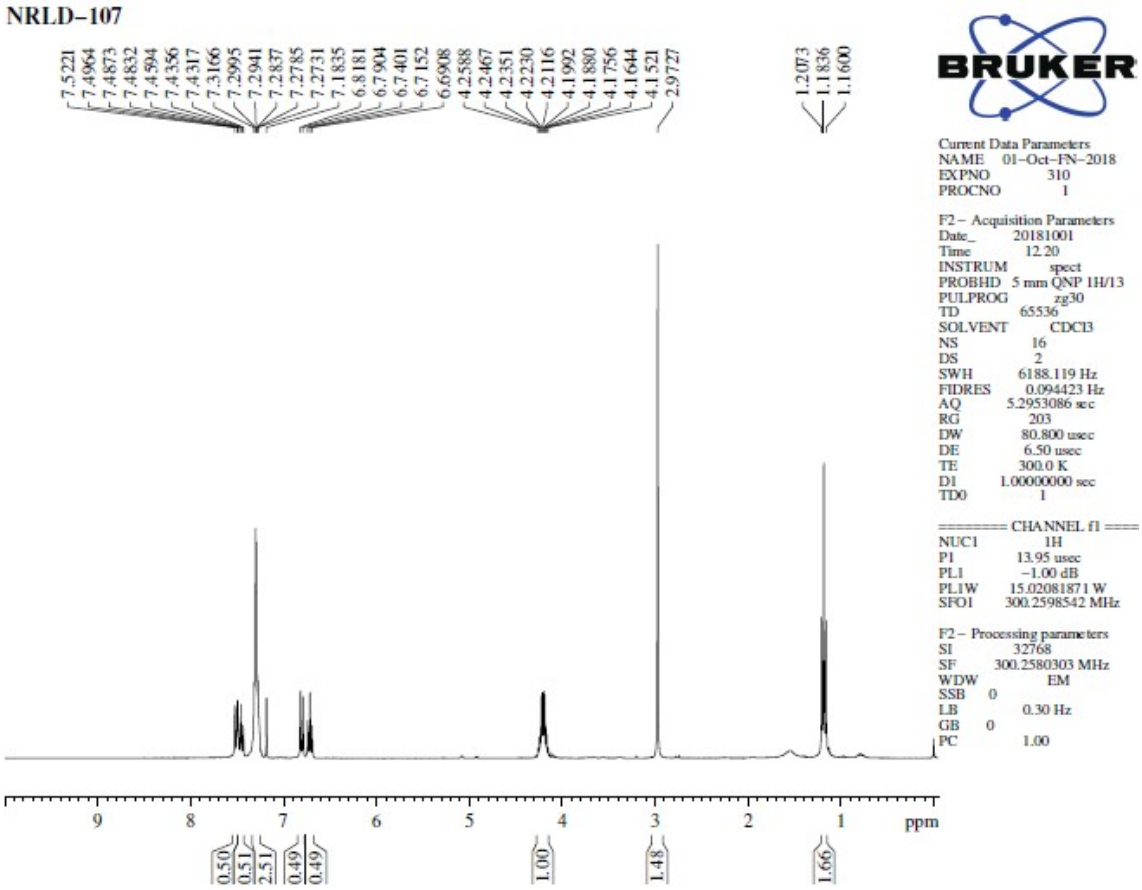

Figure 1: ^{1}H NMR spectrum of 3a

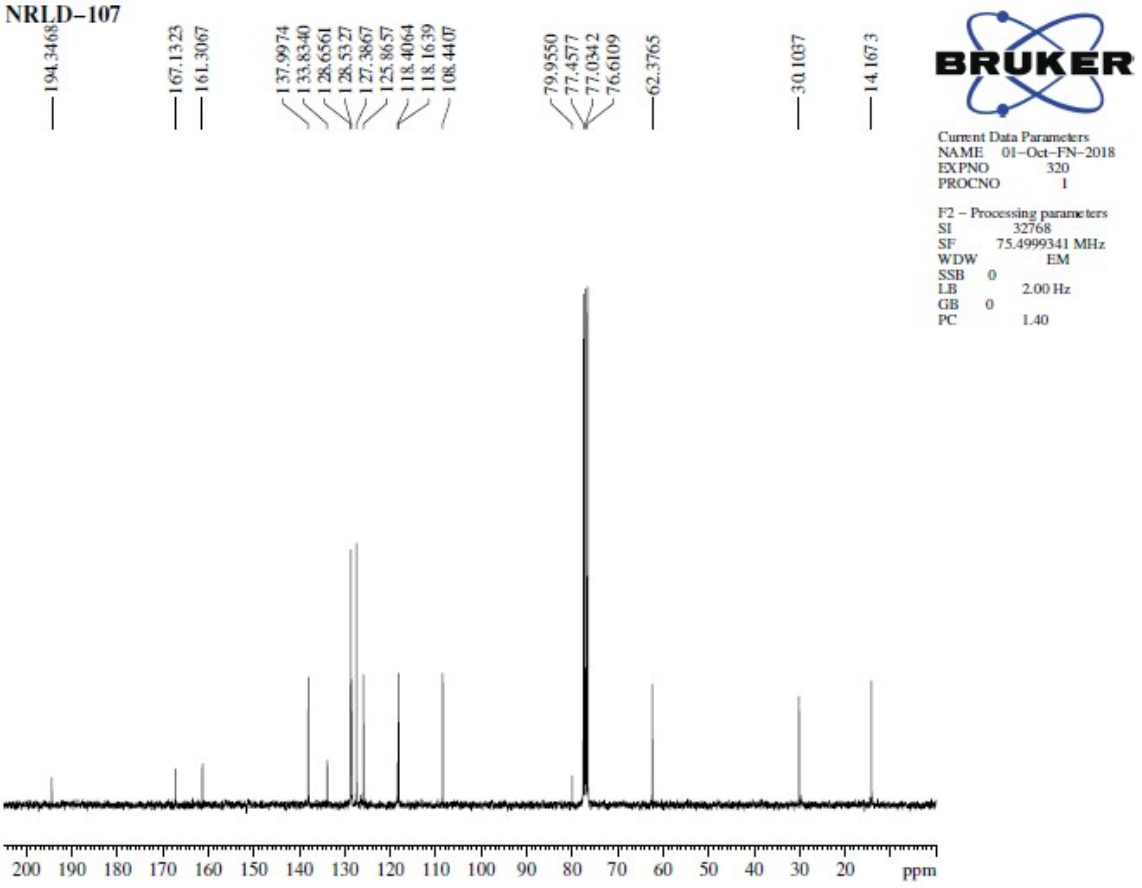

Figure 2: ^{13}C NMR spectrum of 3a

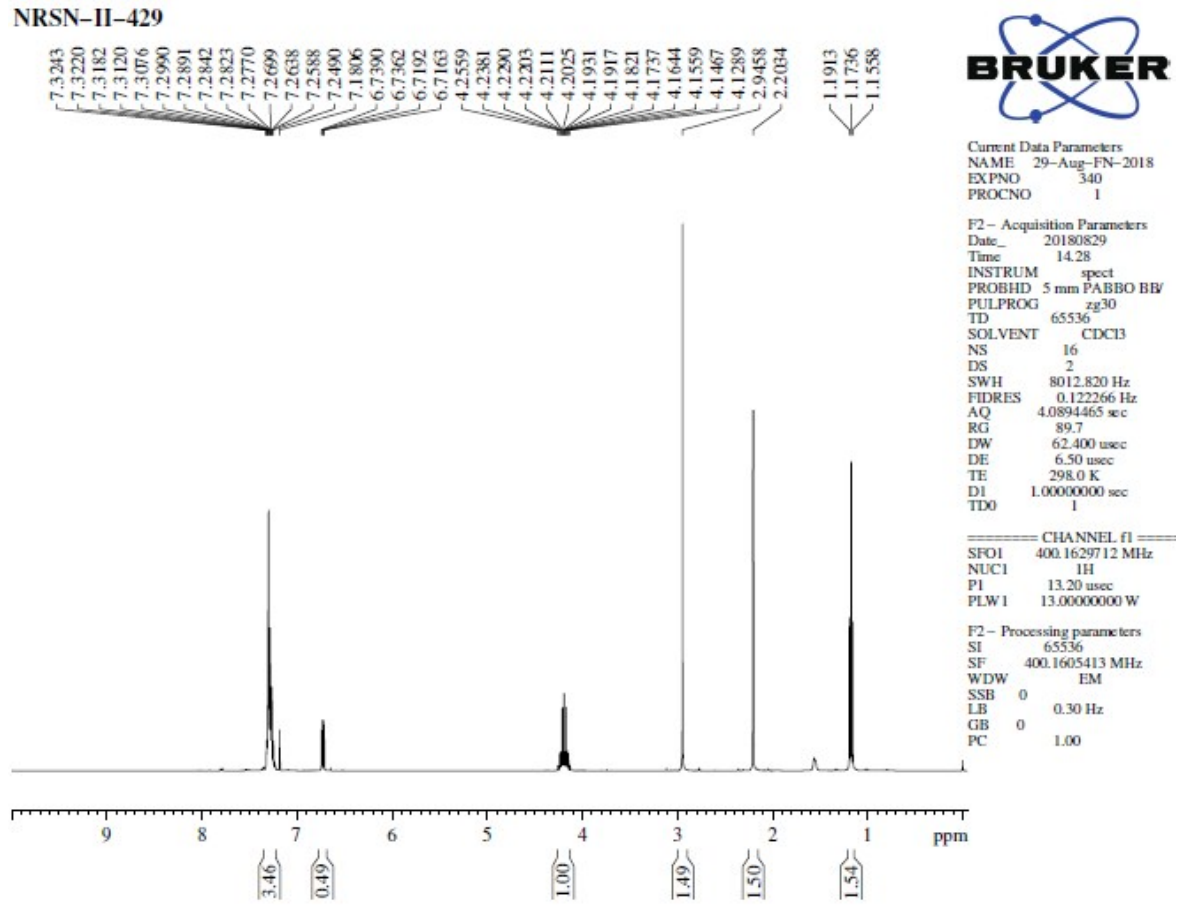

Figure 3: ^{1}H NMR spectrum of 3b

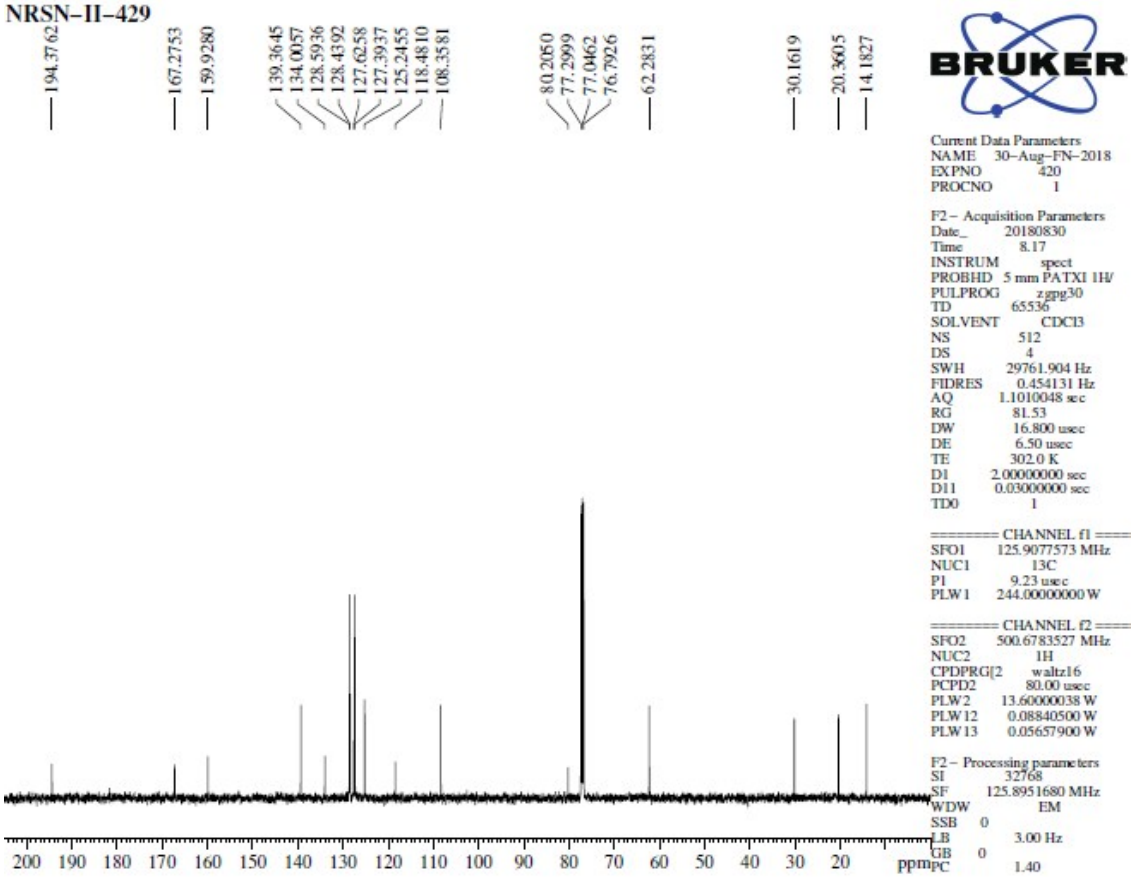

Figure 4: ^{13}C NMR spectrum of 3b

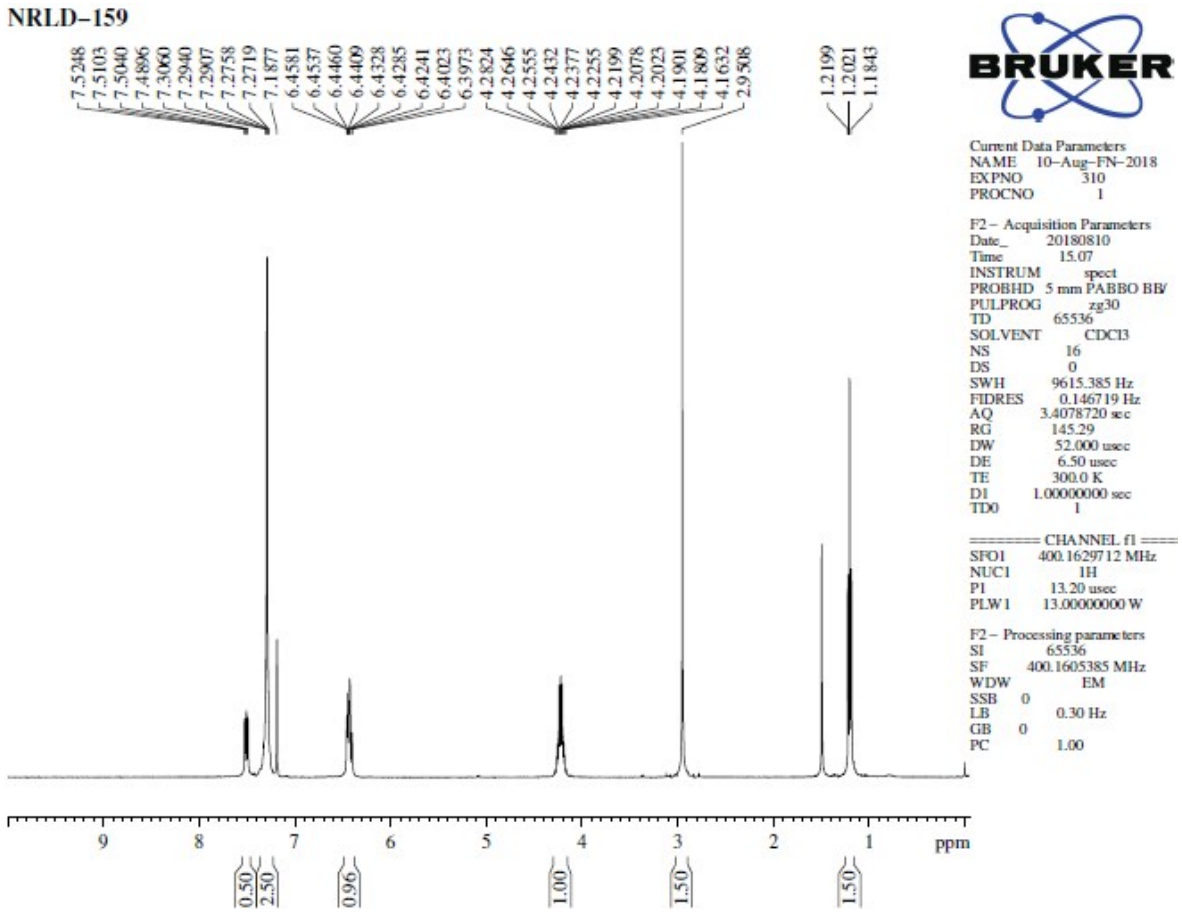

Figure 5: ^{1}H NMR spectrum of 3c

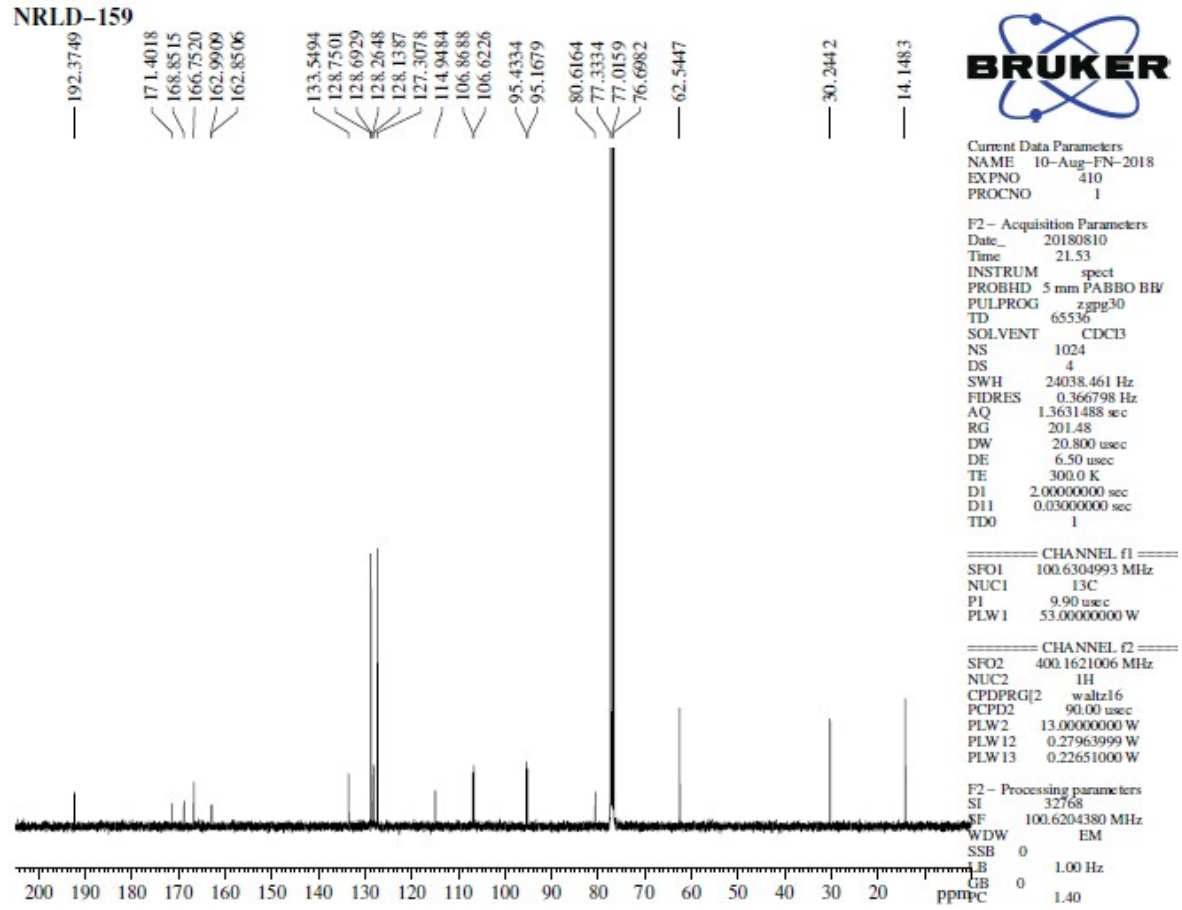

Figure 6: ^{13}C NMR spectrum of 3c

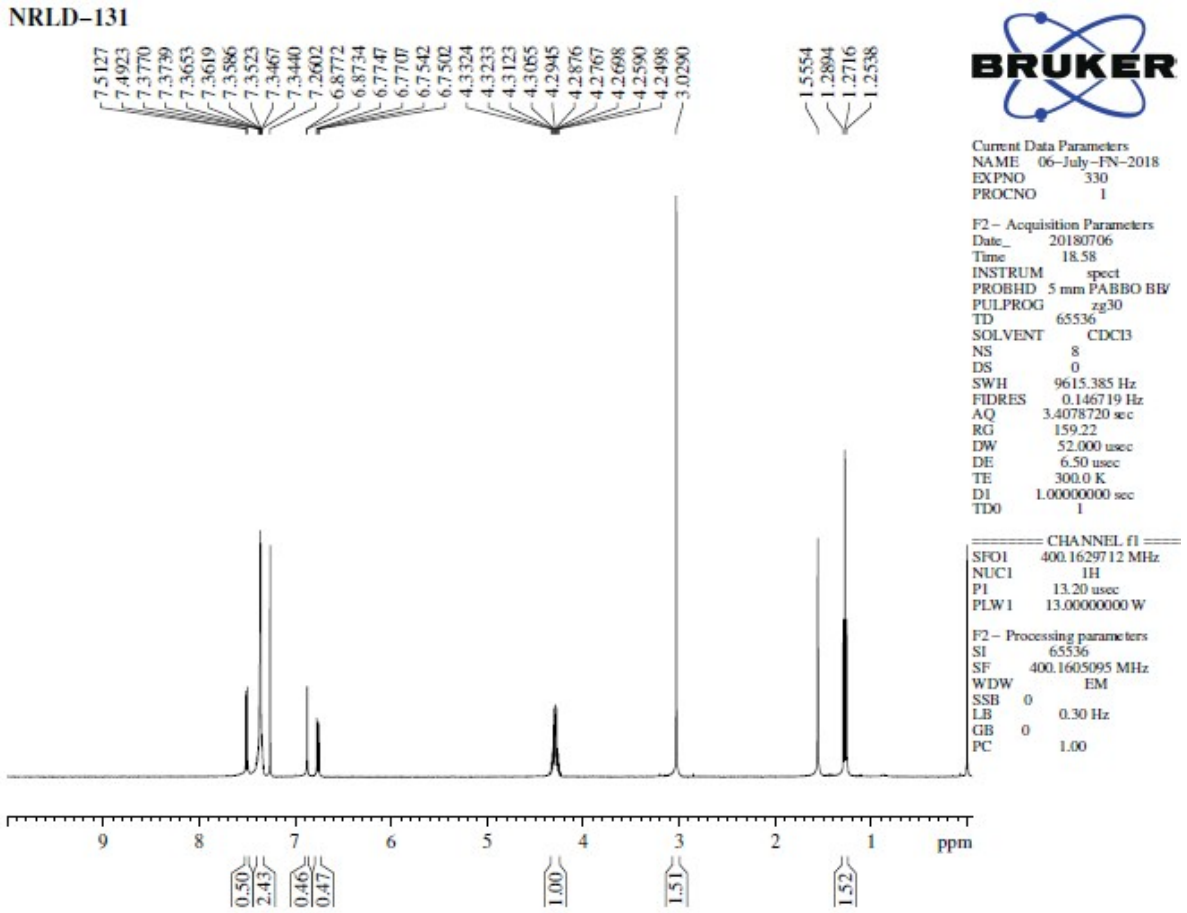

Figure 7: ^{1}H NMR spectrum of 3d

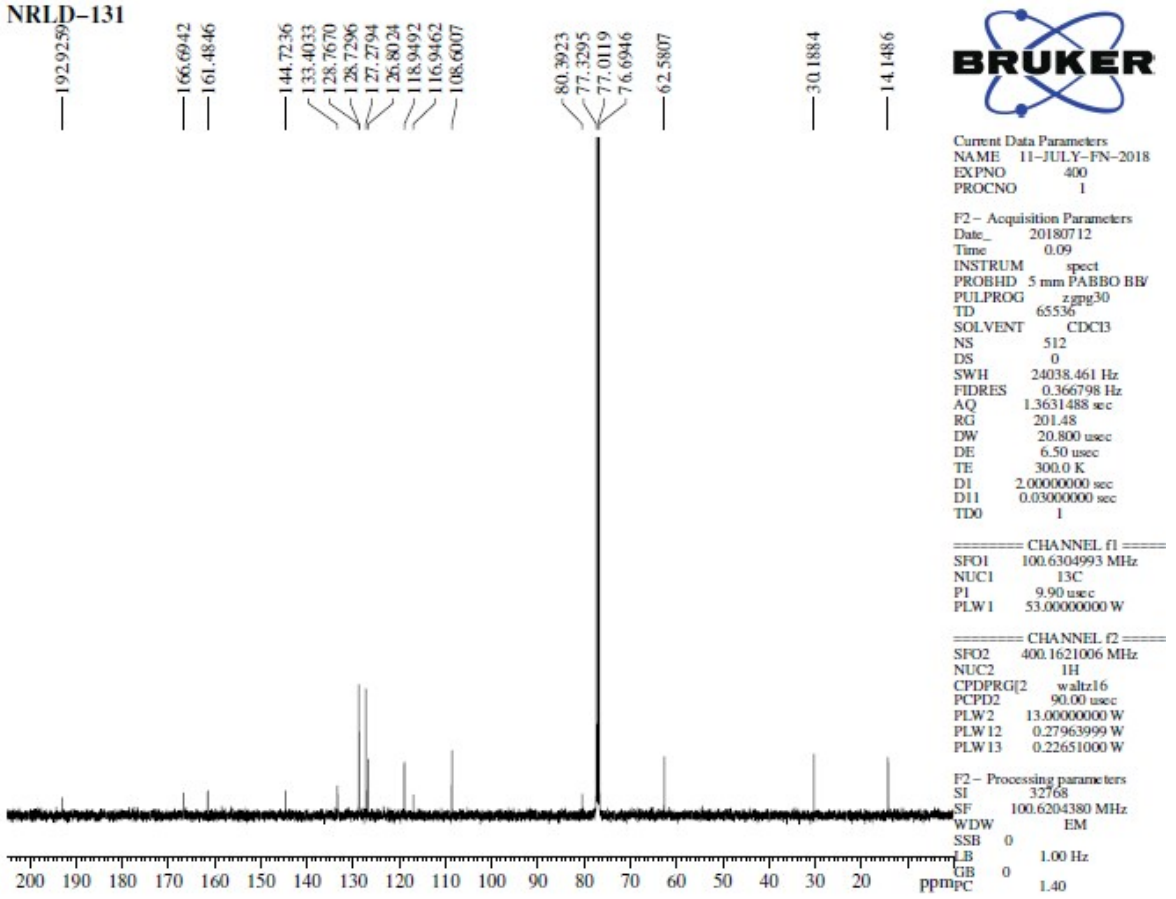

Figure 8: ^{13}C NMR spectrum of 3d

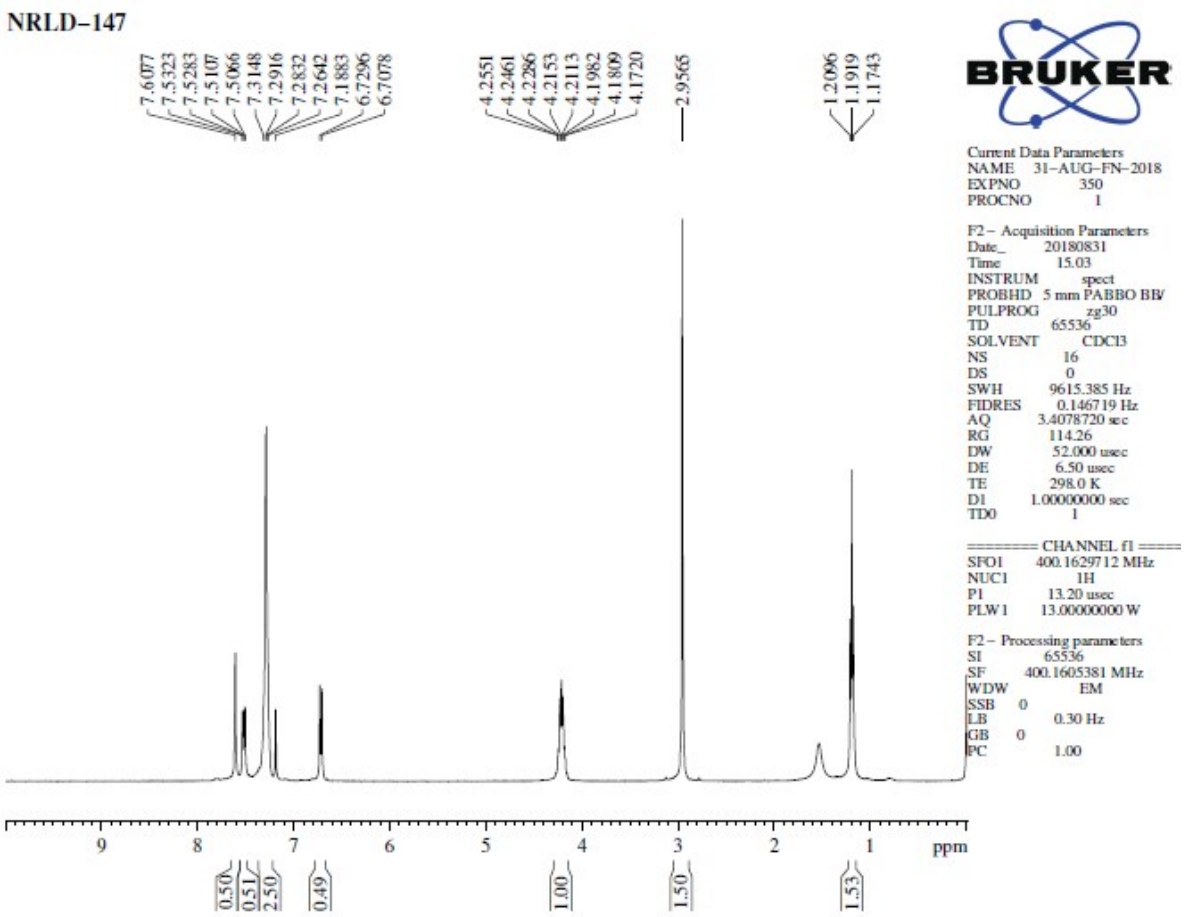

Figure 9: ^{1}H NMR spectrum of 3e

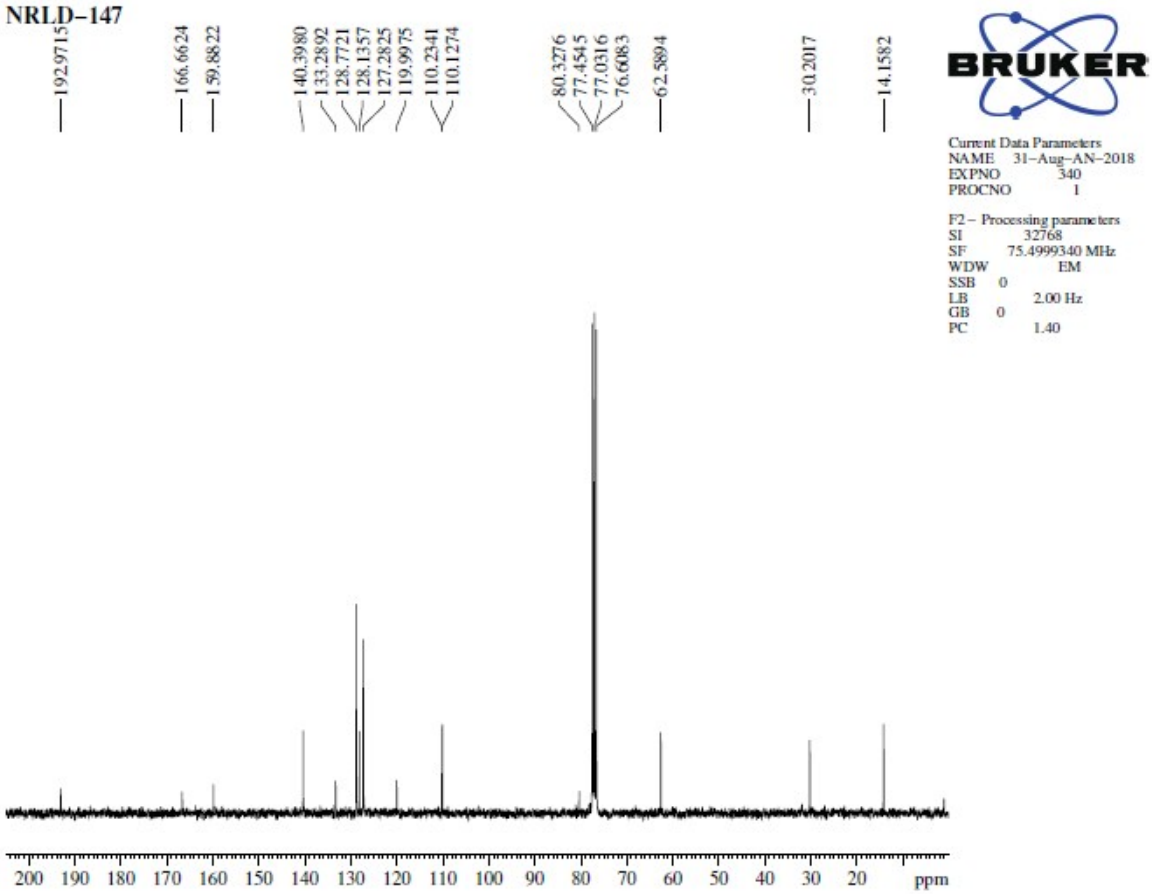

Figure 10: ^{13}C NMR spectrum of 3e

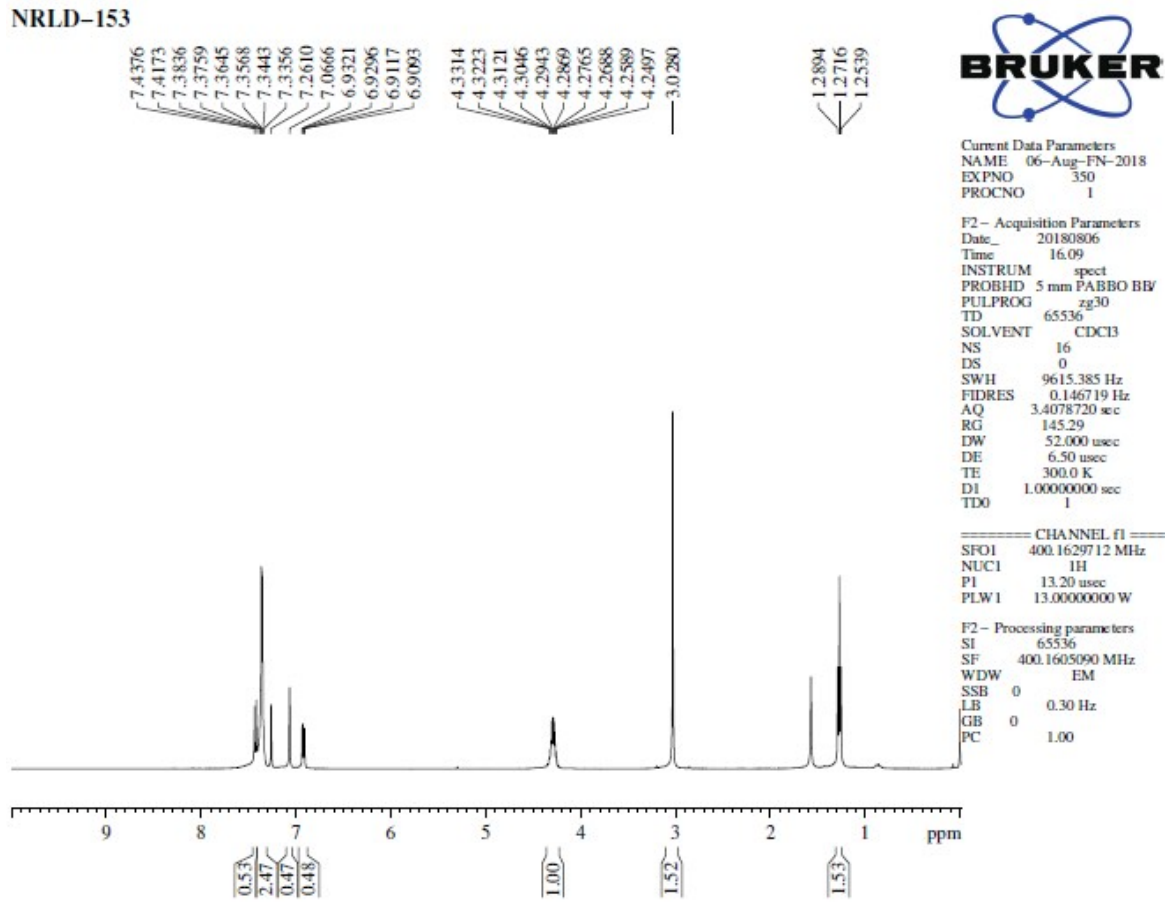

Figure 11: ^{1}H NMR spectrum of 3f

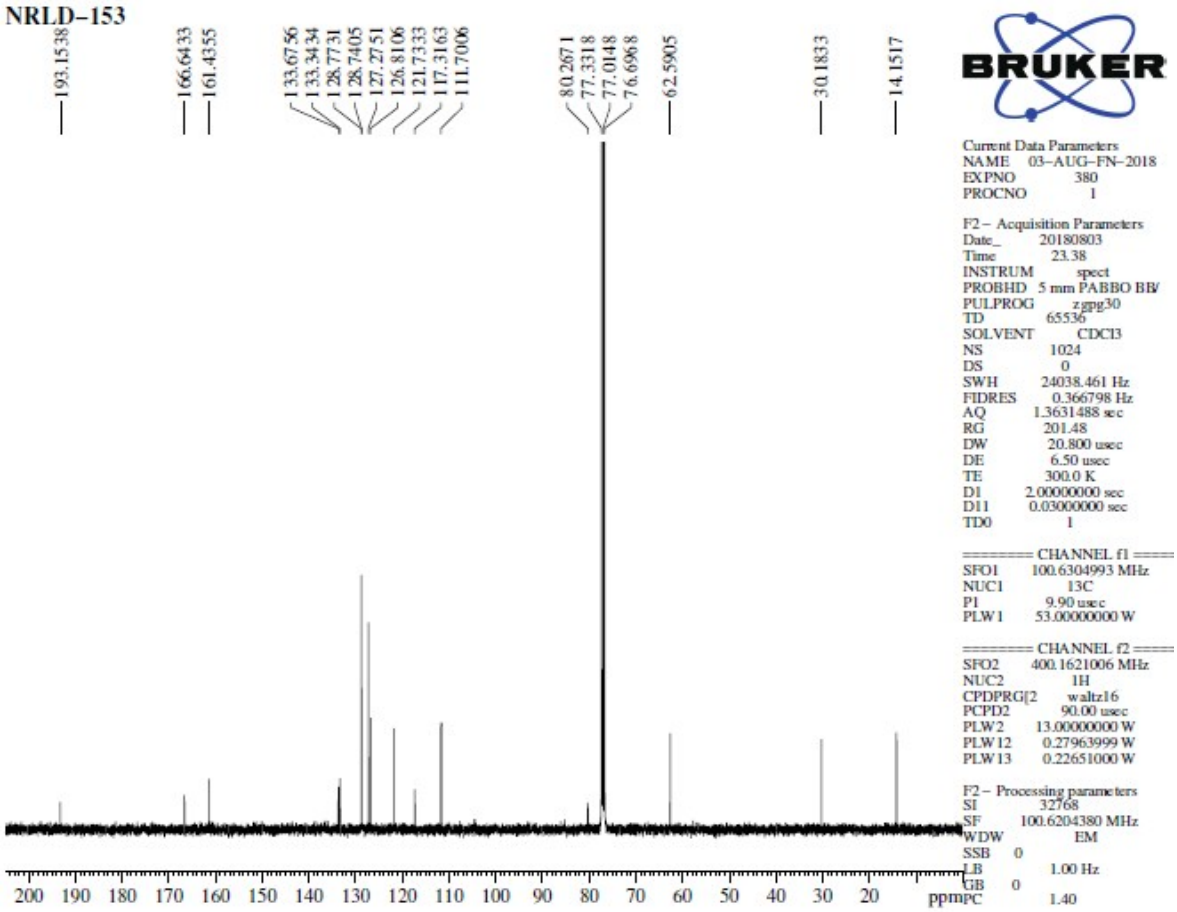

Figure 12: ^{13}C NMR spectrum of 3f

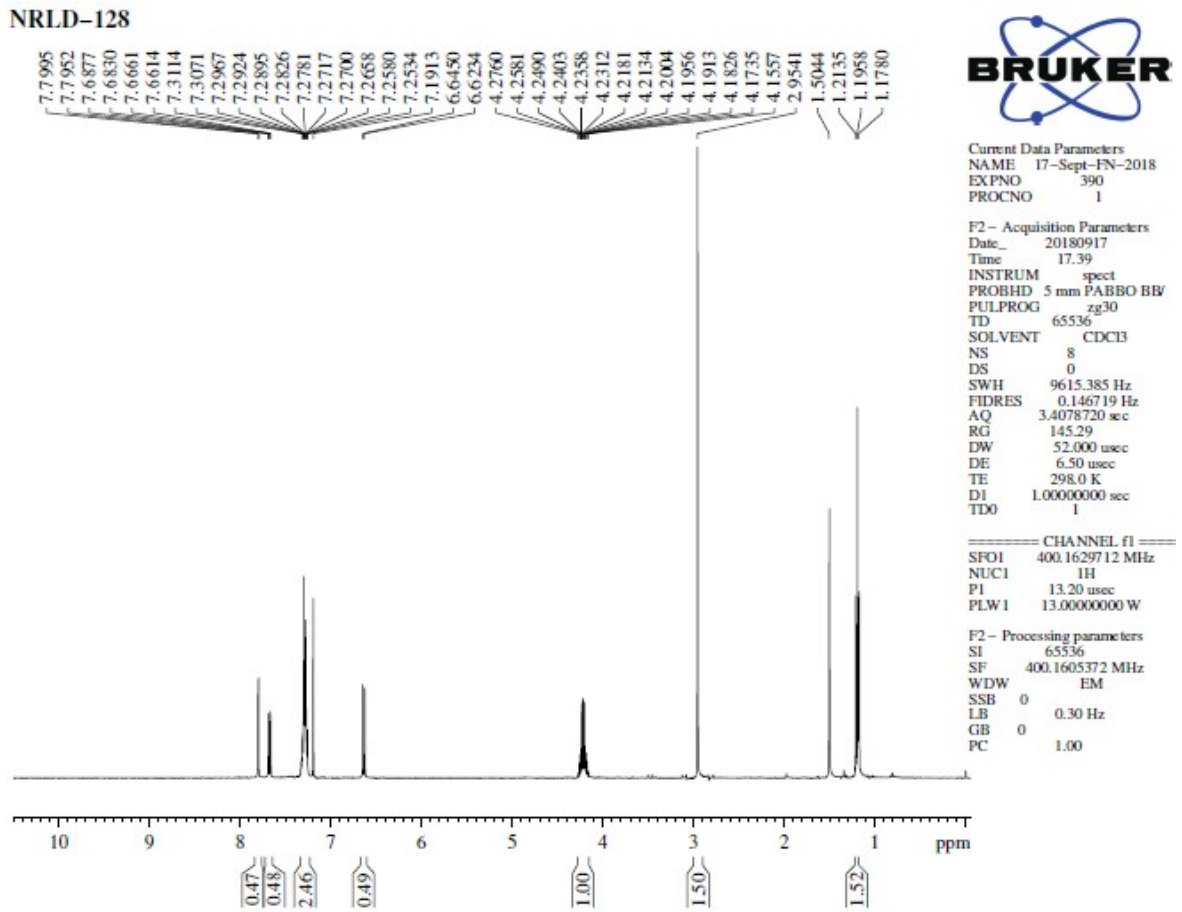

Figure 13: ^{1}H NMR spectrum of 3g

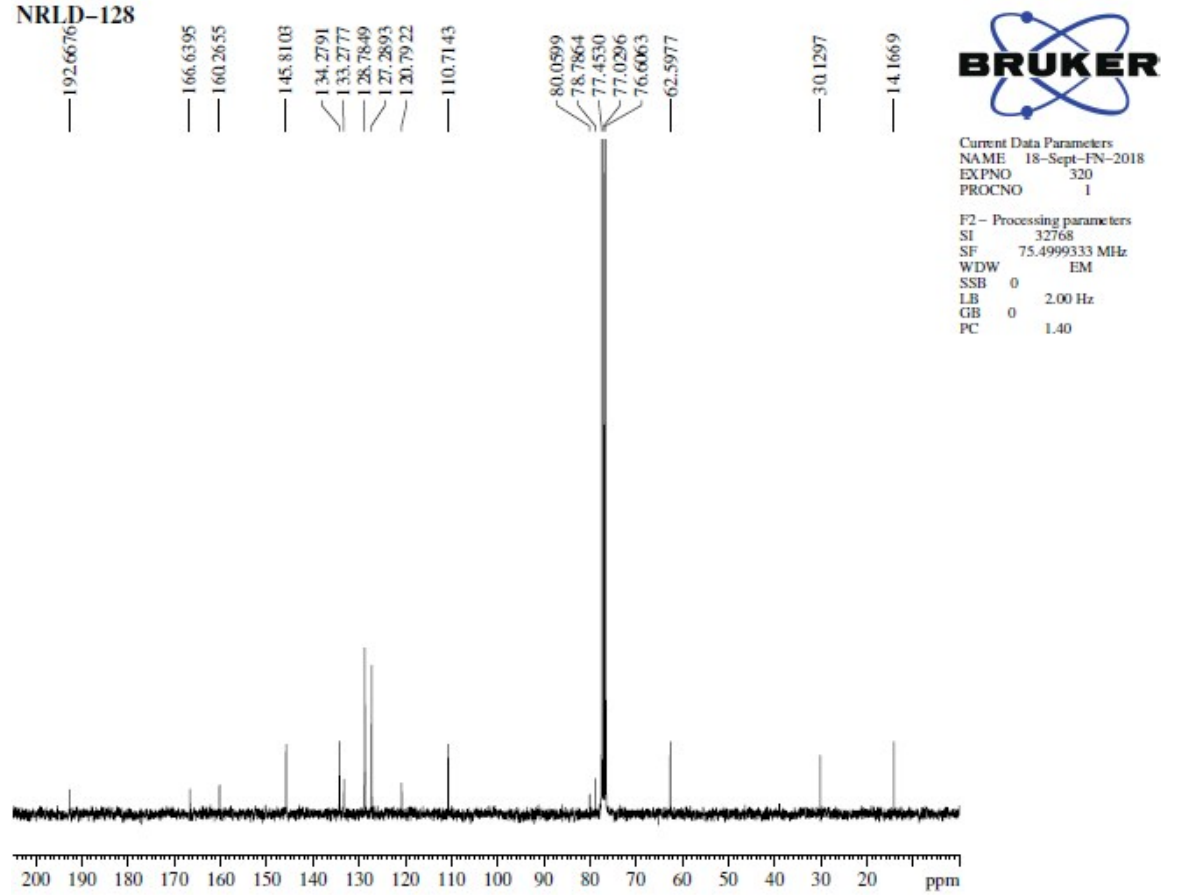

Figure 14: ^{13}C NMR spectrum of 3g

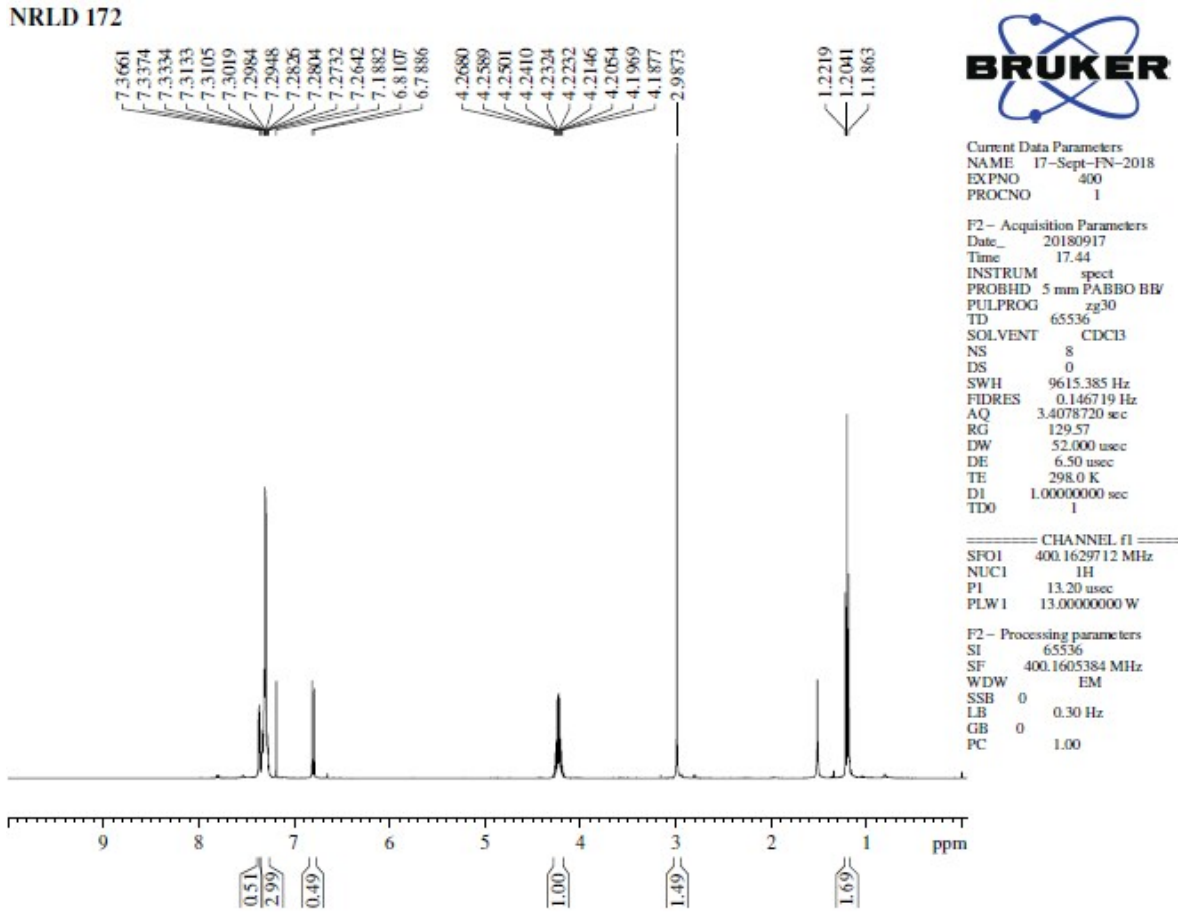

Figure 15: ^{1}H NMR spectrum of 3h

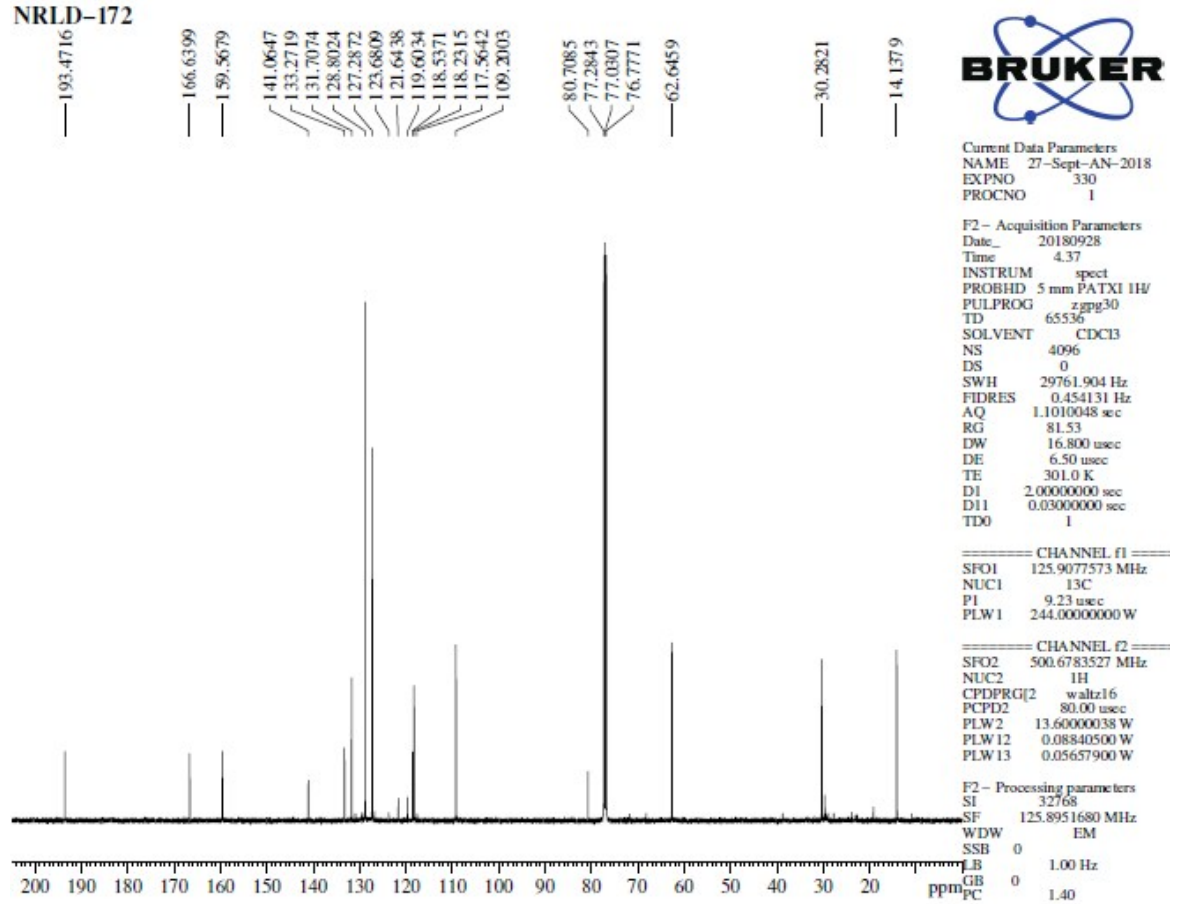

Figure 16: ^{13}C NMR spectrum of 3h

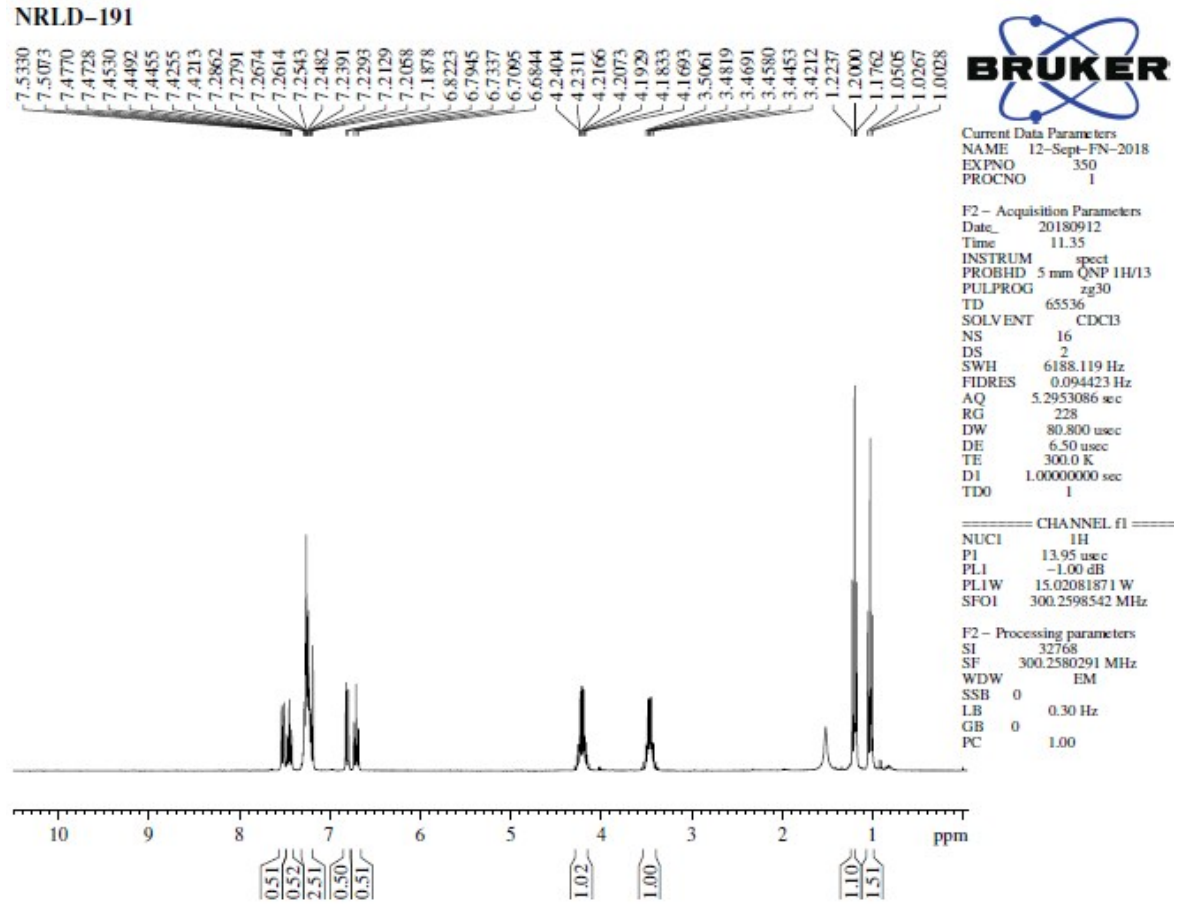

Figure 17: ^{1}H NMR spectrum of 3i

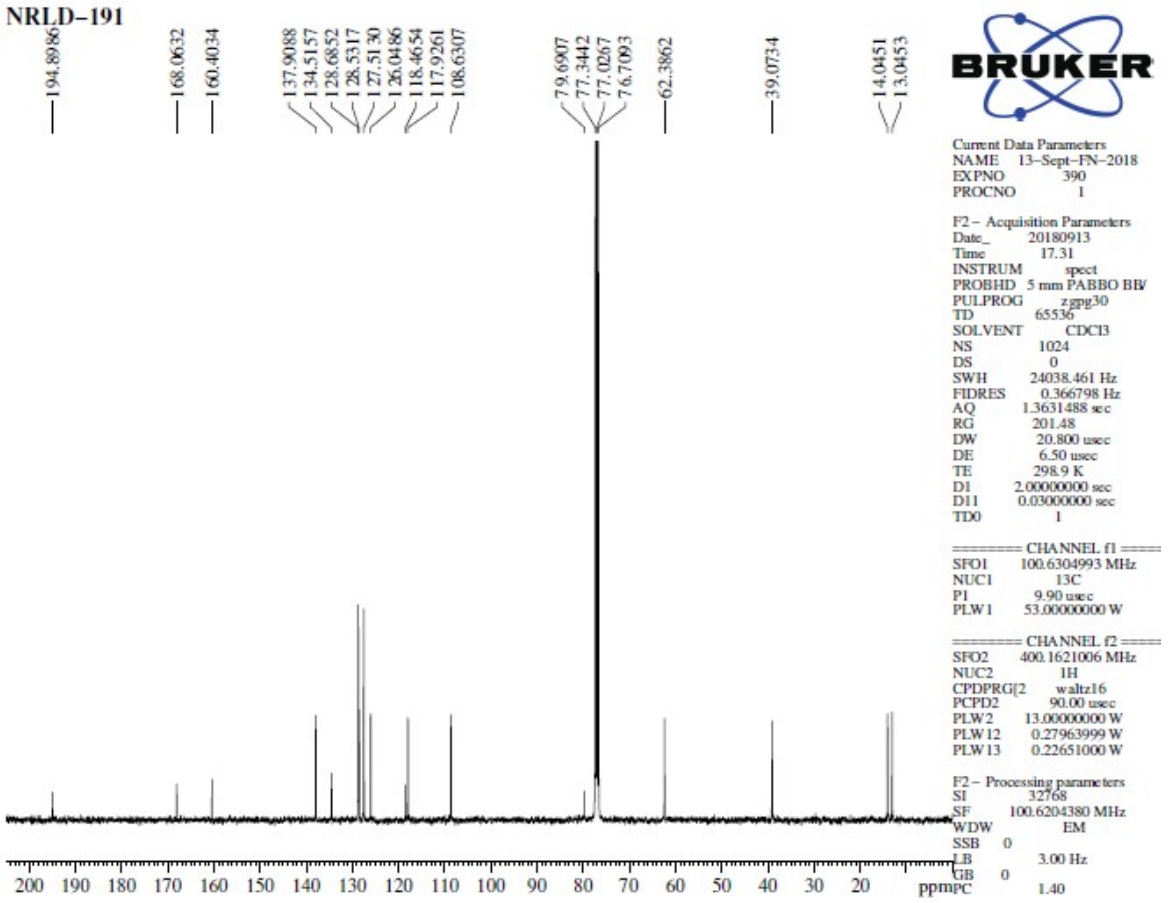

Figure 18: ^{13}C NMR spectrum of 3i

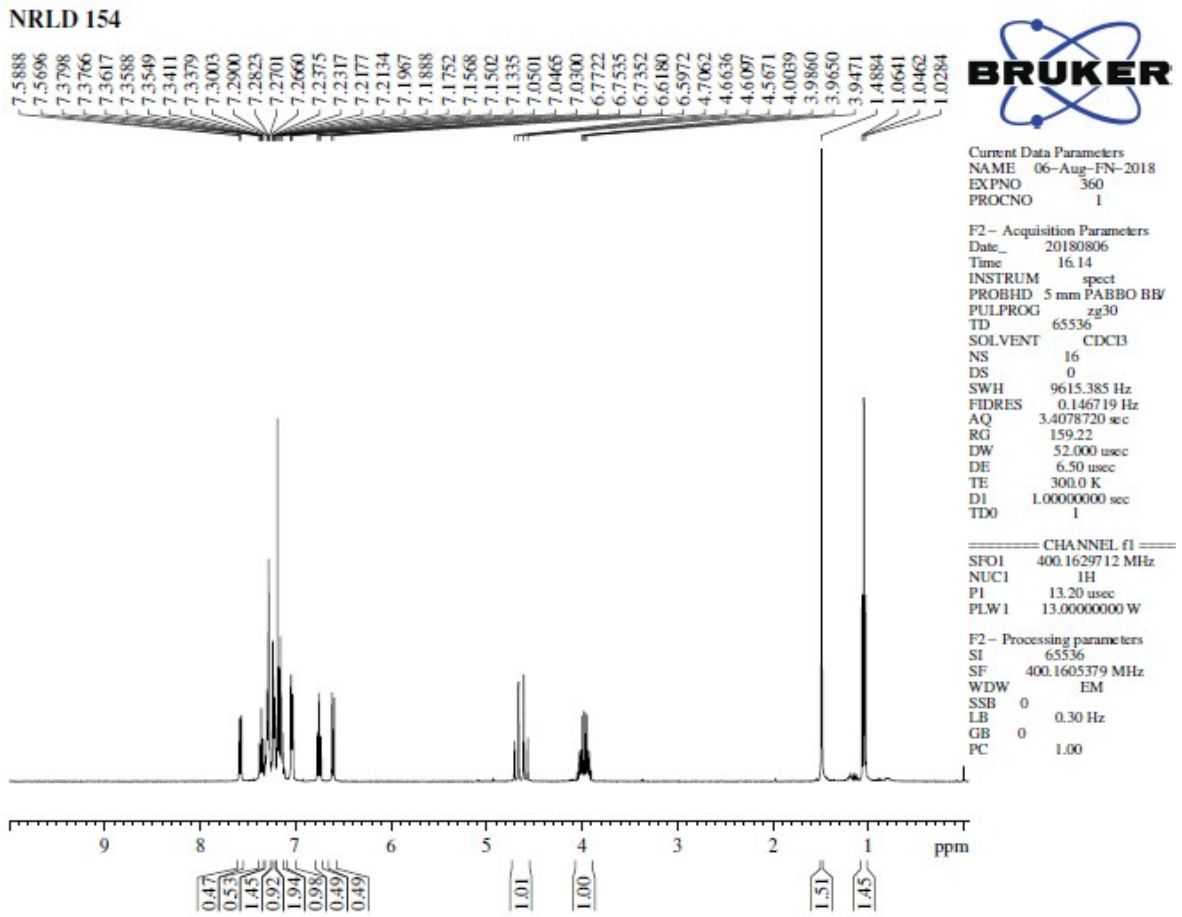

Figure 19: ^{1}H NMR spectrum of 3j

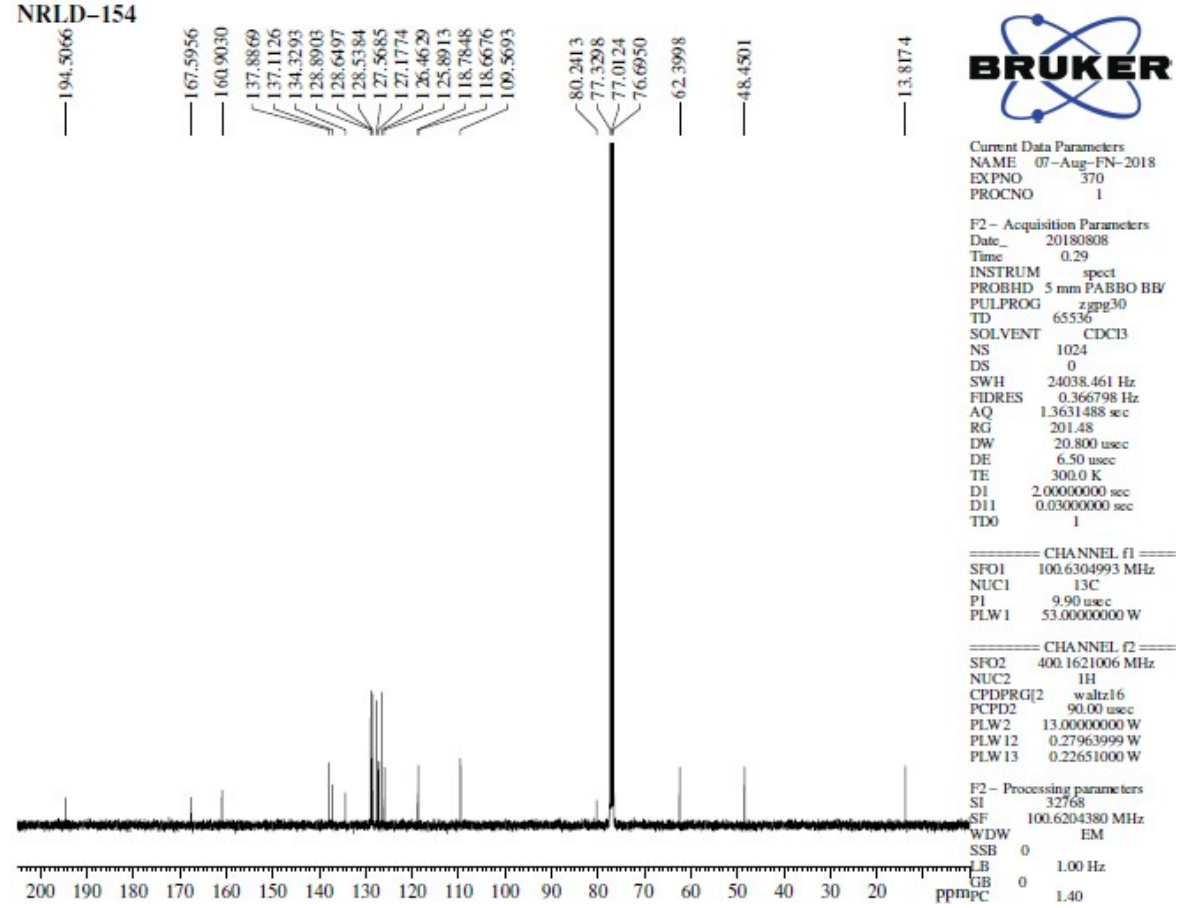

Figure 20: ^{13}C NMR spectrum of 3j

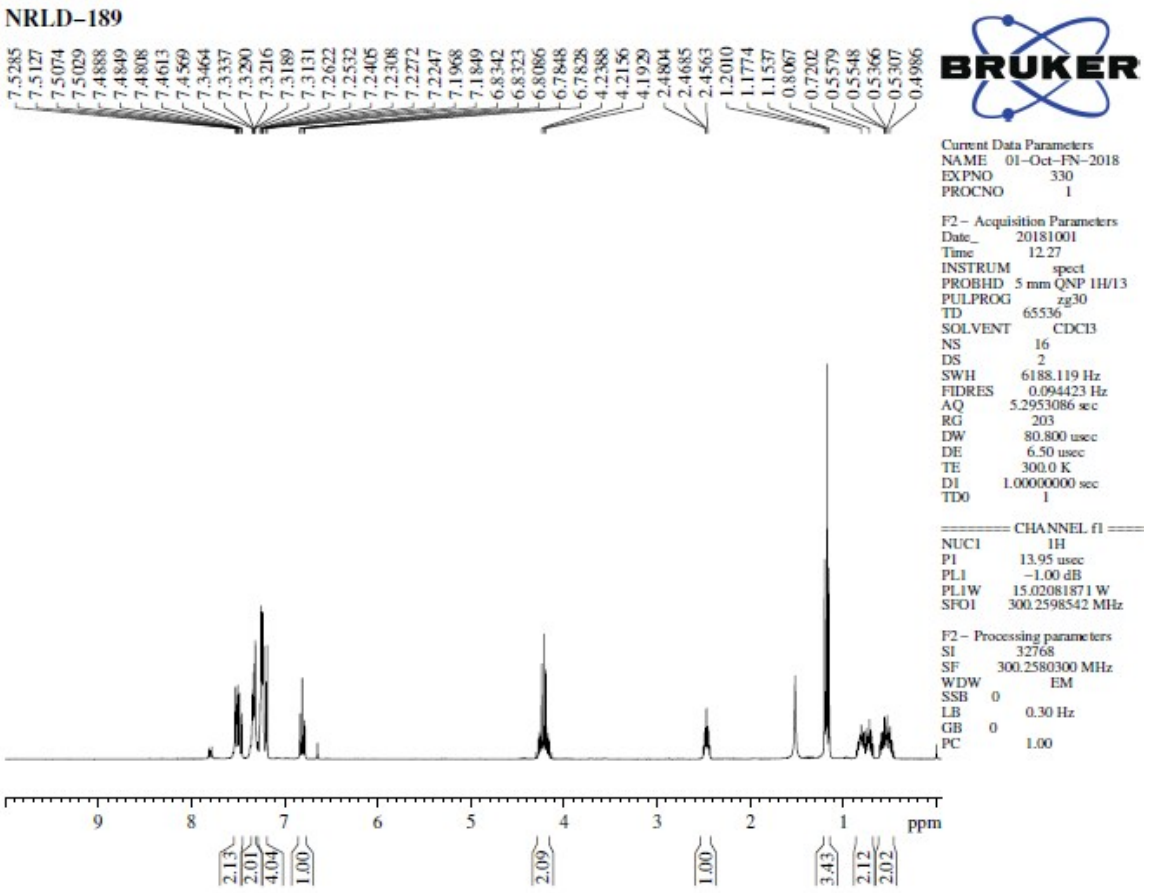

Figure 21: ^{1}H NMR spectrum of 3k

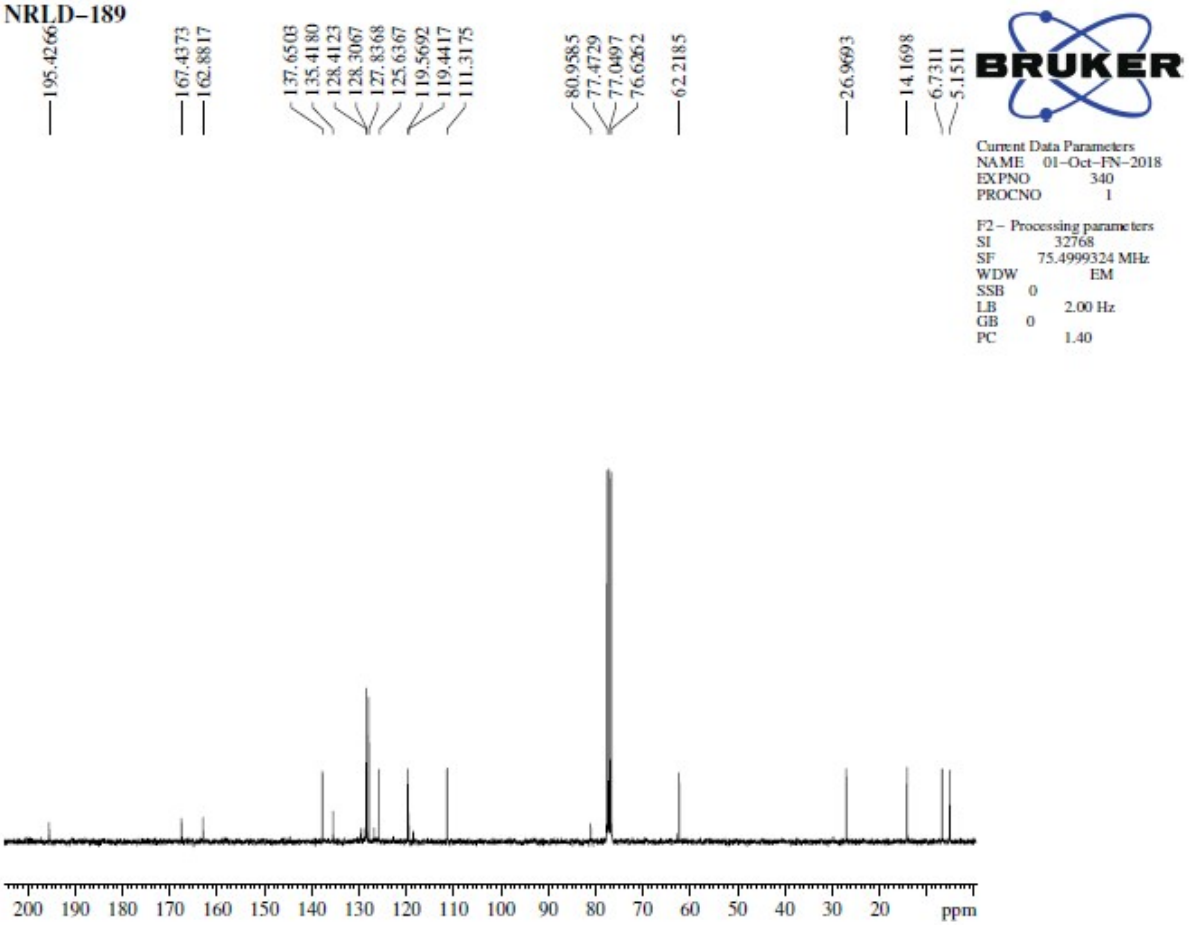

Figure 22: ^{13}C NMR spectrum of 3k

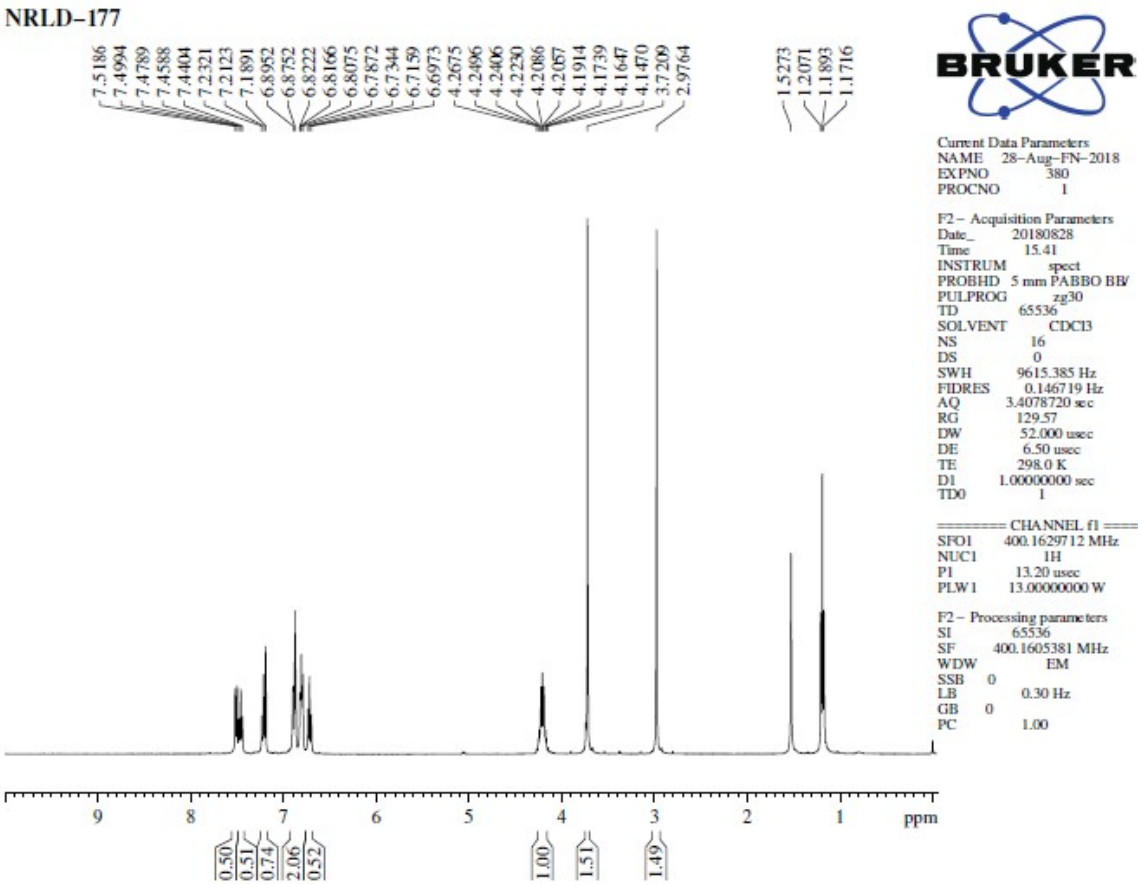

Figure 23: ^{1}H NMR spectrum of 3l

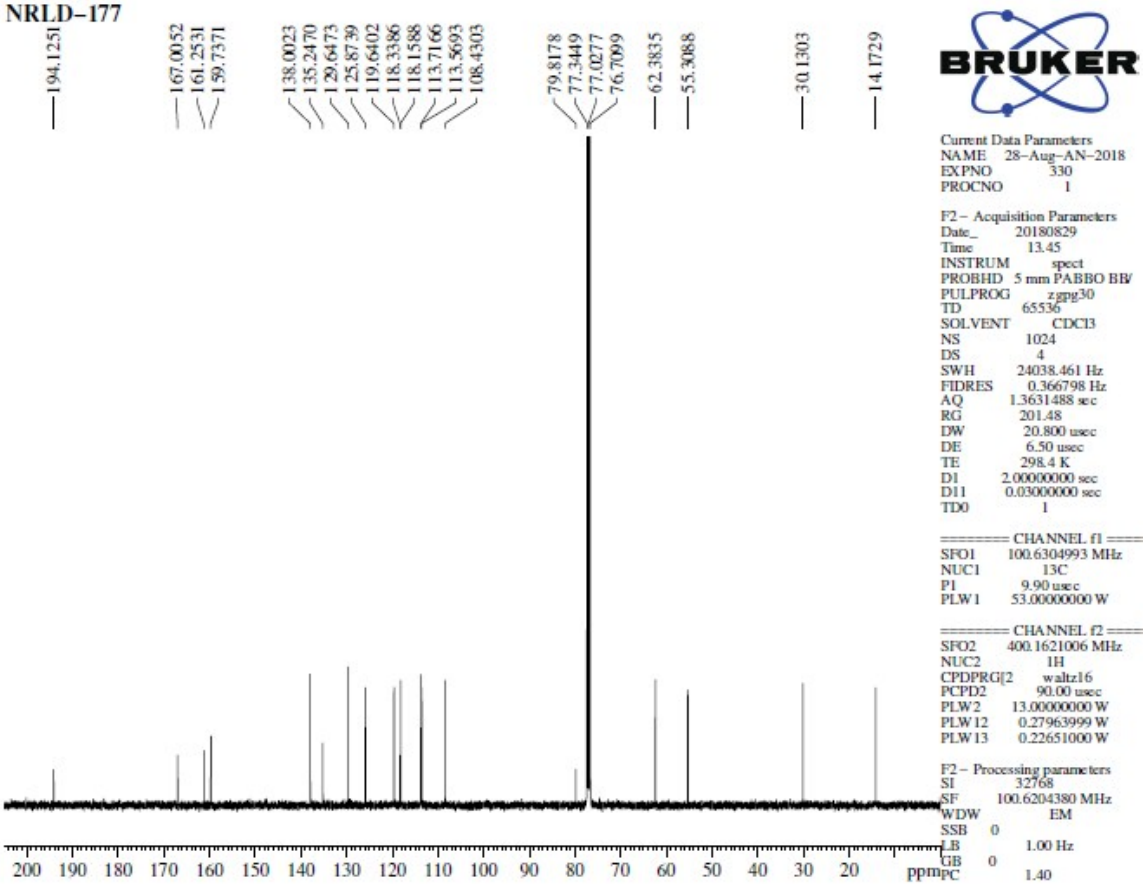

Figure 24: ^{13}C NMR spectrum of 3l

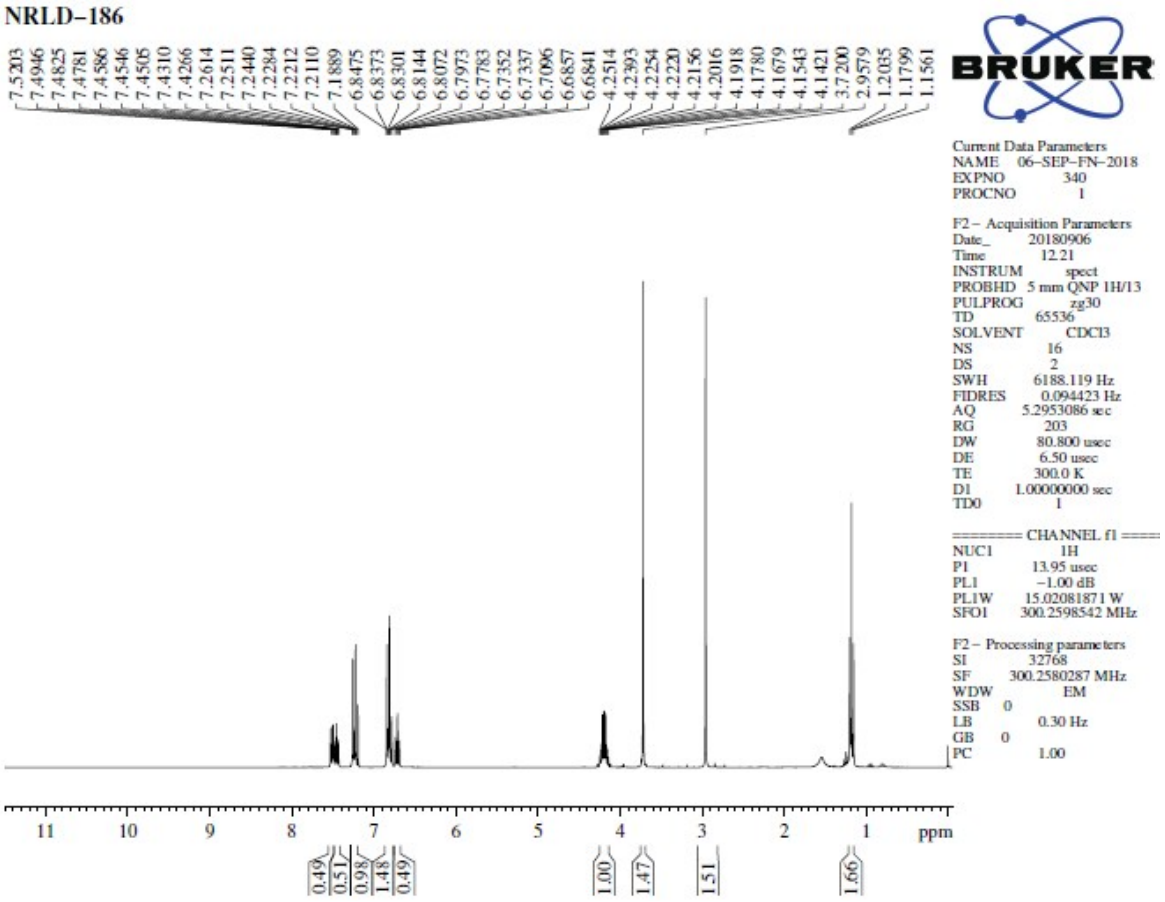

Figure 25: ^{1}H NMR spectrum of 3m

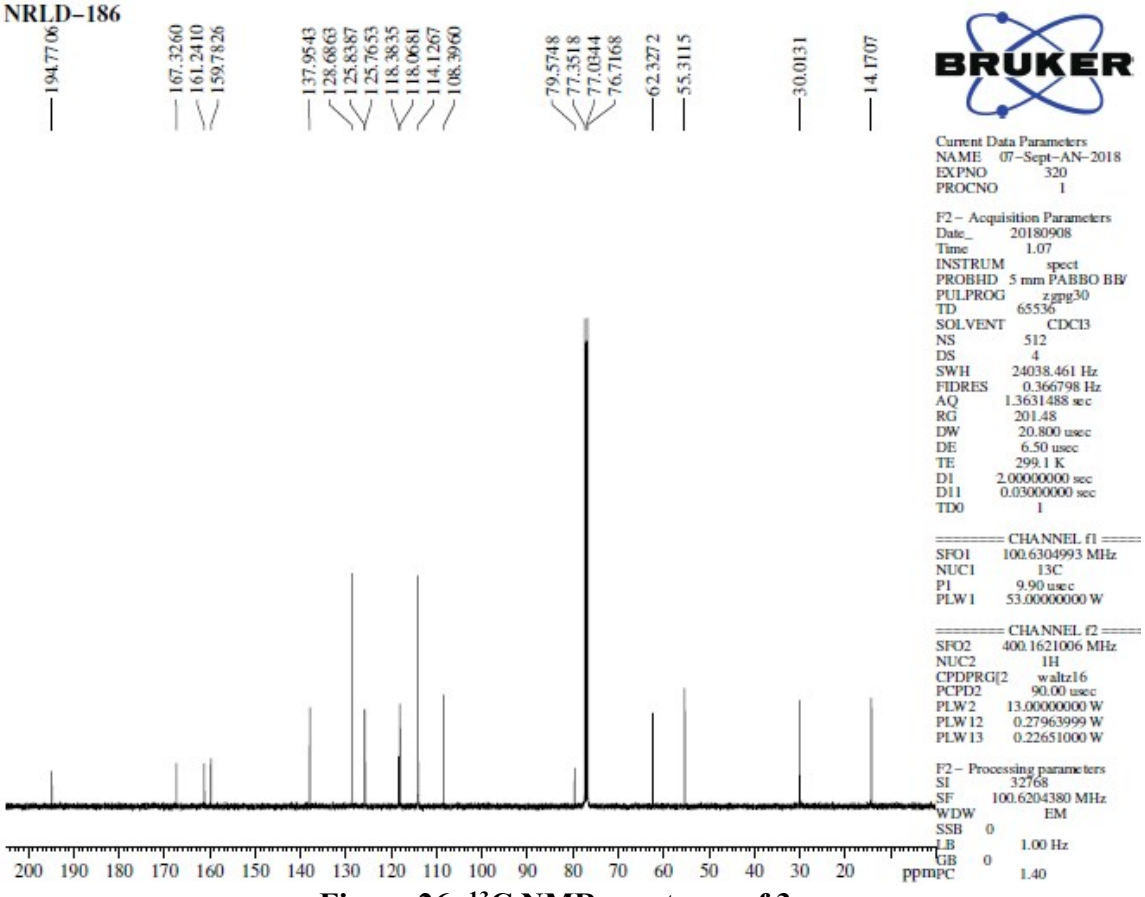

Figure 26: ^{13}C NMR spectrum of 3m

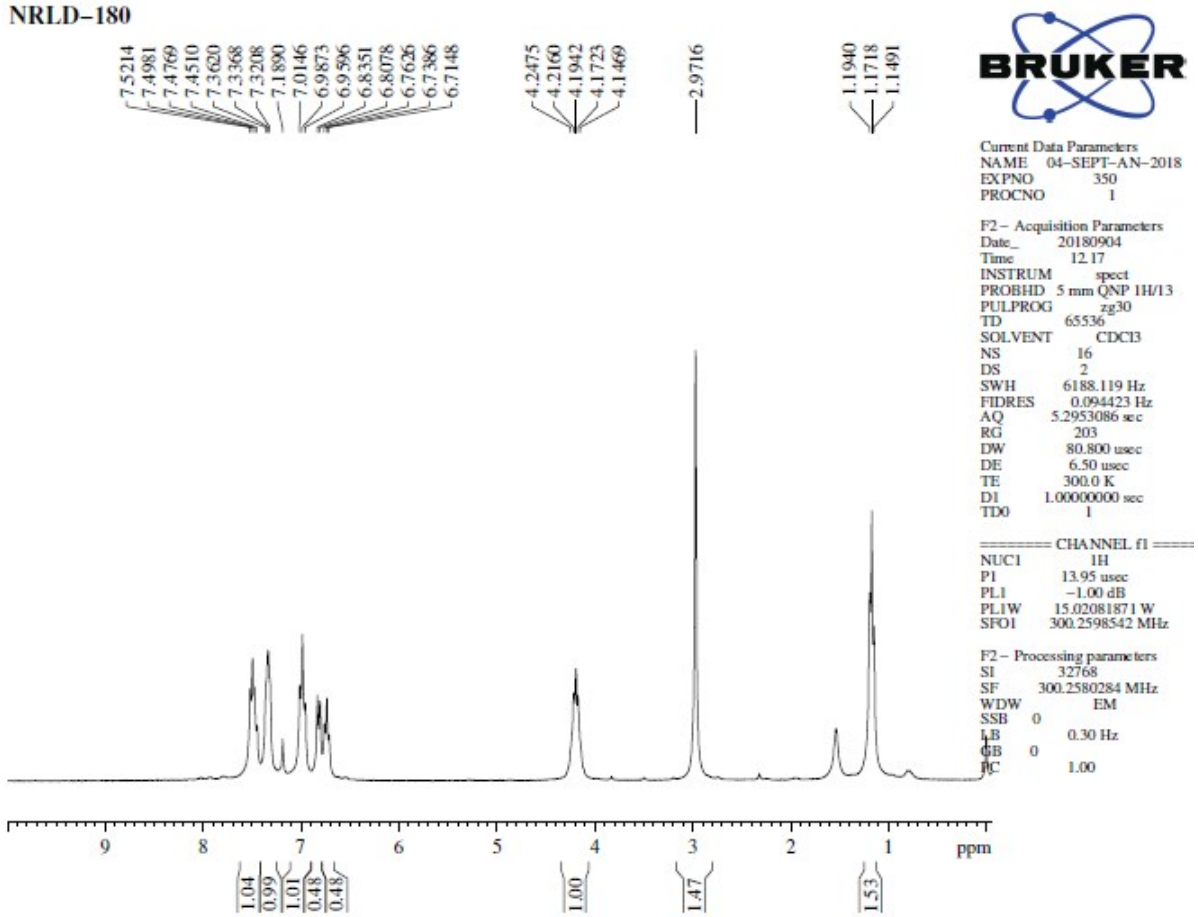

Figure 27: ^{1}H NMR spectrum of 3n

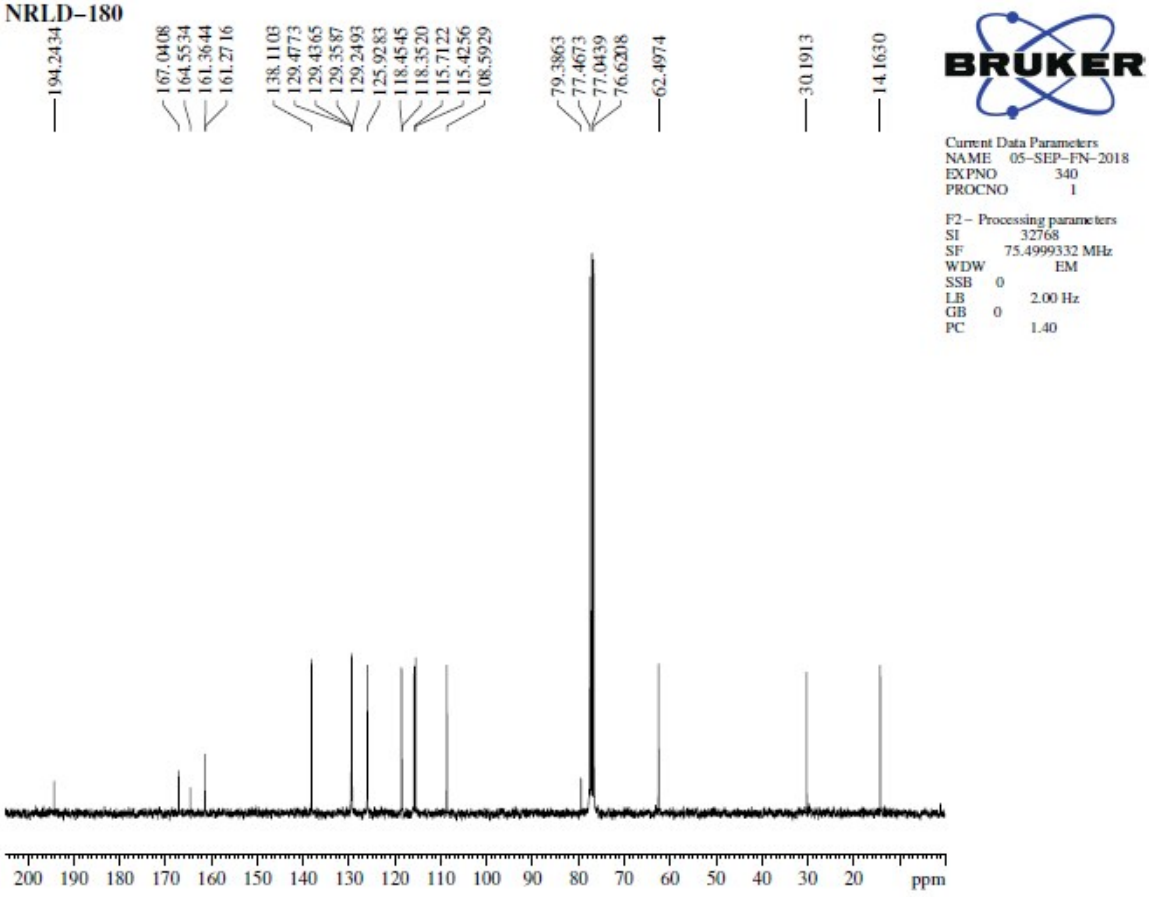

Figure 28: ^{13}C NMR spectrum of 3n

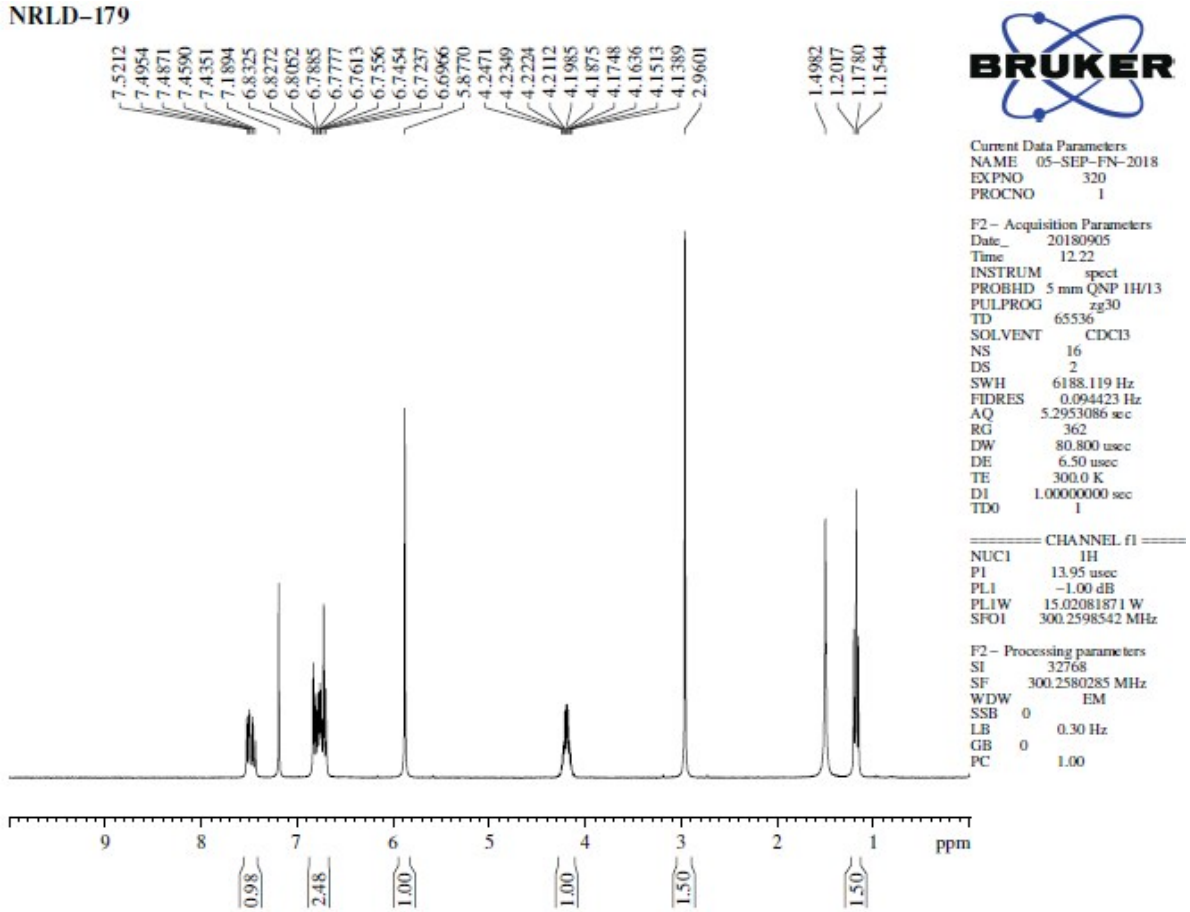

Figure 29: ^{1}H NMR spectrum of 3o

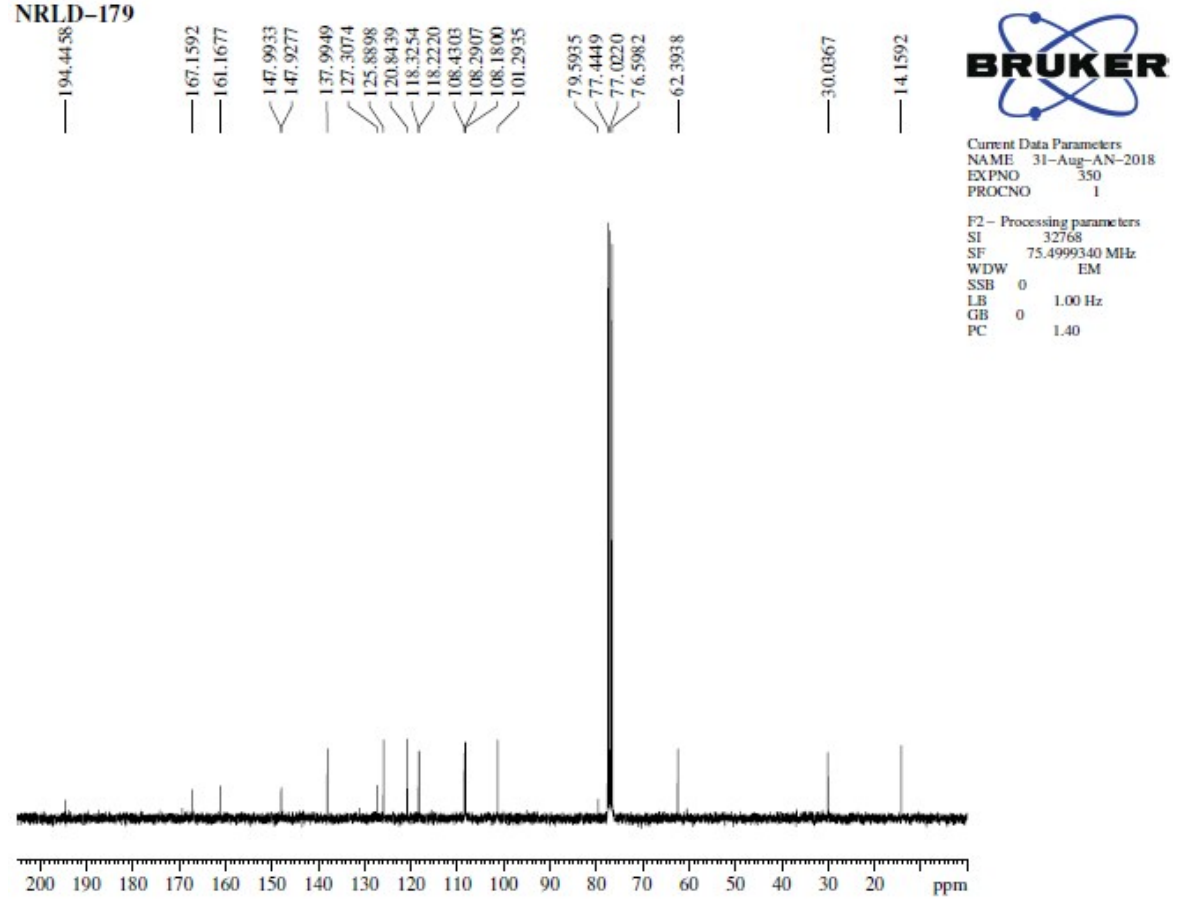

Figure 30: ^{13}C NMR spectrum of 3o

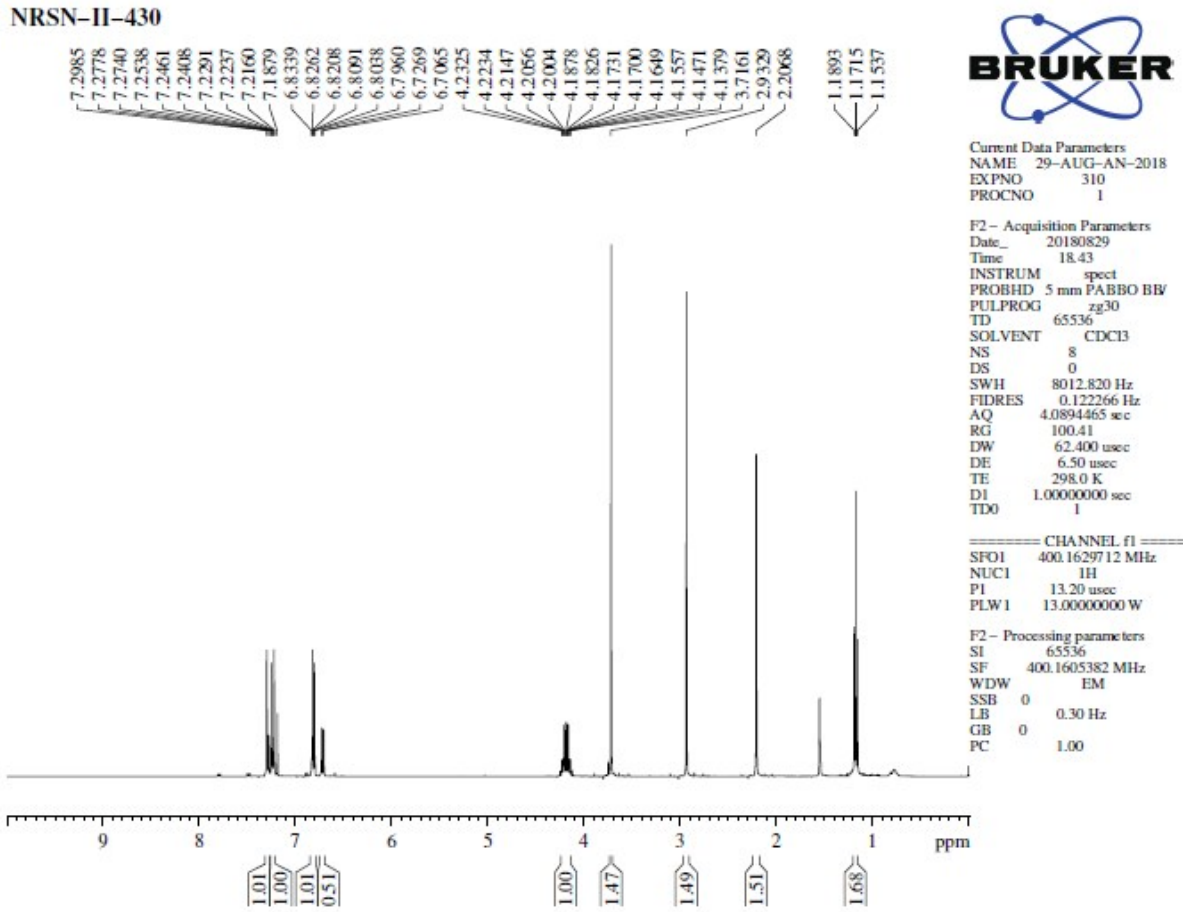

Figure 31: ^{1}H NMR spectrum of 3p

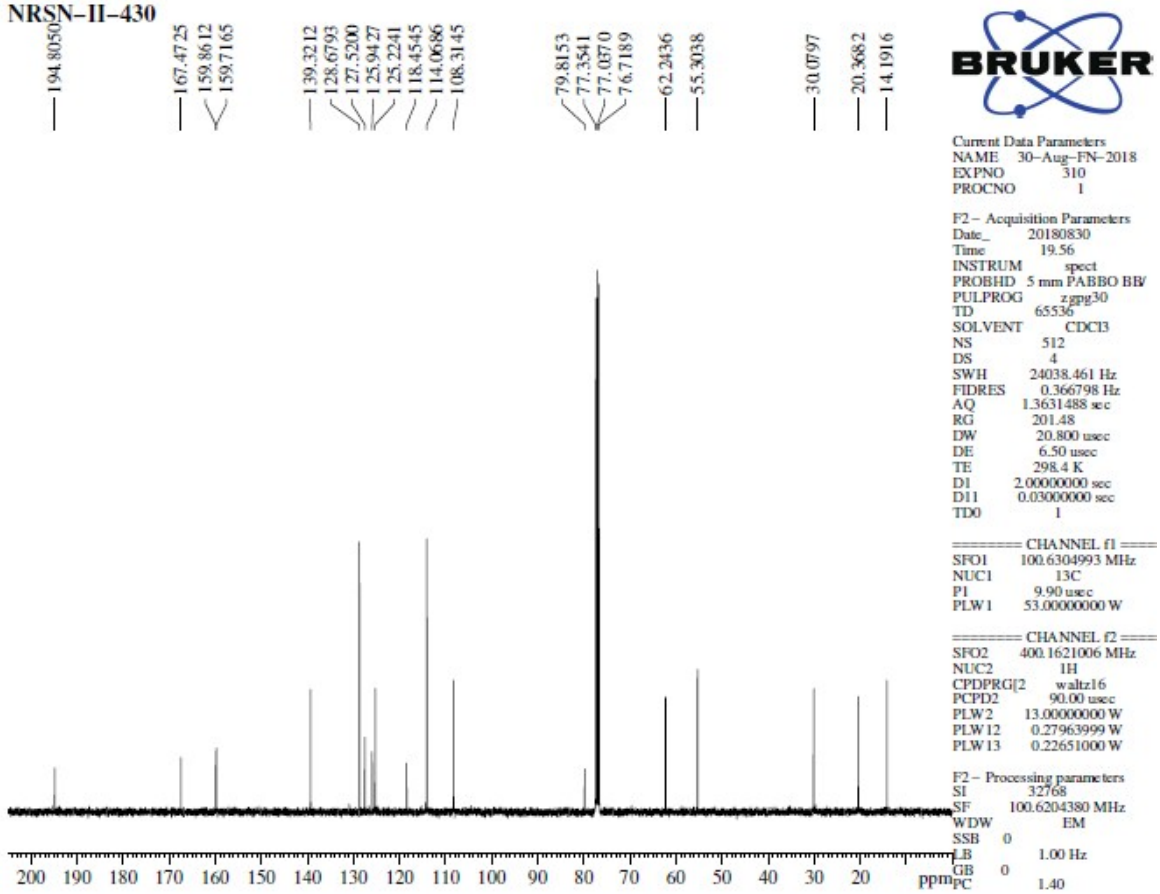

Figure 32: ^{13}C NMR spectrum of 3p

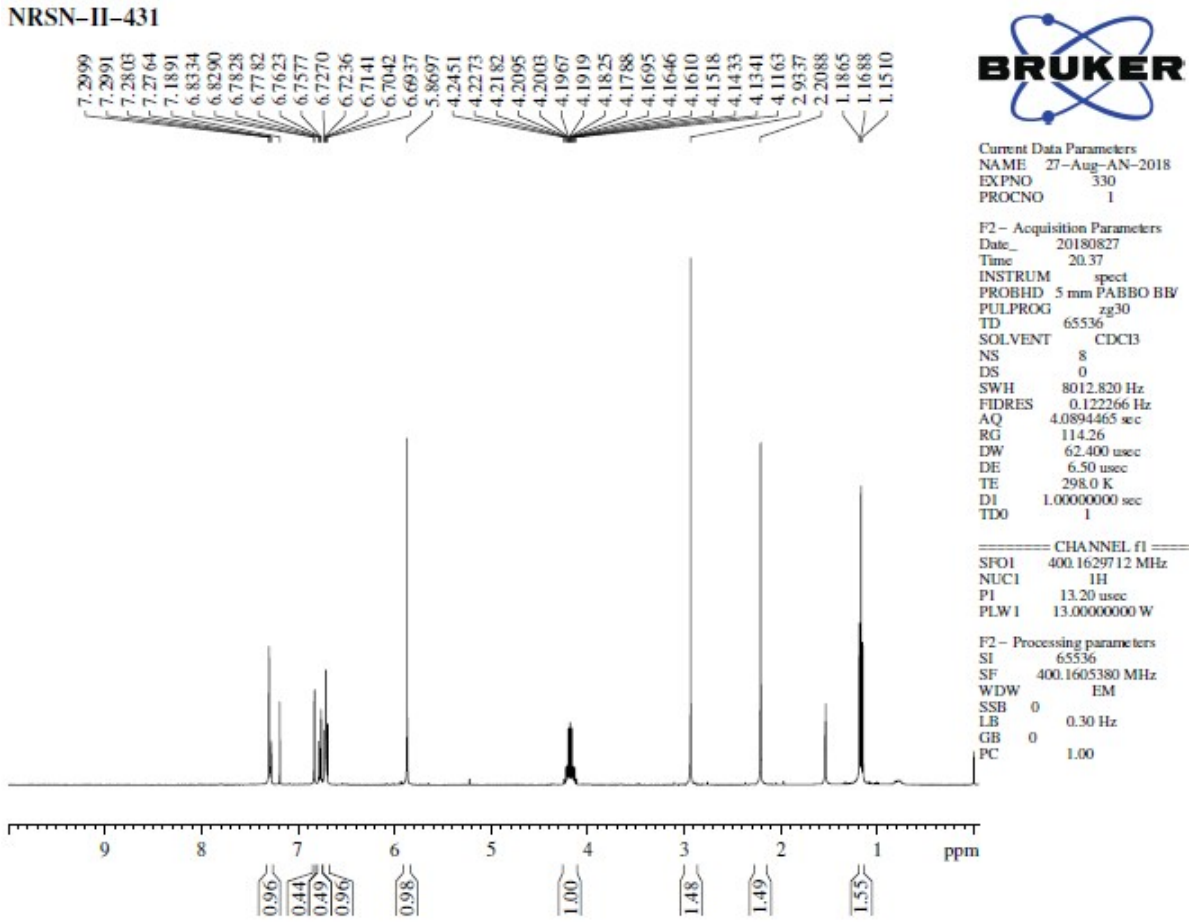

Figure 33: ^{1}H NMR spectrum of 3q

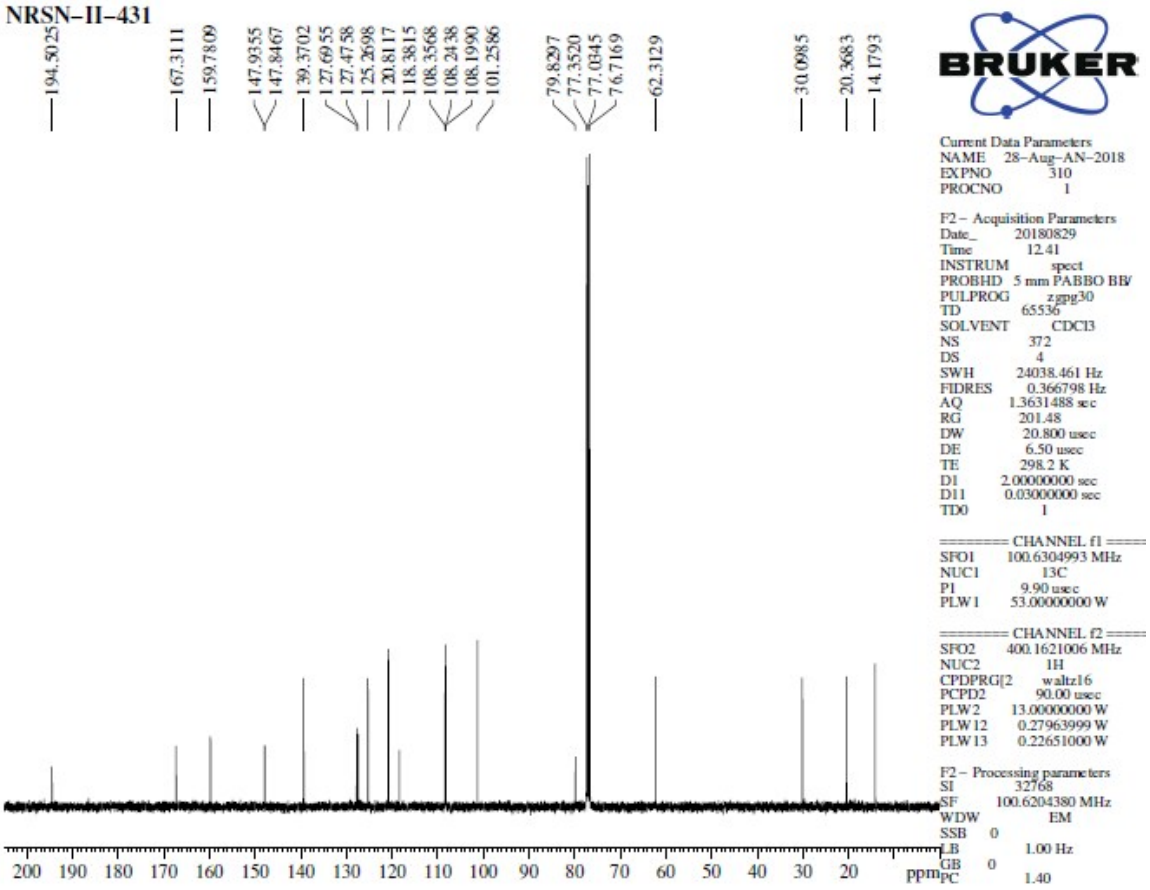

Figure 34: ^{13}C NMR spectrum of 3q

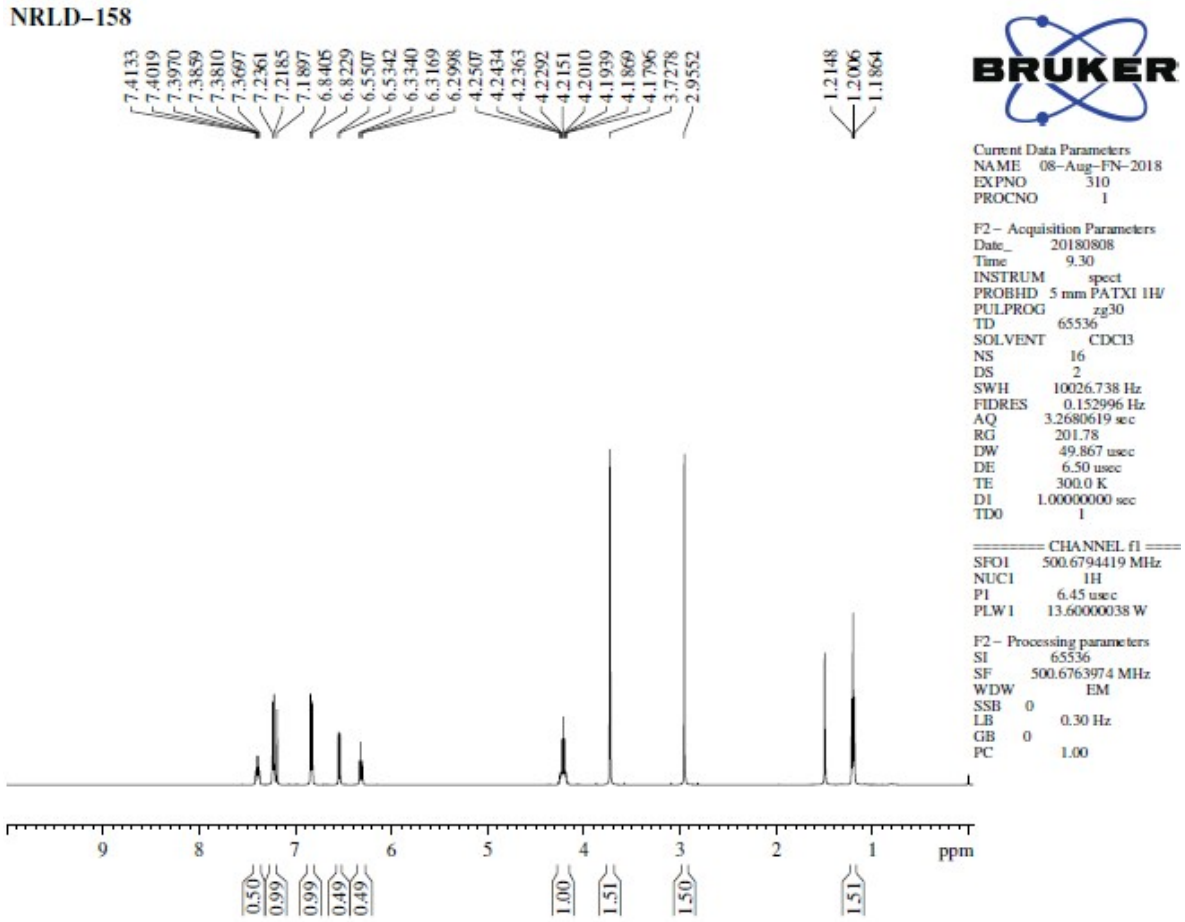

Figure 35: ^{1}H NMR spectrum of 3r

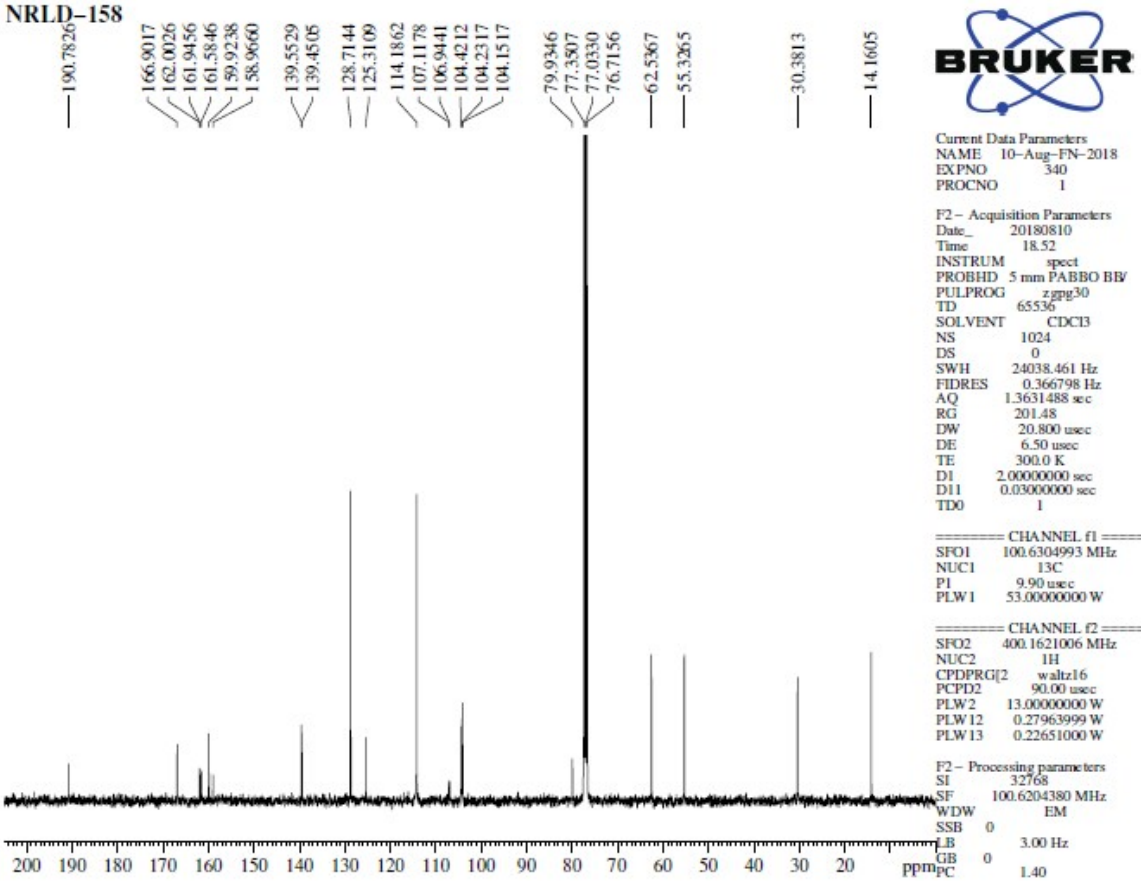

Figure 36: ^{13}C NMR spectrum of 3r

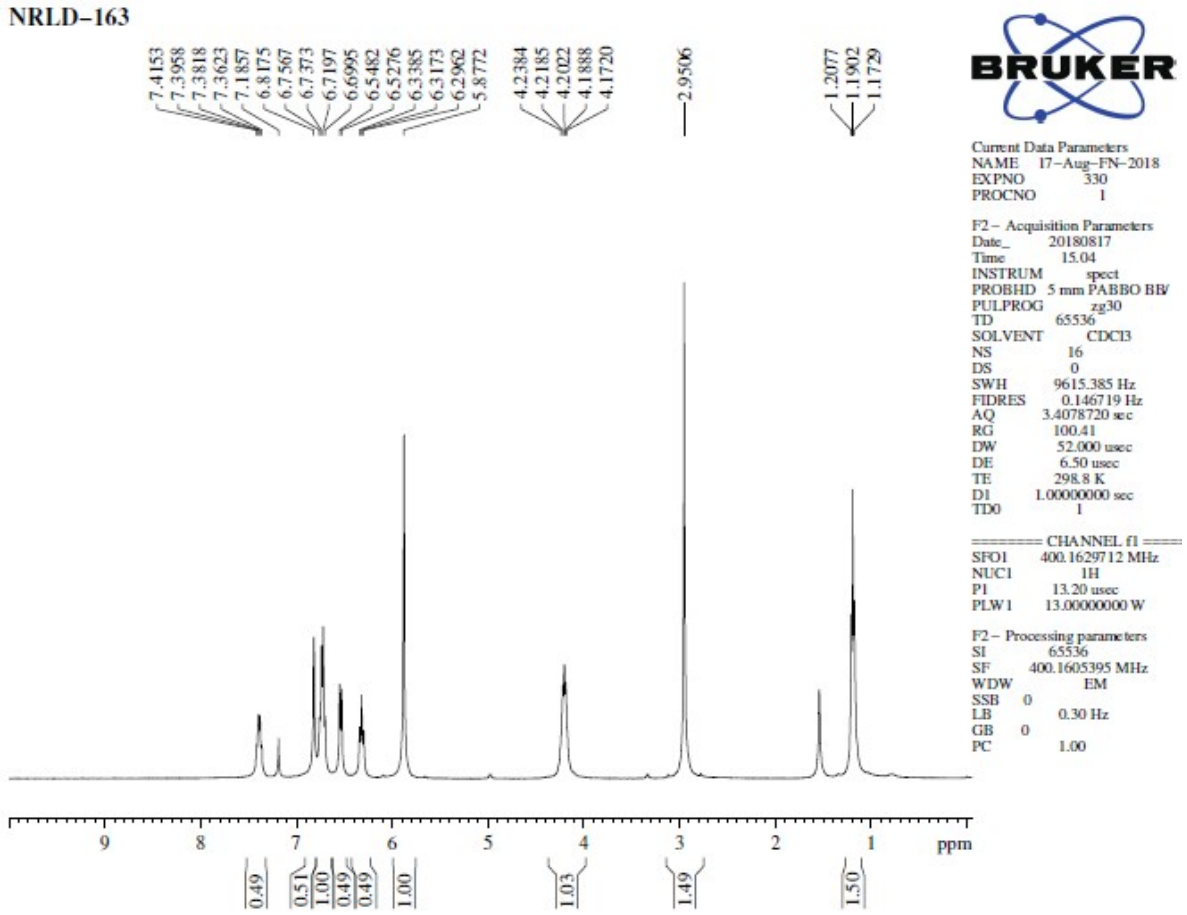

Figure 37: ^{1}H NMR spectrum of 3s

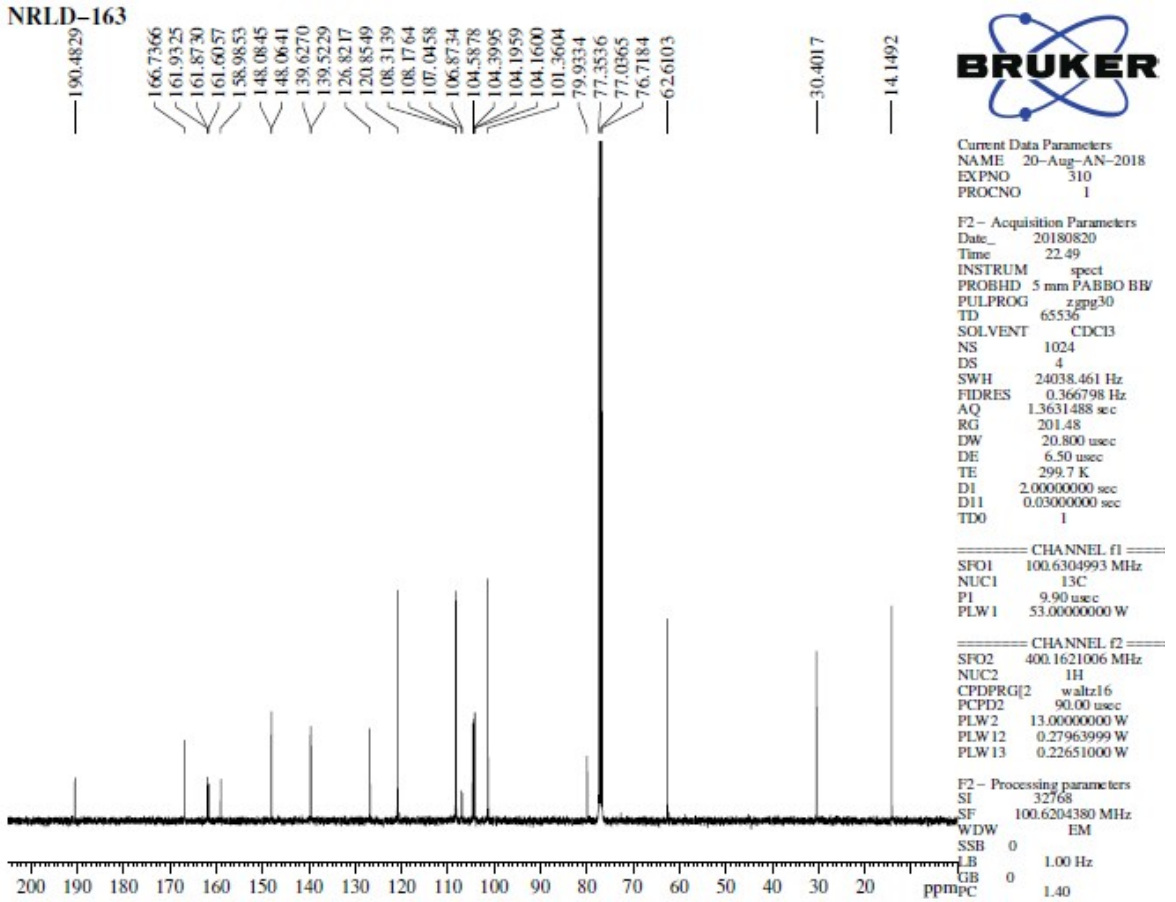

Figure 38: ^{13}C NMR spectrum of 3s

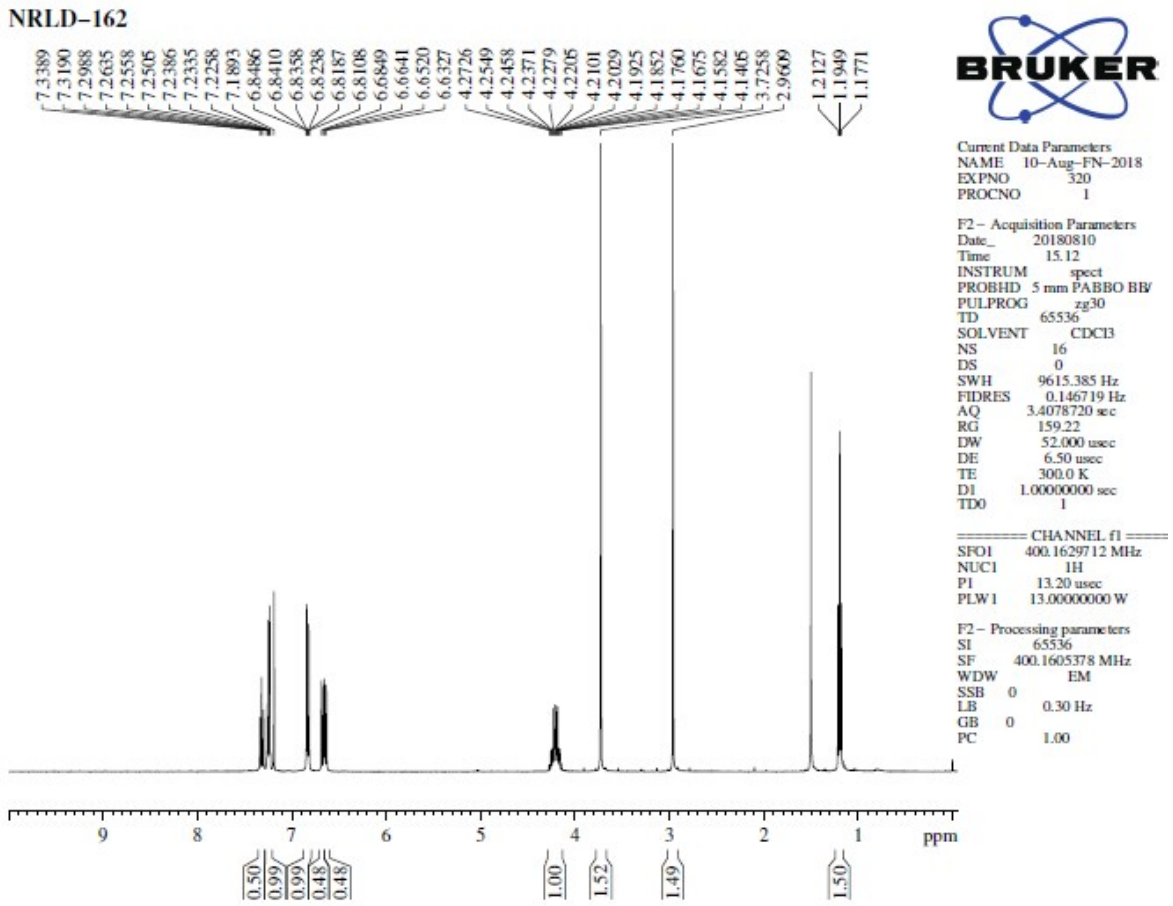

Figure 39: ^{1}H NMR spectrum of 3t

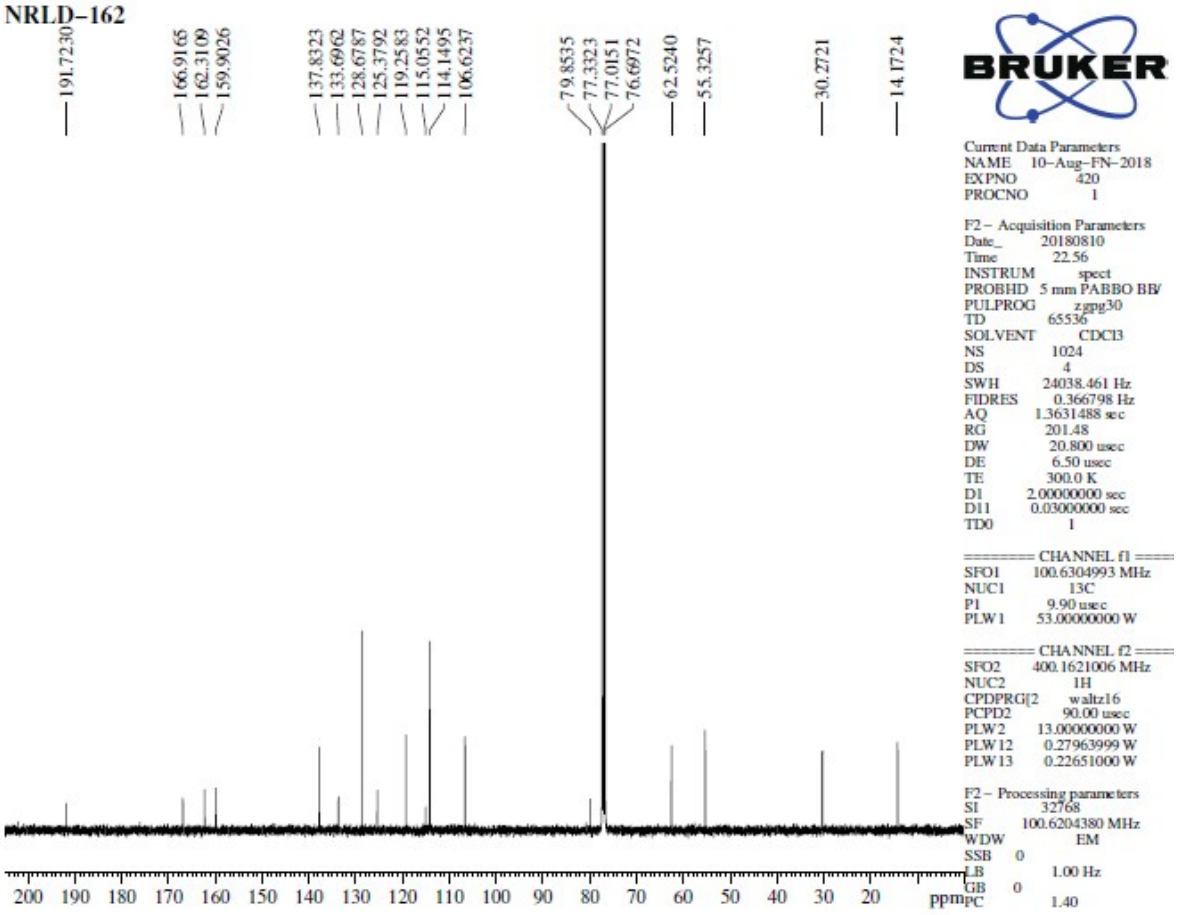

Figure 40: ^{13}C NMR spectrum of 3t

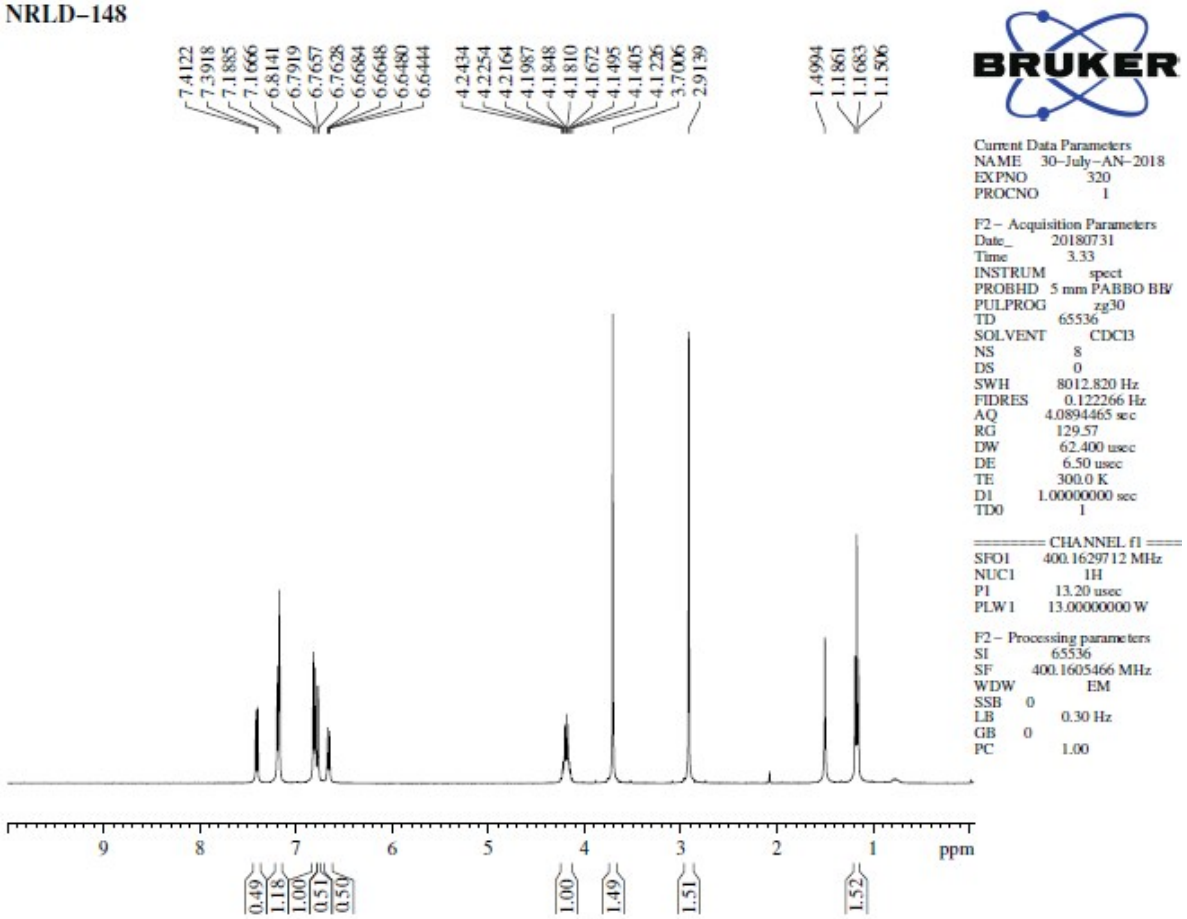

Figure 41: ^{1}H NMR spectrum of 3u

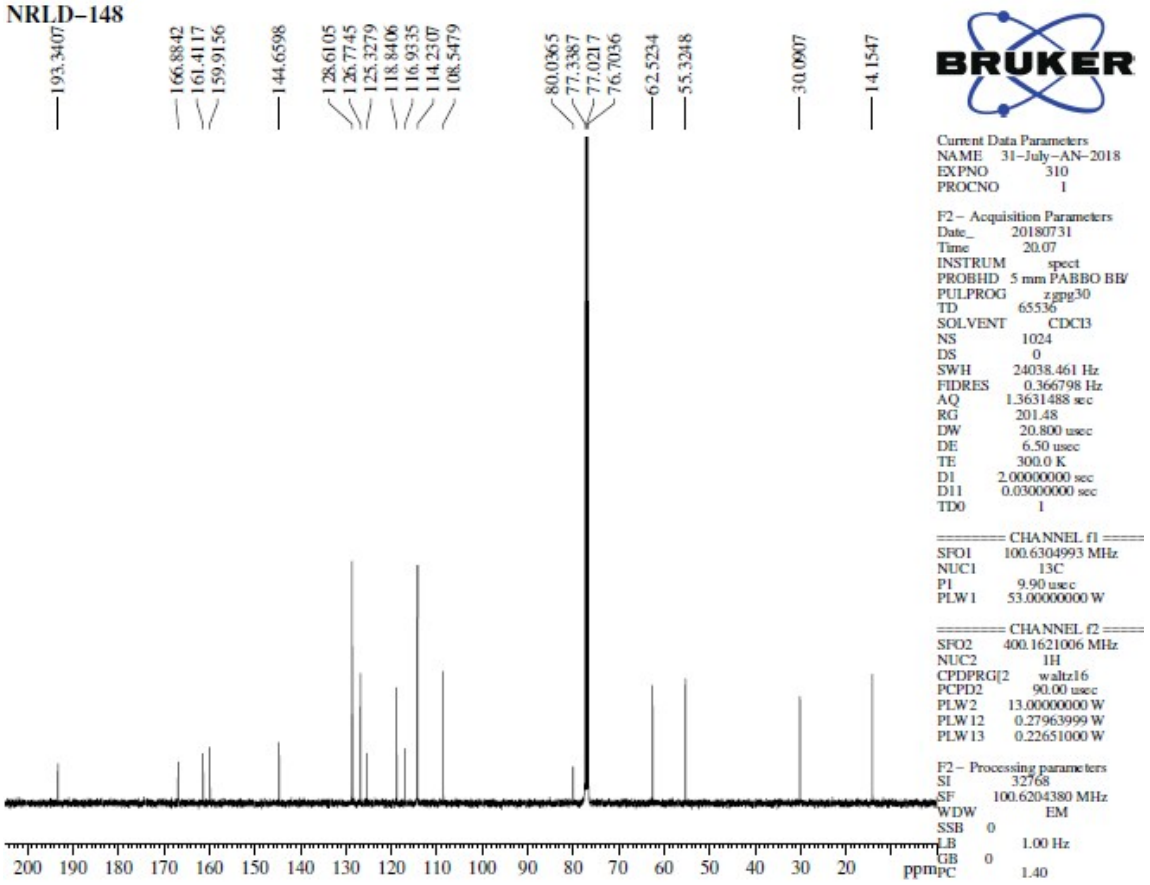

Figure 42: ^{13}C NMR spectrum of 3u

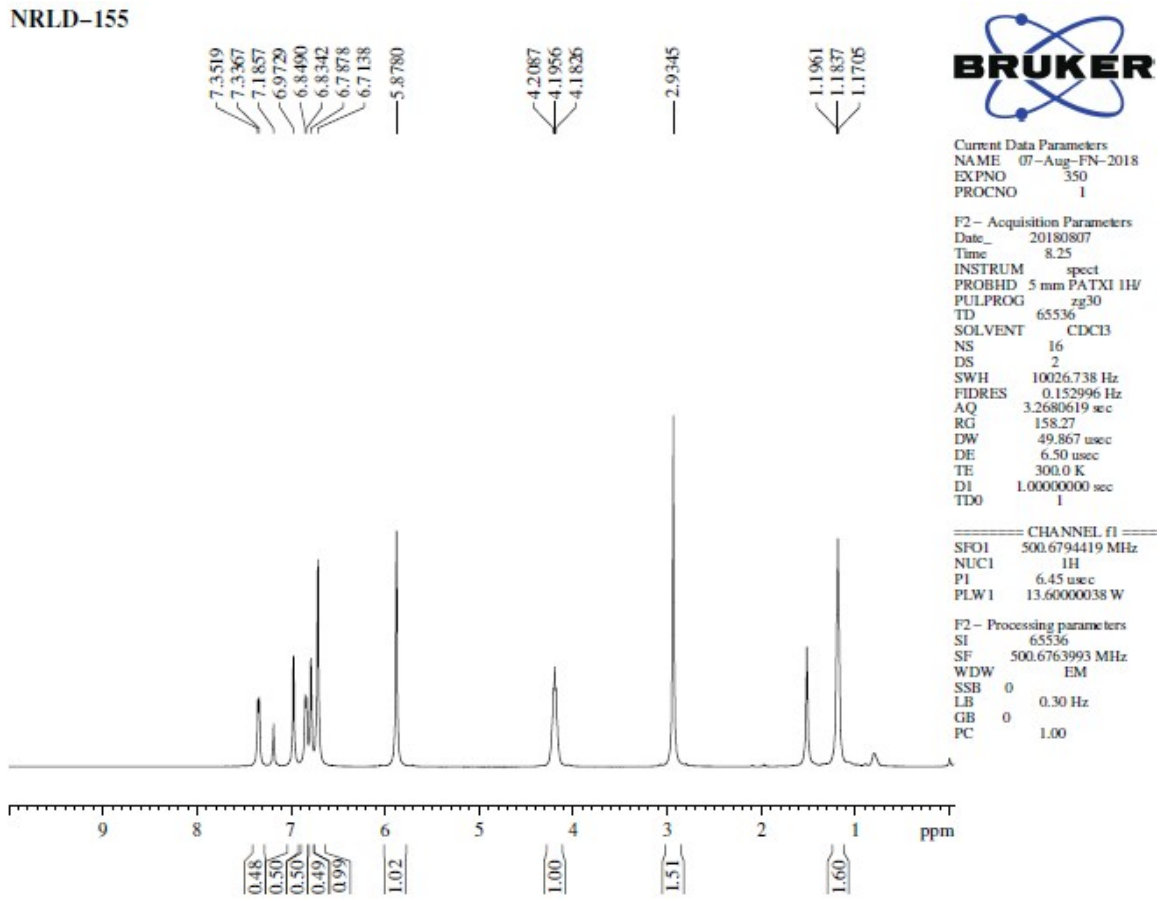

Figure 43: ^{1}H NMR spectrum of 3v

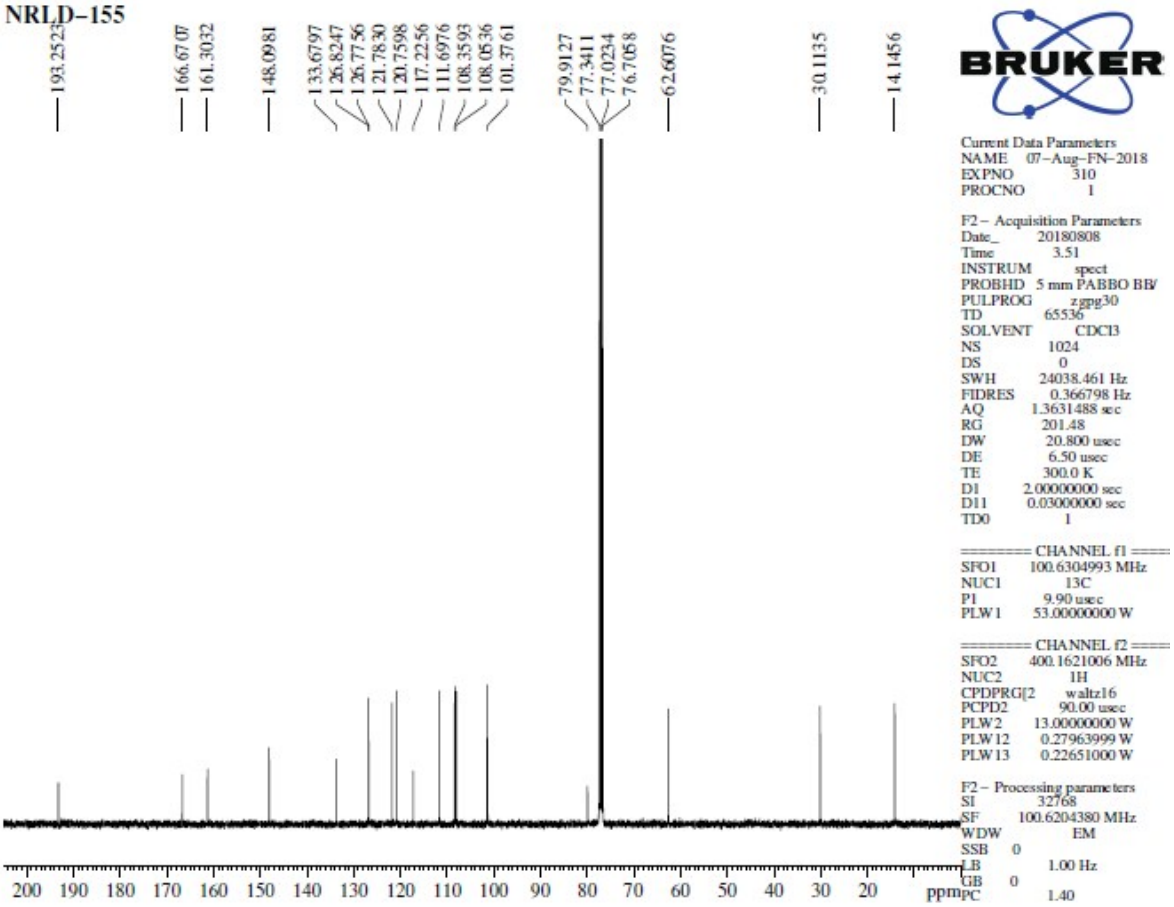

Figure 44: ^{13}C NMR spectrum of 3v

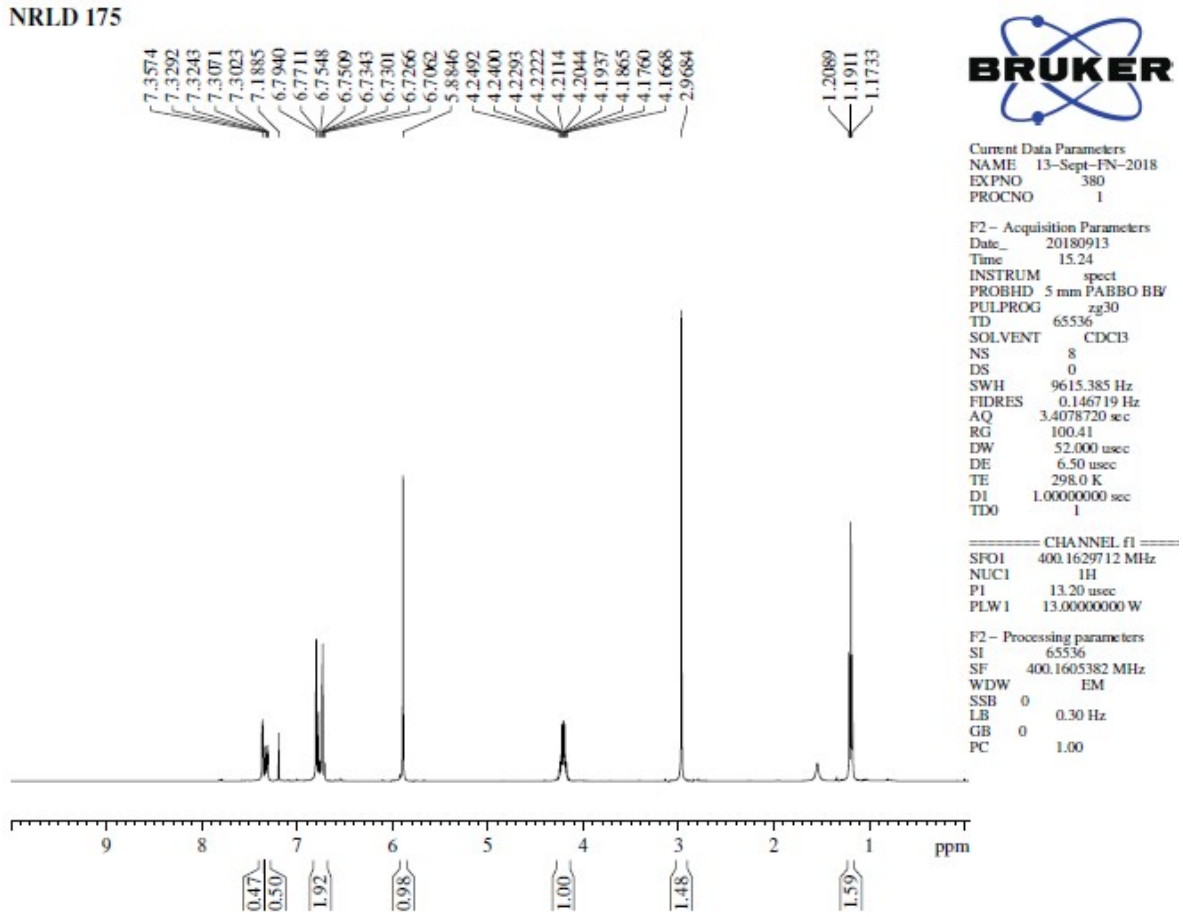

Figure 45: ^{1}H NMR spectrum of 3w

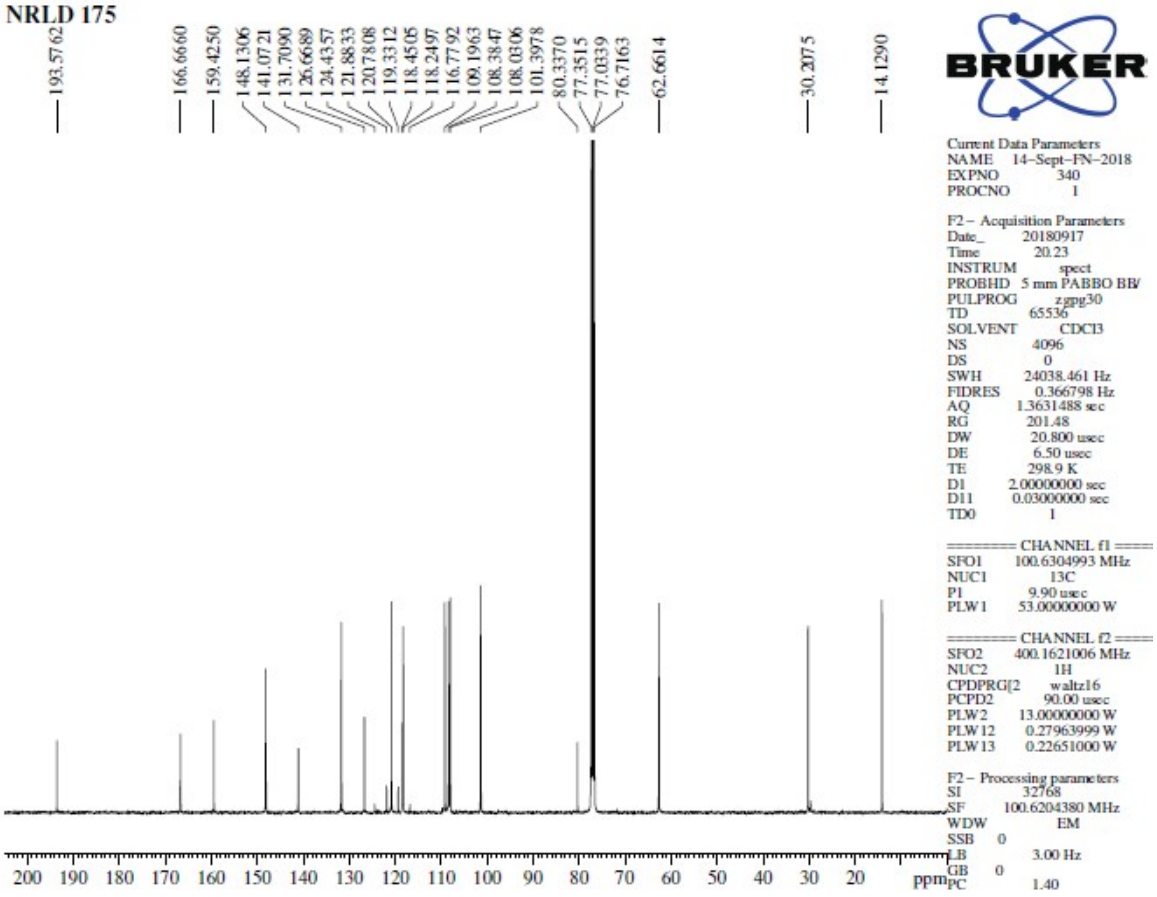

Figure 46: ^{13}C NMR spectrum of 3w

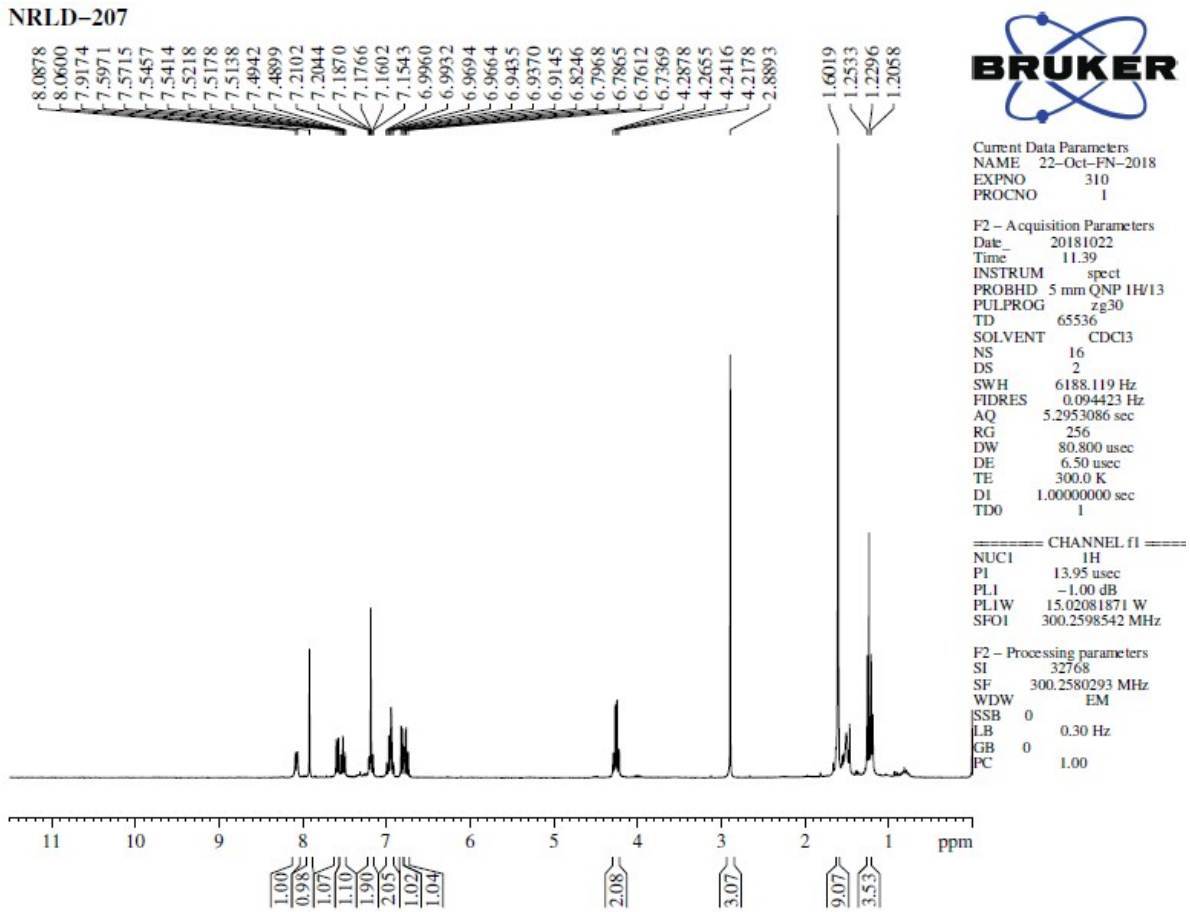

Figure 47: ^{1}H NMR spectrum of 3x

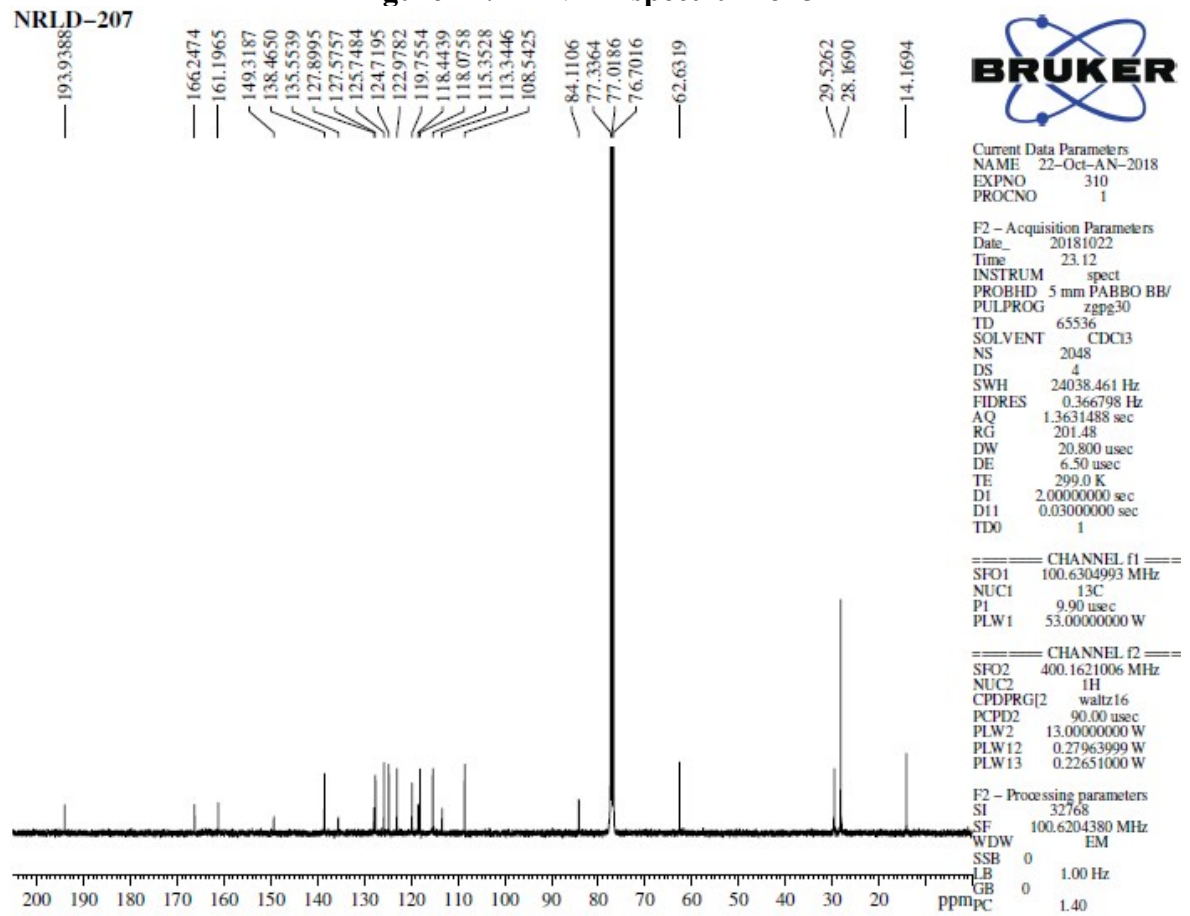

Figure 48: ^{13}C NMR spectrum of 3x

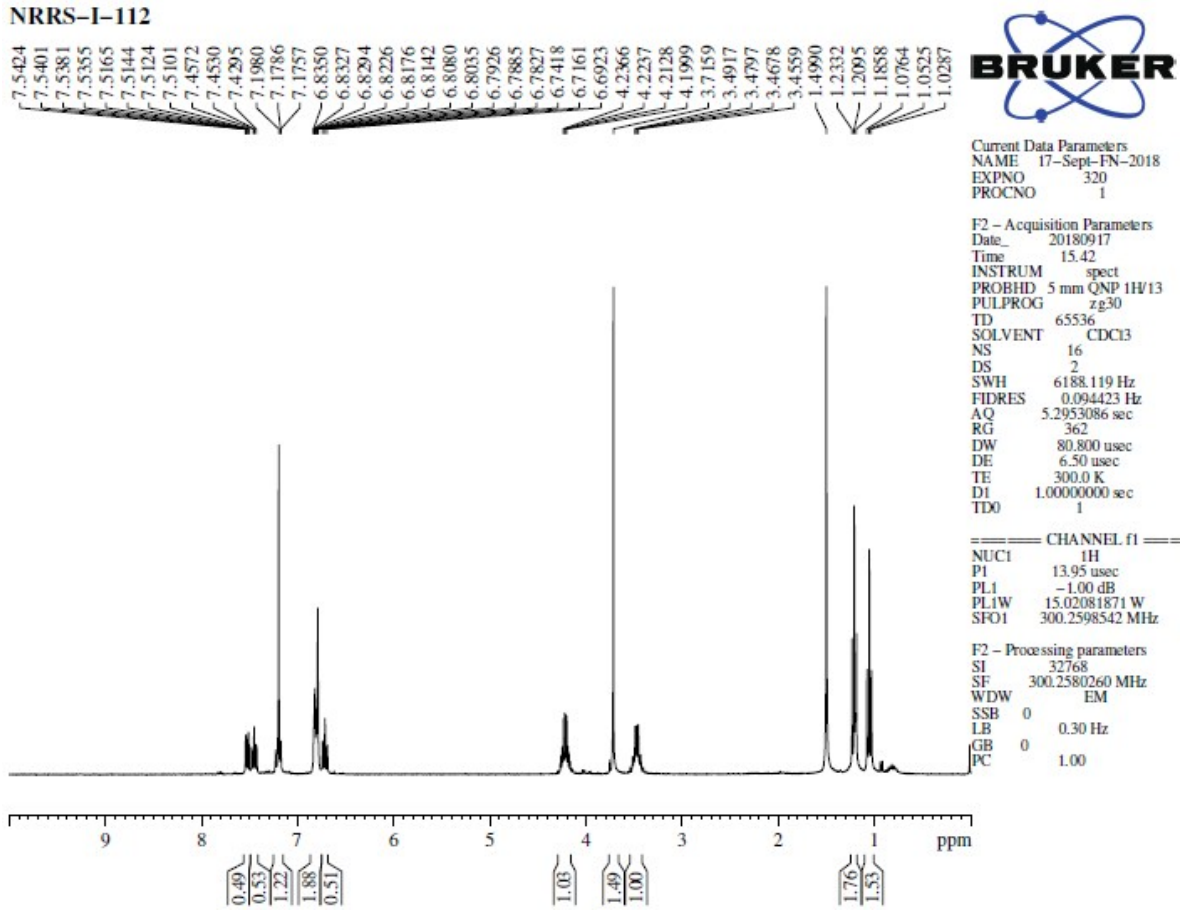

Figure 49: ^{1}H NMR spectrum of 3y

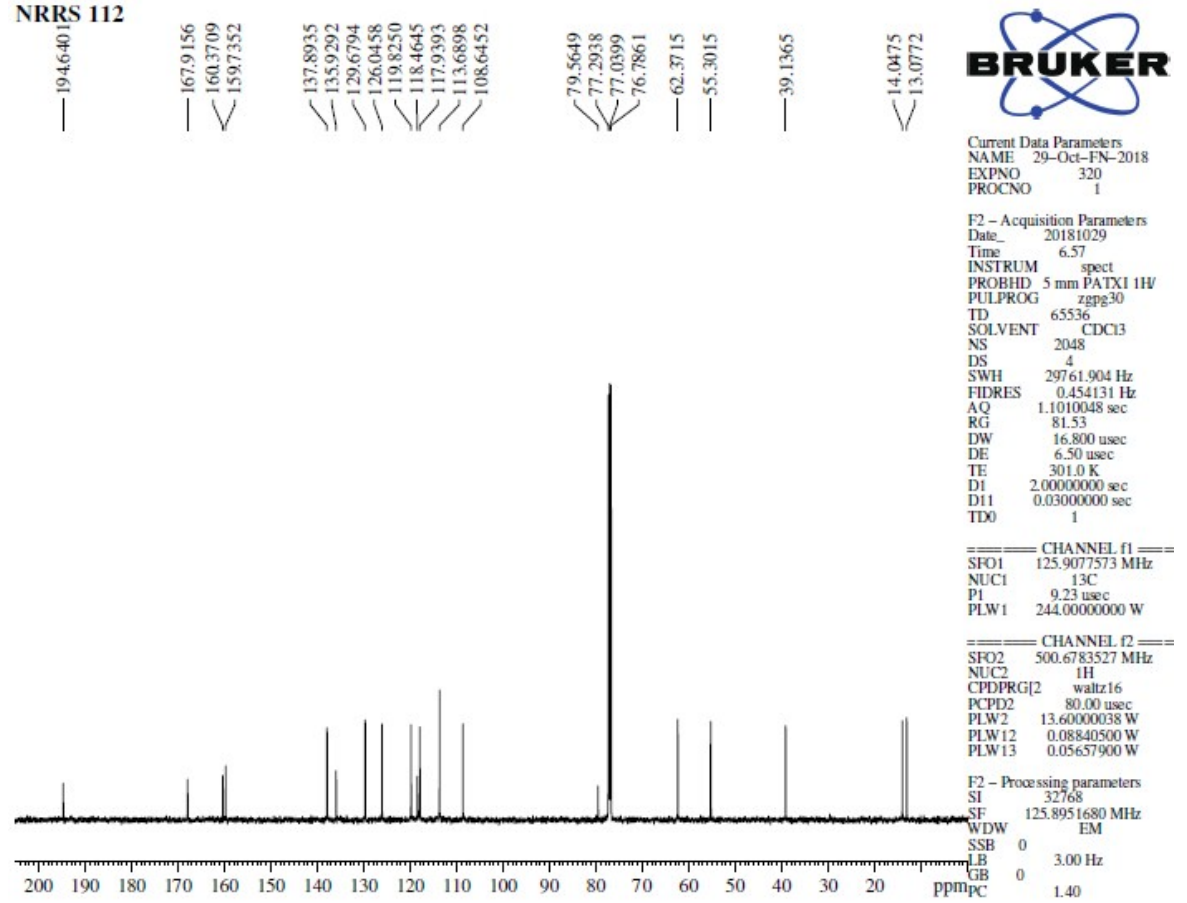

Figure 50: ^{13}C NMR spectrum of 3y

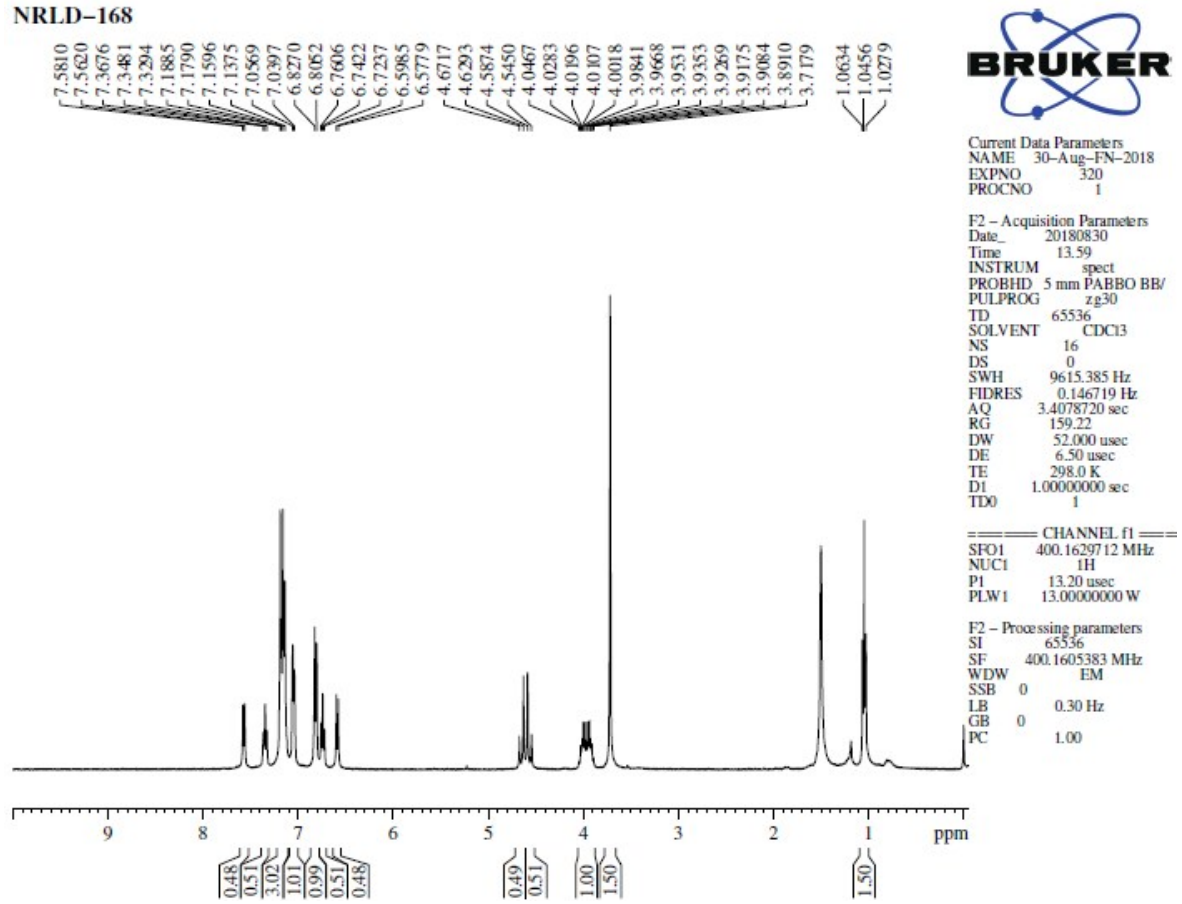

Figure 51: ^{1}H NMR spectrum of 3z

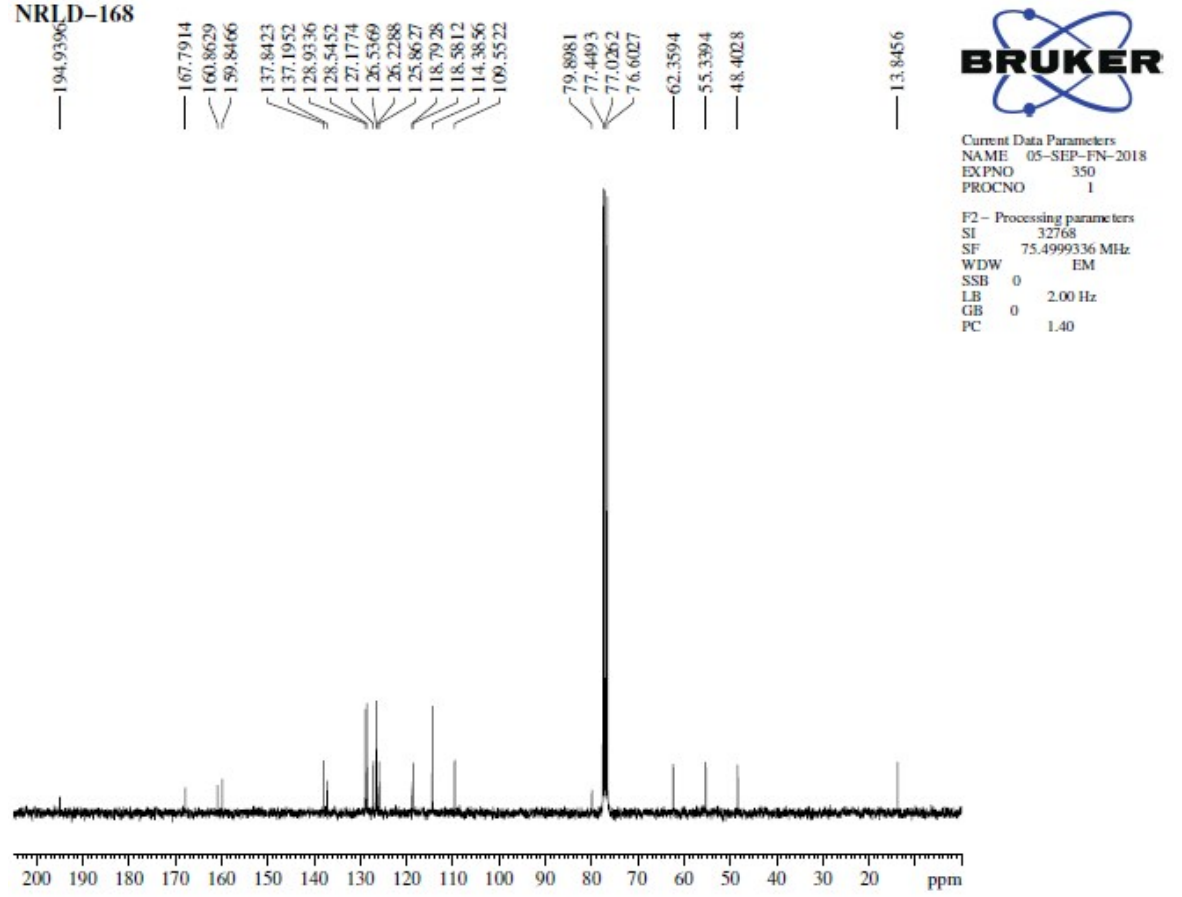

Figure 52: ^{13}C NMR spectrum of 3z

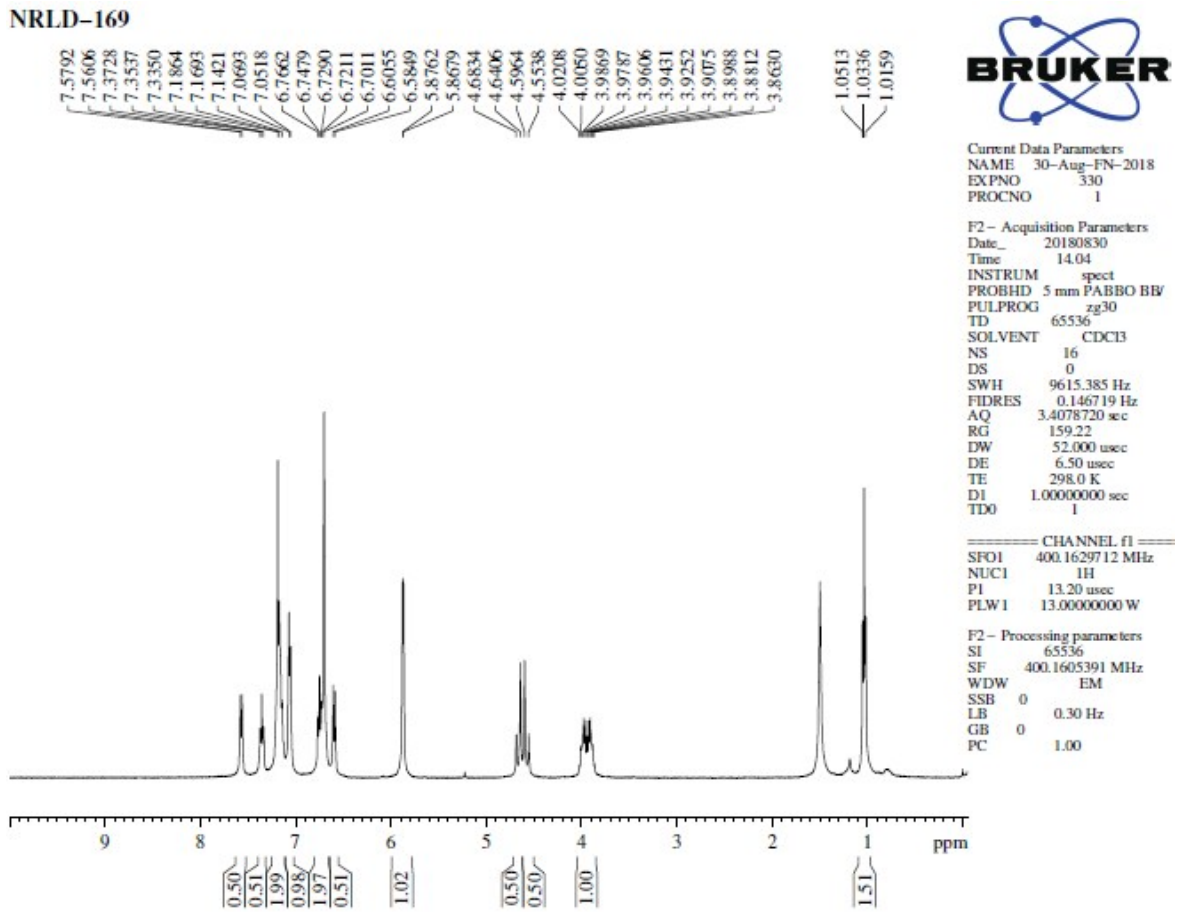

Figure 53: ^{1}H NMR spectrum of 3za

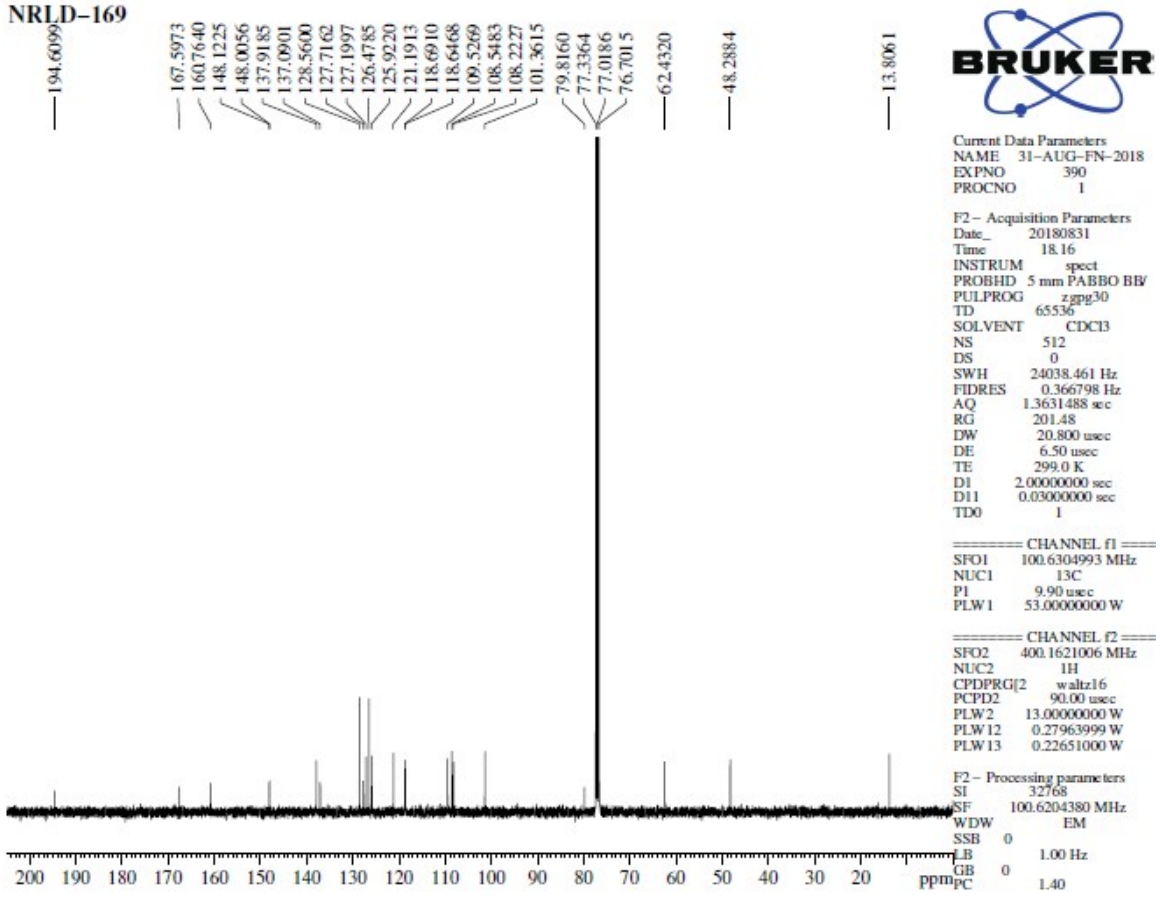

Figure 54: ^{13}C NMR spectrum of 3za

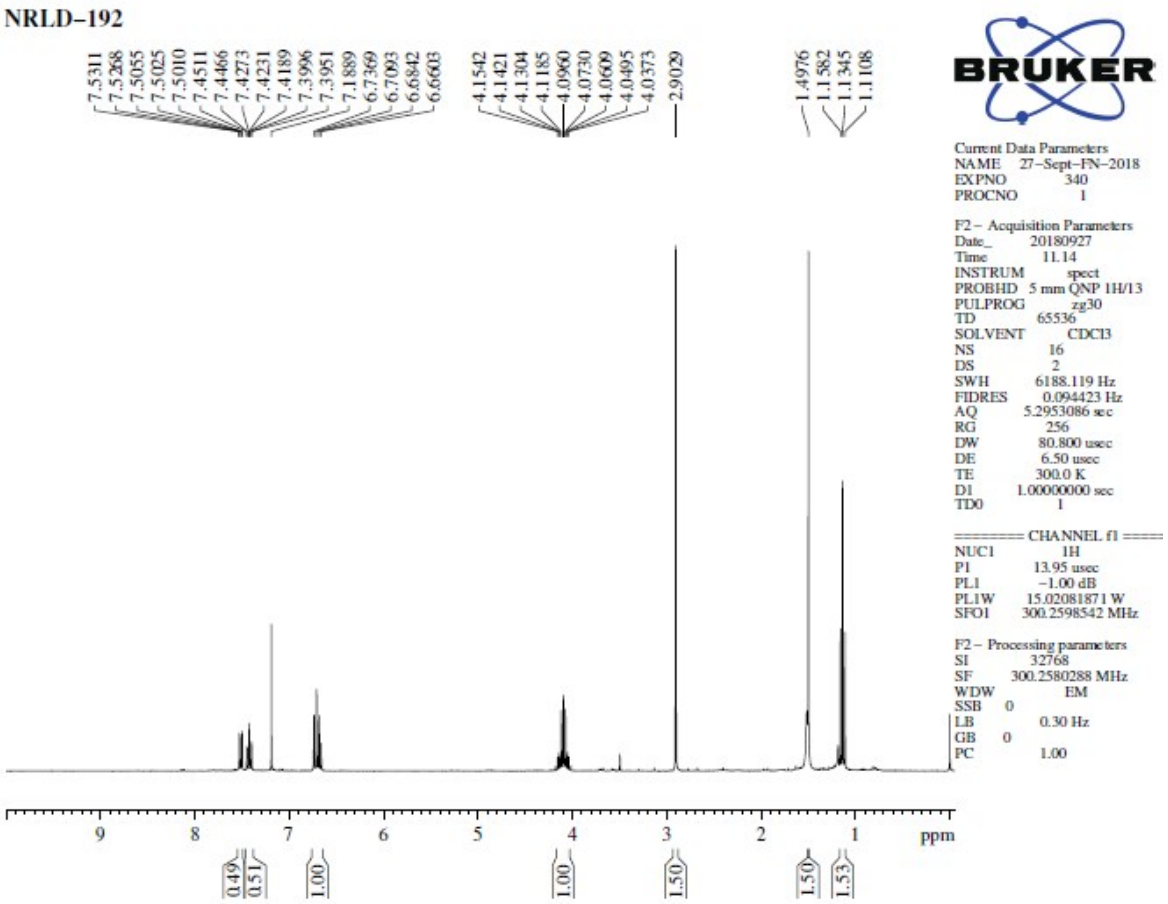

Figure 55: ^{1}H NMR spectrum of 3zb

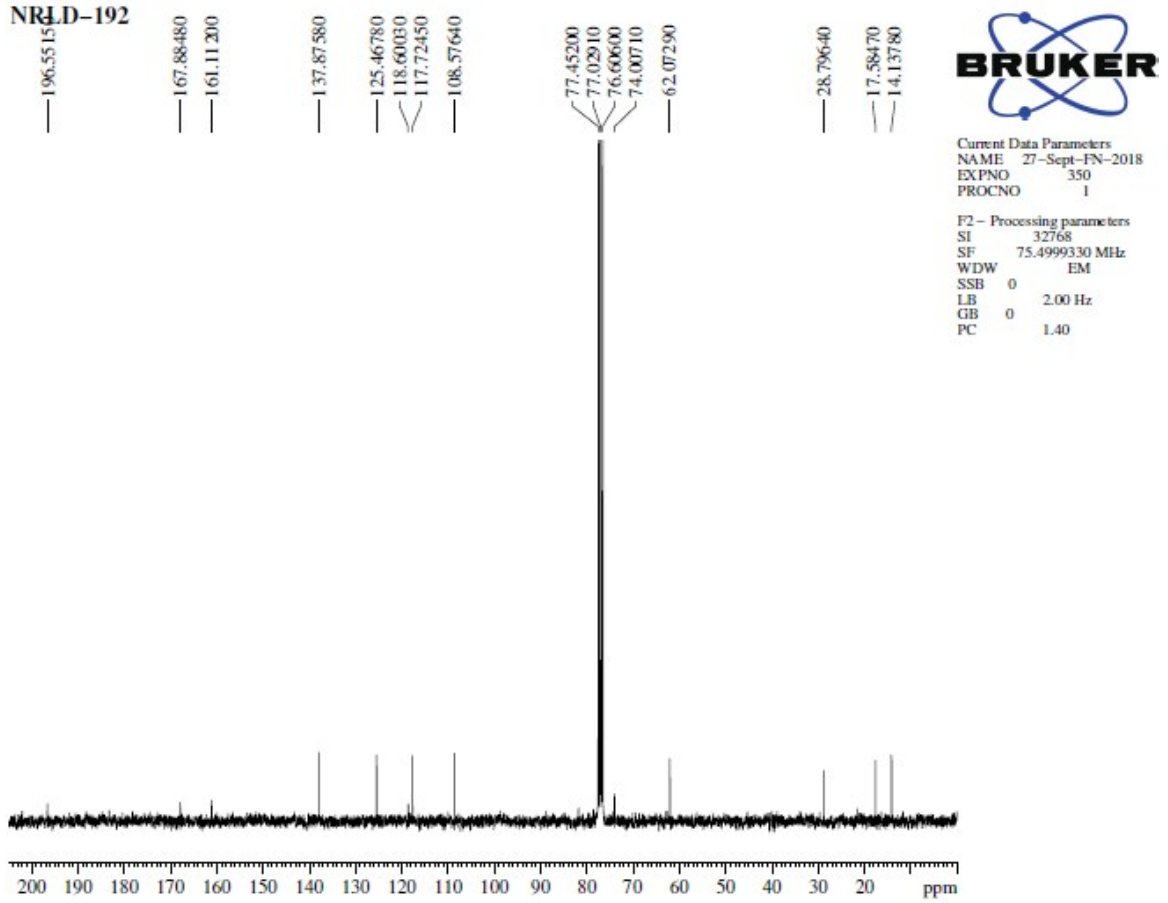

Figure 56: ^{13}C NMR spectrum of 3zb

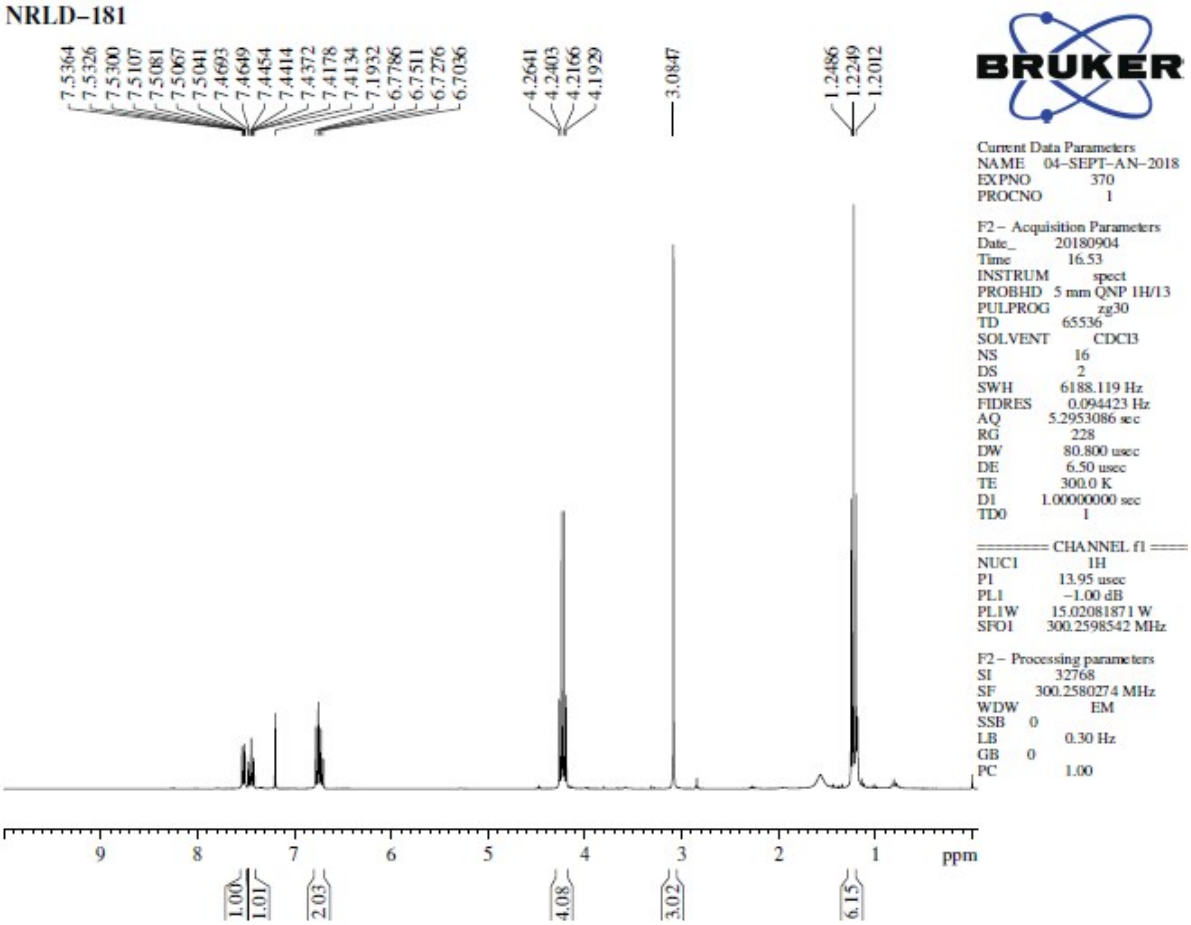

Figure 57: ^{1}H NMR spectrum of 3zc

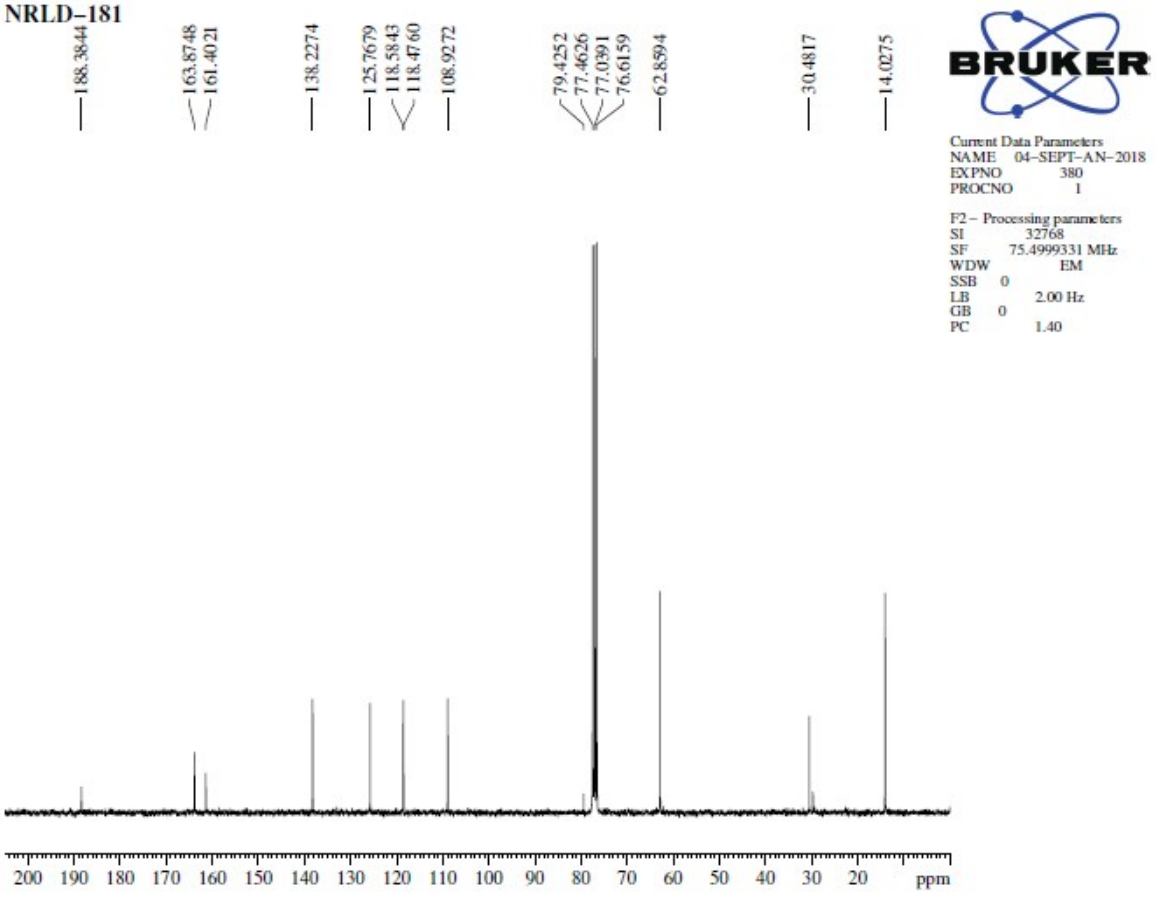

Figure 58: ^{13}C NMR spectrum of 3zc