Electronic Supplementary Material (ESI) for ChemComm.

Rh(III)-catalyzed allylic C-H amidation of unactivated alkenes with *in situ* generated iminoiodinanes

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Electronic Supplementary Information (ESI)

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Experimental Section

General information: All reactions were carried out under the N_2 atmosphere in flame-dried glassware. Syringes which were used to transfer anhydrous solvents or reagents were purged with nitrogen prior to use (three times). Dry solvents are used for the reaction. Column chromatographical purifications were performed using SiO_2 (120- 200 mesh ASTM) from Merck if not indicated otherwise. Abbrevations for signal coupling are as follows: s, singlet; d, doublet; t, triplet; q, quartet; m, multiplet. Commercially available metal salts and acids were purchased from Sigma-Aldrich and Spectrochem. Pvt. Ltd., India and used without further purification. Starting Materials: alkenes, **1a-d**, **1i**, **1j**, **1p**, **1q** and sulphonamide **2g** are commercially available whereas alkenes like **1f-h**[1], **1k-o**[2]**, 1r-w**[3]**, 4**[2,4] and sulphonamide **2b-g**[5,6] were prepared according to the literature procedures.

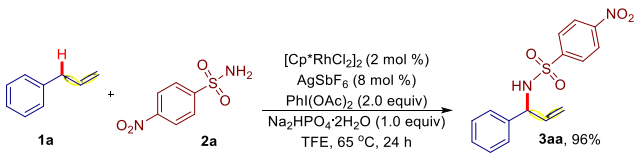
General Procedure for the Synthesis of Allylic Amidation 3:

A 15 mL Schlenk tube with septum containing sulphonamide **2** (0.25 mmol, 50 mg), $[Cp^*RhCl_2]_2$ (2 mol %), $PhI(OAc)_2$ (2.0 equiv) and $Na_2HPO_4{\cdot}2H_2O$ (1 equiv) were evacuated and purged with nitrogen gas three times. In the glove box, $AgSbF_6$ (8 mol %) was added to the Schlenk tube. Followed by, alkene **1** (0.50 mmol, 2.0 equiv) was dissolved in 2,2,2-Trifluoroethanol (2.0 mL) was added *via* syringe and the reaction mixture was evacuated and purged with nitrogen gas three times. Then, rubber septum was taken out and screw cap was used to cover the tube. The reaction mixture was allowed to stir at 65 ^oC for 24 h. Then, the reaction mixture was allowed to reach ambient temperature and diluted with CH_2Cl_2, followed by filtration through celite and the filtrate was concentrated. The crude residue was purified through a silica gel column using hexane and ethyl acetate as eluent to give pure **3**. The yield of product was calculated based on sulfonamide **2**.

Optimization Studies:

Initially, the effect of catalyst loading on the amidation reaction was examined and it was found that decreasing the catalyst loading to 1.5 mol% decreases the yield of product **3aa** in 75%. Increasing the catalyst loading shows only slight increase in the product yield (Table S1, entries 1-2). Further, restricting the reaction time to 16 h and $PhI(OAc)_2$ (1.5 equiv) resulted in the yield of product **3aa** in 80% and 82% yield, respectively (entries 3-4). The reaction was also examined with other catalysts such as $[Cp^*IrCl_2]_2$ and $[(p\text{-cymene})RuCl_2]_2$. It was found that both of these catalysts are ineffective for this reaction (entries 5-6). In the absence of $Na_2HPO_4{\cdot}H_2O$, the desired product **3aa** was not obtained (entry 7). NaOAc was partially effective, giving product **3aa** in moderate 46% yield (entry 8). Whereas, LiOAc was found to be ineffective for the reaction (entry 9). Further, switching to stronger oxidant, $PhI(O_2CCF_3)_2$, did not give the desired product (entry 10). Screening of different solvents shows that the formation of product occurs in the presence of alcoholic solvents like HFIP and TFE only (entry 11-15). Further, decreasing the reaction temperature leads to the lower yield of product **3aa** in 65% (entry 16).

Table S1. Optimization Table



entry	conditions	yield (%)[a]
1	$[Cp^*RhCl_2]_2$ (1.5 mol %)	75
2	$[Cp^*RhCl_2]_2$ (2.5 mol %)	97
3	reaction time 16 h	80
4	$PhI(OAc)_2$ (1.5 equiv)	82
5	$[Cp^*IrCl_2]_2$ (2 mol %)	NR
6	$[(p\text{-cymene})RuCl_2]_2$ (5 mol %)	NR
7	without $Na_2HPO_4{\cdot}2H_2O$	NR
8	NaOAc instead of $Na_2HPO_4{\cdot}2H_2O$	46
9	LiOAc instead of $Na_2HPO_4{\cdot}2H_2O$	NR
10	$PhI(O_2CCF_3)_2$ instead of $PhI(OAc)_2$	NR
11	$ClCH_2CH_2Cl$ as solvent	Trace
12	THF as solvent	NR
13	HFIP as solvent	86
14	CH_3CN as solvent	NR
15	MeOH as solvent	NR
16	reaction temp 50 °C	65

[a] Isolated yield

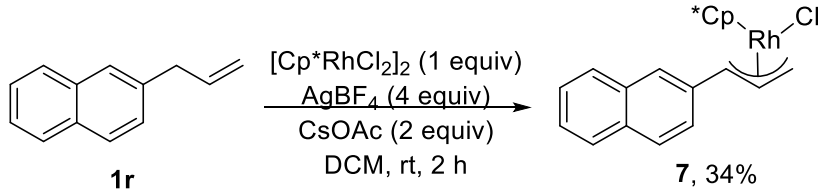
Mechanistic inverstigation:

(a) **Reaction in presence of cinnamyl acetate:** A 15 mL Schlenk tube with septum containing sulphonamide **2** (0.25 mmol, 50 mg), $[Cp^*RhCl_2]_2$ (2 mol %), $PhI(OAc)_2$ (2.0 equiv) and $Na_2HPO_4{\cdot}2H_2O$ (1 equiv) were evacuated and purged with nitrogen gas three times. In the glove box, $AgSbF_6$ (8 mol %) was added to the Schlenk tube. Followed by, alkene **1** (0.50 mmol, 2.0 equiv) and cinnamyl acetate (2 equiv) was dissolved in 2,2,2-Trifluoroethanol (2.0 mL) was added *via* syringe and the reaction mixture was evacuated and purged with nitrogen gas three times. Then, rubber septum was taken out and screw cap was used to cover the tube. The reaction mixture was allowed to stir at 65 ^oC for 24 h. Then, the reaction mixture was allowed to reach ambient temperature and diluted with CH_2Cl_2, followed by filtration through celite and the filtrate was concentrated. The crude residue was purified through a silica gel column using hexane and ethyl acetate as eluent to give pure **3** along with that 100% unreacted cinnamyl acetate was also recovered in the reaction as such.

(b) **Reaction with iminoiodinanes 2a':** Reaction was carried out using general procedure using iminoiodinanes **2a'** amidation source and product was isolated in 58% yield.

(c) **Synthesis and reaction of Cp*Rh π-allyl intermediate:**

(i) Procedure for the synthesis of Cp*Rh π-allyl intermediate:

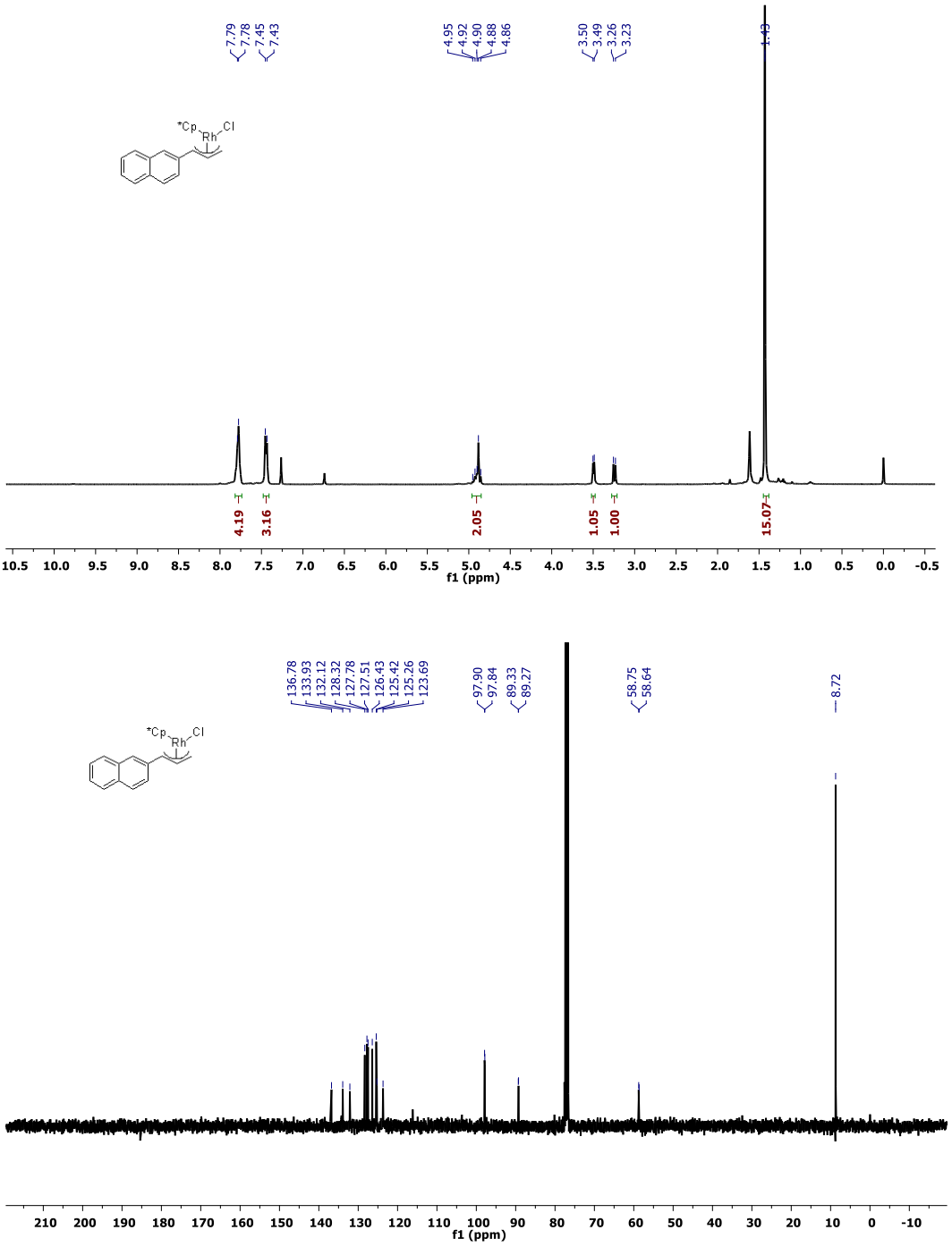


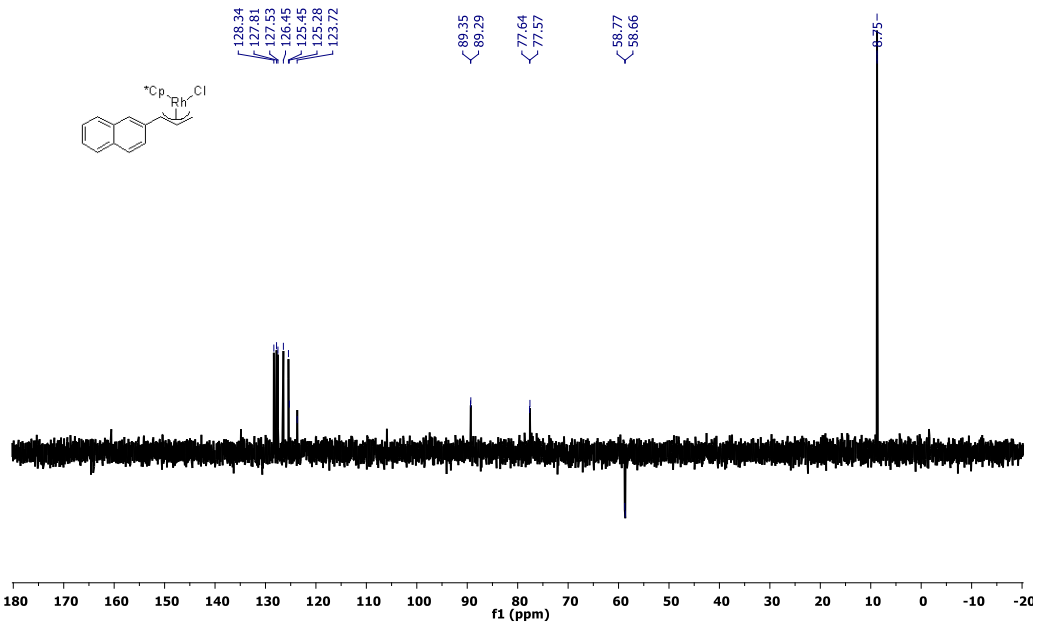
This was prepared by a known procedure.[7]

$[Cp^*RhCl_2]_2$ (184.4 mg, 1.00 equiv), $AgBF_4$ (233.6 mg, 4.00 equiv) and CsOAc (115.2 mg, 0.60, 2.00 equiv) were added in a 150 mL oven-dried Schlenk tube was equipped with a magnetic stir bar inside the glovebox. Next, outside the glovebox DCM (30 mL) was added to the tube and the reaction mixture was pre-stirred for 5 min at r.t. under an Ar atmosphere. Then, 2-allylnaphthalene (202 mg, 4.00 equiv.) was added to the Schlenk tube and the reaction is stirred for 2 h at r.t.. The reaction mixture was cooled down in the fridge for 1 h, after that 10 mL of sat. aq. NaCl solution was added to the suspension. After vigorous shaking for 1 min all solids were filtered off and the organic layer was separated carefully. The aq. layer was washed with DCM (20 mL). Without the addition of drying agents all volatiles of the combined organic phases were removed under reduced pressure. The crude was dissolved in the Et_2O and filtered through a pipette with Whatman® paper. Et_2O was removed under reduced pressure and the obtained solids were washed with pentane multiple times to remove unreacted 2-allylnaphthalene. The product was obtained as red crystals 34% yield (48 mg). NMR data is correlated with the reported literature.

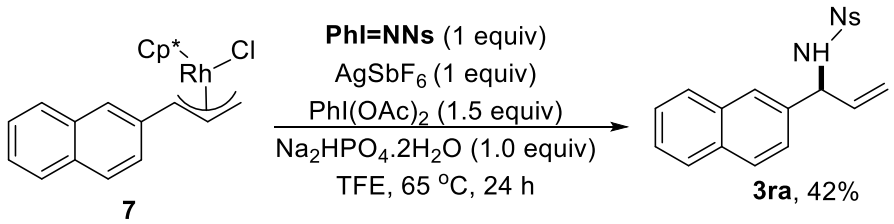
^{1}H NMR (400 MHz, $CDCl_3$): δ 7.81-7.76 (m, 4H), 7.44 (m, 3H), 4.97 – 4.84 (m, 2H), 3.49 (m, 1H), 3.24 (d, J = 9.7 Hz, 1H), 1.43 (s, 15H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 136.8, 133.9, 132.1, 128.3, 127.8, 127.5, 126.4, 125.4, 125.3, 123.7, 97.9 & 97.8(d, J_{Rh-C} = 26 Hz), 89.3 & 89.3 (d, J_{Rh-C} = 25.2 Hz), 58.8 & 58.6 (d, J_{Rh-C} = 43.2 Hz), 8.7.

^{1}H, ^{13}C and DEPT-135 NMR of Cp*Rh π-allyl complex:





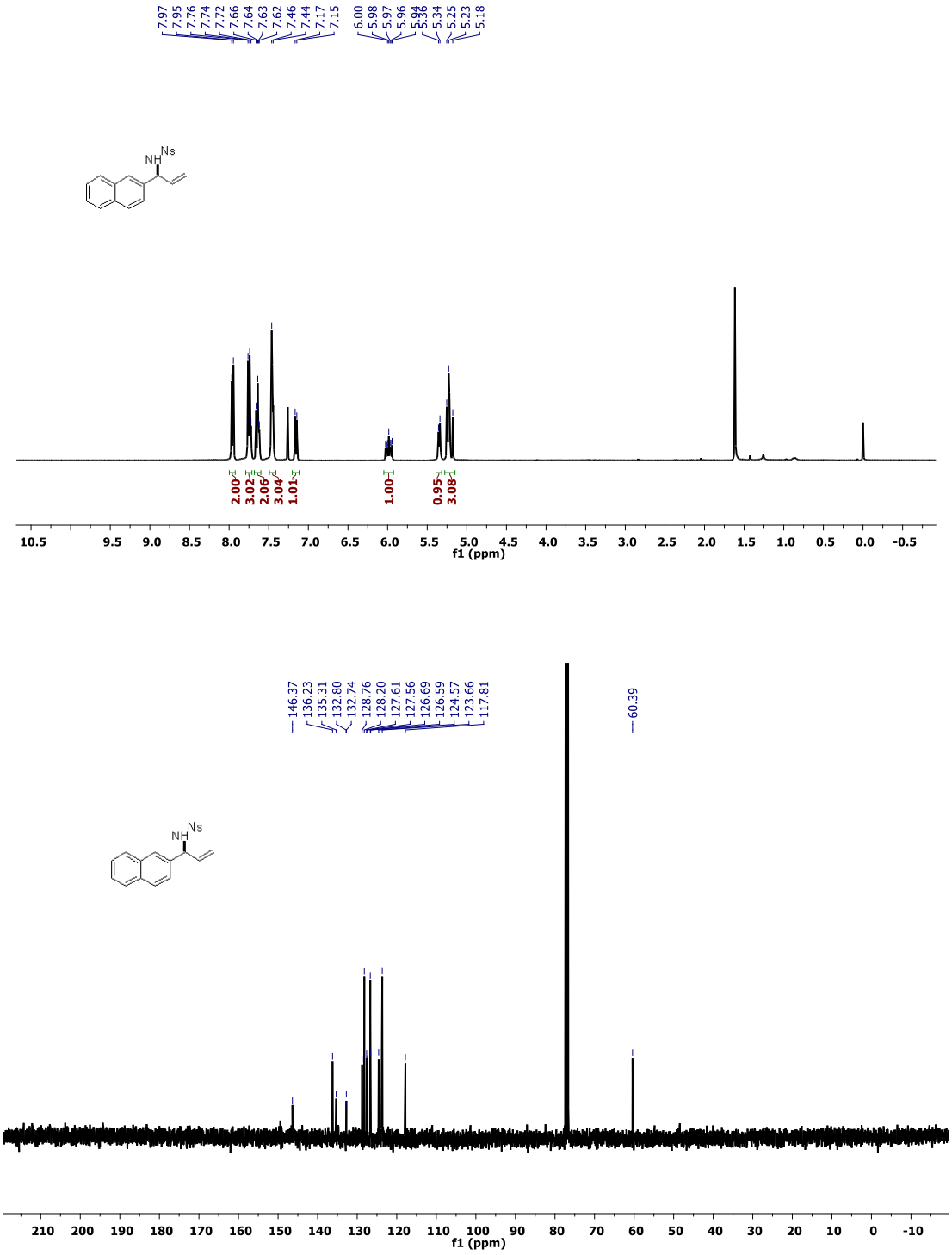
(ii) Procedure for the reaction of π-allyl intermediate with nitrene precursor:

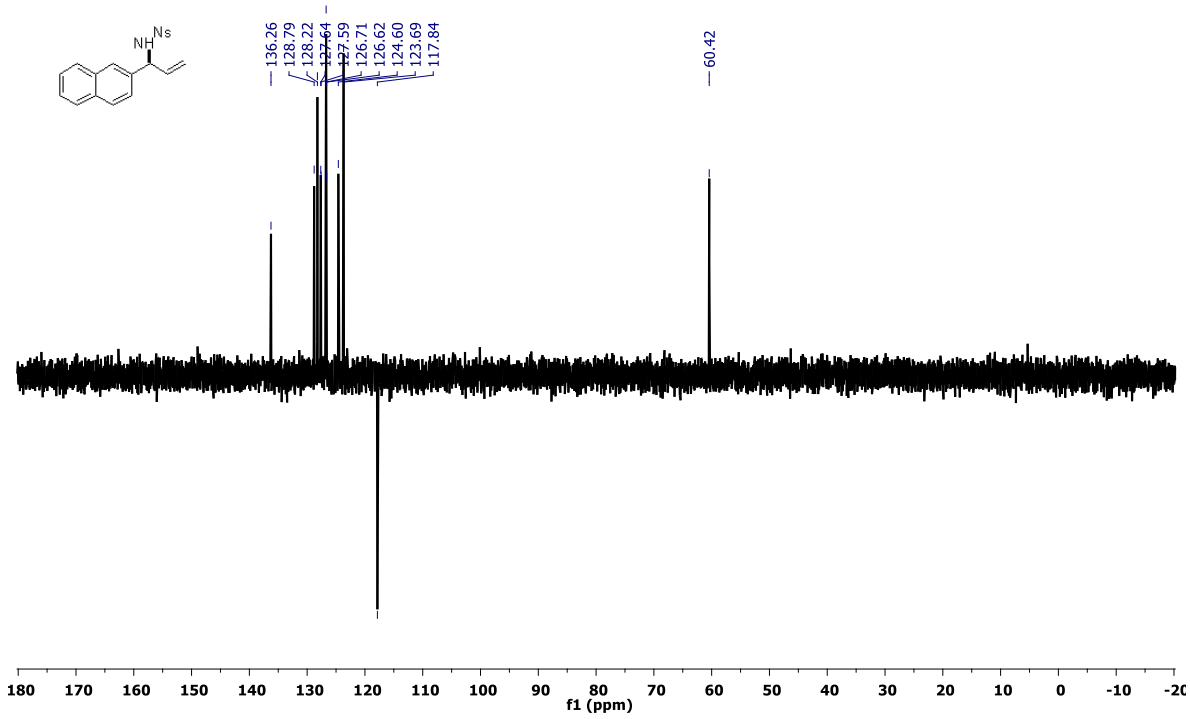


A 15 mL Schlenk tube with septum containing π-allyl Rhodium complex **7** (15 mg, 1 equiv), iminoiodinanes **2a'** (12 mg, 1 equiv), $PhI(OAc)_2$ (1.5 equiv) and $Na_2HPO_4.2H_2O$ (1 equiv) were evacuated and purged with nitrogen gas three times. In the glove box, $AgSbF_6$ (1 equiv) was added to the Schlenk tube. Followed by, 2,2,2-Trifluoroethanol (2.0 mL) was added via syringe and the reaction mixture was evacuated and purged with nitrogen gas three times. Then, rubber septum was taken out and screw cap was used to cover the tube. The reaction mixture was allowed to stir at 65 ^oC for 24 h. Then, the reaction mixture was allowed to reach ambient temperature and diluted with CH_2Cl_2, followed by filtration through celite and the filtrate was concentrated. The crude residue was purified through a silica gel column using hexane and ethyl acetate as eluent to give pure **3ra** in 42% yield. The product obtained was characterized by NMR data.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.96 (d, J = 8.4 Hz, 2H), 7.74 (m, 3H), 7.64 (m, 2H), 7.45 m, 3H), 7.16 (d, J = 8.6 Hz, 1H), 5.98 (ddd, J = 16.5, 10.4, 6.0 Hz, 1H), 5.35 (d, J = 7.4 Hz, 1H), 5.22 (m, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 146.4, 136.2, 135.3, 132.8, 132.7, 128.8, 128.2, 127.6, 127.6, 126.7, 126.6, 124.6, 123.7, 117.8, 60.4.

^{1}H, ^{13}C and DEPT-135 NMR of Cp*Rh π-allyl complex:



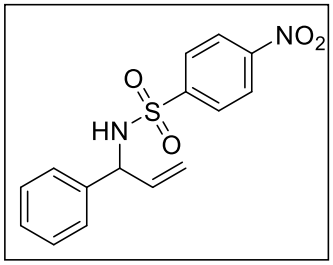

NH
Ns
136.26
128.79
128.22
127.64
127.59
126.71
126.62
124.60
123.69
117.84
60.42
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20
f1 (ppm)

Procedure for Deprotection of Sulfonamides 3aa or **3wa:**

To a solution of the compound **3aa** or **3wa** (0.2 mmol), and $LiOH{\cdot}H_2O$ (16.0 equiv) in DMF (1.0 mL), Thioglycolic acid (8.0 equiv) was added at 0 ^oC. The reaction mixture was stirred at rt for 6 h and diluted with EtOAc. The combined organic layers were washed with saturated aqueous $NaHCO_3$ and brine, dried over Na_2SO_4 and concentrated. The residue was purified on column chromatography (hexanes/*i*-$PrNH_2$ = 19/1) to give amine product **6a** or **6b** as colorless oil and confirmed by NMR and HRMS. The spectral data is correlated with previous reports.[8,9]

Spectral Data of Compounds

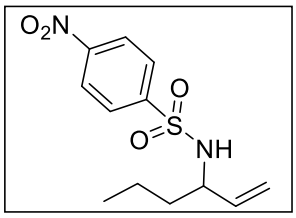
4-Nitro-*N*-(1-phenylallyl)benzenesulfonamide (**3aa**):



Prepared according to general procedure for the reaction of **1a** with **2a**; white solid; eluent (10% ethyl acetate:hexane); yield is 96%.
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.16 (d, *J* = 8.2 Hz, 2H), 7.84 (d, *J* = 8.2 Hz, 2H), 7.18 (m, 3H), 7.08 (m, 1H), 5.93 – 5.82 (m, 1H), 5.49 (d, *J* = 7.6 Hz, 1H), 5.14 (dd, *J* = 17.0, 14.2 Hz, 2H), 5.06 (t, *J* = 6.8 Hz, 1H).
^{13}C NMR (101 MHz, $CDCl_3$): δ 149.7, 146.5, 138.4, 136.4, 128.7, 128.3, 128.1, 127.1, 123.9, 117.4, 60.2.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{15}H_{14}N_2O_4SNa$ 341.0572; Found 341.0590.

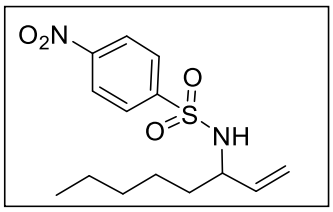
***N*-(Hex-1-en-3-yl)-4-nitrobenzenesulfonamide** (**3ba**):



Prepared according to general procedure for the reaction of **1b** with **2a**; white solid; eluent (10% ethyl acetate:hexane); yield is 96%.
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.34 (d, *J* = 8.4 Hz, 2H), 8.04 (d, *J* = 8.4 Hz, 2H), 5.49 (ddd, *J* = 17.0, 10.0, 7.2 Hz, 1H), 4.97 (dd, *J* = 14.0, 8.0 Hz, 1H), 4.71 (d, *J* = 8.2 Hz, 1H), 3.88 (p, *J* = 7.2 Hz, 1H), 1.49 (dd, *J* = 14.8, 7.4 Hz, 2H), 1.39 – 1.17 (m, 2H), 0.87 (t, *J* = 7.2 Hz, 3H).
^{13}C NMR (101 MHz, $CDCl_3$): δ 149.9, 147.1, 137.2, 128.4, 124.2, 116.4, 56.7, 37.8, 18.6, 13.6.

HRMS (ESI-TOF) m/z: $[M + NH_4]^+$ Calcd for $C_{12}H_{20}N_3O_4S$ 302.1175; Found 302.1156.

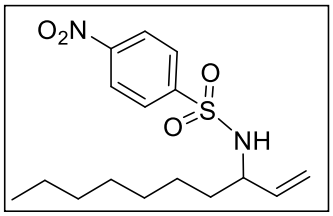
4-Nitro-*N*-(oct-1-en-3-yl)benzenesulfonamide (3ca):



Prepared according to general procedure for the reaction of **1c** with **2a**; white solid; eluent (8% ethyl acetate:hexane); yield is 97%.
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.34 (d, *J* = 8.4 Hz, 2H), 8.05 (d, *J* = 8.4 Hz, 2H), 5.49 (ddd, *J* = 17.2, 11.0, 6.8 Hz, 1H), 5.04 – 4.85 (m, 3H), 3.85 (p, *J* = 7.2 Hz, 1H), 1.48 (t, *J* = 7.2 Hz, 2H), 1.27 (m, 6H), 0.84 (t, *J* = 6.6 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 150.0, 147.1, 137.2, 128.4, 124.2, 116.5, 60.0, 35.6, 31.3, 25.0, 22.4, 14.0.

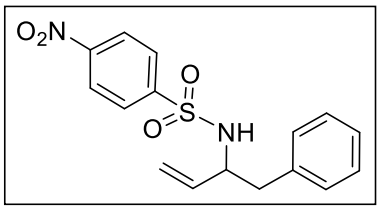
HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{14}H_{20}N_2O_4SNa$ 335.1041; Found 335.1062.

***N*-(Dec-1-en-3-yl)-4-nitrobenzenesulfonamide** (**3da**):



Prepared according to general procedure for the reaction of **1d** with **2a**; yellow solid; eluent (8% ethyl acetate:hexane); yield is 97%.
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.34 (d, *J* = 8.6 Hz, 2H), 8.05 (d, *J* = 8.6 Hz, 2H), 5.49 (ddd, *J* = 17.0, 10.0, 7.0 Hz, 1H), 5.20 – 4.76 (m, 3H), 3.85 (p, *J* = 7.0 Hz, 1H), 1.56 – 1.36 (m, 2H), 1.26 (m, 9H), 0.86 (t, *J* = 7.0 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 149.9, 147.1, 137.2, 128.4, 124.2, 116.5, 60.0, 35.7, 31.7, 29.1, 25.3, 22.6, 14.1.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{16}H_{25}N_2O_4S$ 341.1535; Found 341.1560.

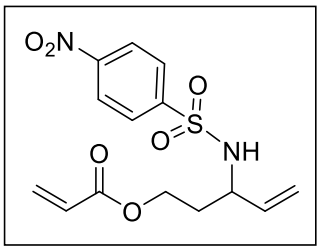
4-Nitro-*N*-(1-phenylbut-3-en-2-yl)benzenesulfonamide (**3ea**):



Prepared according to general procedure for the reaction of **1e** with **2a**; white solid; eluent (8 % ethyl acetate:hexane); yield is 65%.

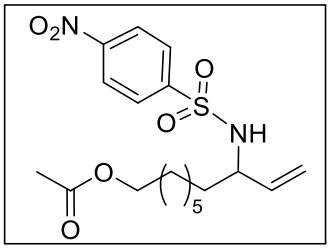
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.18 (d, *J* = 8.6 Hz, 2H), 7.78 (d, *J* = 8.6 Hz, 2H), 7.19 (m, 3H), 7.07 – 6.82 (m, 2H), 5.74 (ddd, *J* = 16.8, 10.4, 6.0 Hz, 1H), 5.12 (t, *J* = 13.6 Hz, 2H), 4.64 (d, *J* = 7.8 Hz, 1H), 4.21 – 3.96 (m, 1H), 2.91 (dd, *J* = 13.8, 5.6 Hz, 1H), 2.70 (dd, *J* = 13.9, 8.2 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 149.7, 146.3, 137.1, 136.0, 129.4, 128.7, 128.1, 127.1, 124.1, 116.6, 57.6, 41.9.
HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{16}H_{17}N_2O_4S$ 333.0909; Found 333.0926.

3-((4-Nitrophenyl)sulfonamido)pent-4-en-1-yl acrylate (**3fa**):



Prepared according to general procedure for the reaction of **1f** with **2a**; white solid; eluent (12 % ethyl acetate:hexane); yield is 56%.
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.33 (d, *J* = 8.6 Hz, 2H), 8.03 (d, *J* = 8.6 Hz, 2H), 6.40 (d, *J* = 17.4 Hz, 1H), 6.08 (dd, *J* = 17.4, 10.4 Hz, 1H), 5.87 (d, *J* = 10.6 Hz, 1H), 5.58 (ddd, *J* = 17.0, 10.4, 6.6 Hz, 1H), 5.06 (dd, *J* = 13.8, 8.0 Hz, 3H), 4.24 – 4.11 (m, 2H), 4.10 – 4.02 (m, 1H), 1.99 – 1.83 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 165.9, 150.0, 146.7, 136.2, 131.5, 128.3, 127.9, 124.3, 117.2, 60.6, 54.0, 34.3.
HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd $C_{14}H_{16}N_2O_6SNa$ 363.0627; Found 363.0626

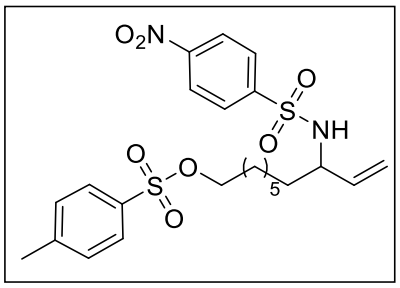
4-((4-Nitrophenyl)sulfonamido)hex-5-en-1-yl acetate (**3ga**):



Prepared according to general procedure for the reaction of **1g** with **2a**; white solid; eluent (12 % ethyl acetate:hexane); yield is 86%.
^{1}H NMR (400 MHz, $CDCl_3$): δ 8.34 (d, *J* = 8.2 Hz, 2H), 8.04 (d, *J* = 8.4 Hz, 2H), 5.48 (ddd, *J* = 17.0, 10.2, 7.0 Hz, 1H), 4.96 (dd, *J* = 13.8, 7.6 Hz, 3H), 4.04 (t, *J* = 6.6 Hz, 2H), 3.85 (p, *J* = 7.0 Hz, 1H), 2.05 (s, 3H), 1.63 – 1.55 (m, 2H), 1.52 – 1.46 (m, 2H), 1.27 (m, 8H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 171.4, 149.9, 147.1, 137.2, 128.4, 124.2, 116.5, 64.5, 56.9, 35.7, 29.0, 28.5, 25.7, 25.2, 21.0.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{14}H_{19}N_2O_4SNa$ 421.1409; Found 421.1410.

4-Methyl-*N*-((6-((4-nitrophenyl)sulfonamido)oct-7-en-1-yl)oxy)benzenesulfonamide (**3ha**):



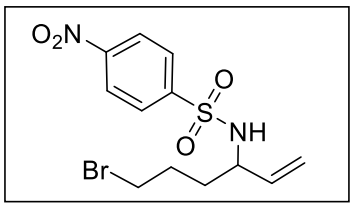
Prepared according to general procedure for the reaction of **1h** with **2a**; colourless oil; eluent (10 % ethyl acetate:hexane); yield is 80%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.33 (d, *J* = 8.4 Hz, 2H), 8.03 (d, *J* = 8.4 Hz, 2H), 7.79 (d, *J* = 8.0 Hz, 2H), 7.36 (d, *J* = 8.0 Hz, 1H), 5.48 (ddd, *J* = 17.2, 10.2, 7.0 Hz, 1H), 5.01 – 4.91 (m, 2H), 4.87 (d, *J* = 8.2 Hz, 1H), 4.01 (t, *J* = 6.4 Hz, 2H), 3.84 (p, *J* = 7.0 Hz, 1H), 2.45 (s, 3H), 1.62 (td, *J* = 14.2, 7.2 Hz, 2H), 1.52 – 1.44 (m, 2H), 1.33 – 1.24 (m, 8H).

^{13}C NMR (101 MHz, $CDCl_3$): δ 149.9, 147.1, 144.7, 137.1, 133.1, 129.8, 128.4, 127.8, 124.1, 116.4, 70.6, 56.9, 35.5, 28.7, 28.7, 28.5, 25.1, 25.0, 21.6.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{21}H_{28}N_3O_7S_2Na$ 533.1387; Found 533.1387.

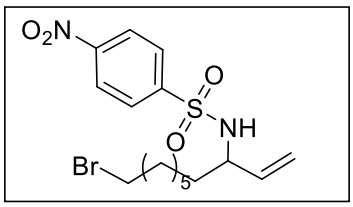
***N*-(6-Bromohex-1-en-3-yl)-4-nitrobenzenesulfonamide** (**3ia**):



Prepared according to general procedure for the reaction of **1i** with **2a**; yellow-white solid; eluent (8 % ethyl acetate:hexane); yield is 60%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.29 (d, *J* = 8.6 Hz, 2H), 7.95 (d, *J* = 8.6 Hz, 2H), 5.65 (ddd, *J* = 16.8, 10.2, 6.5 Hz, 1H), 5.18 (d, *J* = 17.0 Hz, 1H), 5.07 (d, *J* = 10.2 Hz, 1H), 4.18 (d, *J* = 6.4 Hz, 1H), 3.40 (dd, *J* = 9.4, 5.0 Hz, 1H), 3.27 (dd, *J* = 16.4, 7.4 Hz, 1H), 1.88 – 1.71 (m, 2H), 1.70 – 1.61 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 150.0, 144.6, 144.5, 138.3, 137.7, 128.5, 124.20, 116.2, 62.4, 48.7, 32.5, 23.8.

***N*-(10-Bromodec-1-en-3-yl)-4-nitrobenzenesulfonamide** (**3ja**):

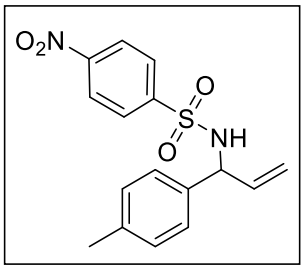


Prepared according to general procedure for the reaction of **1j** with **2a**; white solid; eluent (10 % ethyl acetate:hexane); yield is 62%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.34 (d, *J* = 8.8 Hz, 2H), 8.04 (d, *J* = 8.8 Hz, 2H), 5.49 (ddd, *J* = 17.2, 10.4, 7.0 Hz, 1H), 5.02 – 4.93 (m, 2H), 4.82 (d, *J* = 8.2 Hz, 1H), 3.86 (p, *J* = 7.0 Hz, 1H), 3.40 (t, *J* = 6.8 Hz, 2H), 1.88 – 1.78 (m, 2H), 1.55 – 1.46 (m, 2H), 1.44 – 1.33 (m, 2H), 1.28 (m, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 149.9, 147.0, 137.1, 128.4, 124.2, 116.5, 56.9, 35.6, 33.9, 32.6, 28.9, 28.5, 27.9, 25.2.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{16}H_{23}N_2O_4SBrNa$ 441.0460; Found 441.0460.

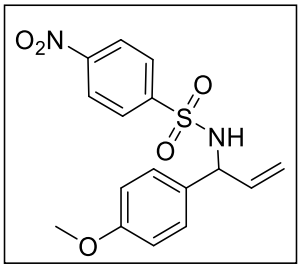
4-Nitro-*N*-(1-(p-tolyl)allyl)benzenesulfonamide (**3ka**):



Prepared according to general procedure for the reaction of **1k** with **2a**; white solid; eluent (10 % ethyl acetate:hexane); yield is 80%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.17 (d, *J* = 8.4 Hz, 2H), 7.84 (d, *J* = 8.4 Hz, 2H), 6.97 (m, 4H), 5.94 – 5.80 (m, 1H), 5.29 (d, *J* = 7.4 Hz, 1H), 5.14 (t, *J* = 13.6 Hz, 2H), 5.02 (t, *J* = 6.6 Hz, 1H), 2.26 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 149.6, 146.6, 138.1, 136.6, 135.4, 129.4, 128.3, 127.1, 123.9, 117.2, 60.0, 20.9.

***N*-(1-(4-Methoxyphenyl)allyl)-4-nitrobenzenesulfonamide** (**3la**):

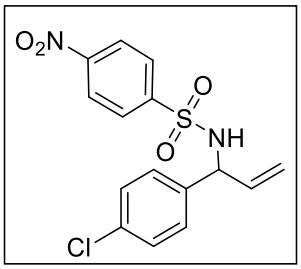


Prepared according to general procedure for the reaction of **1l** with **2a**; white solid; eluent (12 % ethyl acetate:hexane); yield is 75%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.20 (d, *J* = 8.6 Hz, 2H), 7.85 (d, *J* = 8.6 Hz, 2H), 6.99 (d, *J* = 8.4 Hz, 2H), 6.72 (d, *J* = 8.4 Hz, 2H), 5.95 – 5.81 (m, 1H), 5.15 (dd, *J* = 17.1, 13.9 Hz, 2H), 5.02 (s, 2H), 3.74 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 159.5, 149.7, 146.7, 136.6, 130.5, 128.4, 128.4, 123.9, 117.2, 114.1, 59.7, 55.3.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{16}H_{16}N_2O_5SNa$ 371.0678; Found 371.0674.

***N*-(1-(4-Chlorophenyl)allyl)-4-nitrobenzenesulfonamide** (**3ma**):

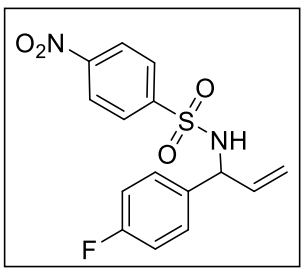


Prepared according to general procedure for the reaction of **1m** with **2a**; white solid; eluent (12 % ethyl acetate:hexane); yield is 65%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.24 (d, *J* = 8.8 Hz, 2H), 7.88 (d, *J* = 8.8 Hz, 2H), 7.20 (d, *J* = 8.4 Hz, 2H), 7.07 (d, *J* = 8.4 Hz, 2H), 5.83 (ddd, *J* = 16.6, 10.4, 6.0 Hz, 1H), 5.25 (d, *J* = 7.4 Hz, 1H), 5.19 (d, *J* =10 Hz, 1H), 5.10 (d, *J* =17 Hz, 1H), 5.05 (t, *J* = 6.6 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 149.8, 146.4, 137.5, 137.0, 135.9, 134.2, 128.9, 128.6, 128.3, 124.1, 118.0, 59.5.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{15}H_{13}N_2O_4SClNa$ 355.0182; Found 375.0177.

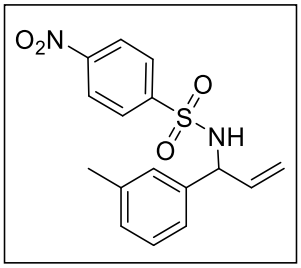
***N*-(1-(4-Fluorophenyl)allyl)-4-nitrobenzenesulfonamide** (**3na**):



Prepared according to general procedure for the reaction of **1n** with **2a**; white solid; eluent (10 % ethyl acetate:hexane); yield is 63%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.24 (d, *J* = 8.4 Hz, 2H), 7.89 (d, *J* = 8.4 Hz, 2H), 7.16 – 7.05 (m, 1H), 6.93 (m, 2H), 5.94 – 5.76 (m, 1H), 5.19 (d, *J* = 10.4 Hz, 1H), 5.14 – 5.04 (m, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 163.6, 161.2, 159.0, 149.9, 146.5, 136.2, 129.0, 128.9, 128.3, 124.0, 117.8, 115.8, 115.6, 59.5. **^{19}F NMR (471 MHz, $CDCl_3$)**: δ -113.17.

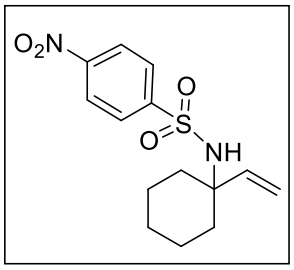
4-Nitro-*N*-(1-(*m*-tolyl)allyl)benzenesulfonamide (**3oa**):



Prepared according to general procedure for the reaction of **1o** with **2a**; white solid; eluent (8 % ethyl acetate:hexane); yield is 70%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.17 (d, *J* = 8.4 Hz, 2H), 7.84 (d, *J* = 8.4 Hz, 2H), 7.09 (t, *J* = 7.6 Hz, 1H), 7.00 (d, *J* = 7.6 Hz, 1H), 6.88 (d, *J* = 7.6 Hz, 1H), 6.83 (s, 1H), 5.87 (ddd, *J* = 16.4, 9.8, 6.6 Hz, 1H), 5.16 (m, 3H), 5.03 (t, *J* = 6.2 Hz, 1H), 2.20 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 149.7, 146.6, 138.5, 138.3, 136.5, 128.9, 128.7, 128.3, 127.8, 124.2, 123.8, 117.3, 60.3, 21.2.

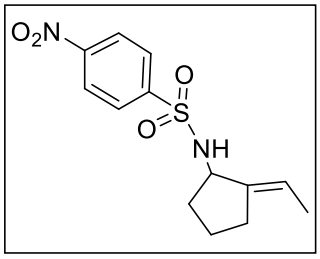
4-Nitro-*N*-(1-vinylcyclohexyl)benzenesulfonamide (**3pa**):



Prepared according to general procedure for the reaction of **1p** with **2a**; white solid; eluent (8 % ethyl acetate:hexane); yield is 70%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.32 (d, *J* = 8.6 Hz, 2H), 8.02 (d, *J* = 8.6 Hz, 2H), 5.55 (dd, *J* = 17.6, 10.8 Hz, 1H), 5.13 (d, *J* = 17.6 Hz, 1H), 5.02 (d, *J* = 10.8 Hz, 1H), 4.77 (s, 1H), 1.90 – 1.80 (m, 2H), 1.64 (m, 2H), 1.49 – 1.41 (m, 4H), 1.39 – 1.29 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 148.8, 141.1, 128.5, 124.0, 115.9, 59.8, 36.1, 25.1, 21.7.

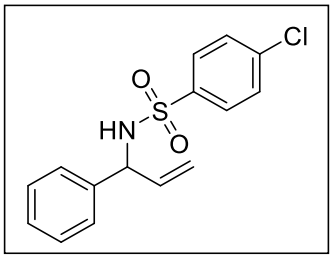
(*E*)-*N*-(2-ethylidenecyclopentyl)-4-nitrobenzenesulfonamide (**3qa**):



Prepared according to general procedure for the reaction of **1q** with **2a**; white solid; eluent (7 % ethyl acetate in hexane); yield is 65%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.37 (d, *J* = 8.4 Hz, 2H), 8.10 (d, *J* = 8.4 Hz, 2H), 5.58 – 5.44 (m, 1H), 4.54 (d, *J* = 4.6 Hz, 1H), 4.25 (s, 1H), 2.30 (dd, *J* = 16.4, 6.8 Hz, 1H), 2.22 – 2.09 (m, 1H), 1.74 – 1.69 (m, 2H), 1.63 – 1.53 (m, 2H), 1.43 (d, *J* = 6.8 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 150.0, 146.9, 141.7, 128.4, 124.3, 121.8, 54.3, 34.9, 31.8, 23.2, 14.3.

4-Chloro-*N*-(1-phenylallyl)benzenesulfonamide (**3ab**):

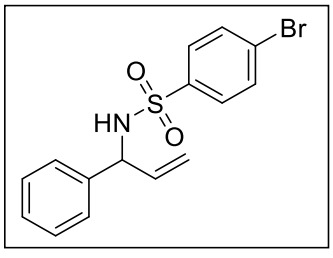


Prepared according to general procedure for the reaction of **1a** with **2b**; white solid; eluent (12 % ethyl acetate in hexane); yield is 80%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.64 (d, *J* = 8.4 Hz, 2H), 7.35 (d, *J* = 8.4 Hz, 2H), 7.25 – 7.21 (m, 3H), 7.12 – 7.06 (m, 2H), 5.93 – 5.82 (m, 1H), 5.15 (t, *J* = 14.0 Hz, 2H), 4.99 (t, *J* = 6.4 Hz, 2H), 4.90 (d, *J* = 6.4 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 139.1, 138.9, 138.8, 136.8, 129.0, 128.7, 128.6, 128.0, 127.1, 117.2, 106.3, 60.0.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{15}H_{14}N_2O_2SClNa$ 330.0331; Found 330.0336.

4-Bromo-*N*-(1-phenylallyl)benzenesulfonamide (**3ac**):

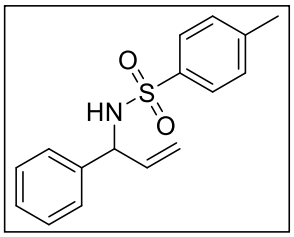


Prepared according to general procedure for the reaction of **1a** with **2c**; white solid; eluent (12 % ethyl acetate in hexane); yield is 83%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.56 (d, *J* = 8.6 Hz, 2H), 7.50 (d, *J* = 8.6 Hz, 2H), 7.24 – 7.21 (m, 3H), 7.09 (dd, *J* = 6.2, 2.8 Hz, 2H), 5.94 – 5.78 (m, 1H), 5.14 (t, *J* = 14.0 Hz, 2H), 5.05 – 4.92 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 140.1, 139.7, 138.9, 136.8, 132.0, 128.7, 128.7, 127.8, 127.3, 127.1, 117.2, 60.0.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{15}H_{14}N_2O_2SBrNa$ 373.9826; Found 373.9817.

4-Methyl-*N*-(1-phenylallyl)benzenesulfonamide (**3ad**):

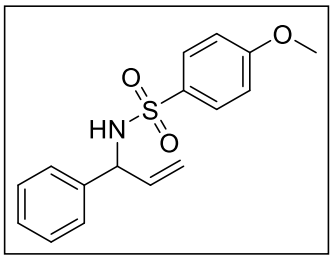


Prepared according to general procedure for the reaction of **1a** with **2d**; white solid; eluent (10 % ethyl acetate:hexane); yield is 73%.

^{1}H NMR (500 MHz, $CDCl_3$): δ 7.63 (d, *J* = 8.2 Hz, 2H), 7.25 – 7.18 (m, 5H), 7.14 – 7.07 (m, 2H), 5.93 – 5.82 (m, 1H), 5.17 – 5.06 (m, 2H), 4.98 – 4.85 (m, 2H), 2.39 (s, 3H). **^{13}C NMR (126 MHz, $CDCl_3$)**: δ 143.2, 139.4, 137.6, 137.1, 129.4, 128.6, 127.8, 127.2, 127.1, 116.9, 59.9, 21.5.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{16}H_{17}N_2O_3SNa$ 288.1058; Found 288.1084.

4-Methoxy-*N*-(1-phenylallyl)benzenesulfonamide (**3ae**):

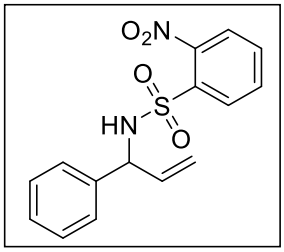


Prepared according to general procedure for the reaction of **1a** with **2e**; white solid; eluent (10 % ethyl acetate in hexane); yield is 70%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.61 (d, *J* = 8.6 Hz, 2H), 7.19 – 7.12 (m, 3H), 7.04 (d, *J* = 7.4 Hz, 2H), 6.79 (d, *J* = 8.6 Hz, 2H), 5.80 (ddd, *J* = 16.6, 10.4, 5.8 Hz, 1H), 5.12 – 5.02 (m, 2H), 4.86 (m, 1H), 4.77 (d, *J* = 4.6 Hz, 1H), 3.78 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 162.7, 139.4, 137.2, 132.2, 129.3, 128.6, 127.8, 127.1, 116.9, 113.9, 59.9, 55.6.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{16}H_{17}N_2O_3SNa$ 326.0827; Found 326.0826.

2-Nitro-*N*-(1-phenylallyl)benzenesulfonamide (**3af**):

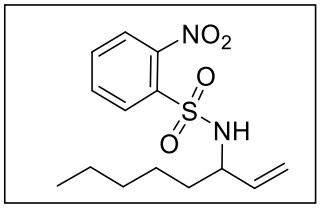


Prepared according to general procedure for the reaction of **1a** with **2f**; white solid; eluent (12 % ethyl acetate:hexane); yield is 90% (*b*:*l* ratio is 9:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.7 (d, *J* = 7.8 Hz, 1H), 7.7 (d, *J* = 8.0 Hz, 1H), 7.5 (t, *J* = 7.6 Hz, 1H), 7.4 (t, *J* = 7.8 Hz, 1H), 7.1 (s, 5H), 5.93 – 5.82 (m, 1H), 5.8 (d, *J* = 8.8 Hz, 1H), 5.09 (dd, *J* = 19.4, 13.4 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 138.4, 136.5, 134.6, 133.1, 132.5, 130.8, 128.5, 128.0, 127.1, 125.0, 117.6, 60.7.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{15}H_{14}N_2O_4SNa$ 341.0572; Found 341.0578.

2-Nitro-*N*-(non-1-en-3-yl)benzenesulfonamide (**3cf**):



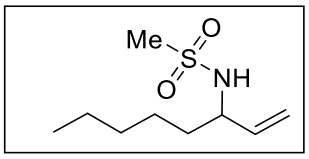
Prepared according to general procedure for the reaction of **1c** with **2f**; yellow solid; eluent (10 % ethyl acetate:hexane); yield is 85%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.07 – 8.00 (m, 1H), 7.81 – 7.75 (m, 1H), 7.69 – 7.58 (m, 2H), 5.54 – 5.41 (m, 1H), 5.24 (d, *J* = 8.4 Hz, 1H), 4.94 (d, *J* = 17.0 Hz, 1H), 4.84 (d, *J* = 10.4 Hz, 1H), 3.88 (p, *J* = 7.2 Hz, 1H), 1.51 – 1.39 (m, 2H), 1.30 – 1.10 (m, 6H), 0.76 (d, *J* = 6.2 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$): δ 147.7, 137.3, 135.0, 133.3, 132.6, 131.0, 125.2, 116.1, 57.6, 35.5, 31.2, 24.9, 22.4, 13.9.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{14}H_{20}N_2O_4SNa$ 335.1041; Found 335.1037.

***N*-(Non-1-en-3-yl)methanesulfonamide** (**3cg**):

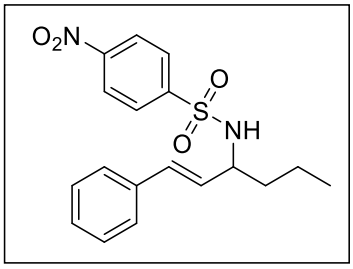


Prepared according to general procedure for the reaction of **1c** with **2g**; colorless oil; eluent (10 % ethyl acetate:hexane); yield is 52%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 5.73 (dt, *J* = 17.2, 8.8 Hz, 1H), 5.26 (d, *J* = 17.0, 1H), 5.20 (d, *J* = 10.4, 1H) 4.41 (d, *J* = 7.2 Hz, 1H), 3.90 (p, *J* = 7.0 Hz, 1H), 2.95 (s, 3H), 1.54 (dd, *J* = 14.2, 6.9 Hz, 2H), 1.45 – 1.24 (m, 8H), 0.88 (t, *J* = 5.0 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 138.5, 116.5, 56.8, 42.1, 35.8, 31.4, 25.2, 22.5, 14.0.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_9H_{19}NO_2SNa$ 228.1034; Found 228.1033.

(*E*)-4-Nitro-*N*-(1-phenylhex-1-en-3-yl)benzenesulfonamide (3ra):

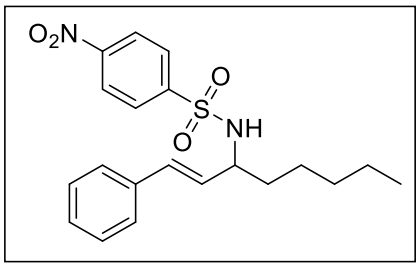


Prepared according to general procedure for the reaction **1r** with **2a**; white solid; eluent (10 % ethyl acetate:hexane); yield is 62%.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.16 (d, *J* = 8.5 Hz, 2H), 8.00 (d, *J* = 8.4 Hz, 2H), 7.25 – 7.18 (m, 3H), 7.05 (d, *J* = 7.3 Hz, 2H), 6.23 (d, *J* = 15.8 Hz, 1H), 5.61 (dd, *J* = 15.8, 8.1 Hz, 1H), 5.07 (d, *J* = 7.7 Hz, 1H), 4.03 (p, *J* = 7.4 Hz, 1H), 1.64 – 1.49 (m, 2H), 1.40 – 1.30 (m, 2H), 0.89 (t, *J* = 7.3 Hz, 3H). **^{13}C NMR (126 MHz, $CDCl_3$)**: δ 149.6, 147.1, 135.5, 132.3, 128.6, 128.5, 128.5, 128.2, 128.0, 126.1, 124.0, 56.9, 37.8, 18.7, 13.5.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{18}H_{20}N_2O_4SNa$ 383.1041; Found 383.1037.

(*E*)-4-Nitro-*N*-(1-phenyloct-1-en-3-yl)benzenesulfonamide (3sa):

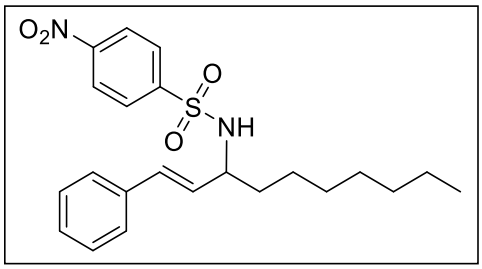


Prepared according to general procedure for the reaction of **1s** with **2a**; white solid; eluent (10 % ethyl acetate:hexane); yield is 70% .

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.16 (d, *J* = 8.6 Hz, 2H), 7.99 (d, *J* = 8.6 Hz, 2H), 7.22 (m, 3H), 7.06 (m, 2H), 6.24 (d, *J* = 15.8 Hz, 1H), 5.62 (dd, *J* = 15.8, 8.0 Hz, 1H), 4.01 (p, *J* = 7.2 Hz, 1H), 1.56 (m, 4H), 1.31 (m, 4H), 0.85 (t, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 149.6, 147.1, 137.4, 135.5, 132.3, 130.2, 128.6, 128.5, 128.2, 128.0, 126.1, 124.0, 57.1, 35.7, 31.3, 25.1, 22.4, 13.9.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{20}H_{24}N_2O_4SNa$ 411.1354; Found 411.1348.

(*E*)-4-Nitro-*N*-(1-phenyldec-2-en-1-yl)benzenesulfonamide (3ta):

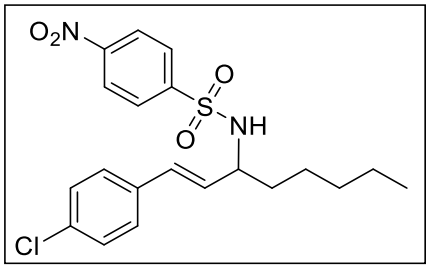


Prepared according to general procedure for the reaction of **4c** with **2a**; white solid; eluent (10 % ethyl acetate:hexane); yield is 82% with trace amount of other regioisomer **3ta'**.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.17 (d, *J* = 8.3 Hz, 2H), 7.99 (d, *J* = 8.3 Hz, 3H), 7.23 (m, 3H), 7.06 (d, *J* = 7.2 Hz, 2H), 6.24 (d, *J* = 15.8 Hz, 1H), 5.62 (dd, *J* = 15.8, 8.0 Hz, 1H), 4.98 (m, 1H), 4.01 (p, J = 7.3 Hz, 1H), 1.57 (m, 2H), 1.28 – 1.22 (m, 10H), 0.86 (t, *J* = 6.9 Hz, 3H). **^{13}C NMR (126 MHz, $CDCl_3$):** δ 149.6, 147.1, 135.5, 132.3, 128.6, 128.5, 128.2, 128.0, 126.1, 124.0, 57.1, 35.8, 31.6, 29.1, 25.5, 22.6, 14.0.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{22}H_{28}N_2O_4SNa$ 439.1667; Found 439.1663.

(*E*)-*N*-(1-(4-Bromophenyl)oct-2-en-1-yl)-4-nitrobenzenesulfonamide (3ua):

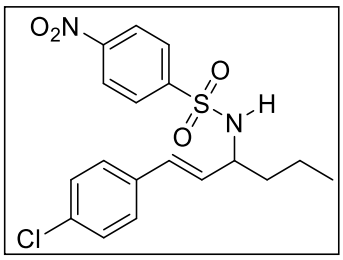


Prepared according to general procedure for the reaction of **1u** with **2a**; white solid; eluent (15 % ethyl acetate:hexane); yield is 67% with trace amount of other regioisomer **3ua'**.

^{1}H NMR (500 MHz, $CDCl_3$): δ 8.21 (d, *J* = 8.4 Hz, 2H), 8.00 (d, *J* = 8.6 Hz, 2H), 7.21 (d, *J* = 8.1 Hz, 2H), 7.03 (d, *J* = 8.1 Hz, 2H), 6.24 (d, *J* = 15.8 Hz, 1H), 5.67 (dd, *J* = 15.8, 7.8 Hz, 1H), 5.00 – 4.86 (m, 1H), 4.00 (p, *J* = 7.4 Hz, 1H), 1.60 – 1.50 (m, 2H), 1.28 (dd, *J* = 15.9, 8.2 Hz, 6H), 0.84 (t, *J* = 6.5 Hz, 3H).**^{13}C NMR (126 MHz, $CDCl_3$):** δ 149.7, 147.1, 134.1, 133.9, 130.9, 129.7, 128.9, 128.8, 128.6, 128.5, 128.4, 127.4, 124.1, 56.9, 35.7, 31.2, 25.1, 22.4, 13.9.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{20}H_{23}N_2O_4SClNa$ 445.0965; Found 445.0967.

(*E*)-*N*-(1-(4-Chlorophenyl)hex-1-en-3-yl)-4-nitrobenzenesulfonamide (3va):

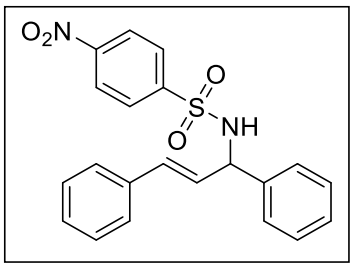


Prepared according to general procedure for the reaction of **1v** with **2a**; yellow solid; eluent (10 % ethyl acetate:hexane); yield is 45% .

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.22 (d, *J* = 8.4 Hz, 2H), 8.00 (d, *J* = 8.4 Hz, 2H), 7.22 (d, *J* = 8.0 Hz, 2H), 7.03 (d, *J* = 8.0 Hz, 2H), 6.25 (d, *J* = 16.0 Hz, 1H), 5.67 (dd, *J* = 16.0, 7.8 Hz, 1H), 4.79 (d, *J* = 7.4 Hz, 1H), 4.03 (p, *J* = 7.2 Hz, 1H), 1.58 – 1.51 (m, 2H), 1.34 (m, 2H), 0.89 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 149.8, 147.1, 134.1, 133.9, 130.9, 128.9, 128.8, 128.5, 127.4, 124.1, 77.3, 77.0, 76.7, 56.6, 37.8, 18.7, 13.6.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{29}H_{40}N_2O_6SNa$ 417.0652; Found 417.0656.

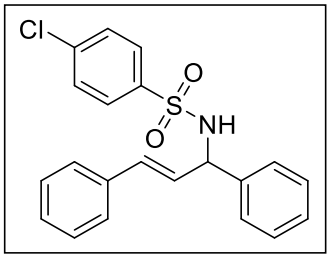
(*E*)-*N*-(1,3-Diphenylallyl)-4-nitrobenzenesulfonamide (**3wa**):



Prepared according to general procedure for the reaction of **1w** with **2a**; white solid; eluent (15 % ethyl acetate:hexane); yield is 75%.

^{1}H NMR (500 MHz, $CDCl_3$) δ 8.05 (d, *J* = 8.7 Hz, 2H), 7.78 (d, *J* = 8.7 Hz, 2H), 7.23 – 7.08 (m, 10H), 6.34 (d, *J* = 15.8 Hz, 1H), 6.02 (dd, *J* = 15.8, 6.9 Hz, 1H), 5.18 (t, *J* = 6.7 Hz, 1H), 5.05 (d, *J* = 6.8 Hz, 1H). **^{13}C NMR (126 MHz, $CDCl_3$)**: δ 149.6, 146.7, 138.6, 135.4, 133.1, 128.9, 128.7, 128.5, 128.3, 127.3, 127.1, 126.5, 123.9, 60.3.
HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{21}H_{18}N_2O_4SNa$ 417.0885; Found 417.0864.

(*E*)-4-Chloro-*N*-(1,3-diphenylallyl)benzenesulfonamide (**3wb**):

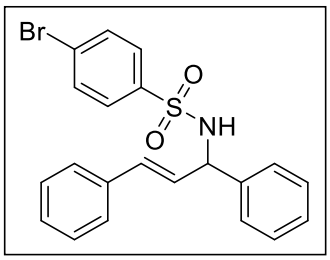


Prepared according to general procedure for the reaction of **1w** with **2b**; white solid; eluent (12 % ethyl acetate:hexane); yield is 58%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.57 (d, *J* = 8.4 Hz, 2H), 7.24 – 7.13 (m, 8H), 7.10 (d, *J* = 5.6 Hz, 4H), 6.30 (d, *J* = 15.8 Hz, 1H), 6.01 (dd, *J* = 15.8, 6.8 Hz, 1H), 5.28 (d, *J* = 7.2 Hz, 1H), 5.07 (t, *J* = 6.8 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 139.3, 139.2, 138.9, 135.8, 132.4, 129.0, 128.8, 128.7, 128.6, 128.6, 128.1, 128.0, 127.9, 127.0, 126.5, 60.0.

HRMS (ESI-TOF) m/z: $[M + NH_4]^+$ Calcd for $C_{21}H_{22}N_2O_2SCl$ 401.1091; Found 401.1086.

(*E*)-4-Bromo-*N*-(1,3-diphenylallyl)benzenesulfonamide (**3wc**):

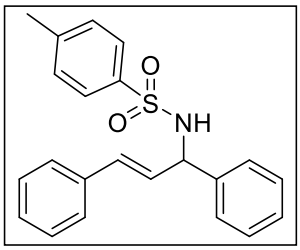


Prepared according to general procedure for the reaction of **1w** with **2c**; white solid; eluent (12 % ethyl acetate:hexane); yield is 63%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.50 (d, *J* = 7.4 Hz, 2H), 7.37 (d, *J* = 7.4 Hz, 2H), 7.14 (m, 10H), 6.30 (d, *J* = 15.6 Hz, 1H), 6.01 (dd, *J* = 15.8, 6.0 Hz, 1H), 5.11 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 139.8, 139.1, 135.8, 132.5, 132.0, 128.8, 128.6, 128.1, 128.0, 127.8, 127.4, 127.0, 126.5, 60.0.

HRMS (ESI-TOF) m/z: $[M + NH_4]^+$ Calcd for $C_{21}H_{22}N_2O_2SBr$ 445.0585; Found 445.0572.

(*E*)-*N*-(1,3-Diphenylallyl)-4-methylbenzenesulfonamide (**5wd**):

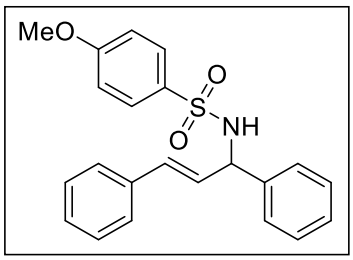


Prepared according to general procedure for the reaction of **1w** with **2e**; white solid; eluent (12 % ethyl acetate:hexane); yield is 65%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.57 (d, *J* = 8.0 Hz, 1H), 7.09 (m, 12 H), 6.25 (d, *J* = 15.8 Hz, 1H), 5.99 (dd, *J* = 15.8, 6.8 Hz, 1H), 5.20 (d, *J* = 7.3 Hz, 1H), 5.02 (t, *J* = 7.0 Hz, 1H), 2.22 (s, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 143.2, 139.6, 137.7, 136.0, 132.0, 129.4, 128.7, 128.4, 128.4, 128.1, 127.8, 127.8, 127.3, 127.0, 126.5, 59.7, 21.4.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{22}H_{21}NO_2SNa$ 310.0880; Found 310.0880.

(*E*)-*N*-(1,3-Diphenylallyl)-4-methoxybenzenesulfonamide (**5we**):

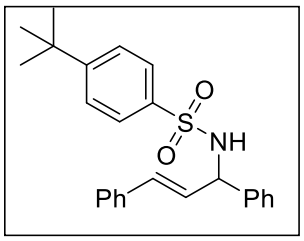


Prepared according to general procedure for the reaction of **1w** with **2f**; white solid; eluent (12 % ethyl acetate:hexane); yield is 72%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.61 (d, *J* = 8.4 Hz, 2H), 7.13 (dt, *J* = 15.4, 7.78Hz, 10 H), 6.70 (d, *J* = 8.4 Hz, 2H), 6.27 (d, *J* = 15.8 Hz, 1H), 6.00 (dd, *J* = 15.8, 6.8 Hz, 1H), 5.16 (t, *J* = 6.7 Hz, 1H), 5.01 (t, *J* = 6.4 Hz, 1H), 3.66 (s, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 162.6, 139.6, 136.1, 132.2, 132.0, 129.4, 128.7, 128.4, 128.2, 127.8, 127.8, 127.0, 126.5, 113.9, 59.8, 55.5.

HRMS (ESI-TOF) m/z: $[M + NH_4]^+$ Calcd for $C_{22}H_{25}N_2O_3S$ 397.1586; Found 397.1588.

(*E*)-4-(*tert*-Butyl)-*N*-(1,3-diphenylallyl)benzenesulfonamide (**3wf**):

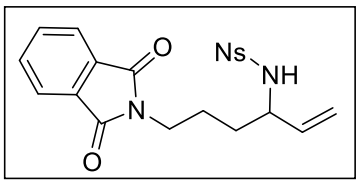


Prepared according to general procedure for the reaction of **3w** with **2d**; yellow solid; eluent (10 % ethyl acetate:hexane); yield is 58%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 7.61 (d, *J* = 8.2 Hz, 2H), 7.27 (d, *J* = 8.2 Hz, 2H), 7.13 (m, 10H), 6.28 (d, *J* = 16.0 Hz, 1H), 5.99 (dd, *J* = 15.8, 6.6 Hz, 1H), 5.08 (t, *J* = 6.8 Hz, 1H), 4.97 (d, *J* = 7.2 Hz, 1H), 1.18 (s, 9H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 156.2, 139.5, 137.6, 136.0, 135.8, 135.6, 132.2, 128.7, 128.5, 128.1, 127.9, 127.9, 127.1, 127.1, 126.5, 125.8, 59.7, 35.0, 31.0.

HRMS (ESI-TOF) m/z: $[M + NH_4]^+$ Calcd for $C_{25}H_{31}N_2O_2S$ 423.2106; Found 423.2112.

***N*-(6-(1,3-Dioxoisoindolin-2-yl)hex-1-en-3-yl)-4-nitrobenzenesulfonamide** (**5aa**):

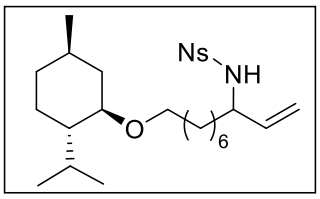


Prepared according to general procedure for the reaction of **4a** with **2a**; white-yellow solid; eluent (15% ethyl acetate in hexane); yield is 58%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.31 (d, *J* = 8.6 Hz, 2H), 8.03 (d, *J* = 8.6 Hz, 2H), 7.83 (dt, *J* = 6.7, 3.4 Hz, 1H), 7.77 – 7.69 (m, 1H), 5.49 (ddd, *J* = 17.1, 10.2, 6.8 Hz, 1H), 5.14 (d, *J* = 8.4 Hz, 1H), 4.97 (dd, *J* = 13.4, 11.0 Hz, 2H), 3.95 (p, *J* = 7.2 Hz, 1H), 3.67 (t, *J* = 7.0 Hz, 2H), 1.72 – 1.64 (m, 2H), 1.56 (m, 2H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 168.4, 149.9, 146.9, 136.7, 134.1, 131.9, 128.4, 124.2, 123.3, 116.8, 56.5, 37.2, 32.5, 24.7.

HRMS (ESI-TOF) m/z: $[M + H]^+$ Calcd for $C_{20}H_{20}N_3O_6S$ 430.1073; Found 430.1097.

***N*-(10-(((1*R*,2*S*,5*R*)-2-Isopropyl-5-methylcyclohexyl)oxy)dec-1-en-3-yl)-4-nitrobenzenesulfonamide** (**5ba**):

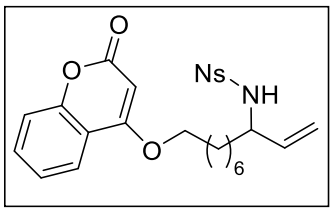


Prepared according to general procedure for the reaction of **4b** with **2a**; yellow oil; eluent (20% ethyl acetate in hexane); yield is 60%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.33 (d, *J* = 8.2 Hz, 2H), 8.03 (d, *J* = 8.0 Hz, 2H), 5.54 – 5.43 (m, 1H), 5.05 – 4.91 (m, 2H), 4.72 (d, *J* = 7.0 Hz, 1H), 3.86 (p, *J* = 7.2 Hz, 1H), 3.59 (dd, *J* = 13.4, 6.6 Hz, 1H), 3.24 (dd, *J* = 14.2, 7.1 Hz, 1H), 2.99 (dd, *J* = 14.6, 6.8 Hz, 1H), 2.19 (dd, *J* = 14.0, 7.0 Hz, 1H), 2.14 – 2.05 (m, 1H), 1.51 (dd, *J* = 12.9, 6.5 Hz, 5H), 1.02 – 0.80 (m, 11 H), 0.76 (d, *J* = 6.8 Hz, 3H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 161.7, 149.9, 147.1, 137.2, 128.4, 124.2, 116.5, 79.2, 68.5, 56.9, 48.3, 40.5, 35.7, 34.6, 31.6, 30.2, 29.2, 29.1, 26.1, 25.6, 25.3, 23.4, 22.4, 21.0, 16.2.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{26}H4_2N_2O_5SNa$ 517.2712; Found 517.2708.

4-Nitro-*N*-(10-((2-oxo-2*H*-chromen-4-yl)oxy)dec-1-en-3-yl)benzenesulfonamide (**5ca**):

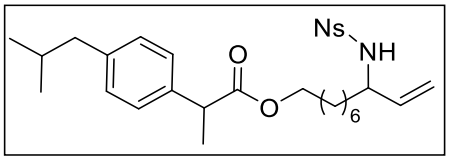


Prepared according to general procedure for the reaction of **4c** with **2a**; sticky white solid; eluent (25 % ethyl acetate:hexane); yield is 56%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.26 (d, *J* = 8.4 Hz, 2H), 7.96 (d, *J* = 8.4 Hz, 2H), 7.75 (d, *J* = 7.8 Hz, 1H), 7.48 (t, *J* = 7.8 Hz, 1H), 7.24 (dd, *J* = 12.9, 8.1 Hz, 1H), 5.61 (s, 1H), 5.49 – 5.35 (m, 1H), 4.94 – 4.84 (m, 2H), 4.69 (d, *J* = 8.0 Hz, 1H), 4.06 (t, *J* = 5.9 Hz, 2H), 3.87 – 3.76 (m, 1H), 1.81 (dt, *J* = 12.8, 6.6 Hz, 2H), 1.49 – 1.35 (m, 4H), 1.19 (m, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 165.8, 163.2, 153.3, 149.9, 147.1, 137.1, 132.4, 128.4, 124.2, 123.9, 123.0, 116.8, 116.5, 115.8, 90.4, 69.3, 56.9, 35.7, 29.0, 28.9, 28.3, 25.8, 25.2.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{25}H_{28}N_2O_7SNa$ 523.1515; Found 523.1522.

8-((4-Nitrophenyl)sulfonamido)dec-9-en-1-yl 2-(4-isobutylphenyl)propanoate (**5da**):

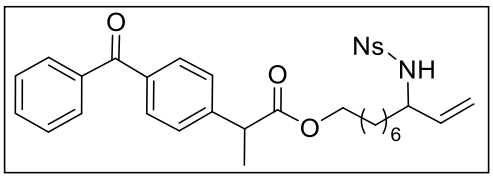


Prepared according to general procedure for the reaction of **4d** with **2a**; yellow oil; eluent (25 % ethyl acetate:hexane); yield is 86%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.24 (d, *J* = 8.2 Hz, 2H), 7.96 (d, *J* = 8.4 Hz, 2H), 7.12 (d, *J* = 7.6 Hz, 2H), 7.00 (d, *J* = 7.6 Hz, 2H), 5.46 – 5.32 (m, 1H), 5.11 (t, *J* = 7.6 Hz, 1H), 4.87 (t, *J* = 12.8 Hz, 2H), 3.96 (t, *J* = 6.4 Hz, 2H), 3.83 – 3.69 (m, 1H), 3.61 (q, *J* = 7.0 Hz, 1H), 2.36 (d, *J* = 7.1 Hz, 2H), 1.76 (ddd, *J* = 19.8, 13.4, 6.6 Hz, 2H), 1.45 (m, 8H), 1.18 (m, 5H), 0.81 (d, *J* = 6.5 Hz, 6H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 174.9, 149.8, 147.1, 140.4, 137.8, 137.1, 129.2, 128.3, 127.1, 124.1, 116.4, 64.6, 56.9, 45.1, 44.9, 35.5, 30.1, 28.9, 28.8, 28.3, 25.5, 25.2, 22.3, 18.4.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{29}H_{40}N_2O_6SNa$ 567.2505; Found 567.2513.

8-((4-Nitrophenyl)sulfonamido)dec-9-en-1-yl 2-(4-benzoylphenyl)propanoate (**5ea**):

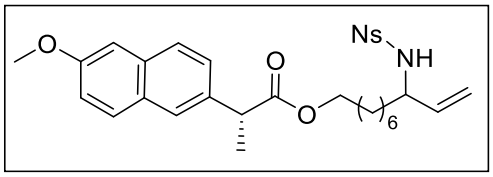


Prepared according to general procedure for the reaction of **4e** with **2a**; white solid; eluent (25 % ethyl acetate:hexane); yield is 78%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.23 (d, *J* = 8.2 Hz, 2H), 7.95 (d, *J* = 8.2 Hz, 2H), 7.76 – 7.65 (m, 3H), 7.60 (d, *J* = 7.6 Hz, 1H), 7.56 – 7.46 (m, 2H), 7.46 – 7.34 (m, 3H), 5.46 – 5.35 (m, 1H), 5.29 (t, *J* = 7.4 Hz, 1H), 4.87 (t, *J* = 14.4 Hz, 2H), 4.04 – 3.93 (m, 1H), 3.81 – 3.69 (m, 2H), 1.49 (m, 6H), 1.41 – 1.34 (m, 2H), 1.20 – 1.02 (m, 8H). **^{13}C NMR (101 MHz, $CDCl_3$)**; δ 174.1, 149.8, 147.3, 141.0, 137.7, 137.4, 137.3, 132.6, 131.6, 131.6, 130.1, 129.2, 129.1, 129.0, 128.5, 128.3, 128.3, 124.1, 116.2, 64.9, 56.9, 45.4, 35.6, 33.8, 28.9, 28.8, 28.3, 25.6, 25.5, 25.1, 24.9, 18.3.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{32}H_{36}N_2O_7SNa$ 615.2141; Found 615.2135.

8-((4-Nitrophenyl)sulfonamido)dec-9-en-1-yl(2*R*)-2-(6-methoxynaphthalen-2-yl)propanoate (**5fa**):

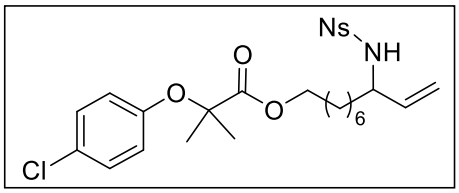


Prepared according to general procedure for the reaction of **4f** with **2a**; yellow oil; eluent (30 % ethyl acetate:hexane); yield is 82%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.23 (d, *J* = 8.4 Hz, 2H), 7.93 (d, *J* = 8.4 Hz, 2H), 7.66 – 7.57 (m, 3H), 7.33 (d, *J* = 8.4 Hz, 1H), 7.06 (d, *J* = 9.6 Hz, 1H), 5.37 (ddd, *J* = 17.2, 10.0, 7.2 Hz, 1H), 4.92 – 4.83 (m, 2H), 4.74 (d, *J* = 7.8 Hz, 1H), 4.05 – 3.90 (m, 2H), 3.84 (s, 1H), 3.74 (tt, *J* = 14.0, 7.0 Hz, 2H), 1.50 (d, *J* = 7.2 Hz, 3H), 1.47 – 1.41 (m, 2H), 1.32 (dd, *J* = 15.8, 9.0 Hz, 2H), 1.04 (m, 8H). **^{13}C NMR (101 MHz, $CDCl_3$):** δ 174.8, 157.5, 149.8, 147.1, 137.2, 135.9, 133.6, 129.3, 128.9, 128.3, 127.1, 126.3, 125.9, 124.1, 118.9, 116.4, 105.6, 64.7, 56.8, 55.3, 45.5, 35.6, 28.9, 28.8, 28.4, 25.6, 25.1, 18.4.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{30}H_{26}N_2O_7SNa$ 591.2141; Found 591.2138.

8-((4-Nitrophenyl)sulfonamido)dec-9-en-1-yl 2-(4-chlorophenoxy)-2-methylpropanoate (**5ga**):

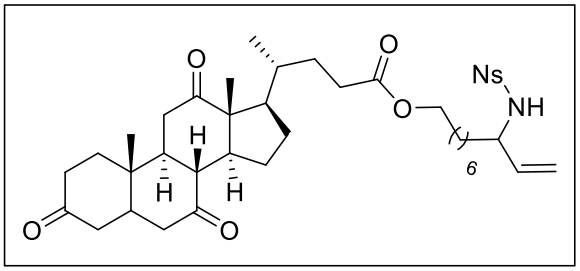


Prepared according to general procedure for the reaction of **4g** with **2a**; colourless oil; eluent (25 % ethyl acetate:hexane); yield is 80%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.25 (d, *J* = 8.0 Hz, 2H), 7.96 (d, *J* = 8.6 Hz, 2H), 7.11 (d, *J* = 8.0 Hz, 2H), 6.70 (d, *J* = 8.4 Hz, H), 5.40 (ddd, *J* = 17.0, 9.2, 8..0 Hz, 1H), 4.98 – 4.76 (m, 3H), 4.06 (t, *J* = 6.4 Hz, 2H), 3.77 (p, *J* = 6.7 Hz, 1H), 1.51 (m, 9H), 1.45 – 1.36 (m, 2H), 1.10 (m, 8H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 174.1, 154.1, 149.9, 147.1, 137.4, 137.1, 130.2, 129.1, 128.4, 127.4, 127.0, 124.1, 120.2, 116.4, 79.5, 65.5, 56.9, 35.6, 28.9, 28.9, 28.3, 25.6, 25.3, 25.2.

HRMS (ESI-TOF) m/z: $[M + Na]^+$ Calcd for $C_{26}H_{33}N_2O_7SClNa$ 575.1595; Found 575.1597.

8-((4-Nitrophenyl)sulfonamido)dec-9-en-1-yl (4*R*)-4-((8*R*,9*S*,10*S*,13*R*,14*S*,17*R*)-10,13-dimethyl-3,7,12-trioxohexadecahydro-1*H*-cyclopenta[*a*]phenanthren-17-yl)pentanoate (**5ha**):

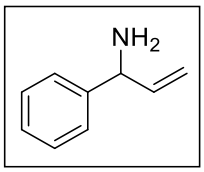


Prepared according to general procedure for the reaction of **5h** with **2a**; yellow solid; eluent (35 % ethyl acetate:hexane); yield is 75%.

^{1}H NMR (400 MHz, $CDCl_3$): δ 8.26 (d, *J* = 8.6 Hz, 2H), 7.96 (d, *J* = 8.6 Hz, 2H), 5.42 (ddd, *J* = 17.2, 10.2, 6.8 Hz, 1H), 4.89 (dd, *J* = 13.8, 7.2 Hz, 3H), 3.97 (t, *J* = 5.8 Hz, 2H), 3.78 (p, *J* = 7.0 Hz, 1H), 2.82 (ddd, *J* = 25.2, 16.8, 9.4 Hz, 3H), 2.37 – 1.71 (m, 20H), 1.68 – 1.39 (m, 9H), 1.33 (s, 3H), 1.22 (m, 9H), 1.01 (s, 3H), 0.78 (d, *J* = 6.6 Hz, 3H).). **^{13}C NMR (101 MHz, $CDCl_3$) δ** 212.2, 209.2, 208.8, 174.2, 149.9, 147.1, 137.2, 128.4, 124.1, 116.4, 64.3, 56.9, 51.8, 49.0, 46.8, 45.6, 45.5, 45.0, 42.8, 38.6, 36.4, 36.0, 35.7, 35.5, 35.2, 31.5, 30.5, 29.0, 28.5, 27.6, 25.8, 25.2, 25.1, 21.9, 18.6, 11.8.

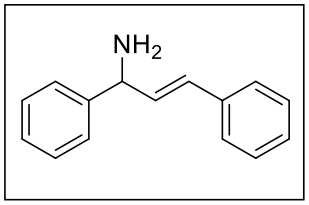
HRMS (ESI-TOF) m/z: $[M + NH_4]^+$ Calcd for $C_{40}H_{60}N_3O_9S$ 758.4050; Found 758.4045.

1-Phenylprop-2-en-1-amine (**6a**):



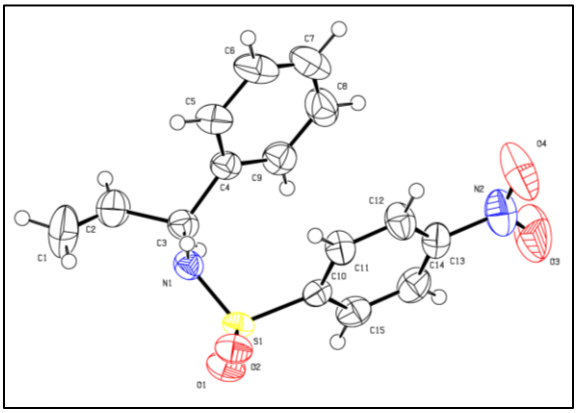
Colourless oil, 71%. **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 7.31 – 7.15 (m, 5H), 6.06 – 5.88 (m, 1H), 5.17 (d, *J* = 17.2 Hz, 1H), 5.05 (d, *J* = 10.1 Hz, 1H), 4.46 (d, 5.4Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 144.3, 144.0, 142.2, 128.6, 127.1, 126.6, 113.7, 58.4. **HRMS (ESI-TOF) m/z:** $[M+H]^+$ Calcd for $C_9H_{12}N$ 134.0970; Found 134.0968.

(*E*)-1,3-Diphenylprop-2-en-1-amine (**6b**):



Colourless oil, 82%. **^{1}H NMR (400 MHz, $CDCl_3$)**: δ 7.30 (ddd, *J* = 31.6, 20.8, 9.5 Hz, 10H), 6.60 (d, *J* = 15.8 Hz, 1H), 6.37 (dd, *J* = 15.8, 6.0 Hz, 1H), 4.72 (d, *J* = 5.2 Hz, 1H). **^{13}C NMR (101 MHz, $CDCl_3$)**: δ 136.92, 133.8, 129.2, 128.6, 128.5, 127.5, 127.2, 126.7, 126.4, 58.0. . **HRMS (ESI-TOF) m/z:** $[M+H]^+$ Calcd for $C_{15}H_{16}N$ 210.1283; Found 210.1278.

Crystallographic Data of Compound **3aa** (50% ellipsoid probability) (CCDC 2062182):



Crystal data and structure refinement for **3aa**

Identification code	**3aa**	
Empirical formula	C15 H14 N2 O4 S	
Formula weight	318.34	
Temperature	296(2) K	
Wavelength	0.71073 A	
Crystal system, space group	Triclinic, P-1	
Unit cell dimensions	a = 7.8308(4) A	alpha = 89.147(2) deg.
	b = 7.8632(4) A	beta = 82.332(2) deg.
	c = 12.8392(6) A	gamma = 74.0871(19) deg.
Volume	753.29(7) A^3	
Z, Calculated density	2, 1.403 Mg/m^3	
Absorption coefficient	0.234 mm^-1	
F(000)	332	
Crystal size	0.250 x 0.220 x 0.160 mm	
Theta range for data collection	1.601 to 24.995 deg.	

Limiting indices	-9<=h<=9, -9<=k<=8, -15<=l<=15
Reflections collected / unique	10917 / 2630 [R(int) = 0.0171]
Completeness to theta = 24.995	99.2 %
Absorption correction	None
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	2630 / 0 / 203
Goodness-of-fit on F^2	1.045
Final R indices [I>2sigma(I)]	R1 = 0.0341, wR2 = 0.0841
R indices (all data)	R1 = 0.0383, wR2 = 0.0885
Extinction coefficient	n/a
Largest diff. peak and hole	0.247 and -0.295 e.A^-3

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1. M.-Z. Lu, X.-R. Chen, H. Xu, H.-X. Dai, J.-Q. Yu, *Chem. Sci.*, 2018, **9**, 1311.
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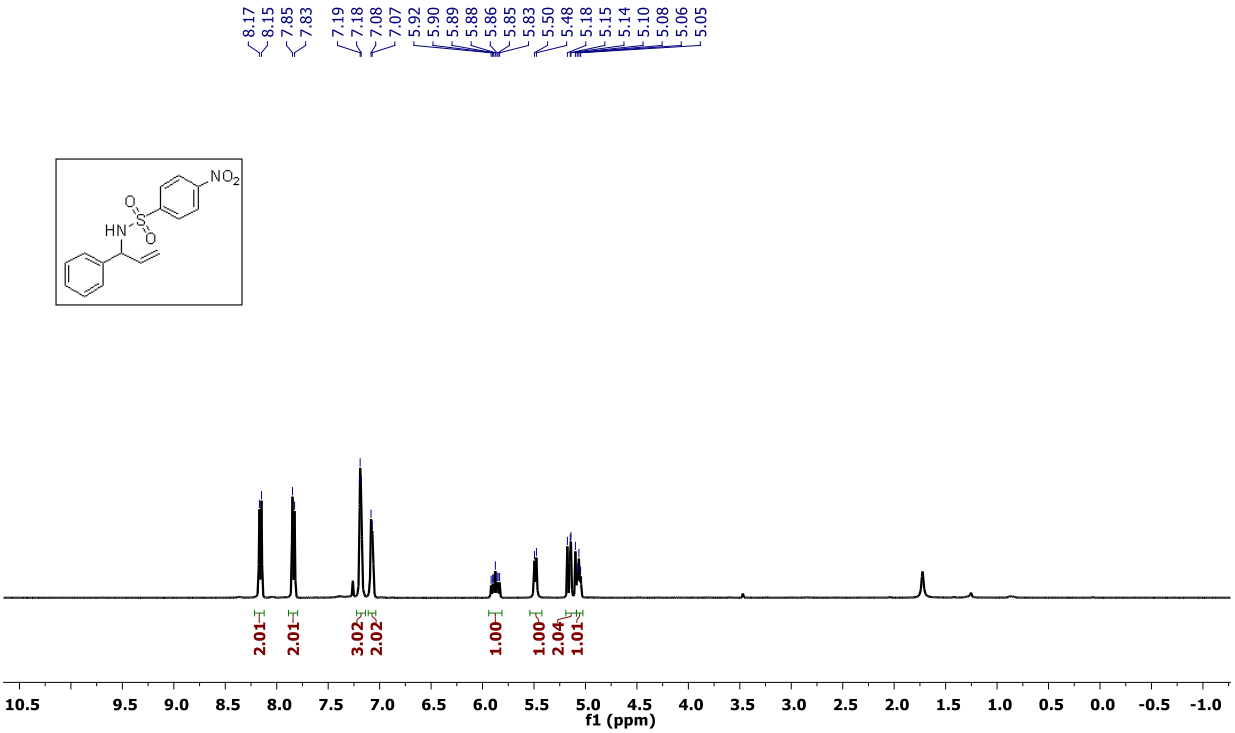
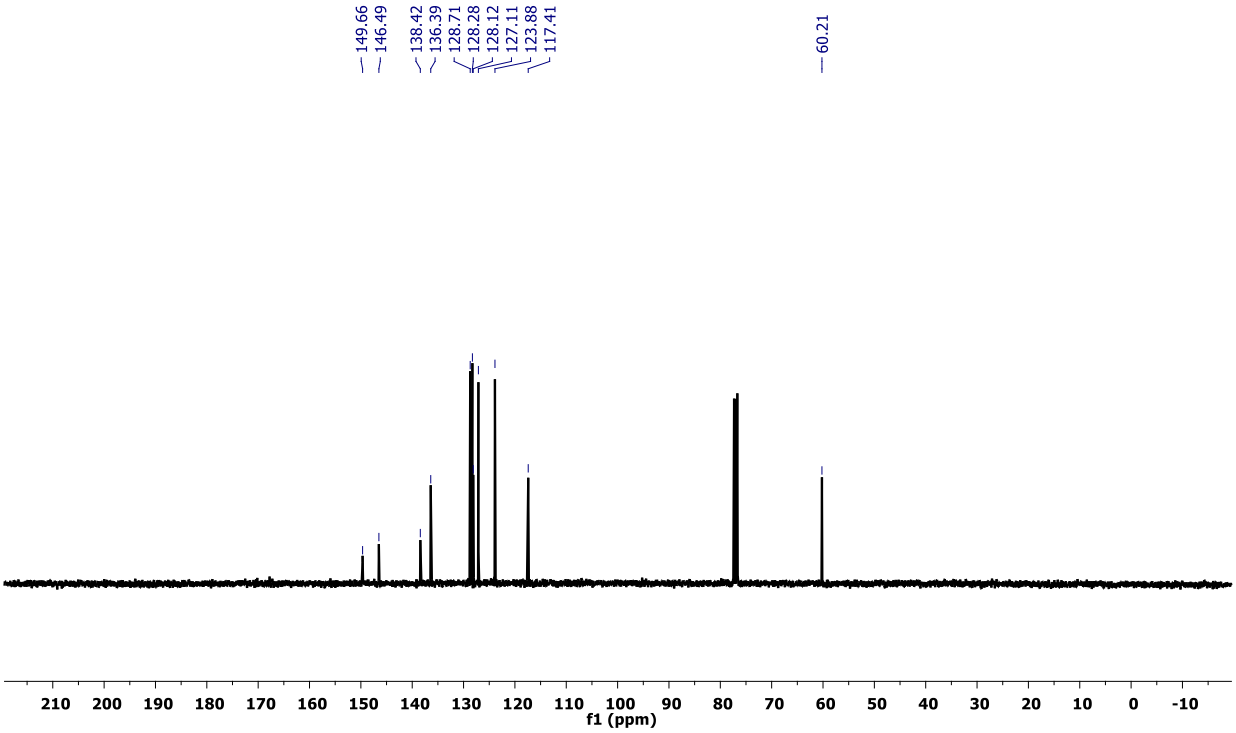
8. T. Nagano, S. Kobayashi, *J. Am. Chem. Soc*., 2009, **131**, 4200.
9. B. P. Bondzi, P. Eilbracht, *Org. Lett.* 2008, **10**, 3433.

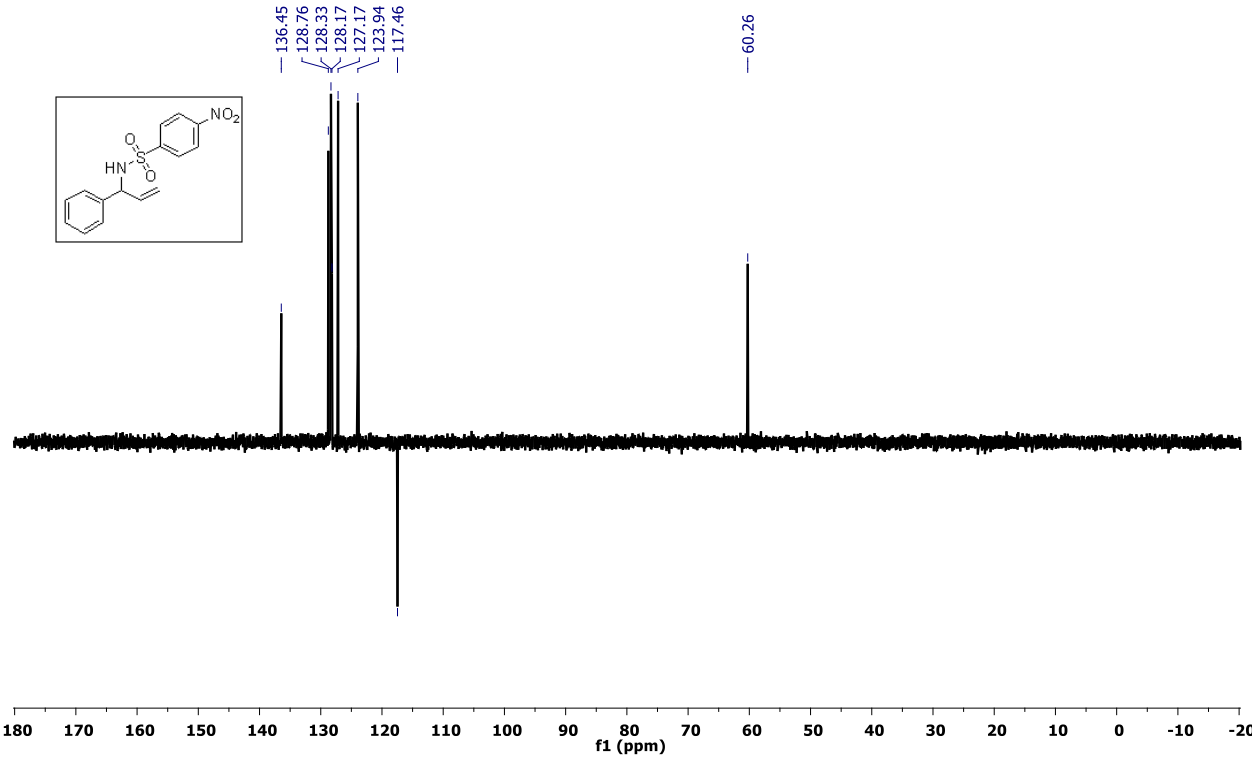
Copies of NMR Spectra

^{1}H and ^{13}C spectra of compound 3aa:

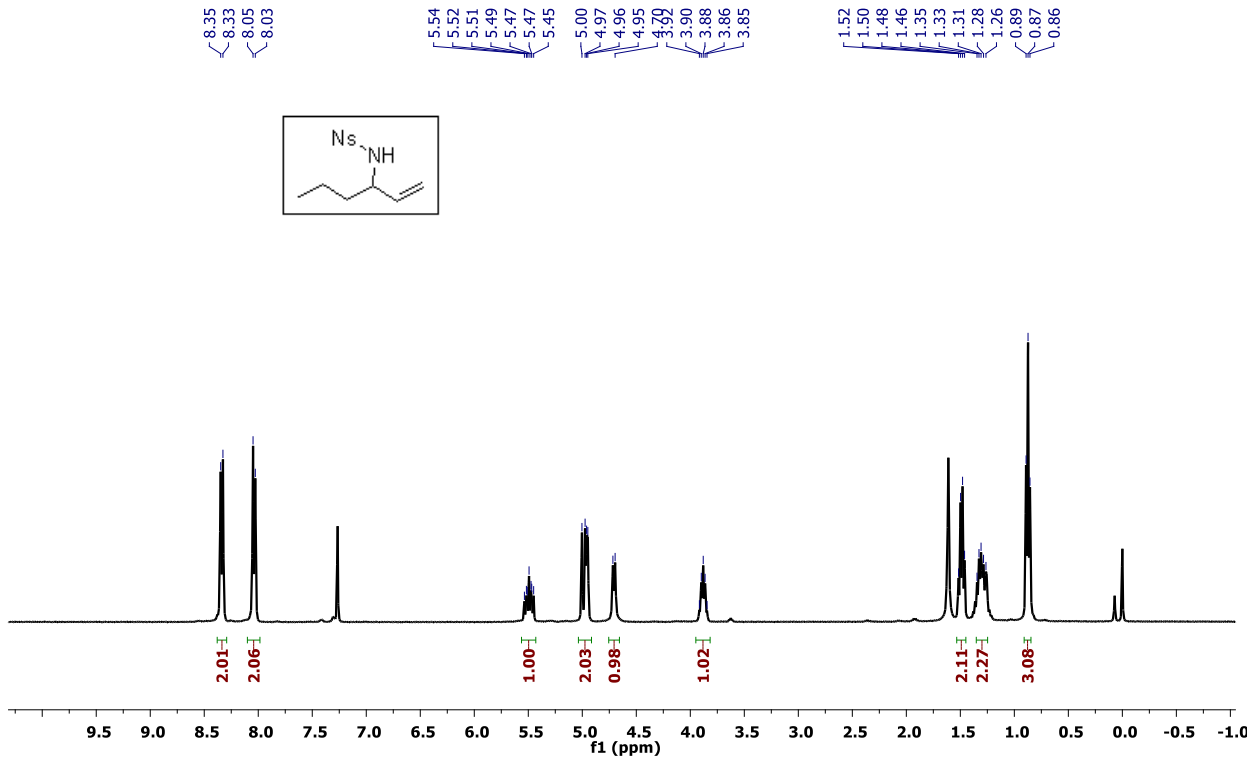


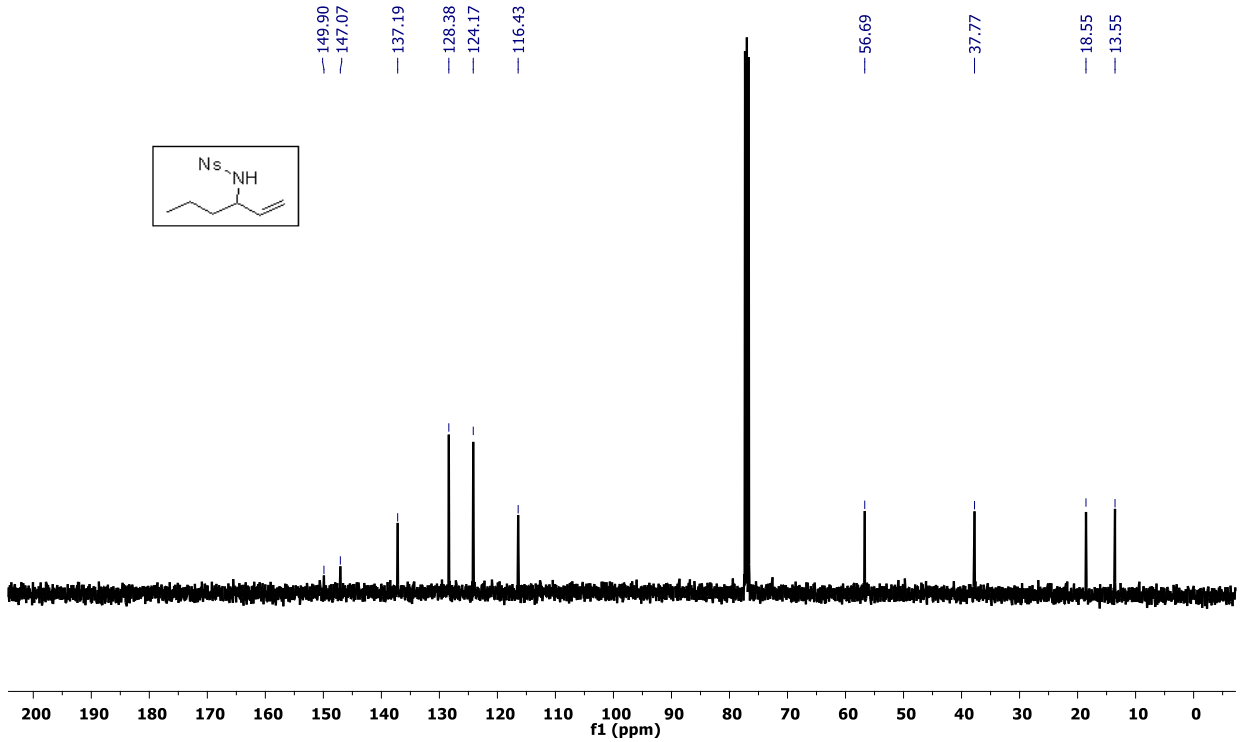


DEPT135 spectra of compound 3aa:



^{1}H and ^{13}C spectra of compound 3ba:





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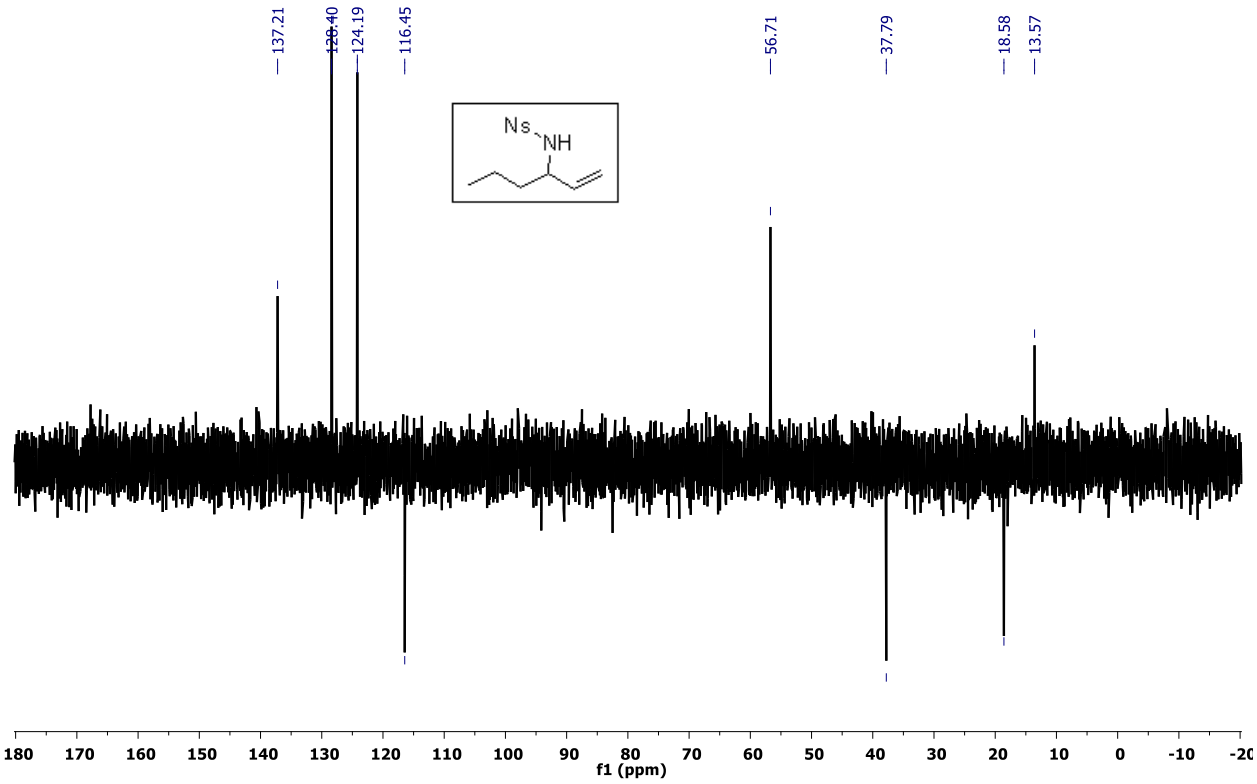
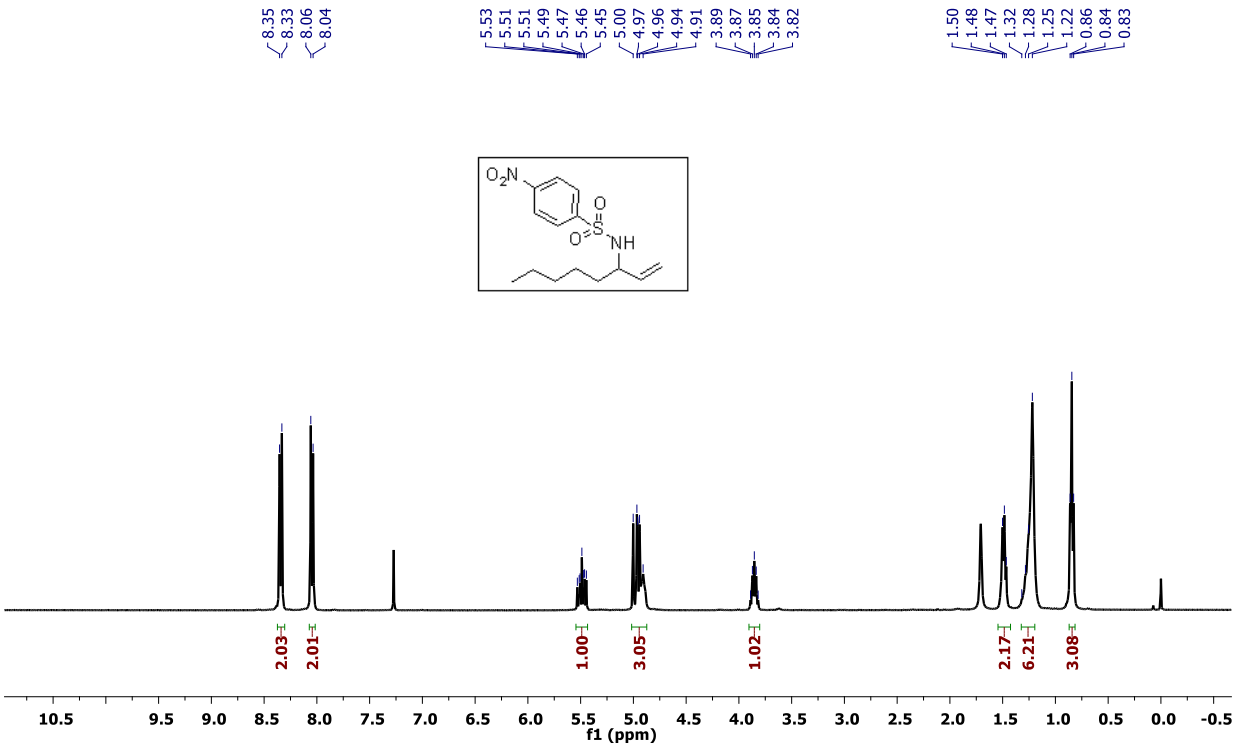
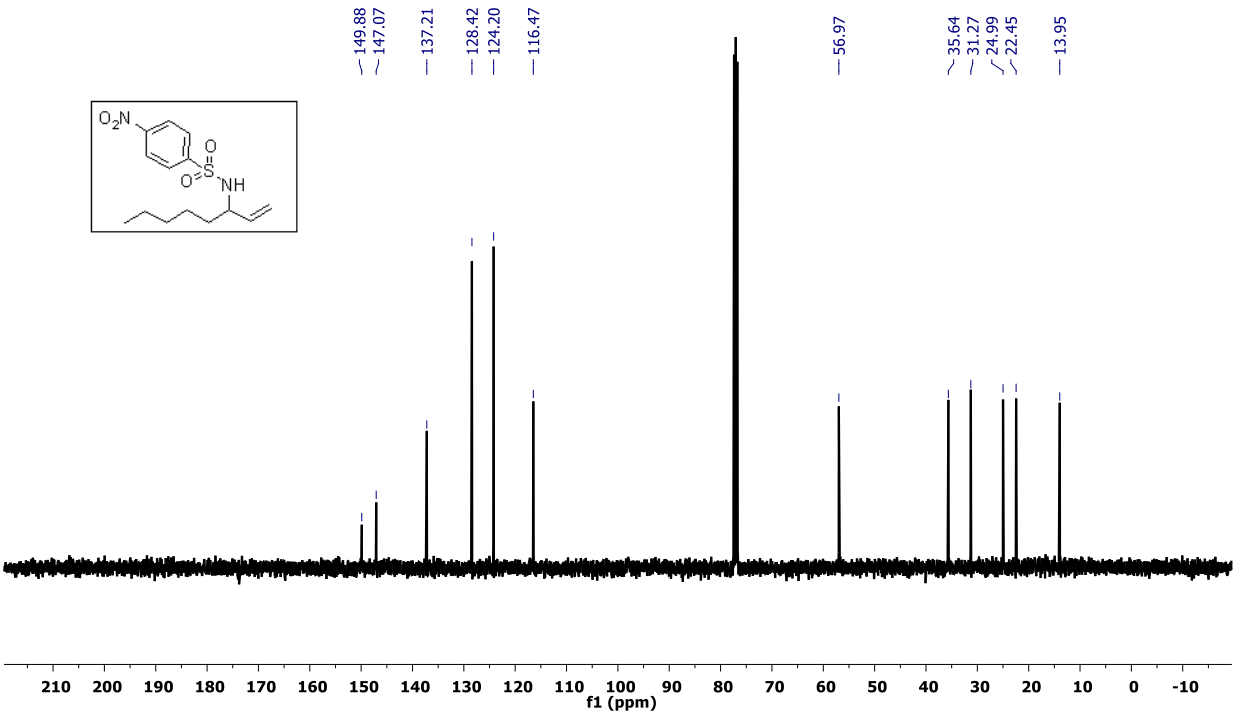


^{1}H and ^{13}C spectra of compound 3ca:





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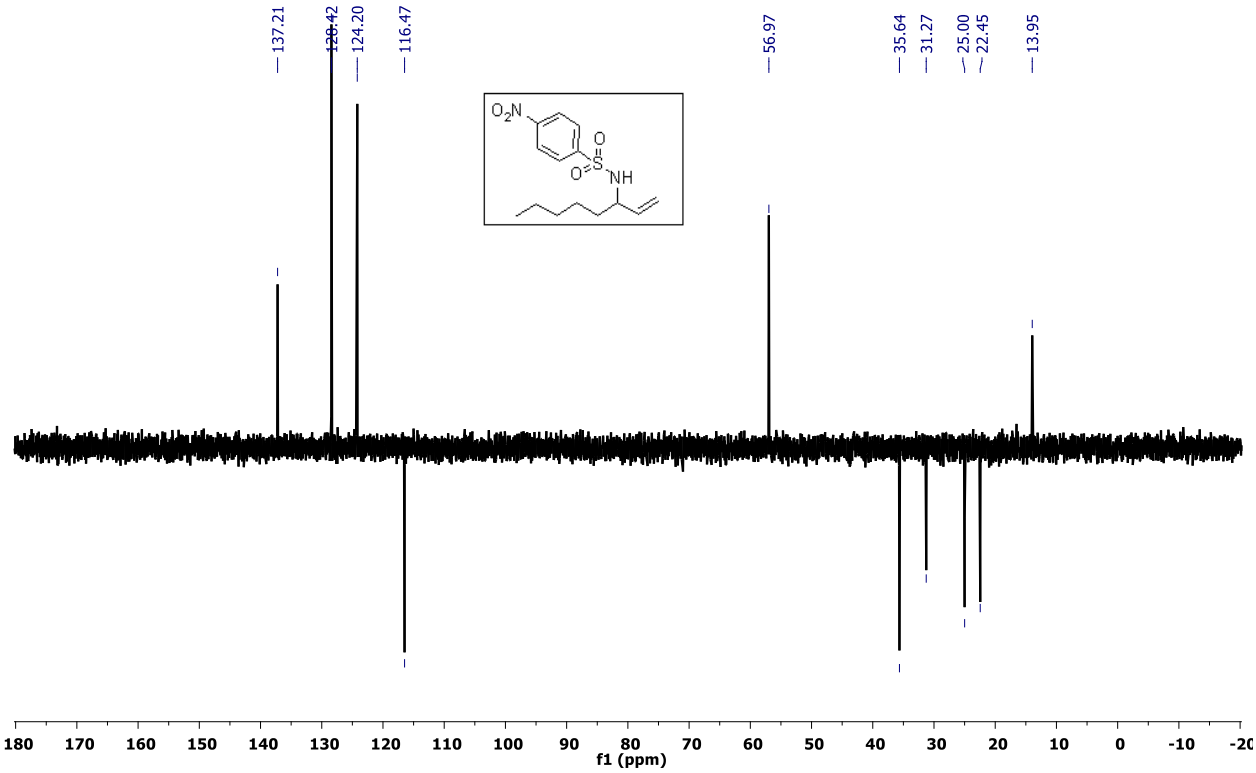
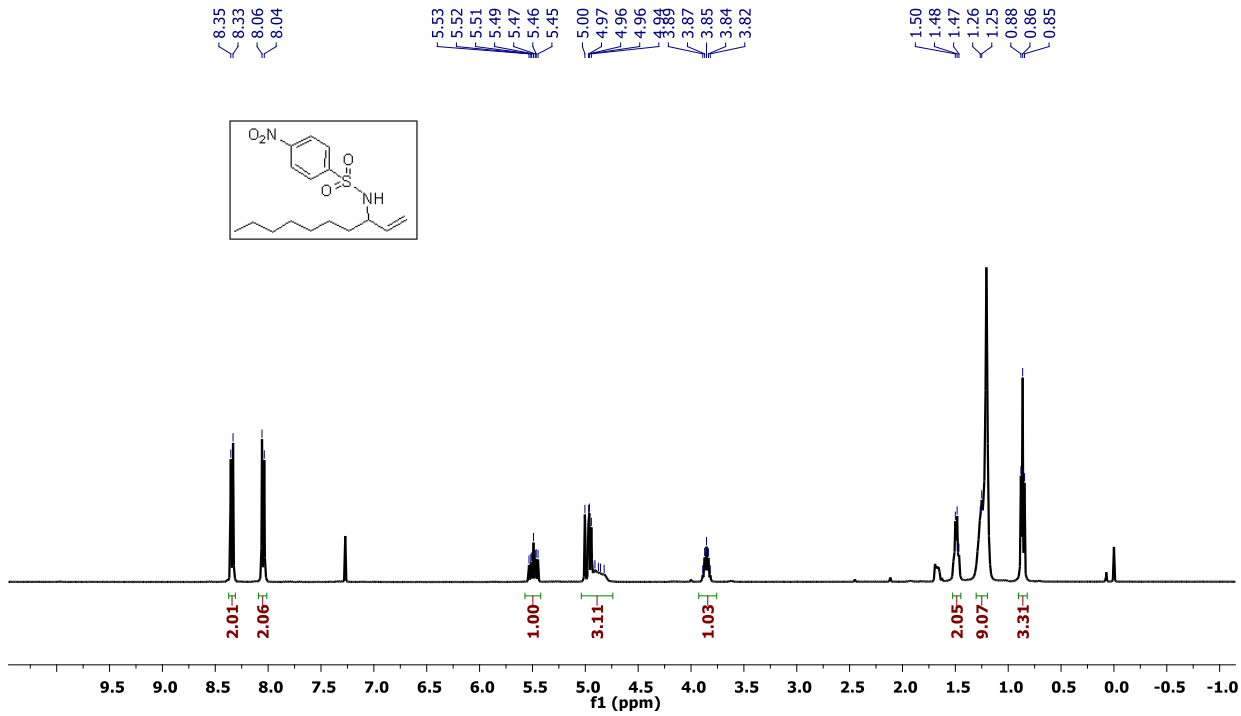
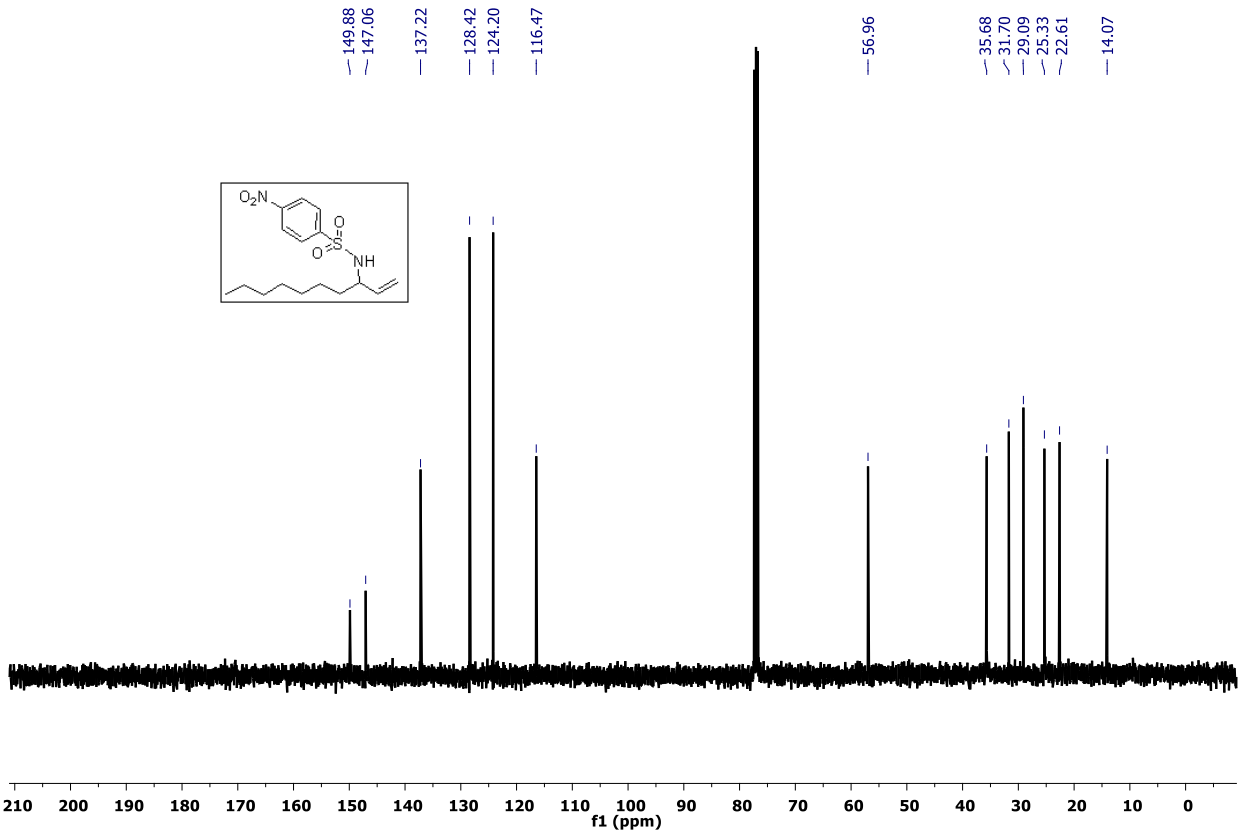


^{1}H and ^{13}C spectra of compound 3da:





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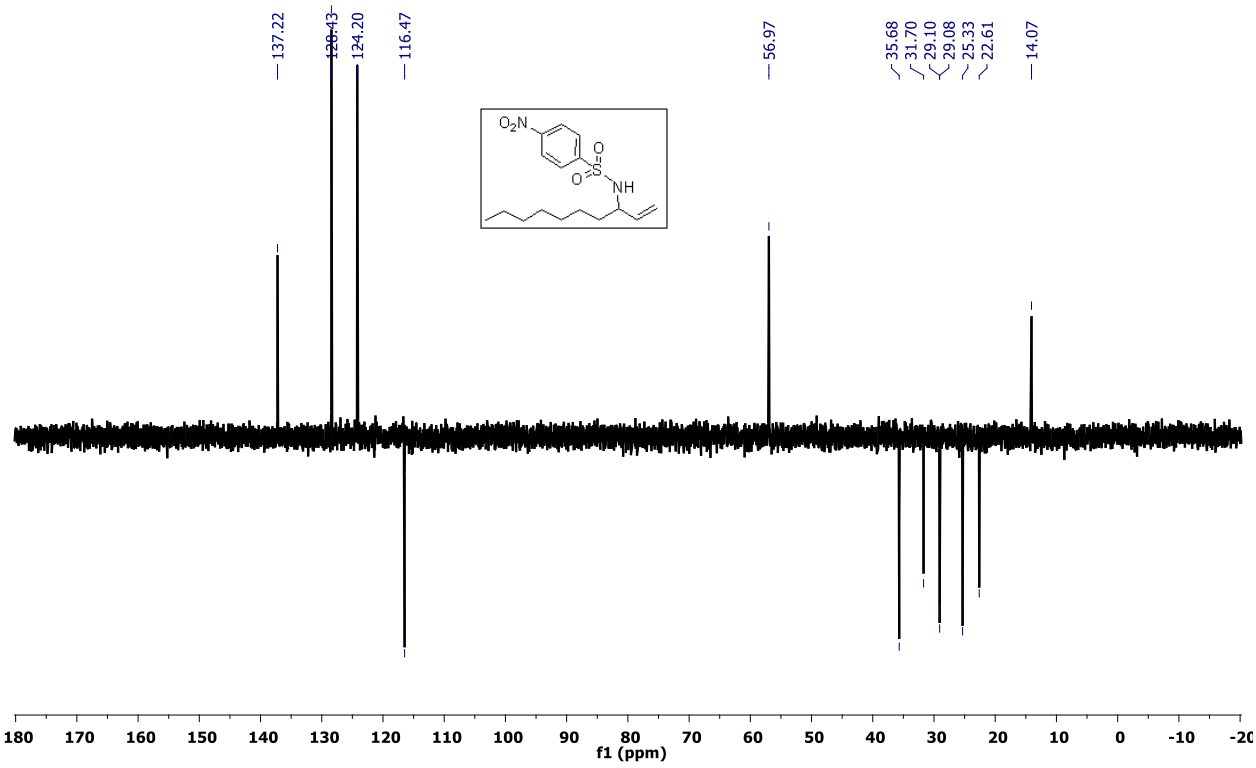
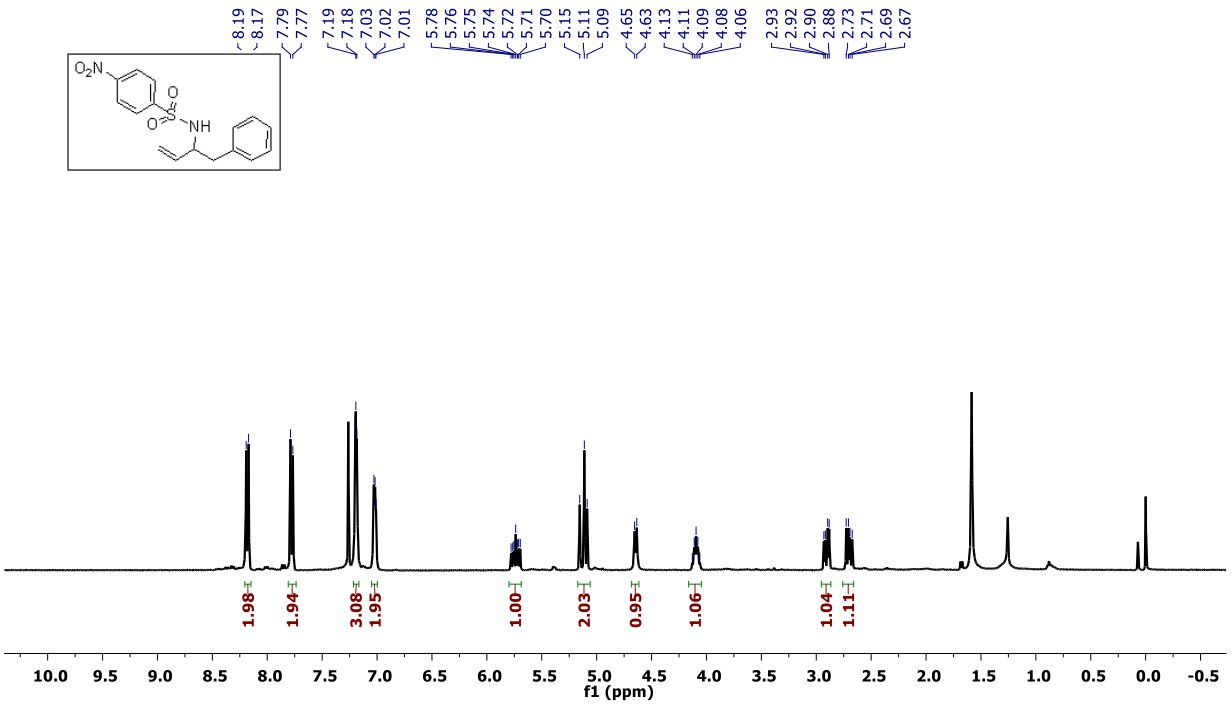
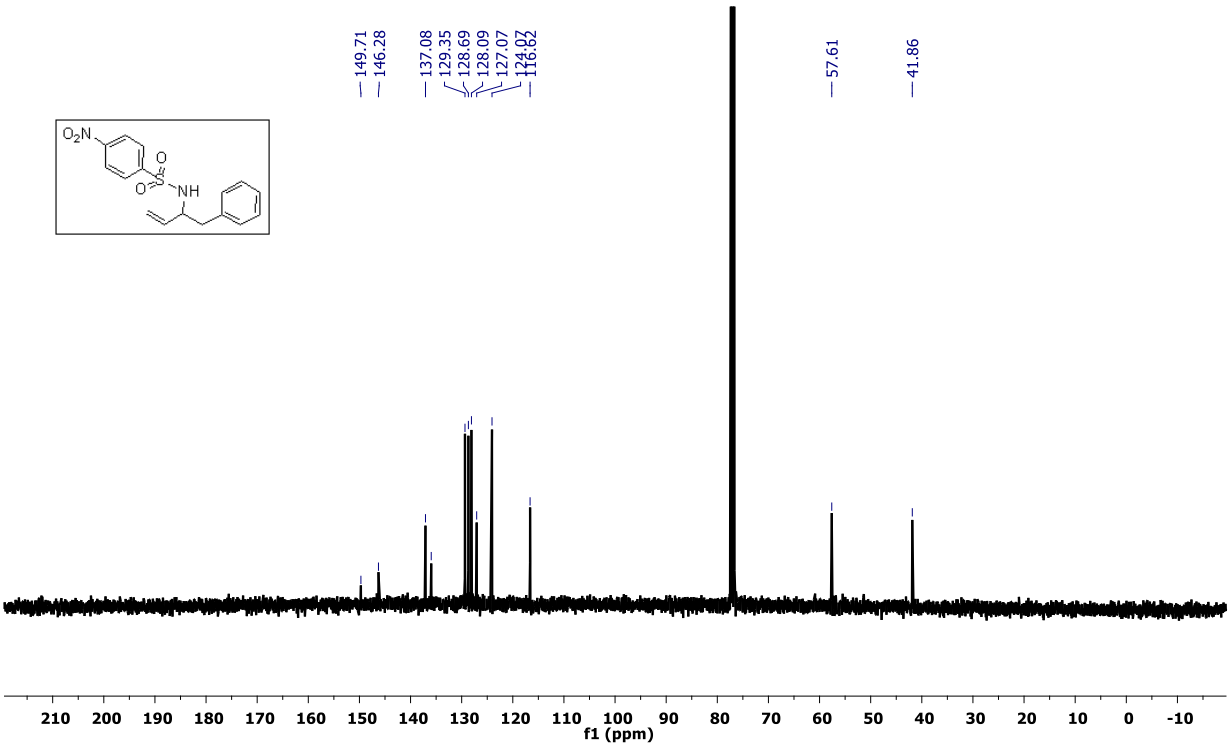


^{1}H and ^{13}C spectra of compound 3ea:





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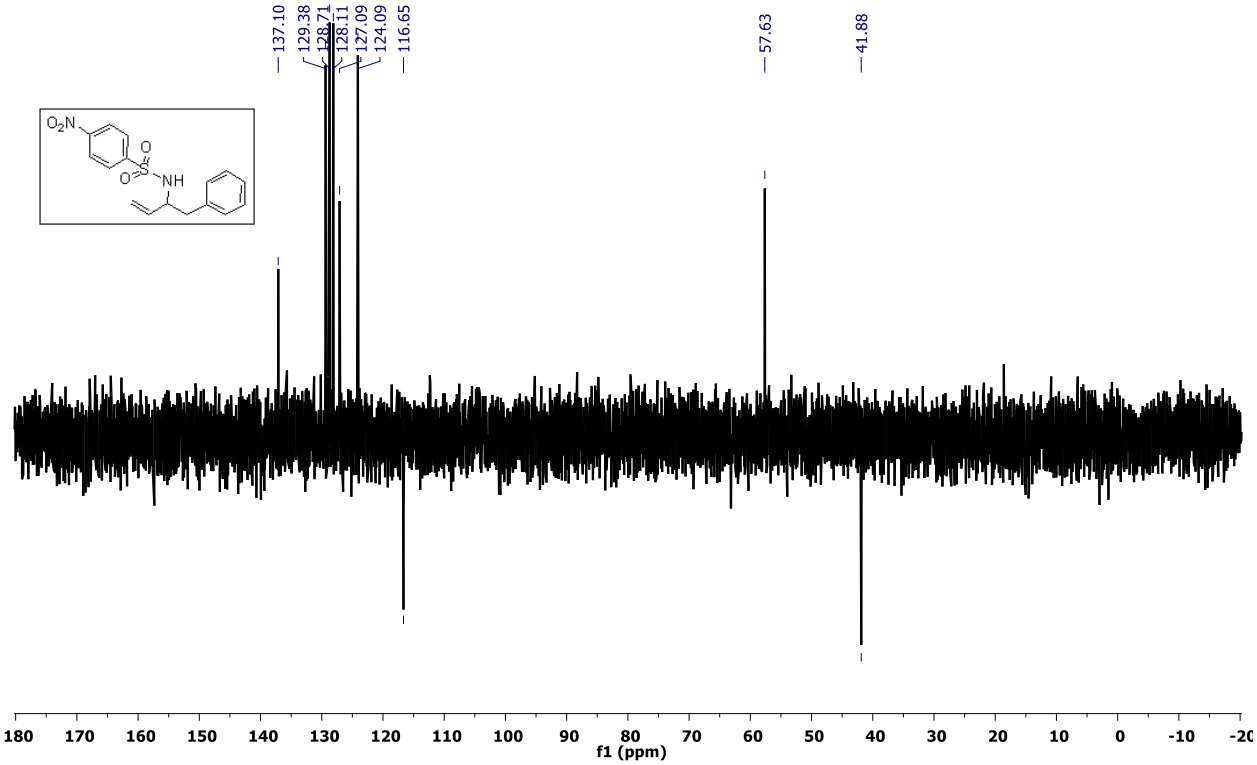
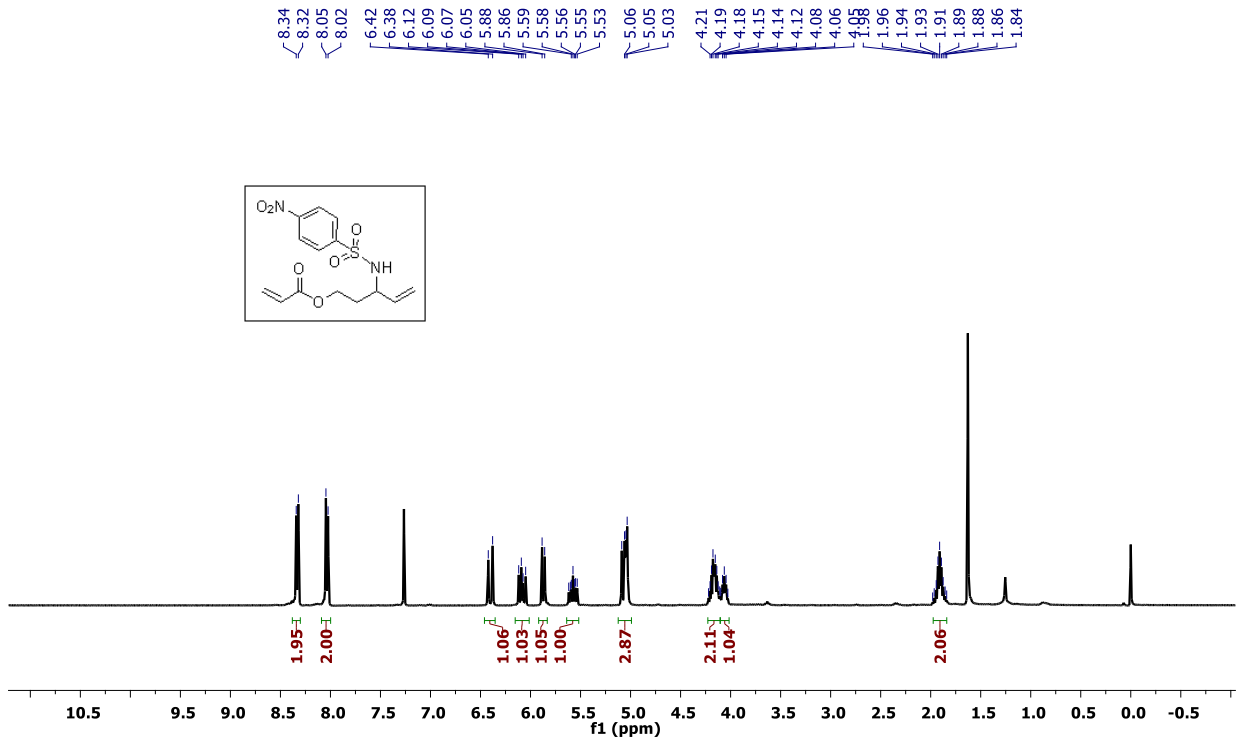
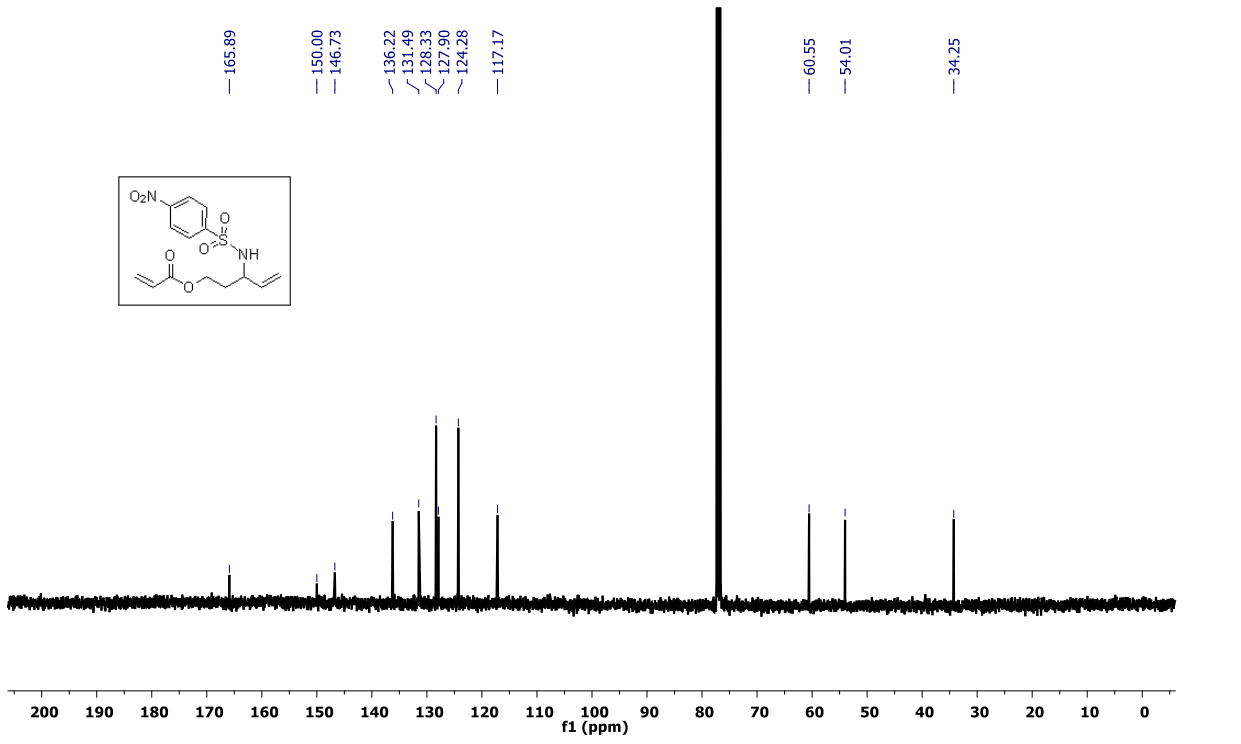
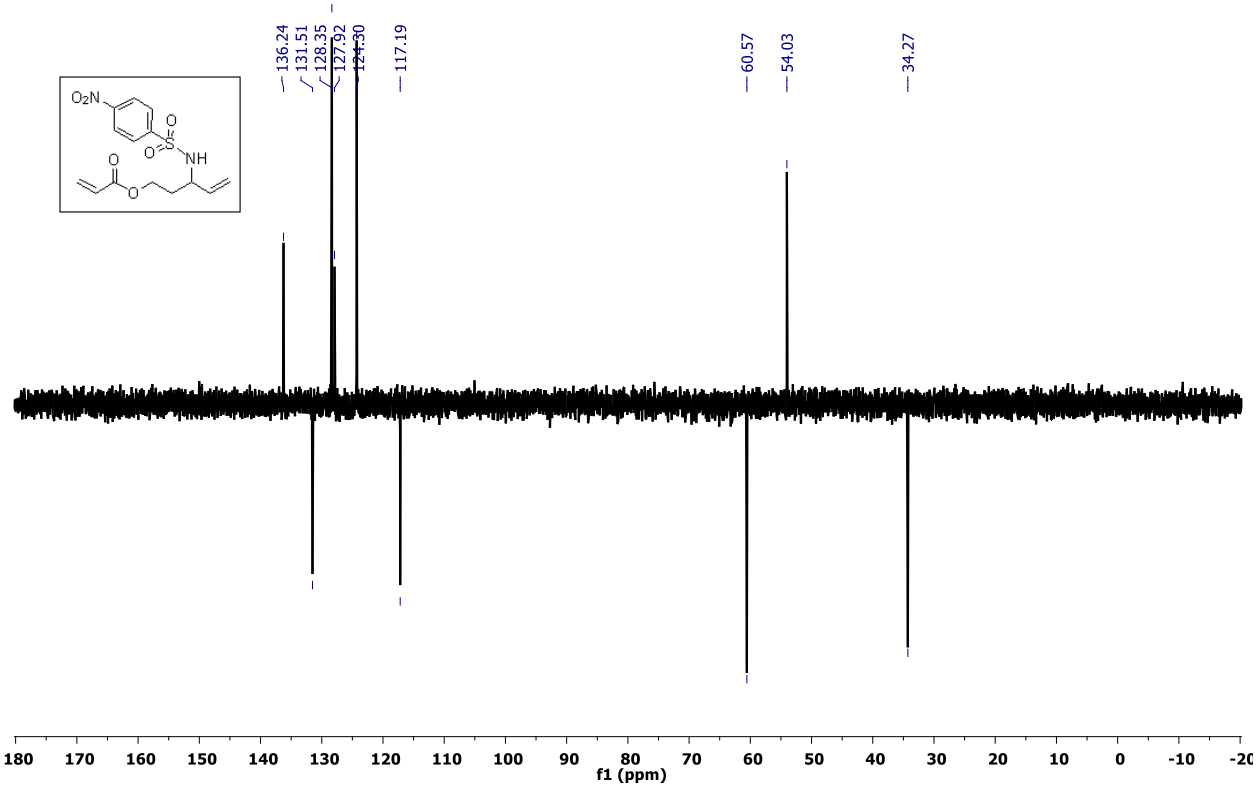


^{1}H and ^{13}C spectra of compound 3fa:

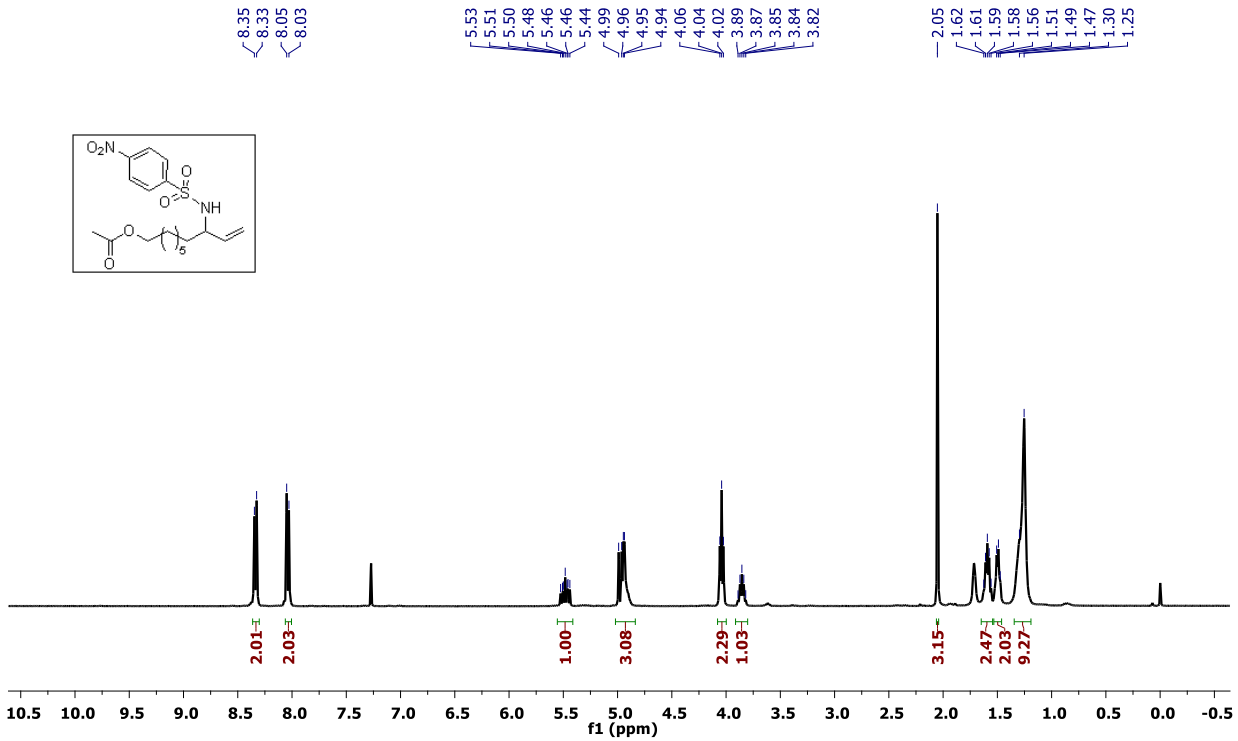


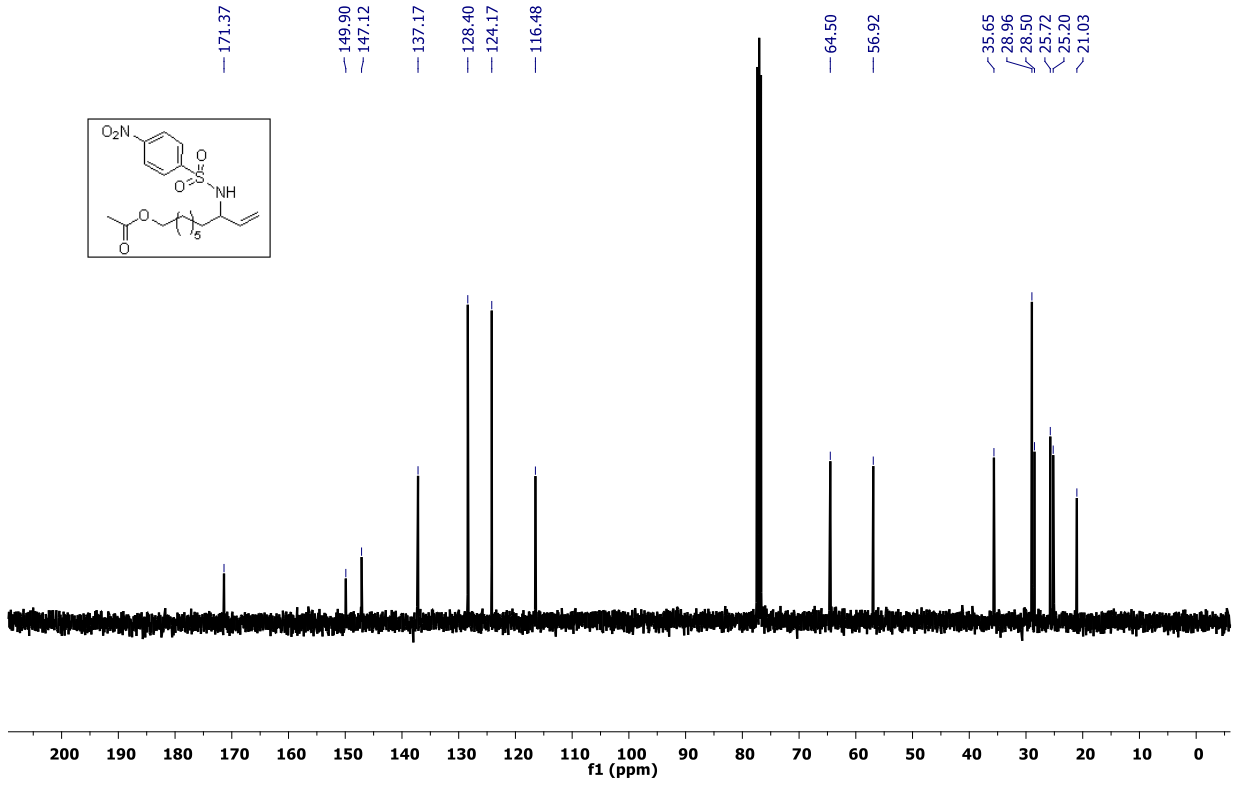


DEPT135 spectra of compound 3fa:

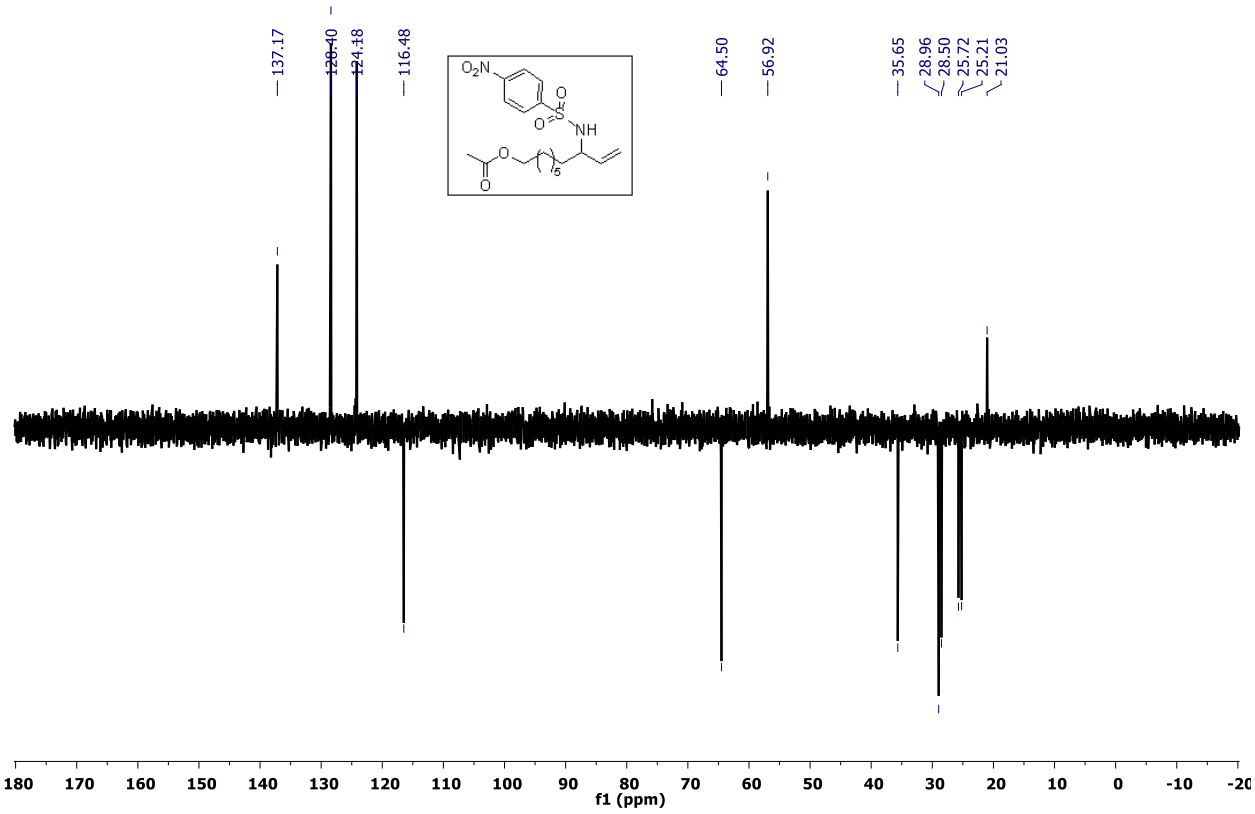


^{1}H and ^{13}C spectra of compound 3ga:

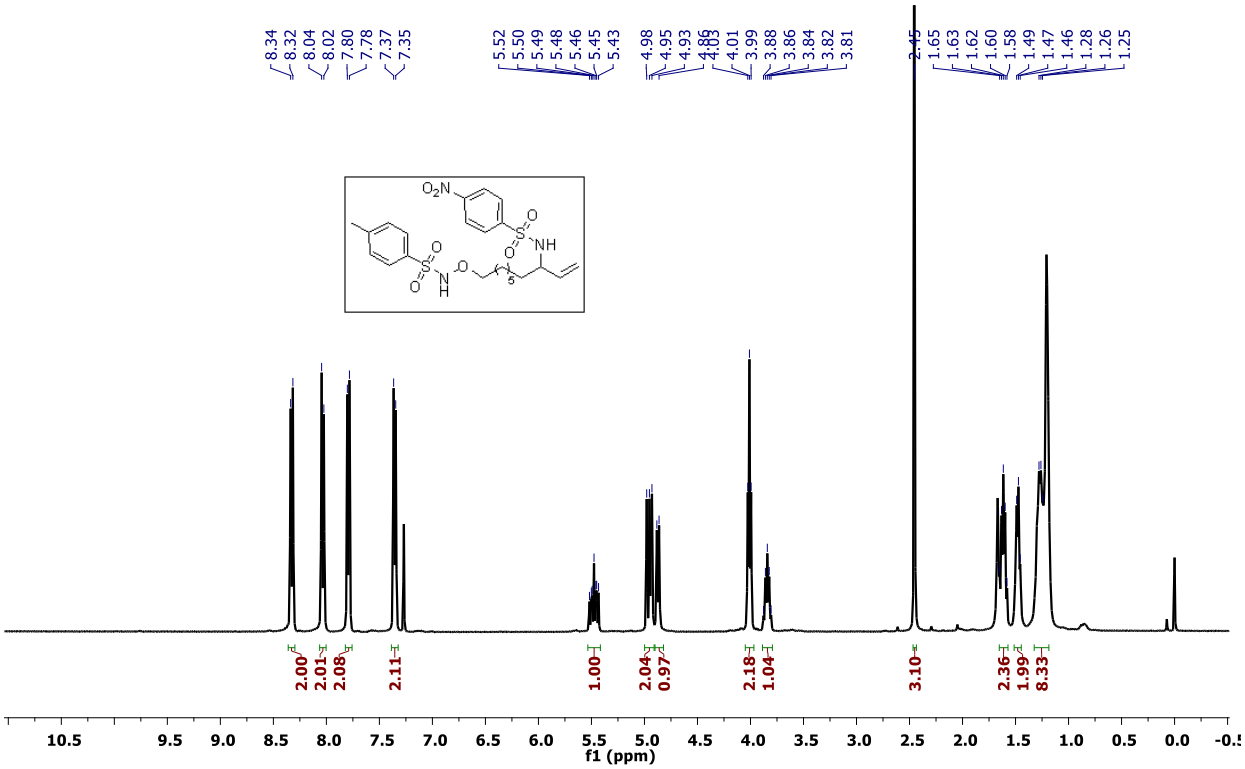


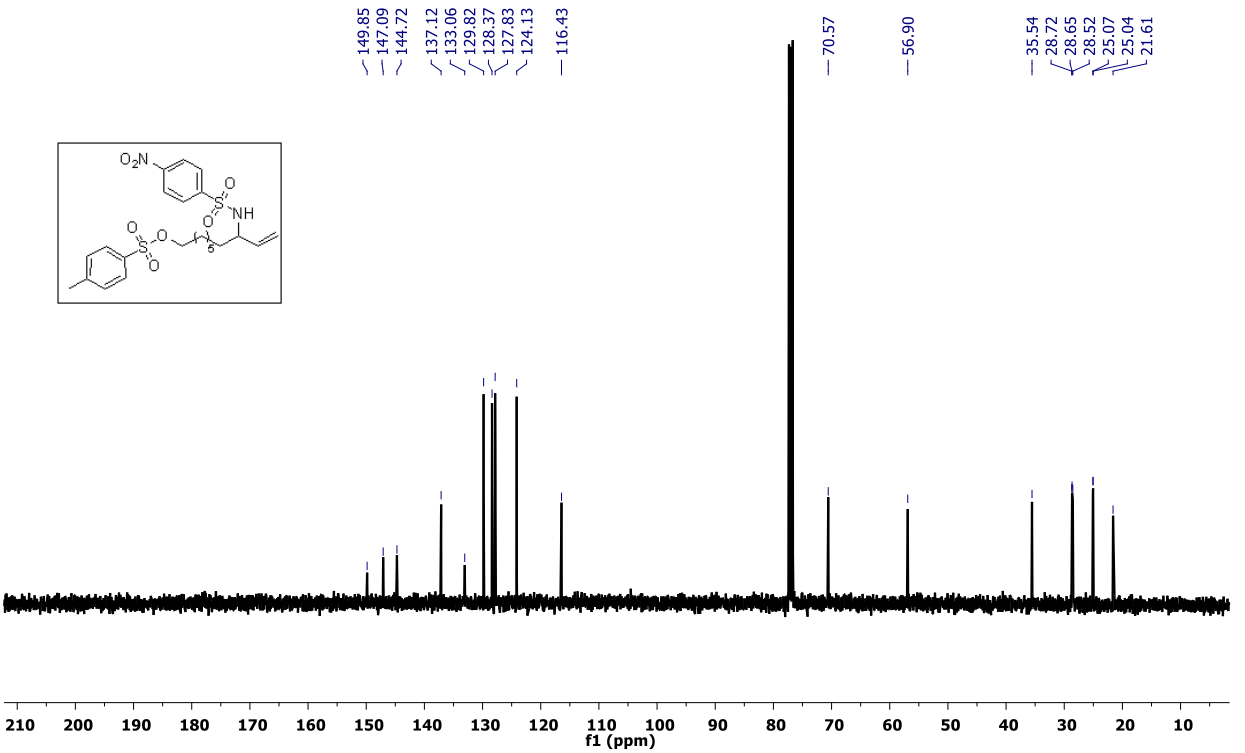


DEPT135 spectra of compound 3ga:

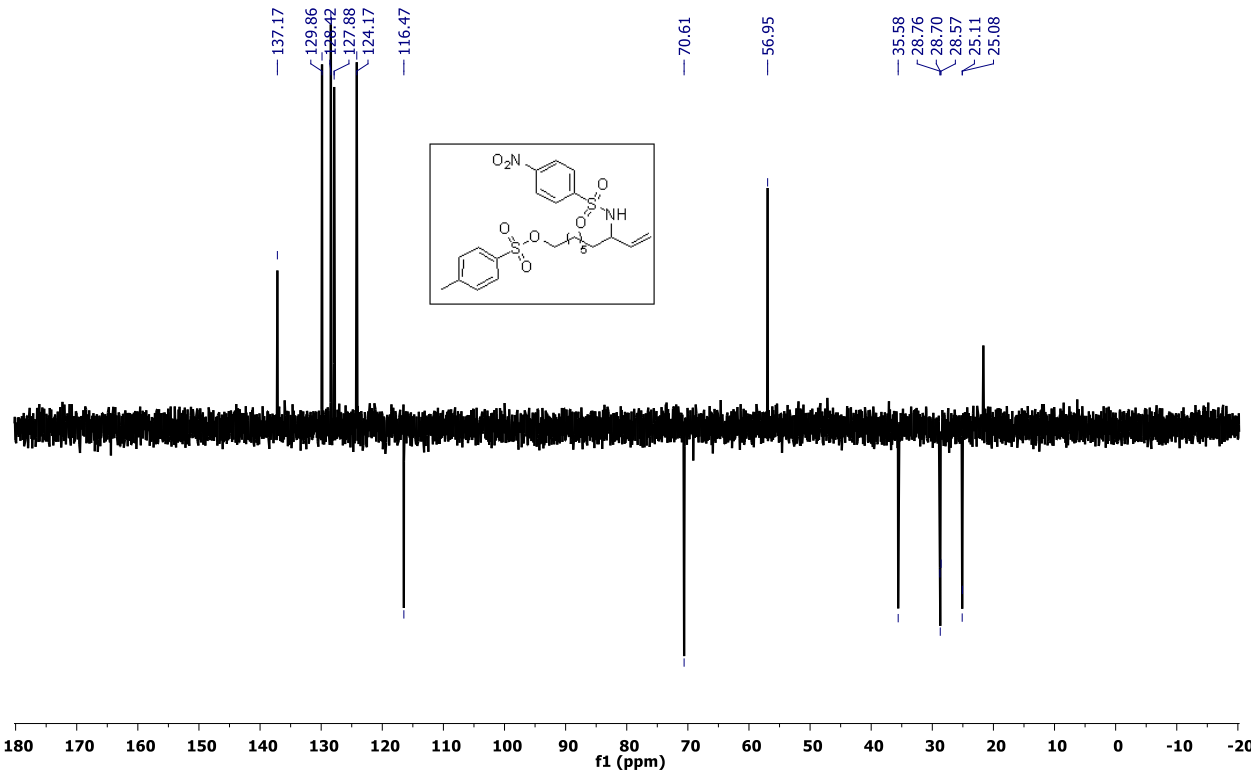


^{1}H and ^{13}C spectra of compound 3ha:

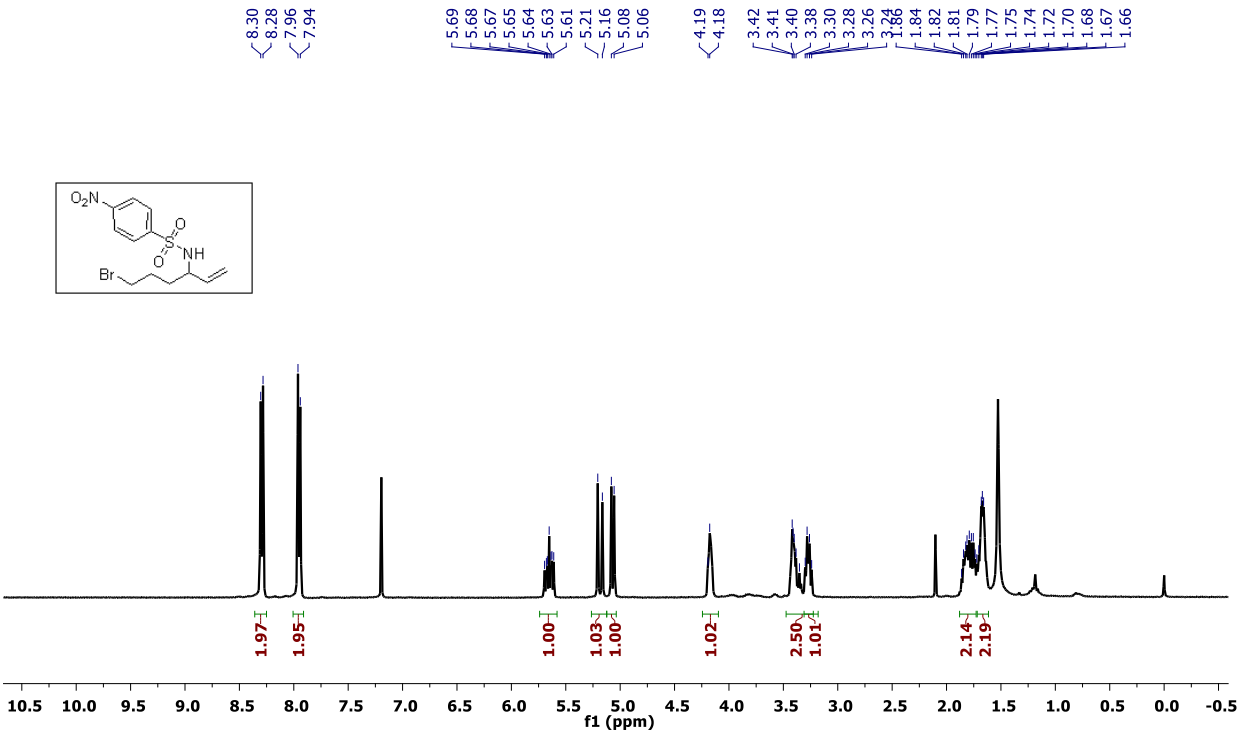


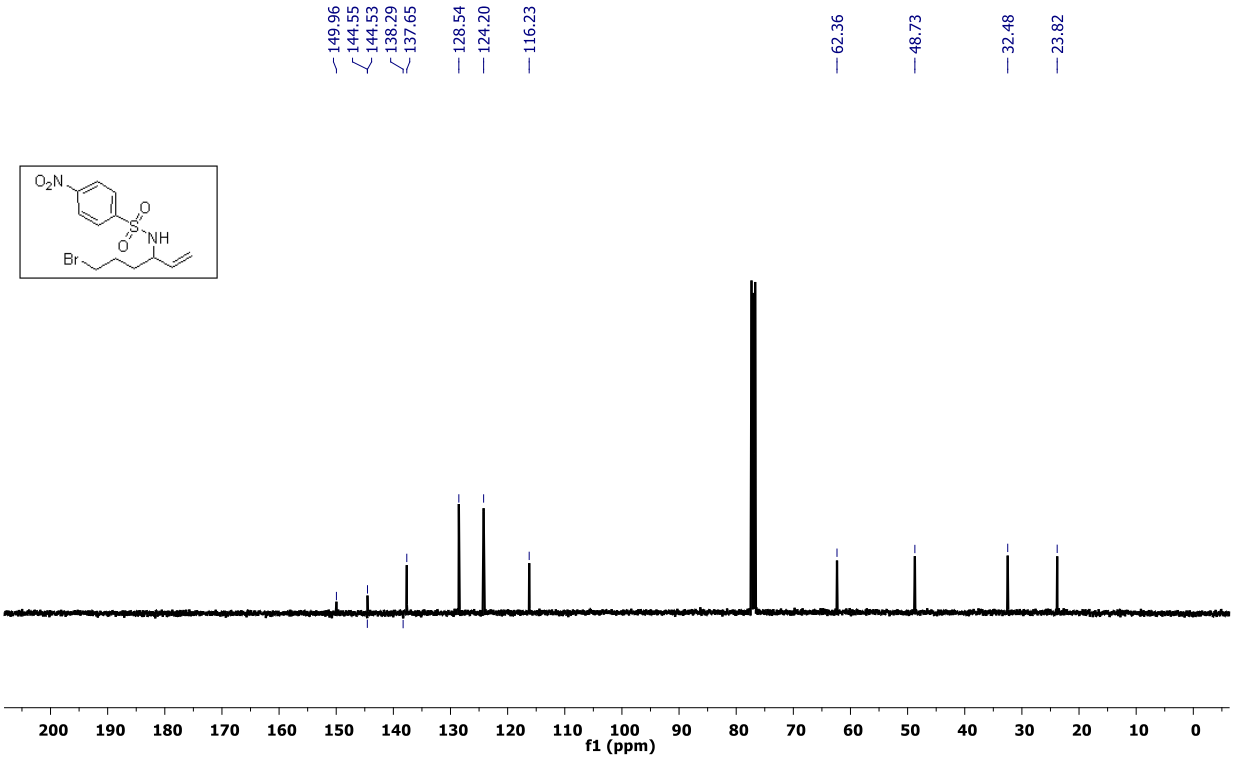


DEPT135 spectra of compound 3ha:

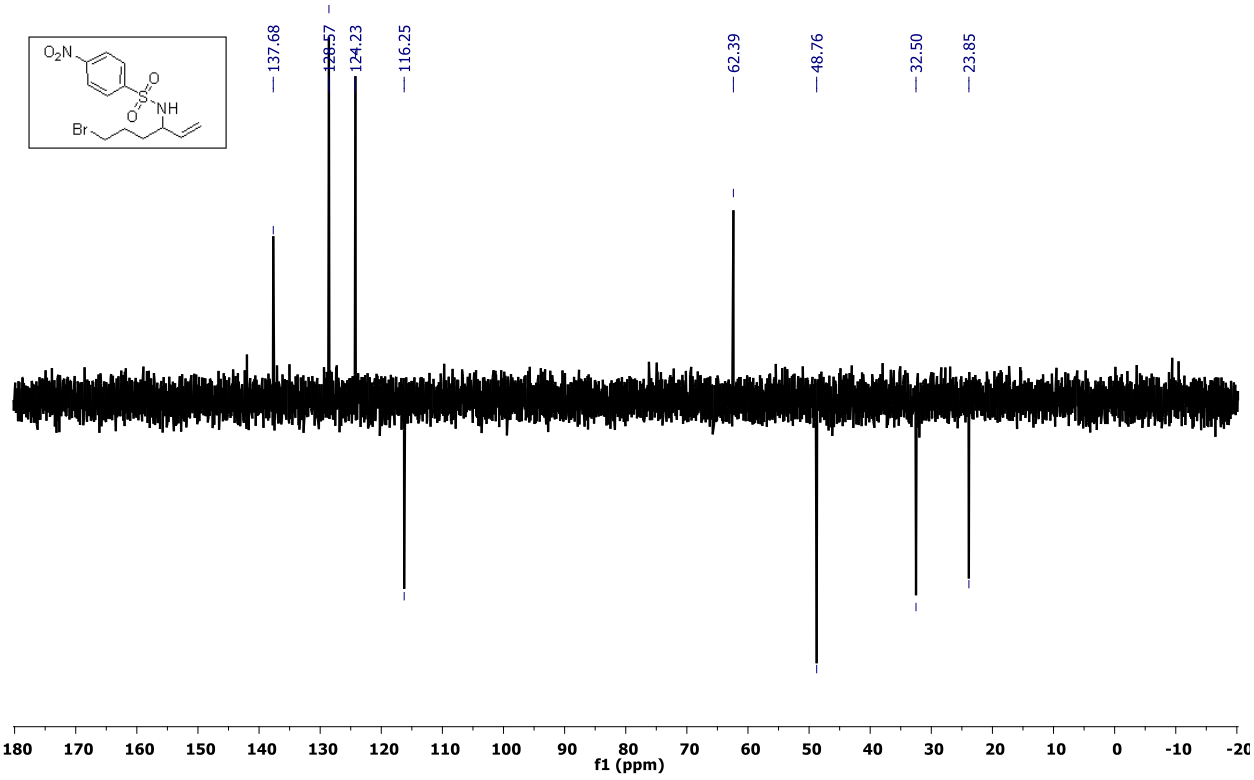


^{1}H and ^{13}C spectra of compound 3ia:

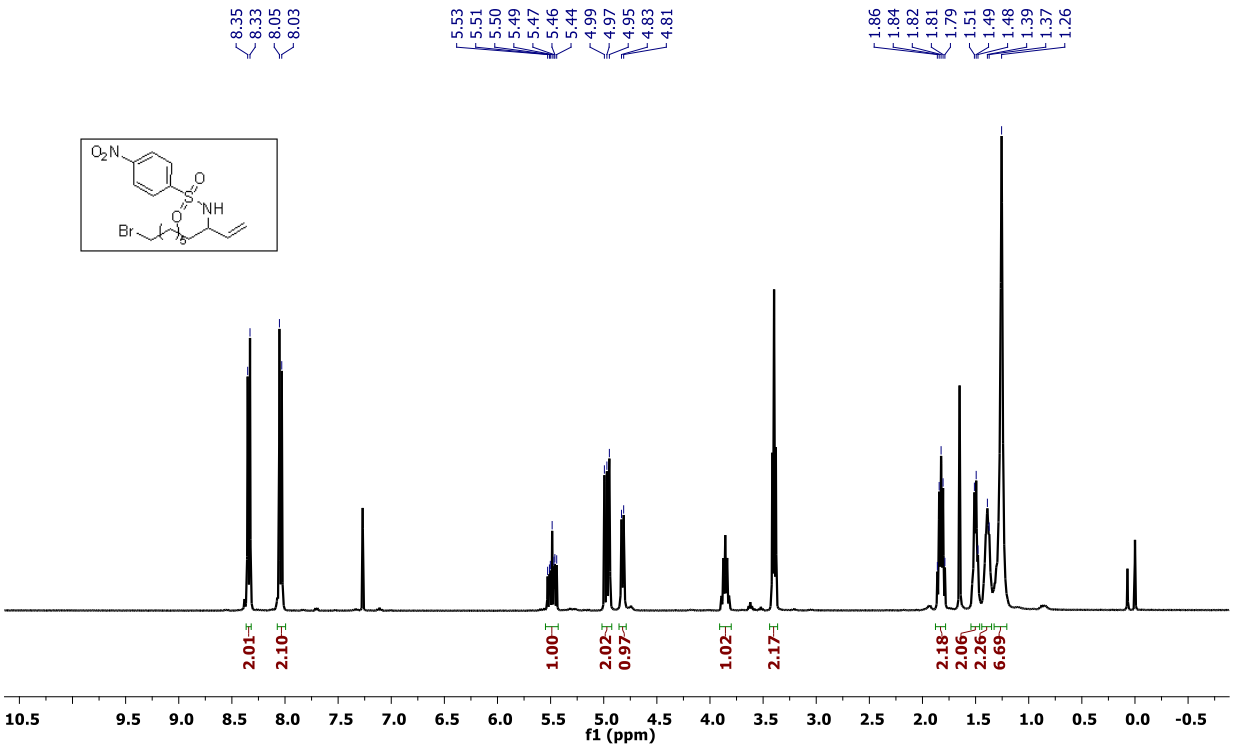


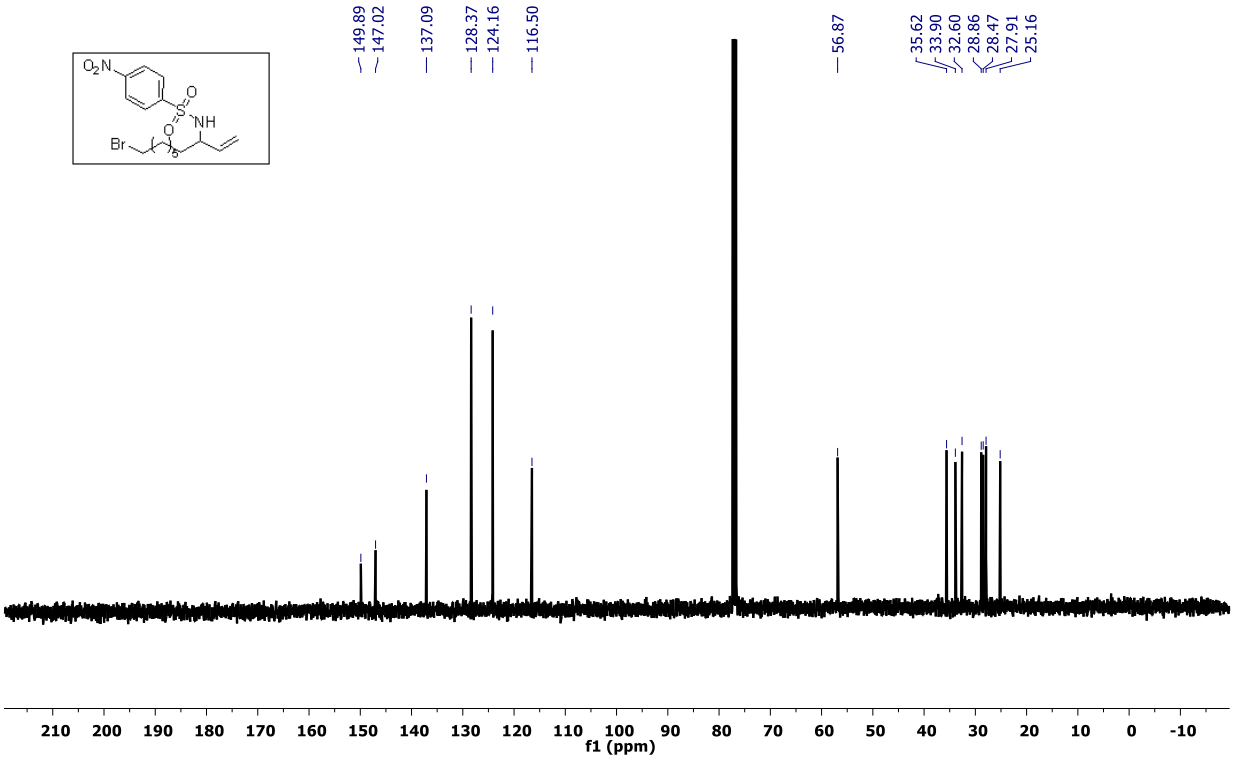


DEPT135 spectra of compound 3ia:

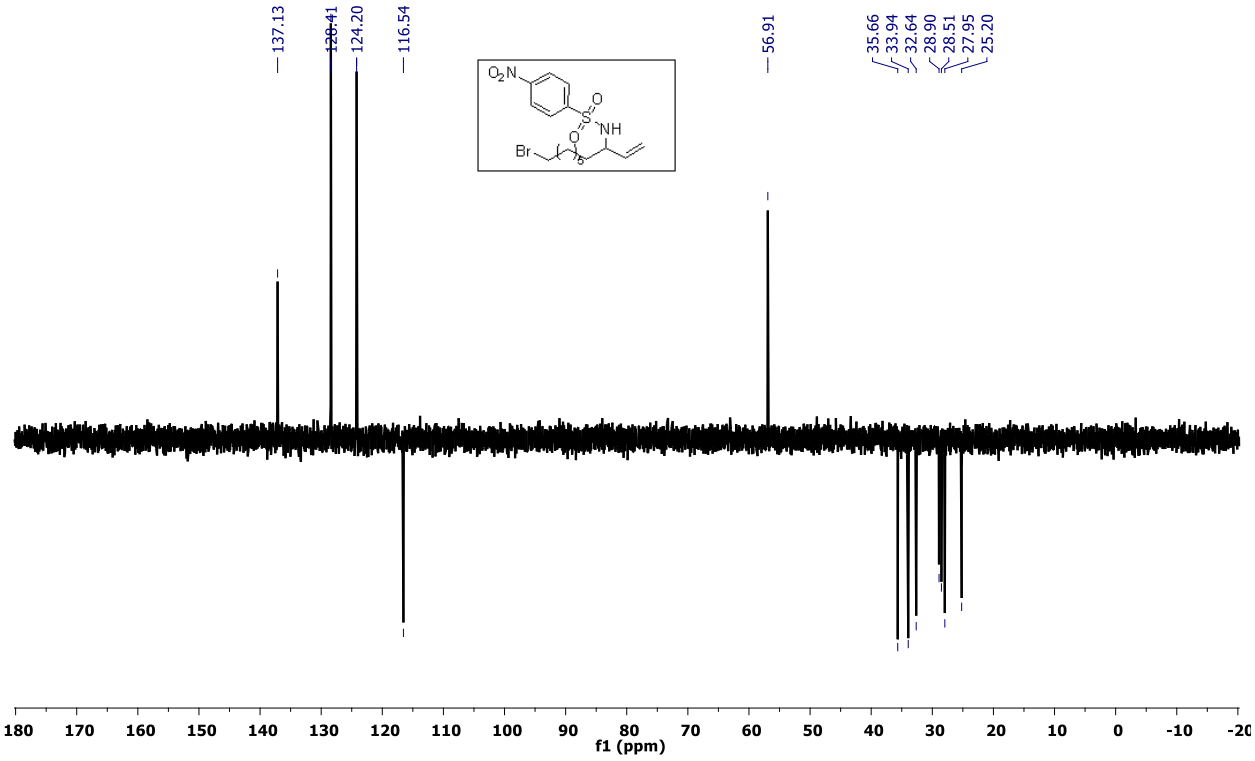


^{1}H and ^{13}C spectra of compound 3ja:

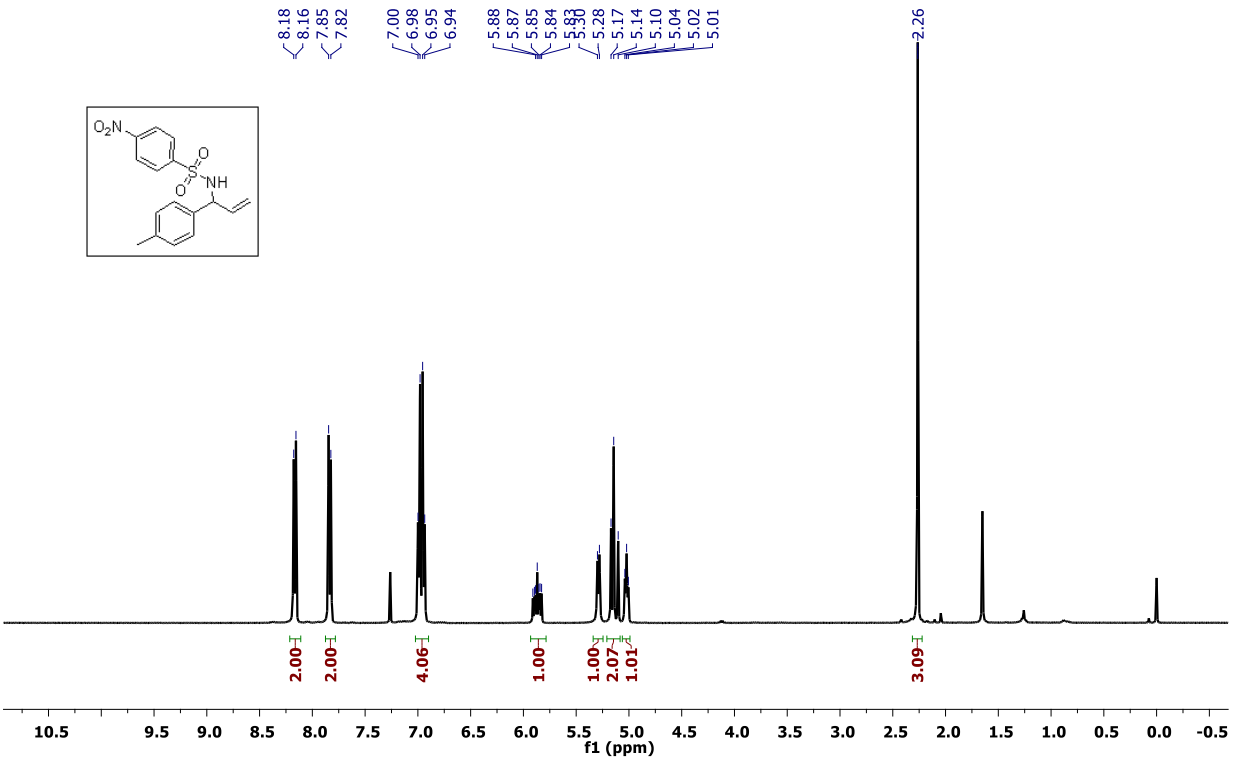


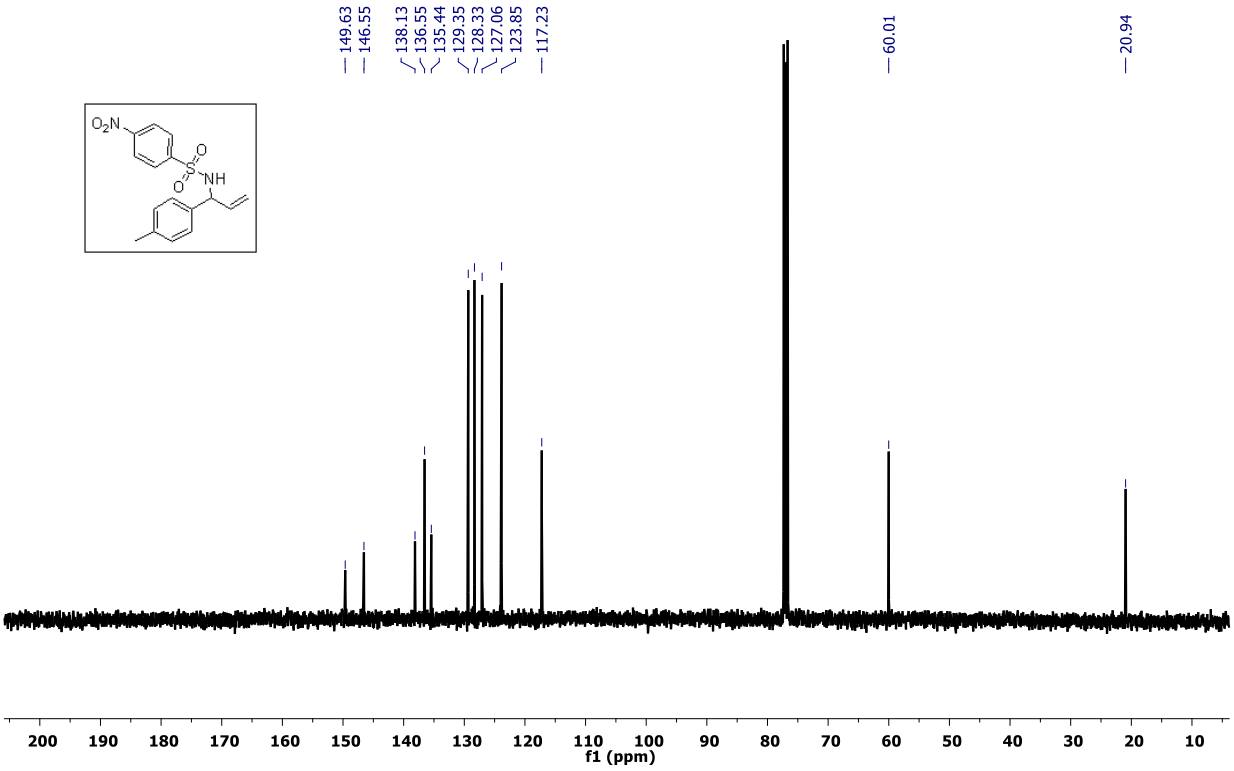


DEPT135 spectra of compound 3ja:



^{1}H and ^{13}C spectra of compound 3ka:





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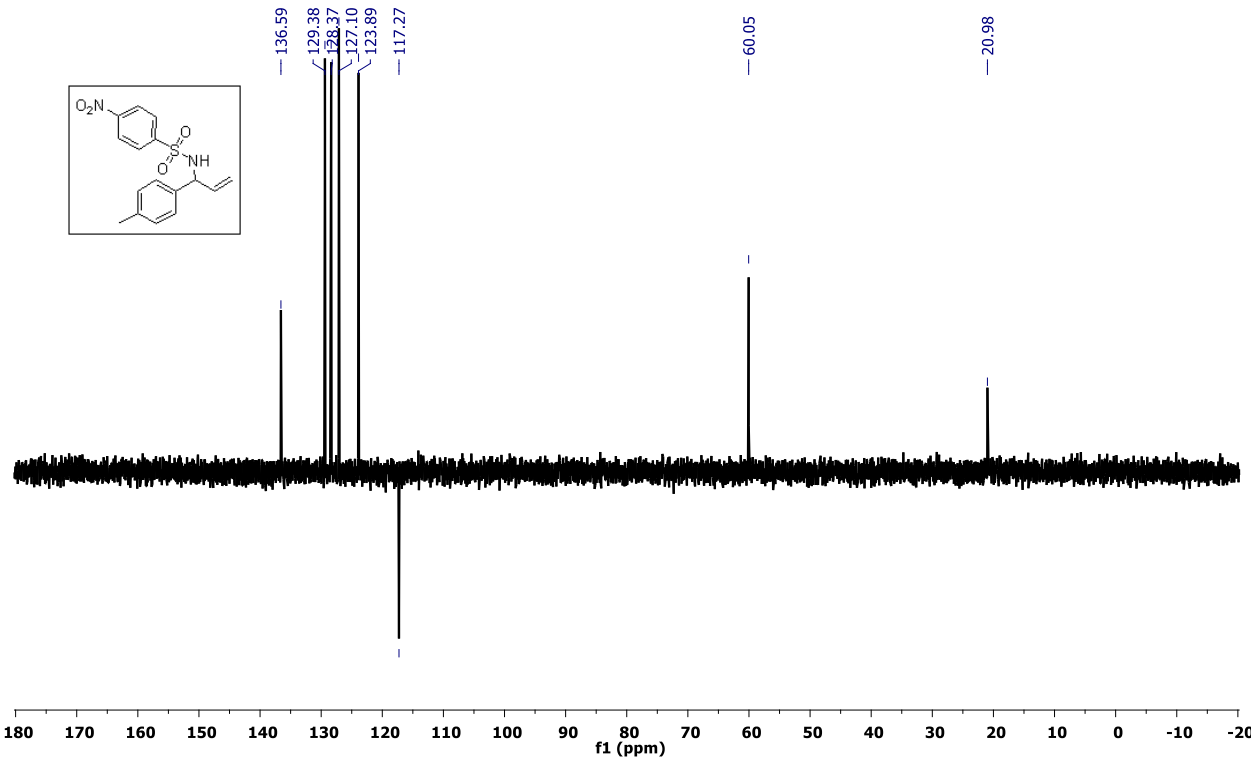
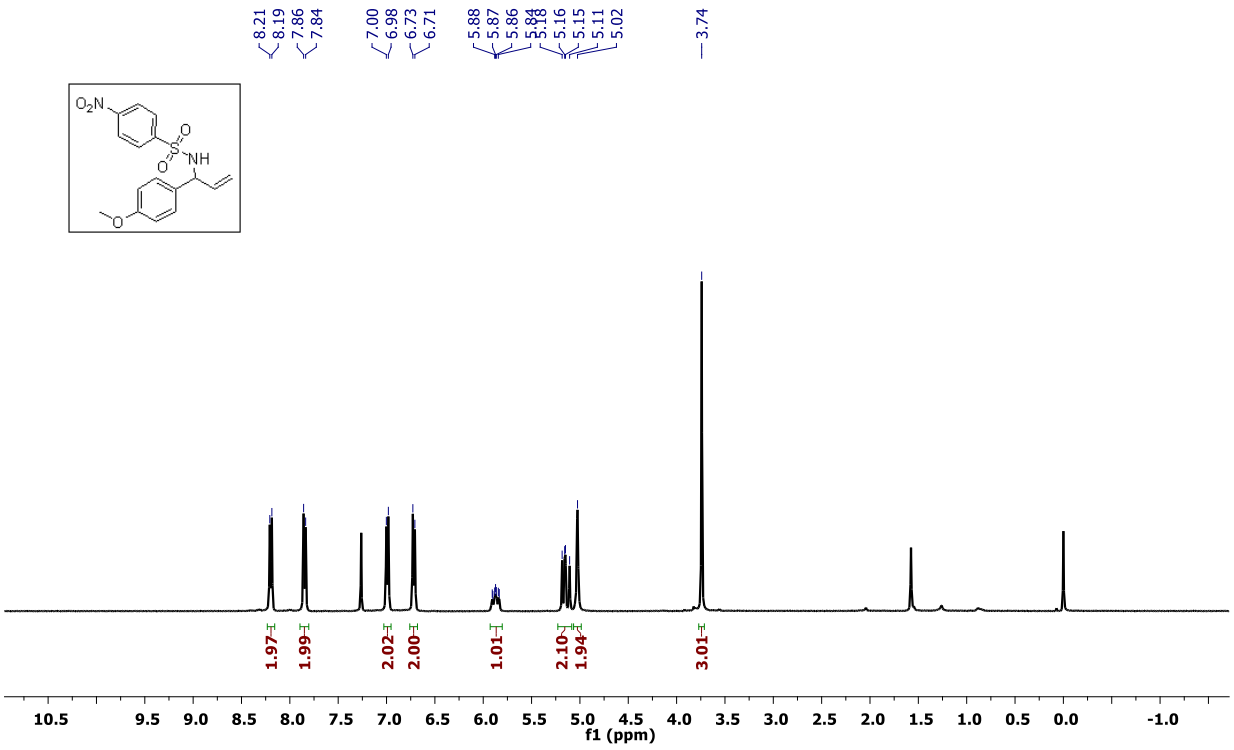
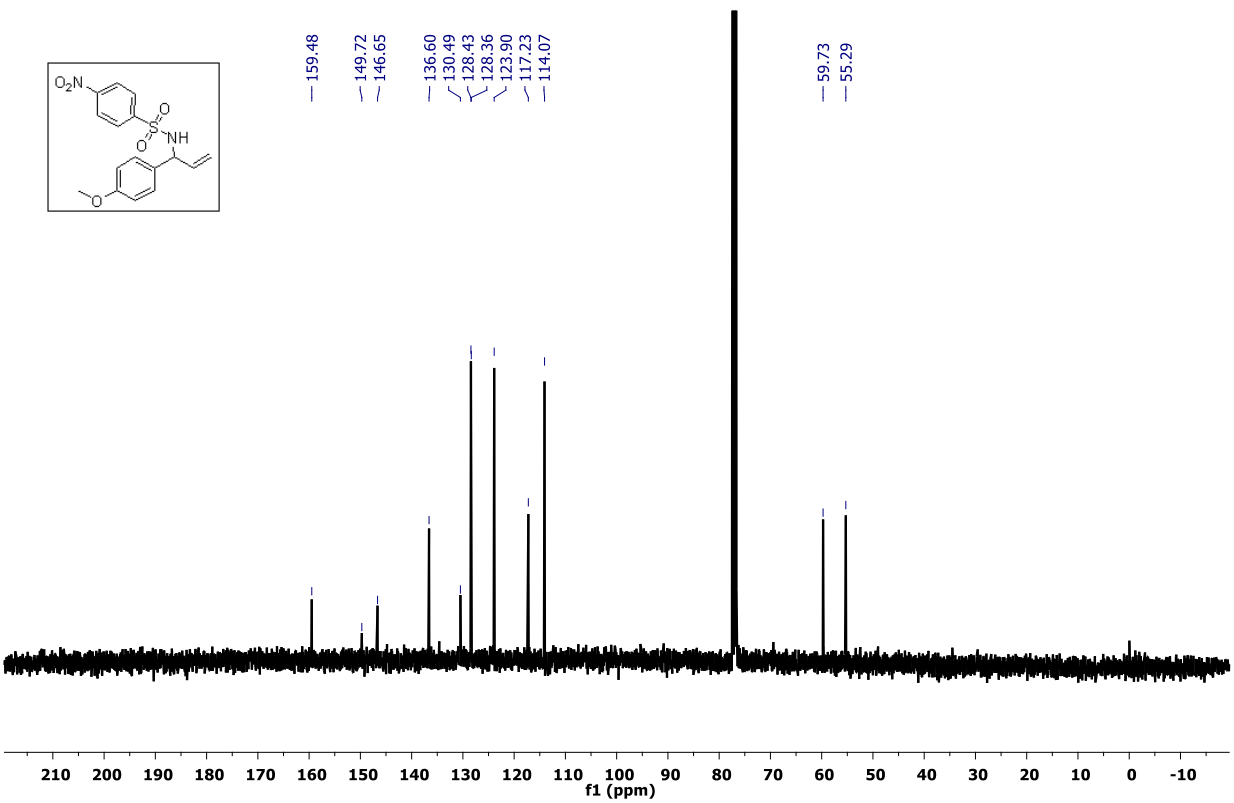


^{1}H and ^{13}C spectra of compound 3la:





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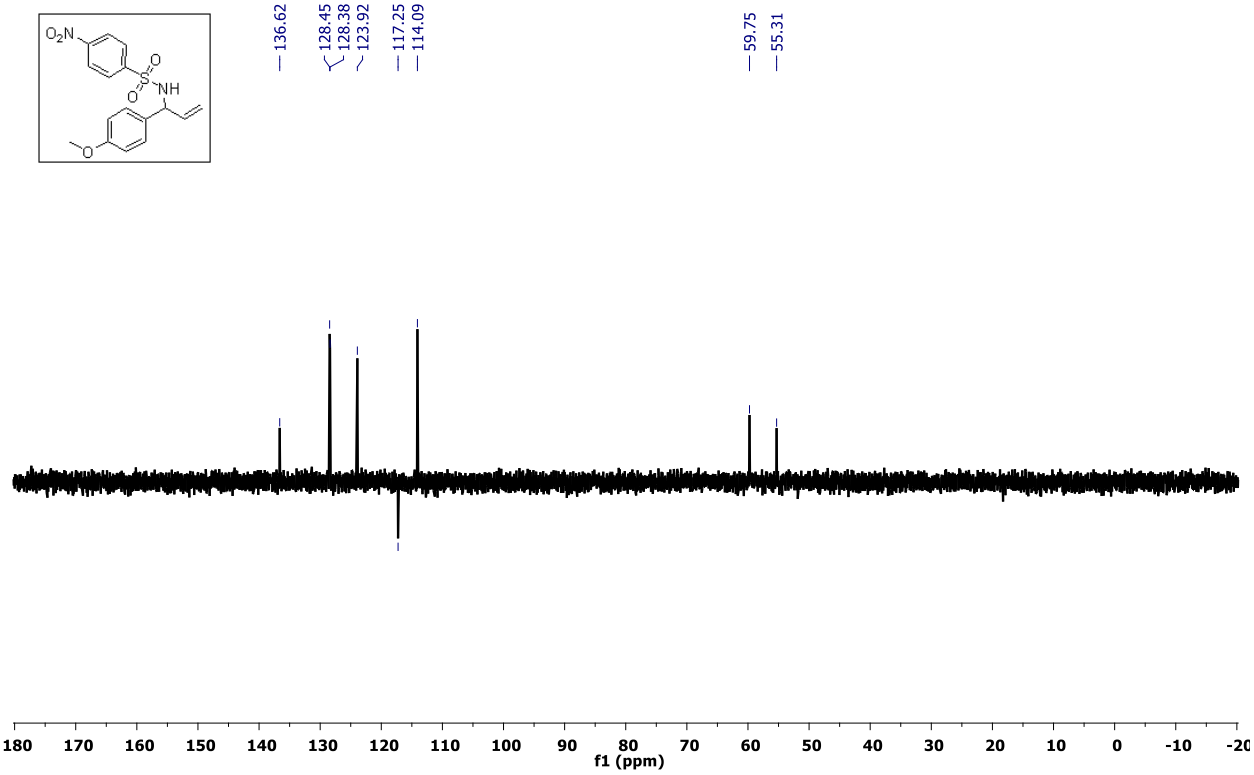
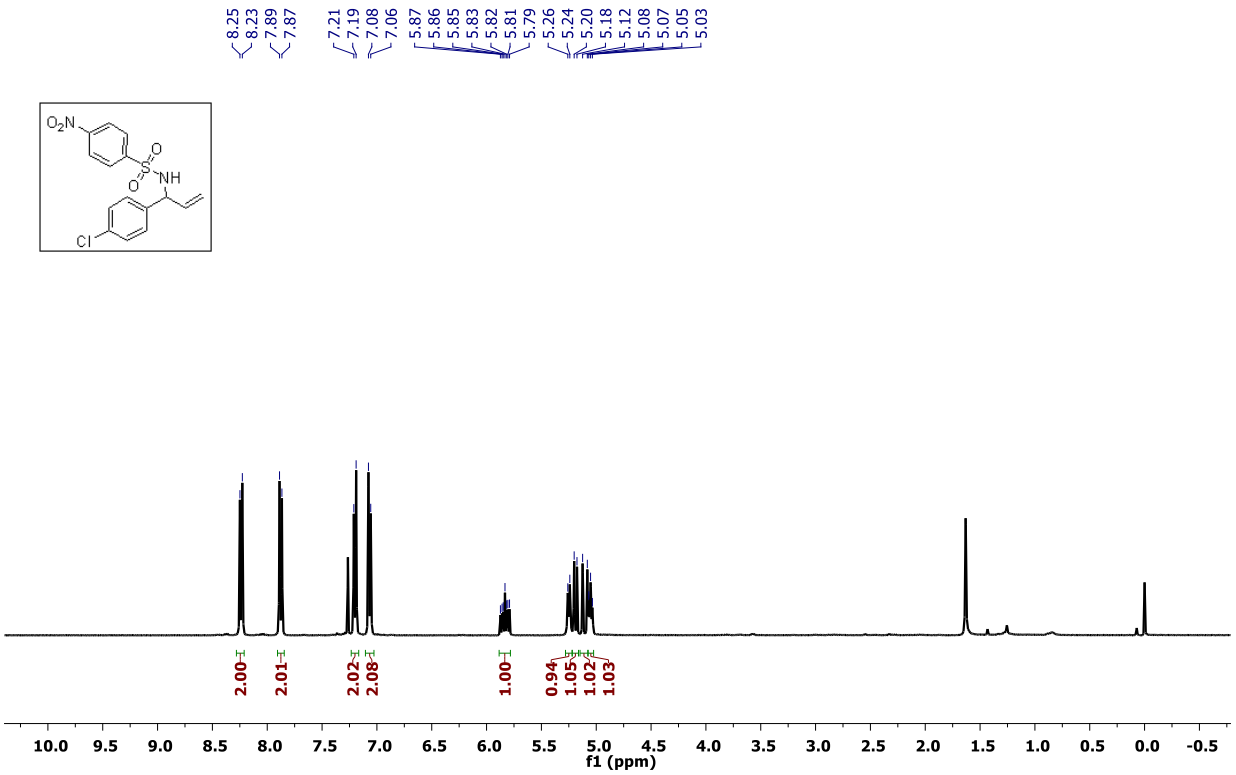
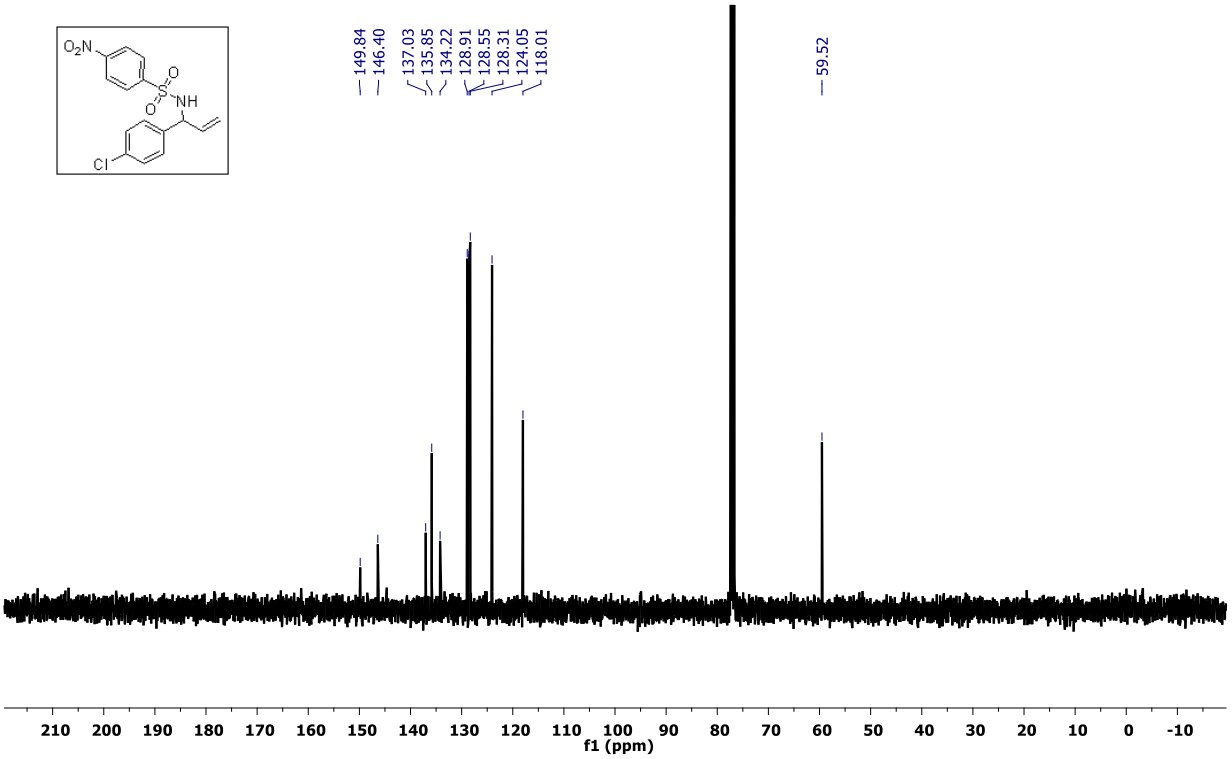


^{1}H and ^{13}C spectra of compound 3ma:





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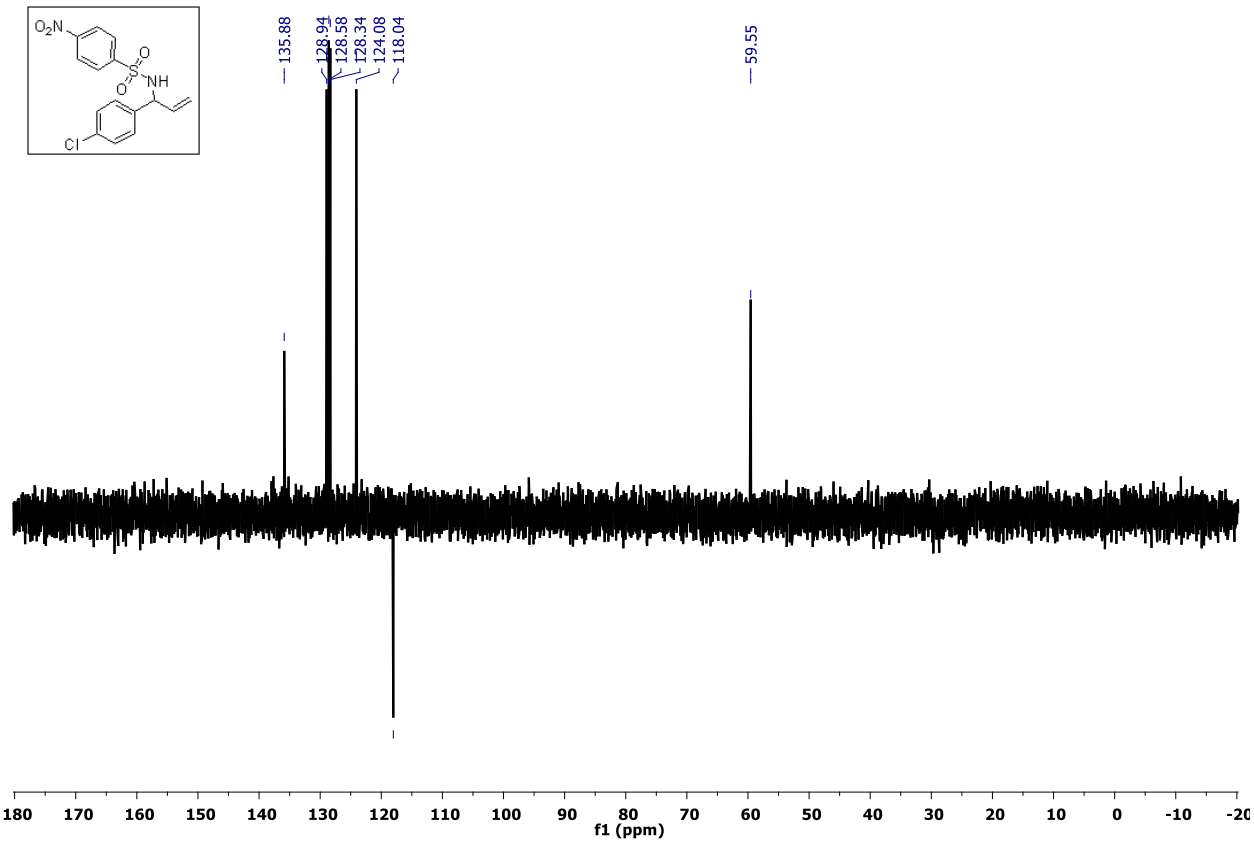
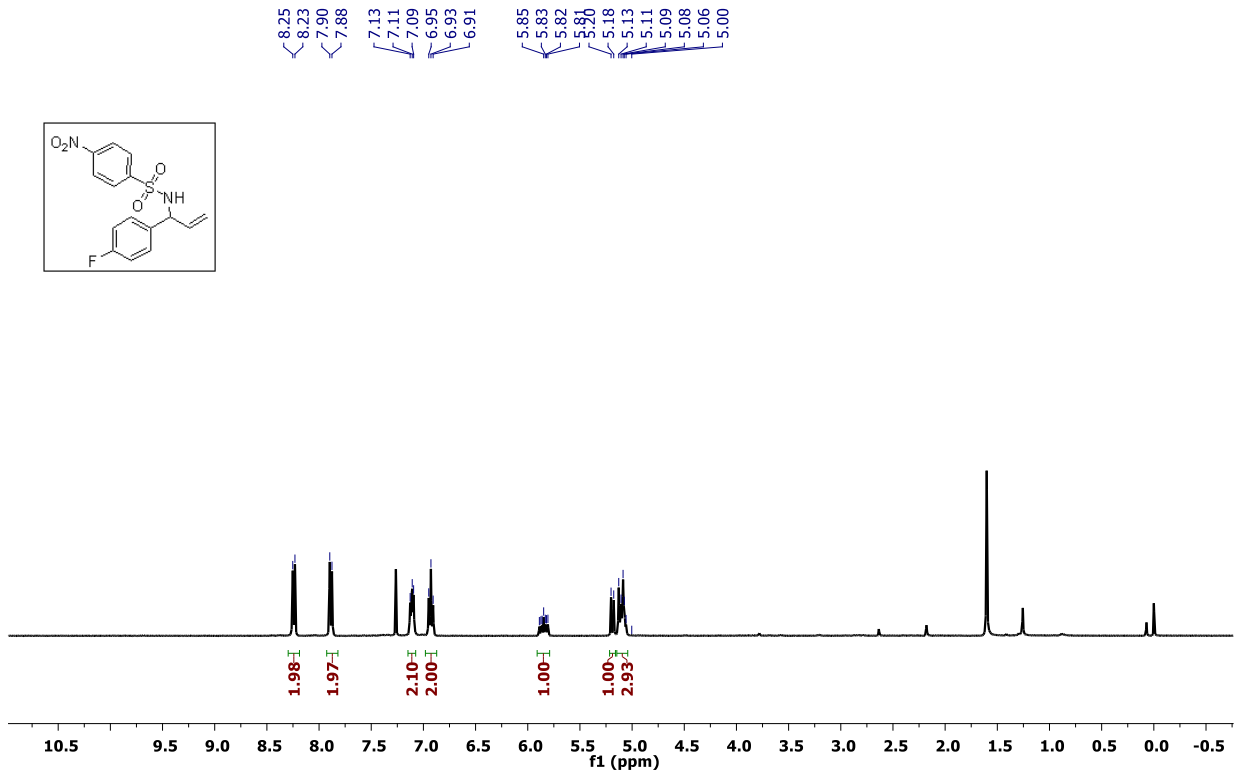
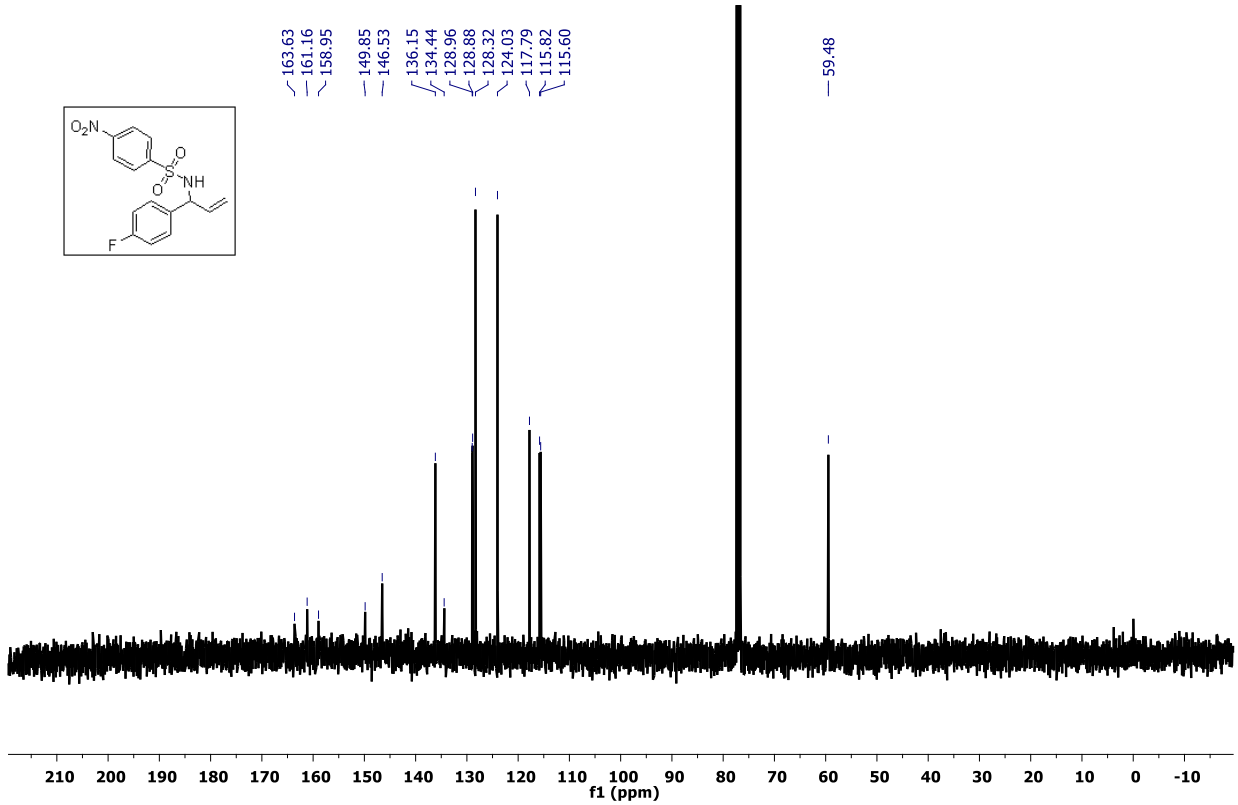
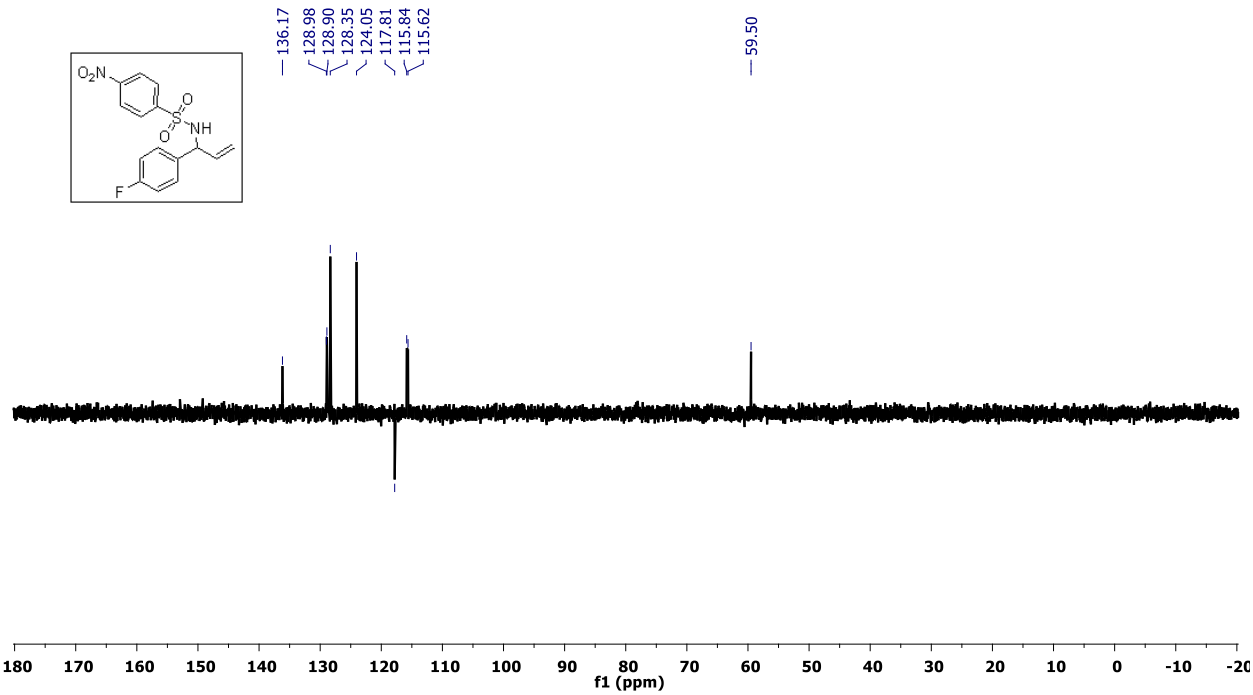


^{1}H and ^{13}C spectra of compound 3na:

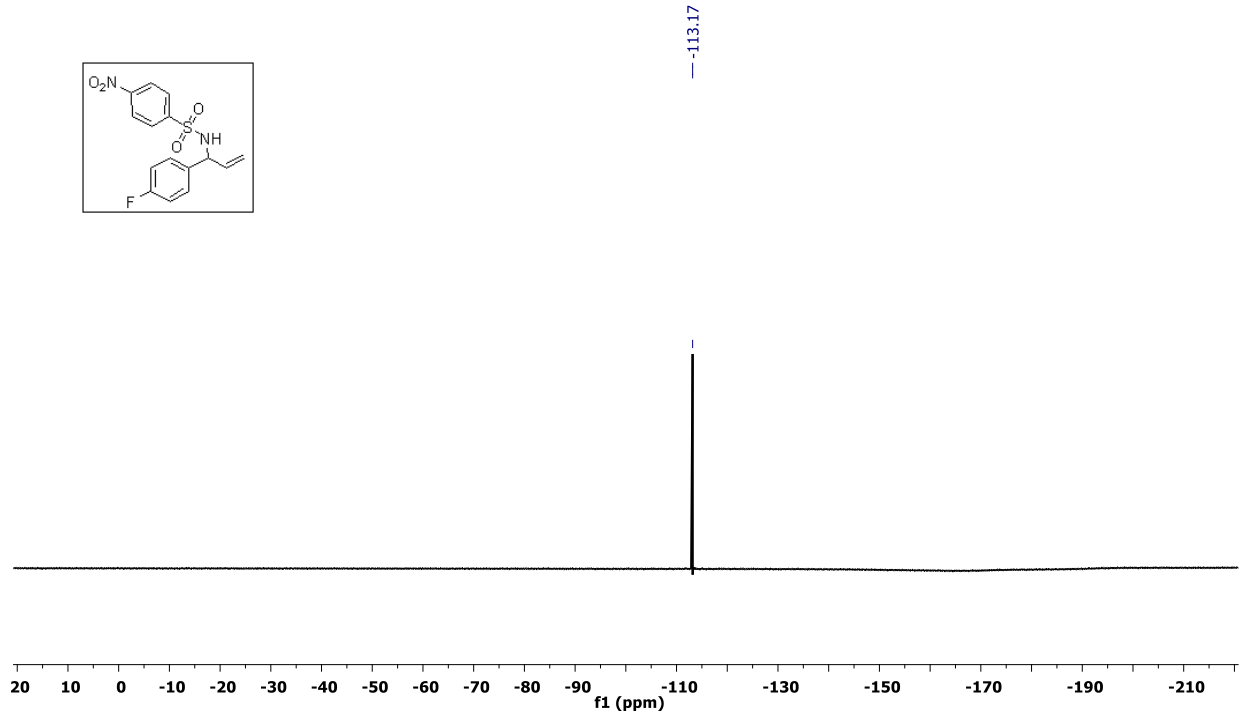




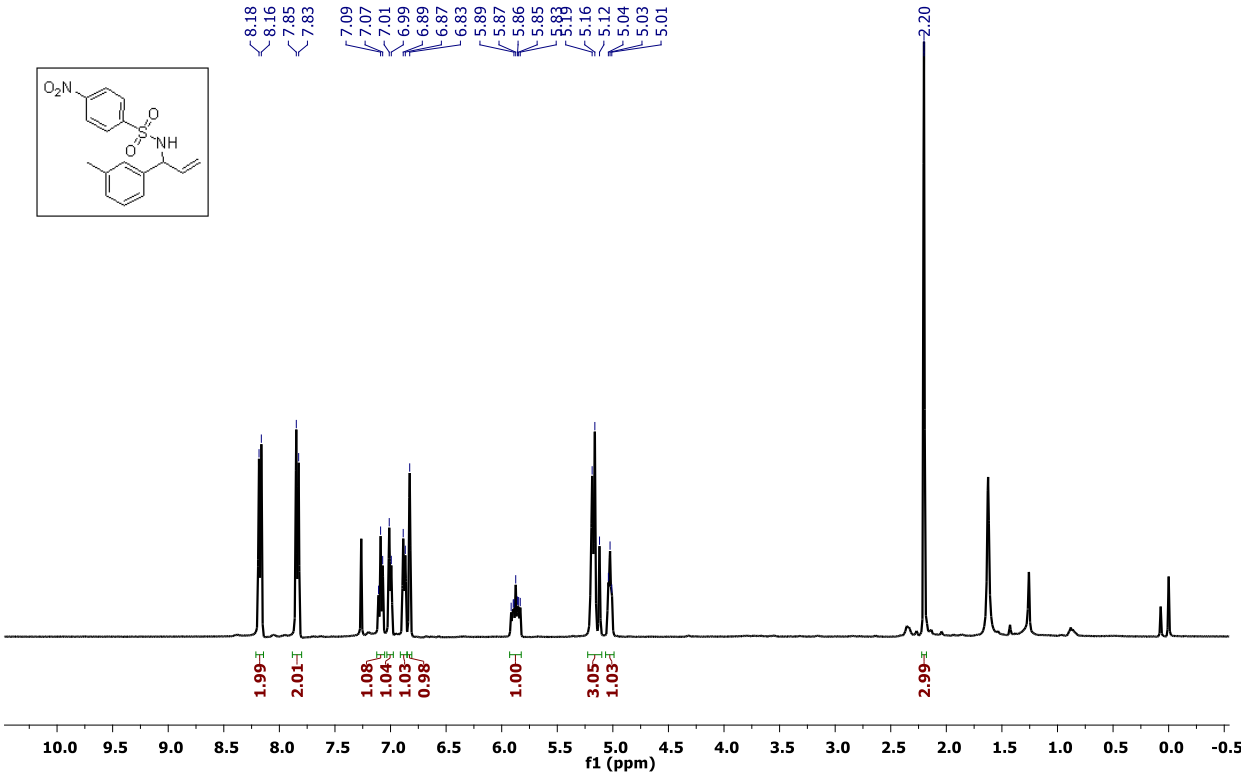
DEPT135 spectra of compound 3na:

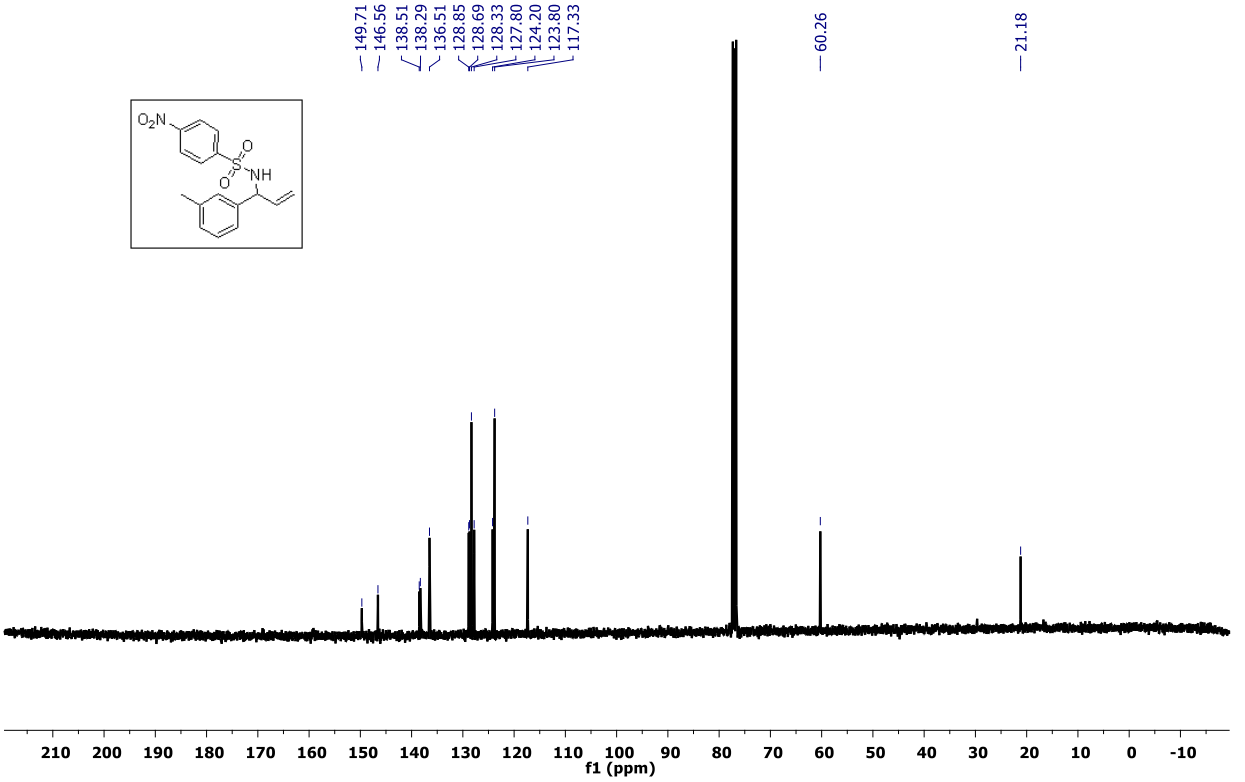


^{19}F spectra of compound 3na:



^{1}H and ^{13}C spectra of compound 3oa:





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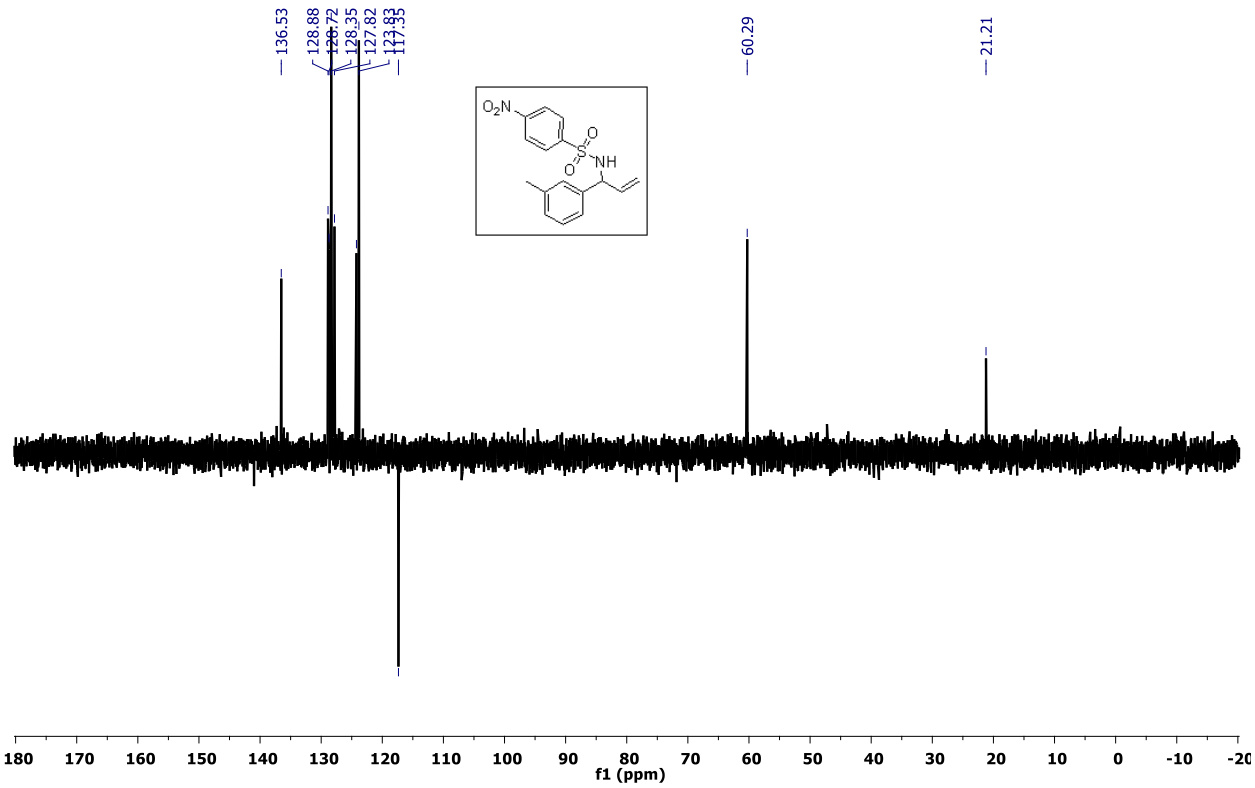
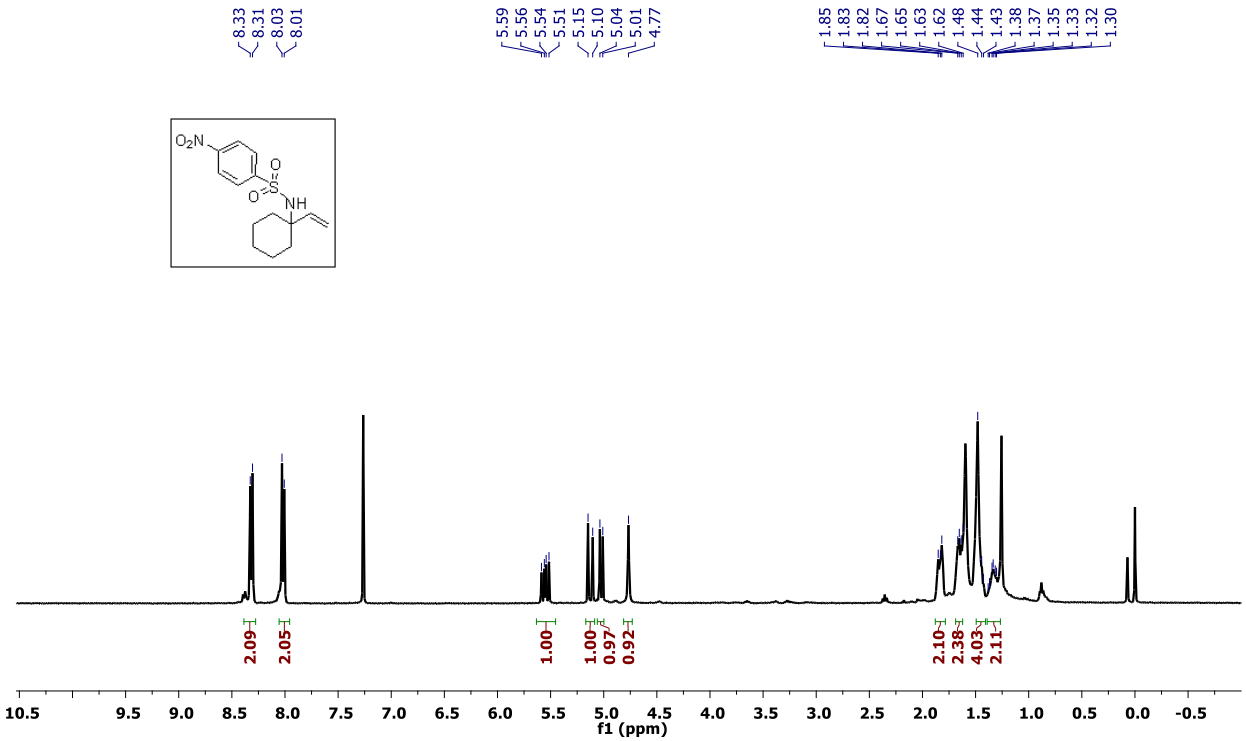
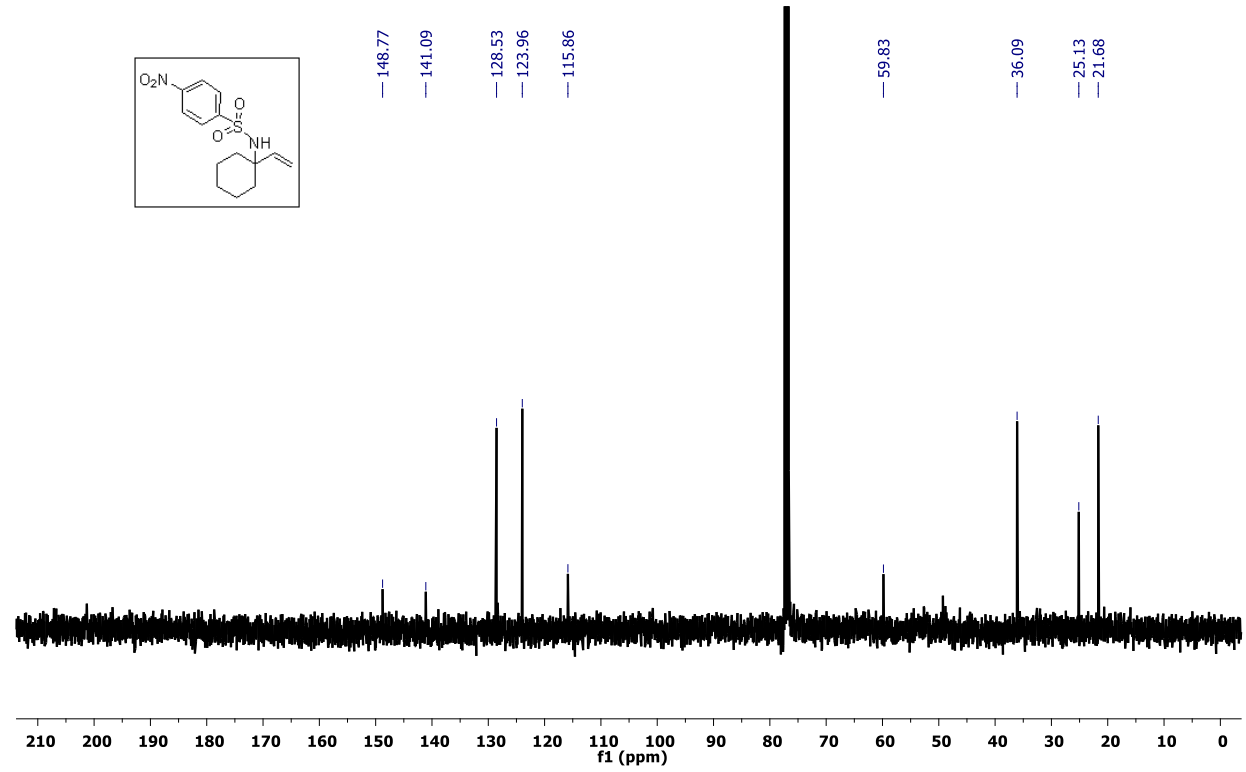


^{1}H and ^{13}C spectra of compound 3pa:





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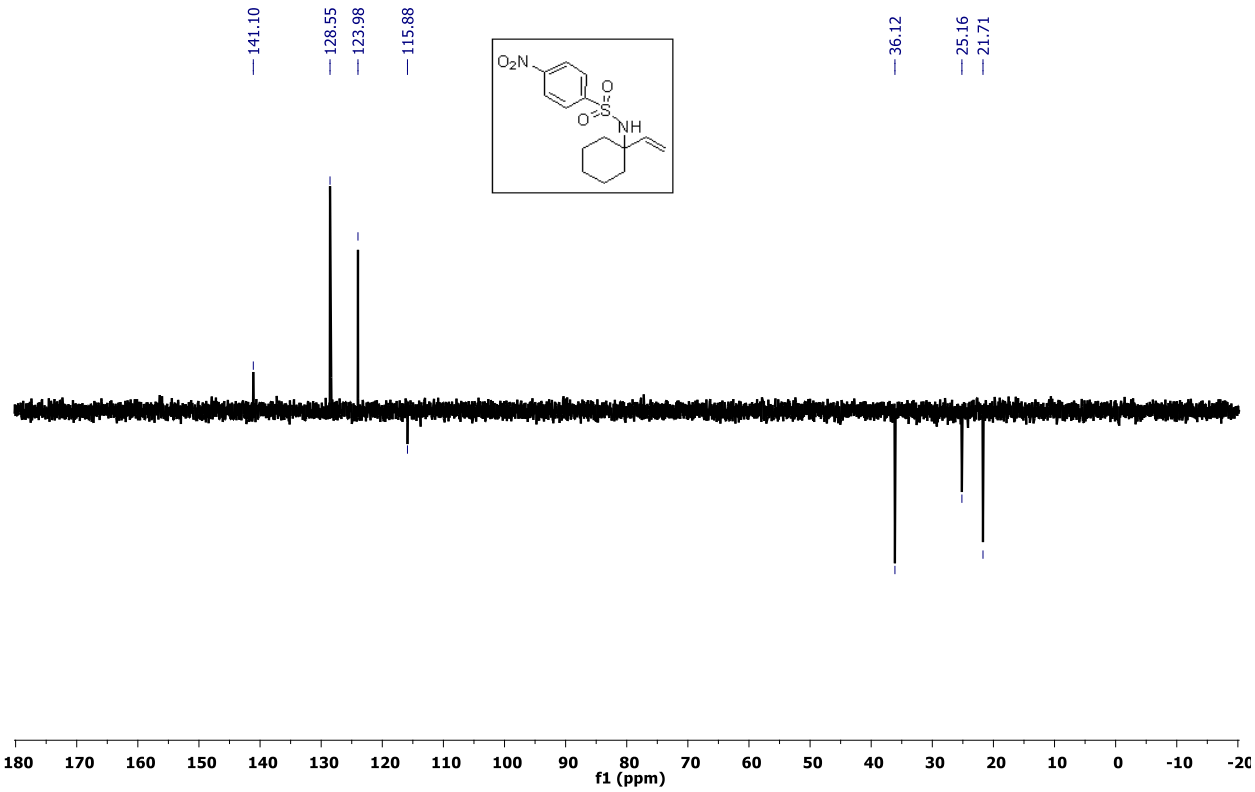
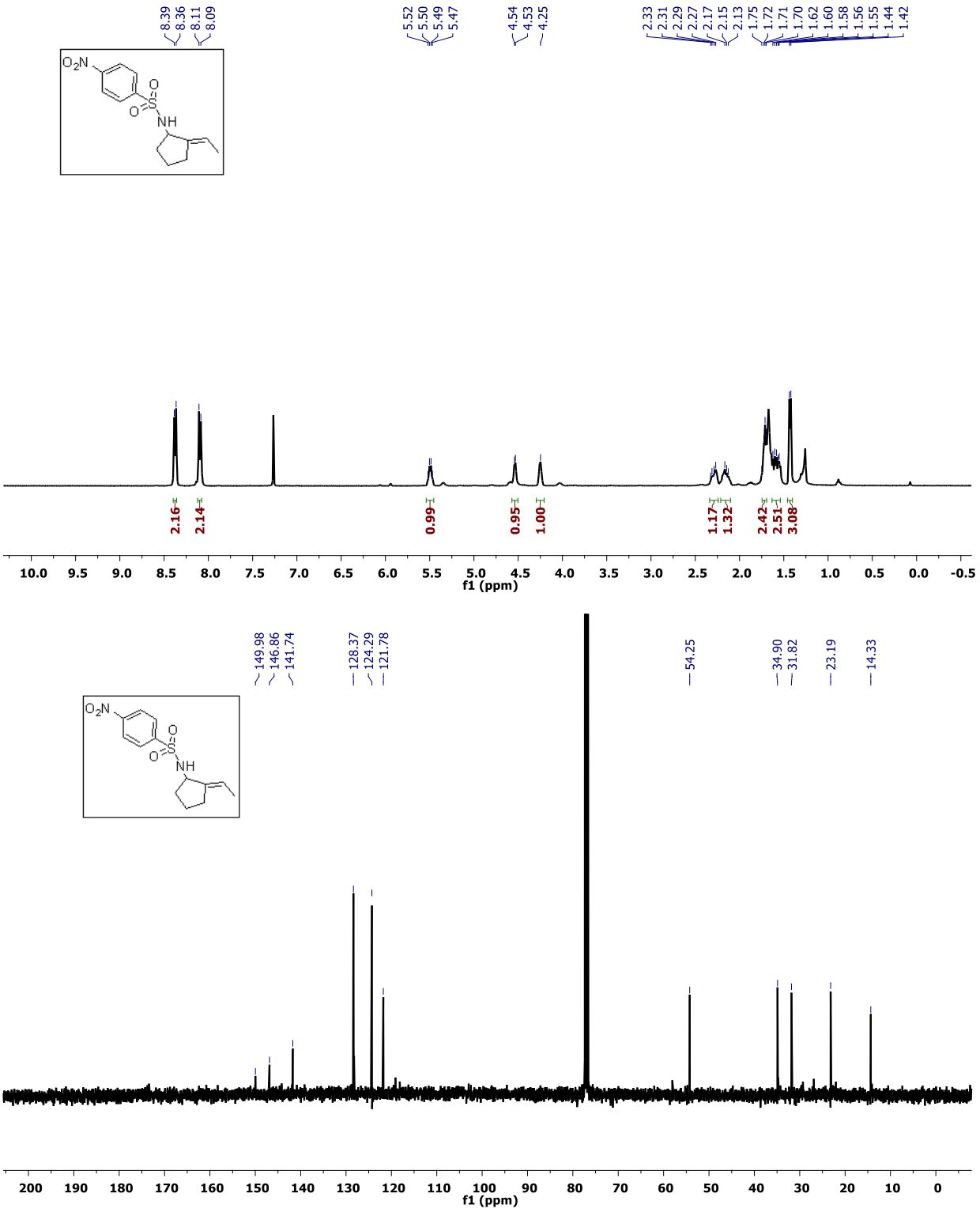
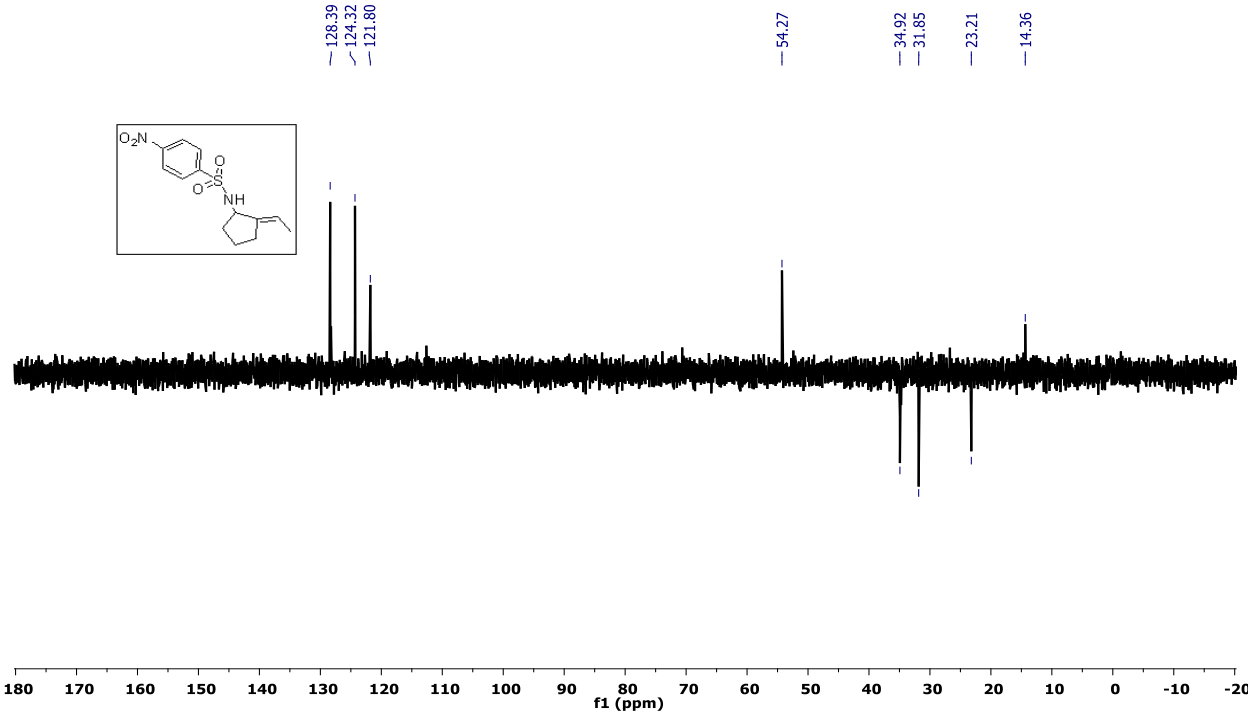


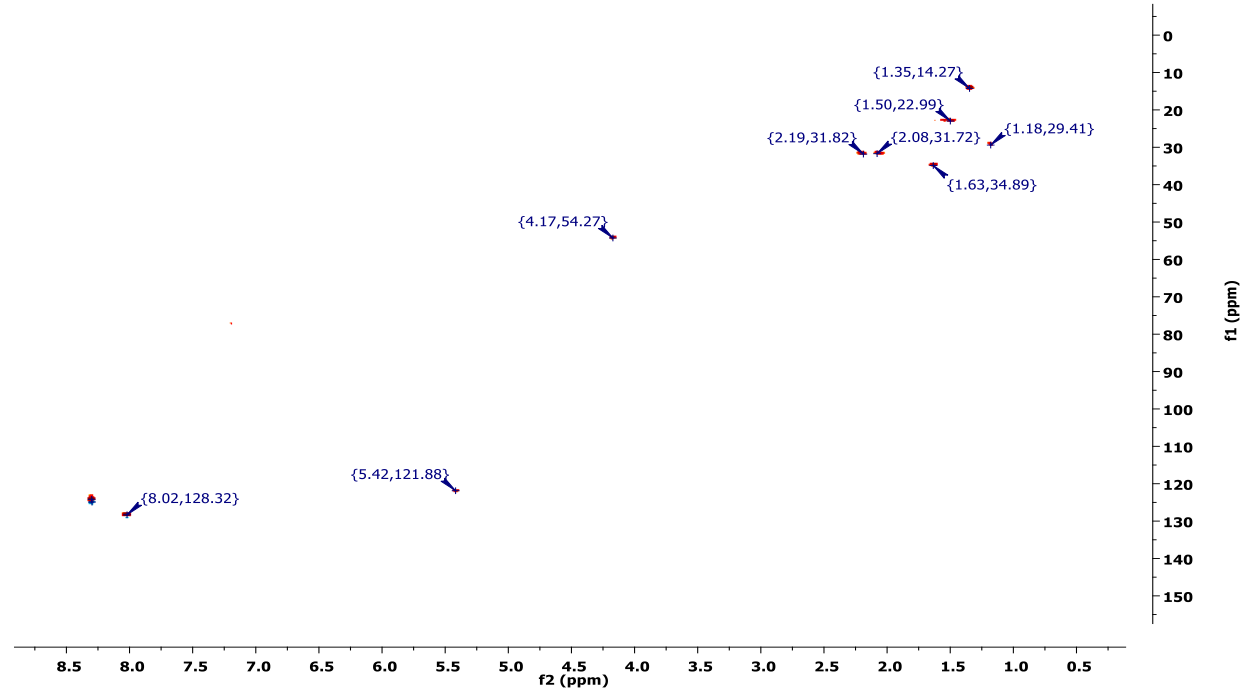
^{1}H and ^{13}C spectra of compound 3qa:



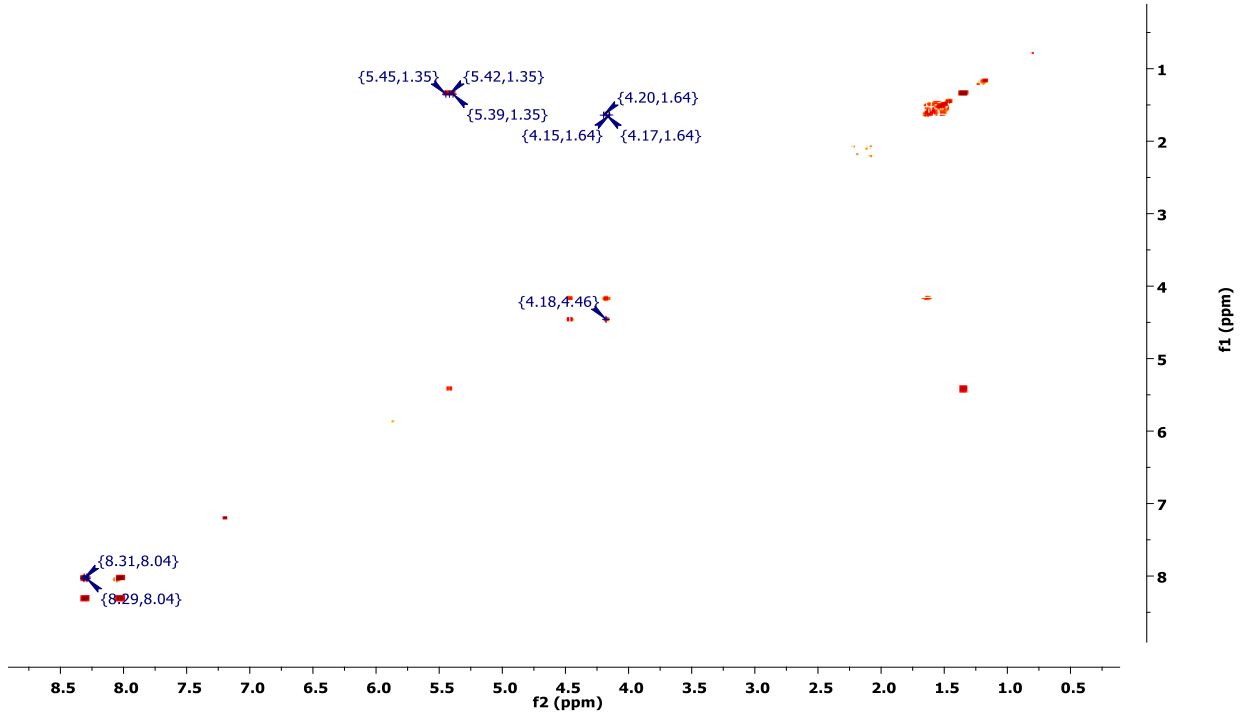
DEPT135 spectra of compound 3qa:



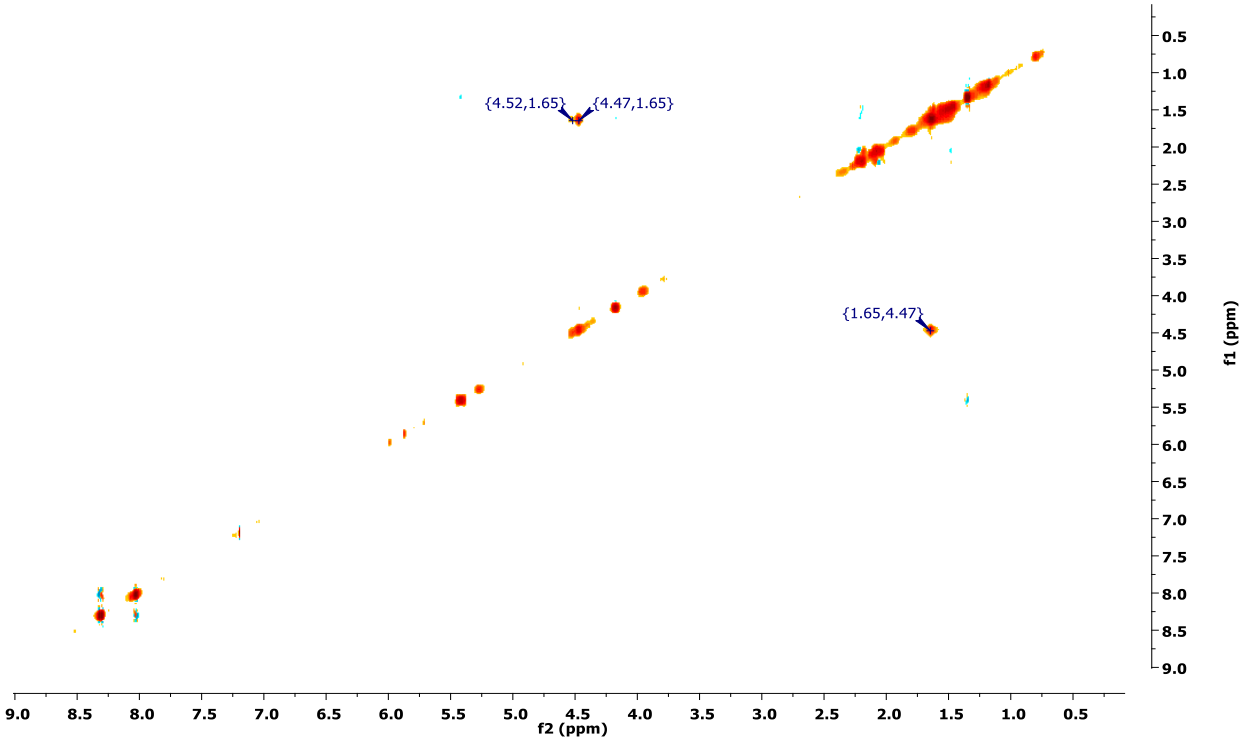
HSQC spectra of compound 3qa:



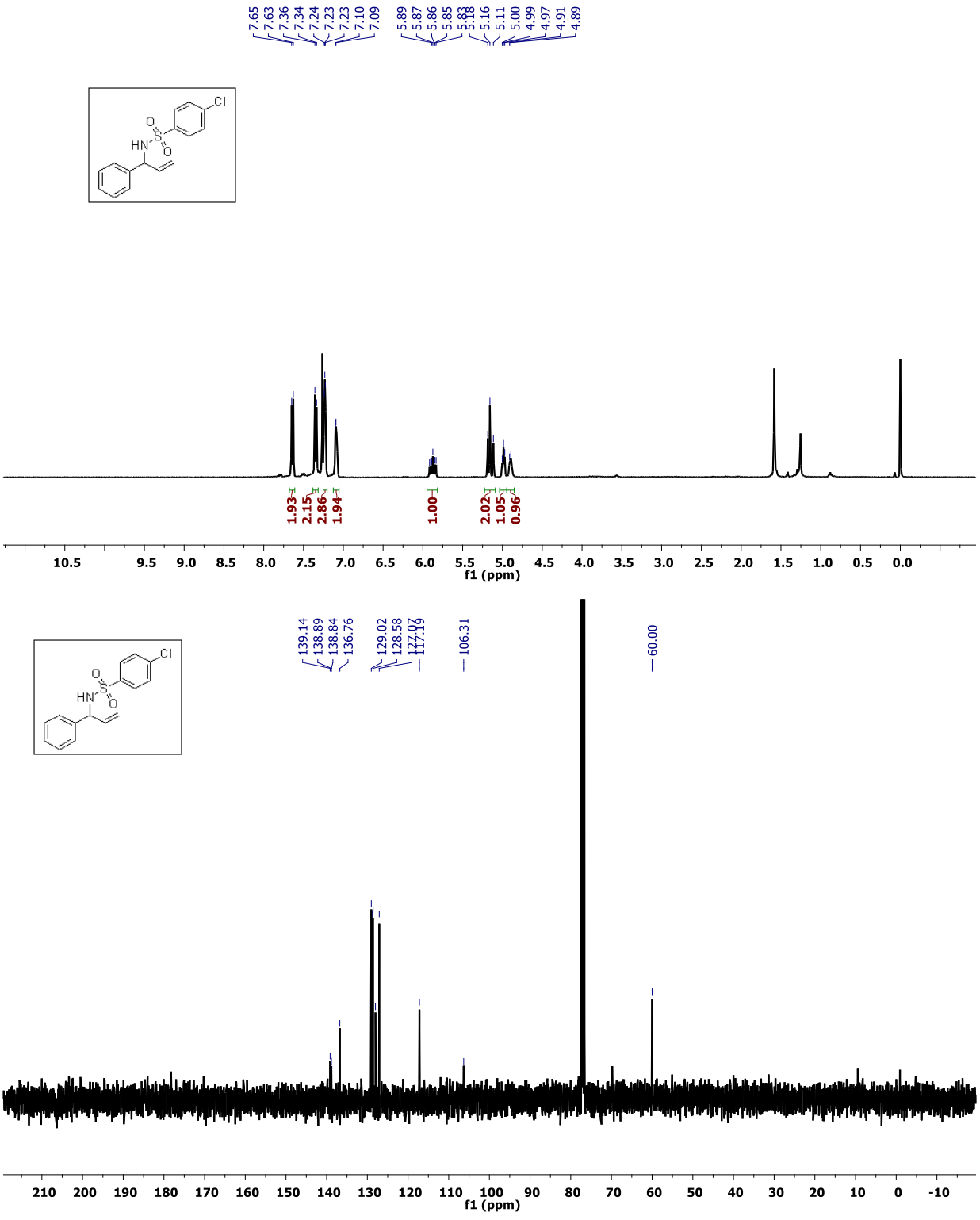
COSY spectra of compound 3qa:



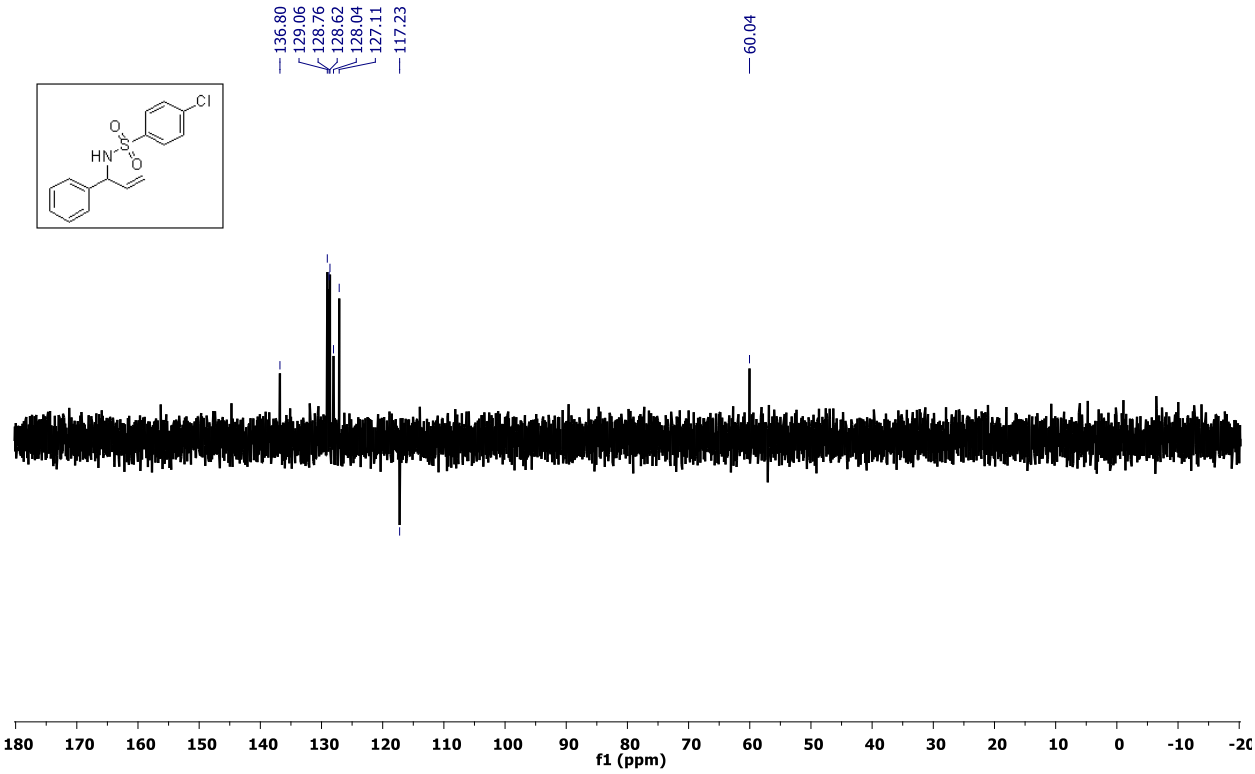
NOSY spectra of compound 3qa:



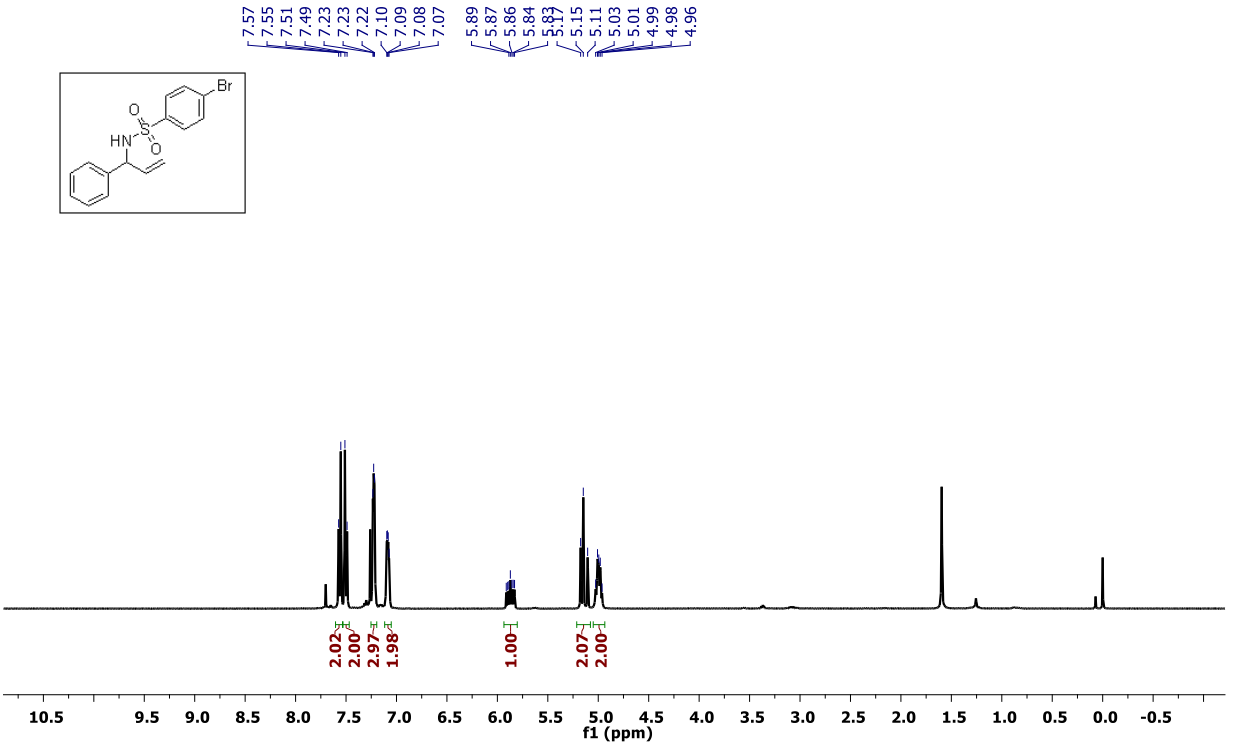
^{1}H and ^{13}C spectra of compound 3ab:

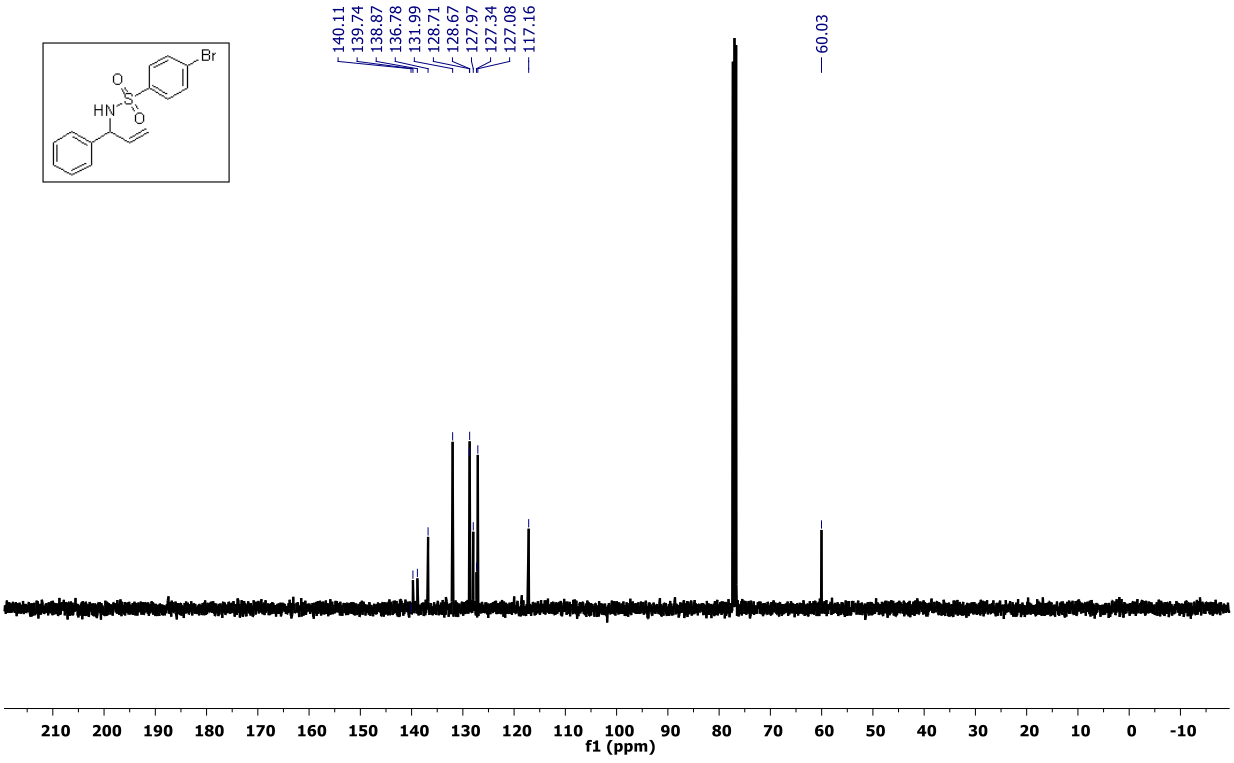


DEPT135 spectra of compound 3ab:

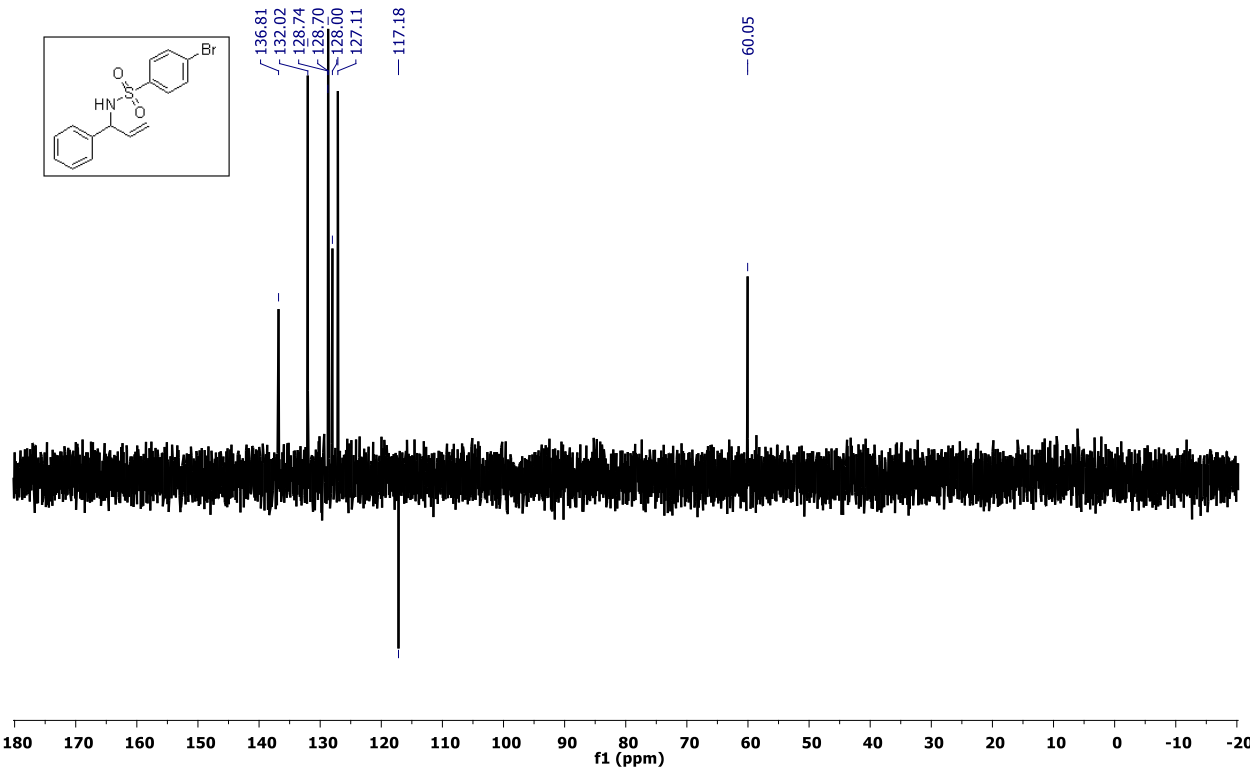


^{1}H and ^{13}C spectra of compound 3ac:

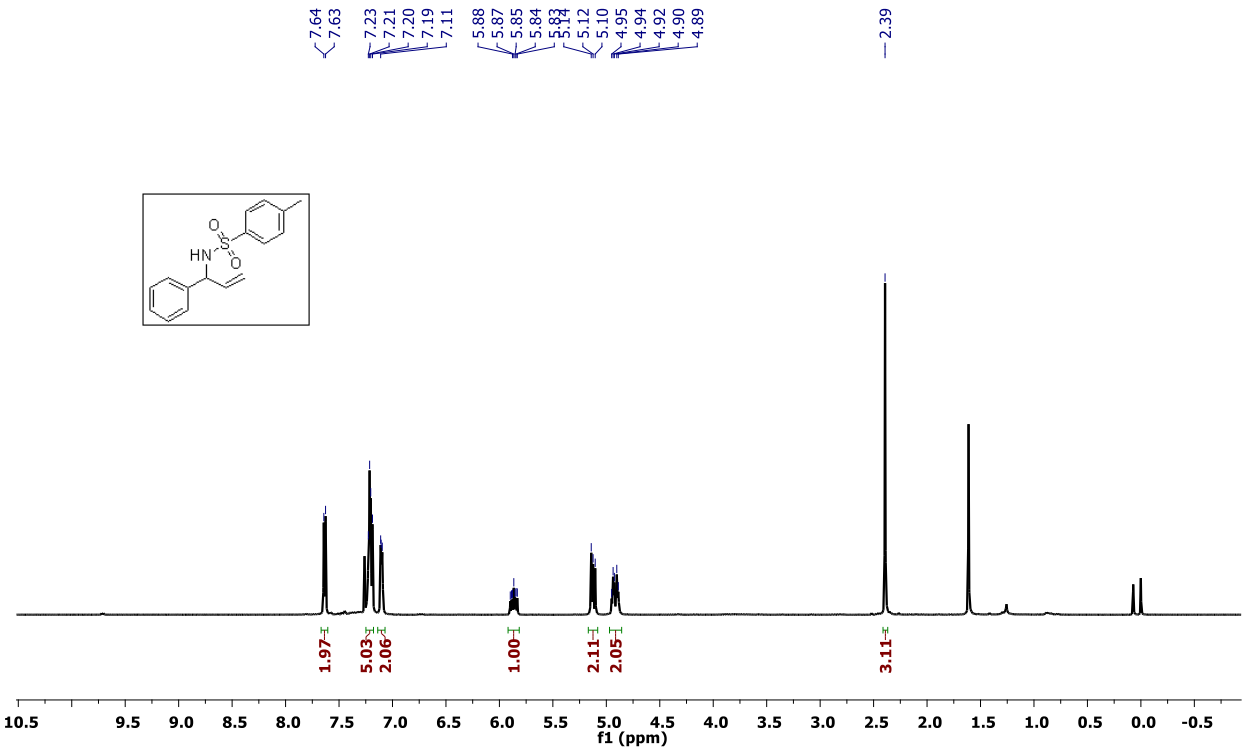


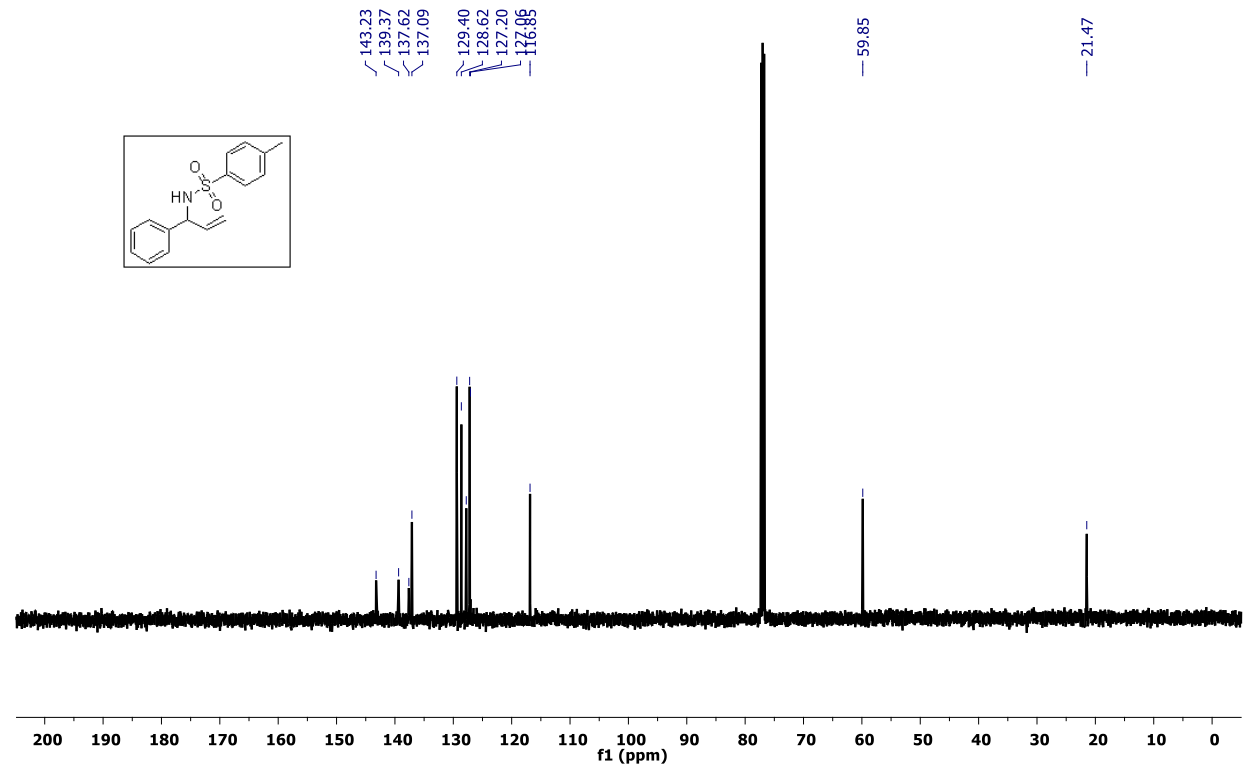


DEPT135 spectra of compound 3ac:

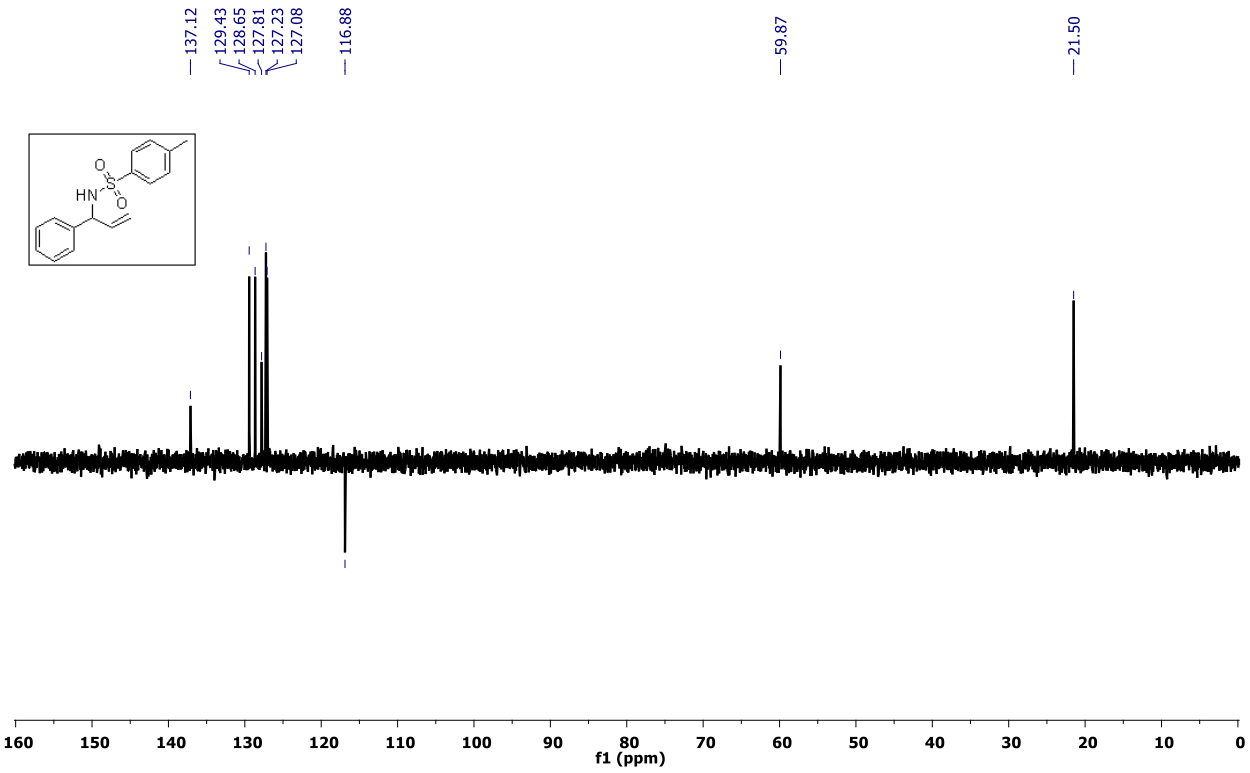


^{1}H and ^{13}C spectra of compound 3ad:

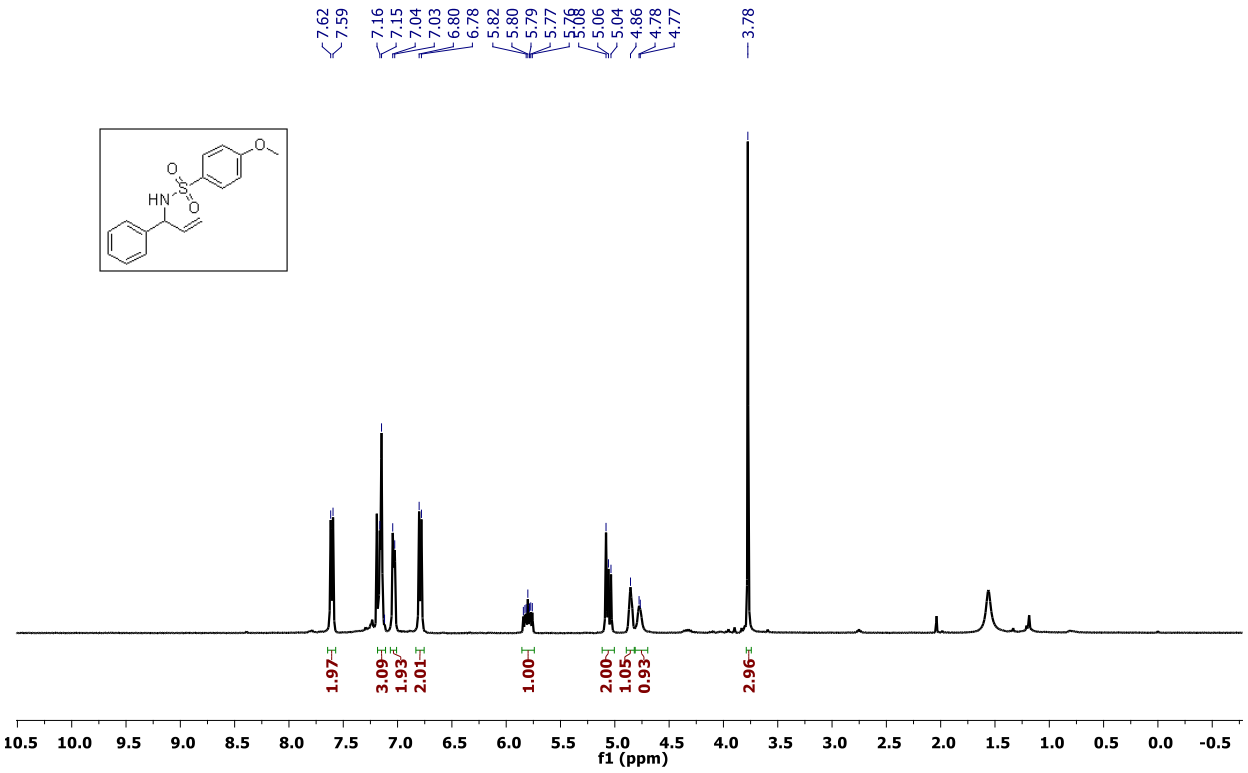


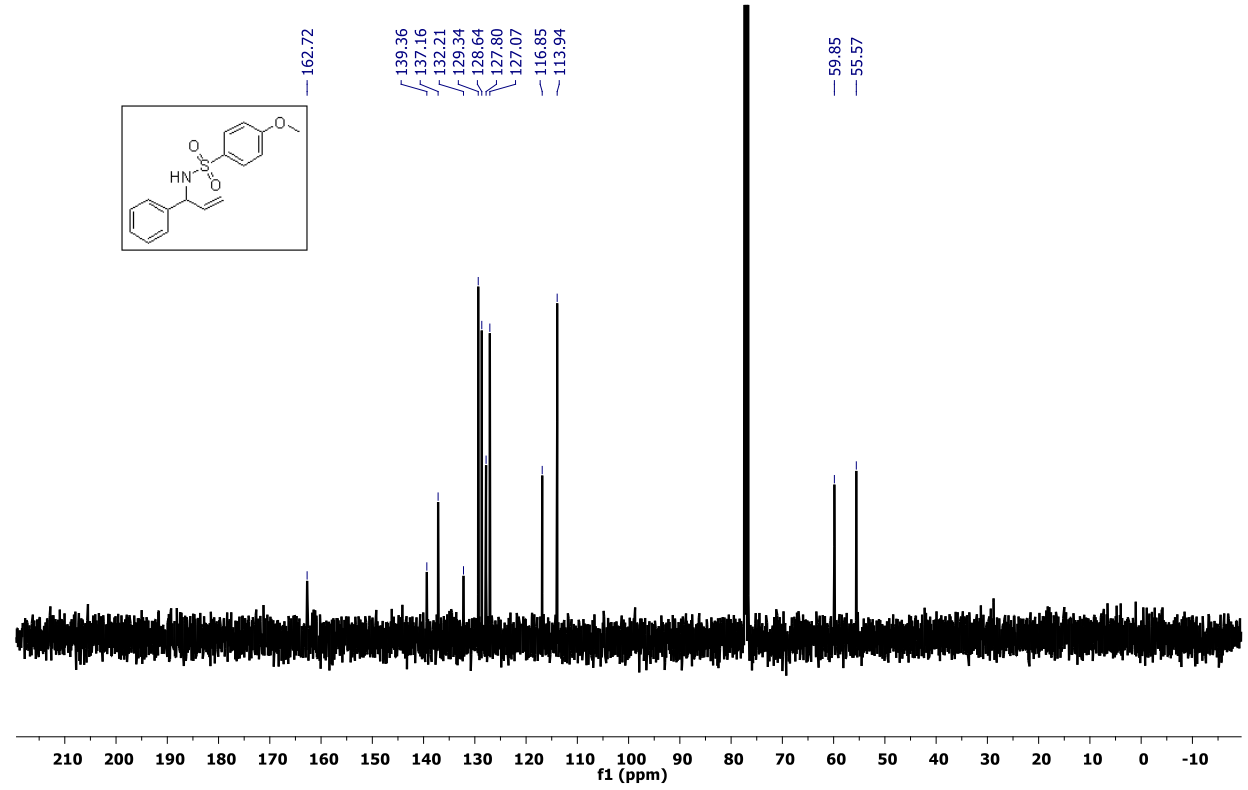


DEPT135 spectra of compound 3ad:

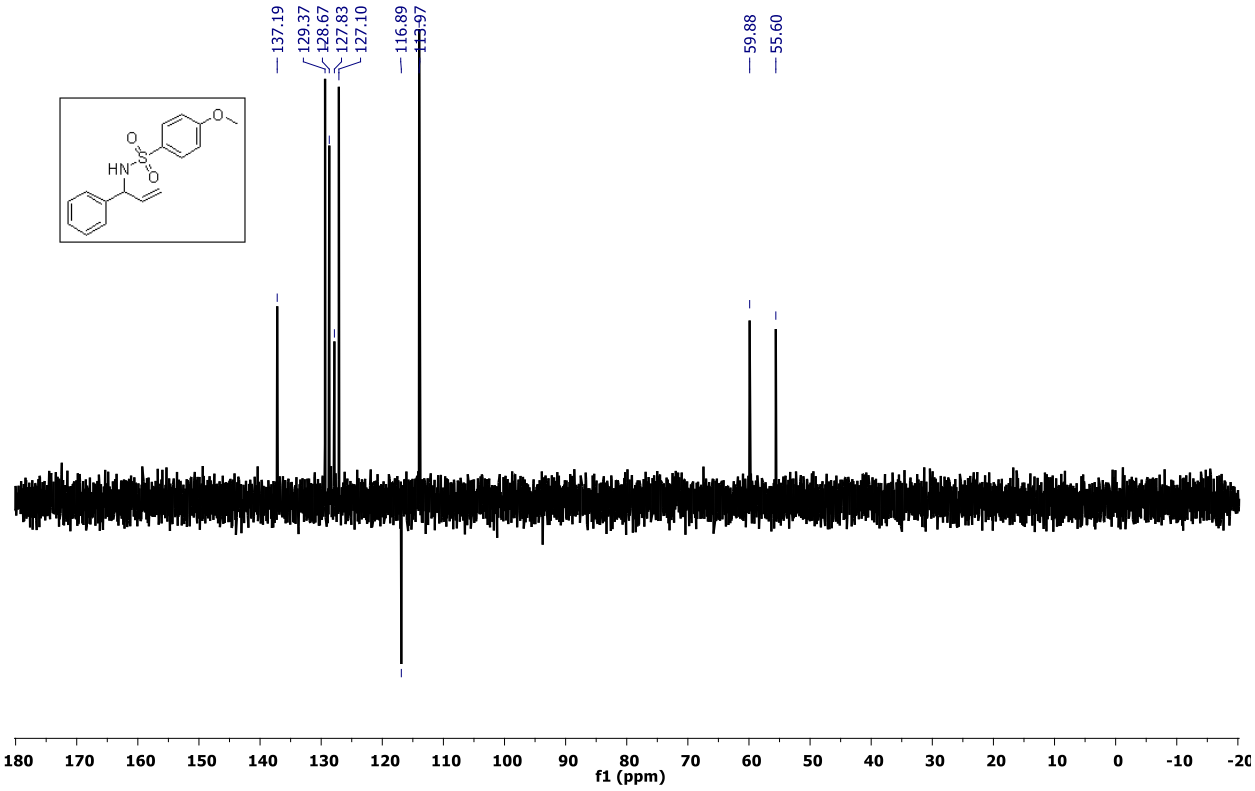


^{1}H and ^{13}C spectra of compound 3ae:

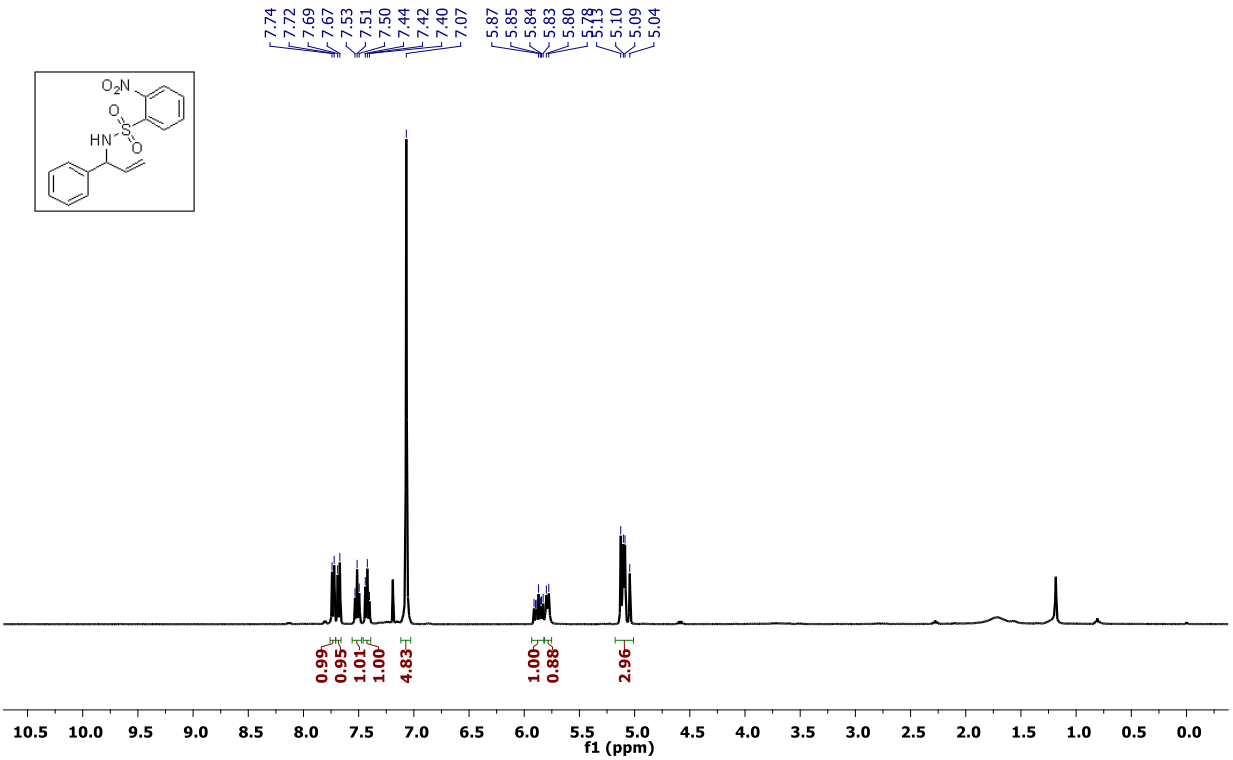


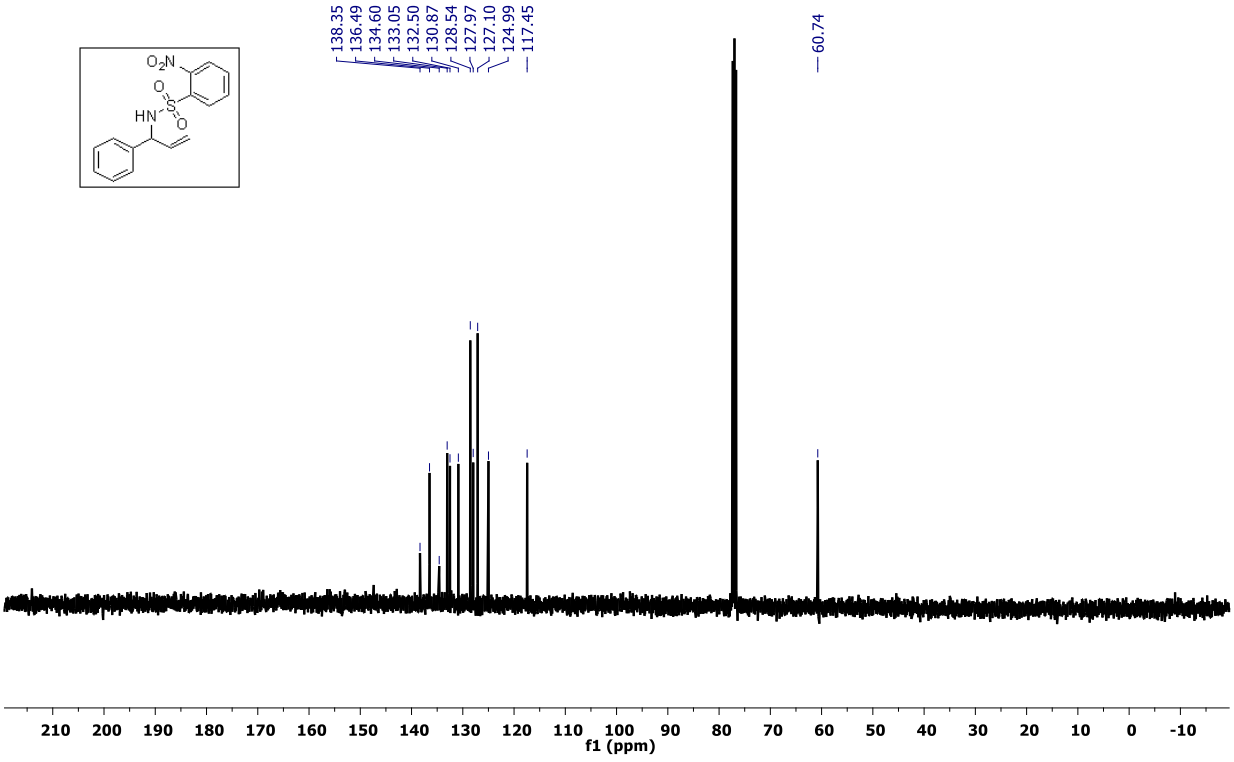


DEPT135 spectra of compound 3ae:

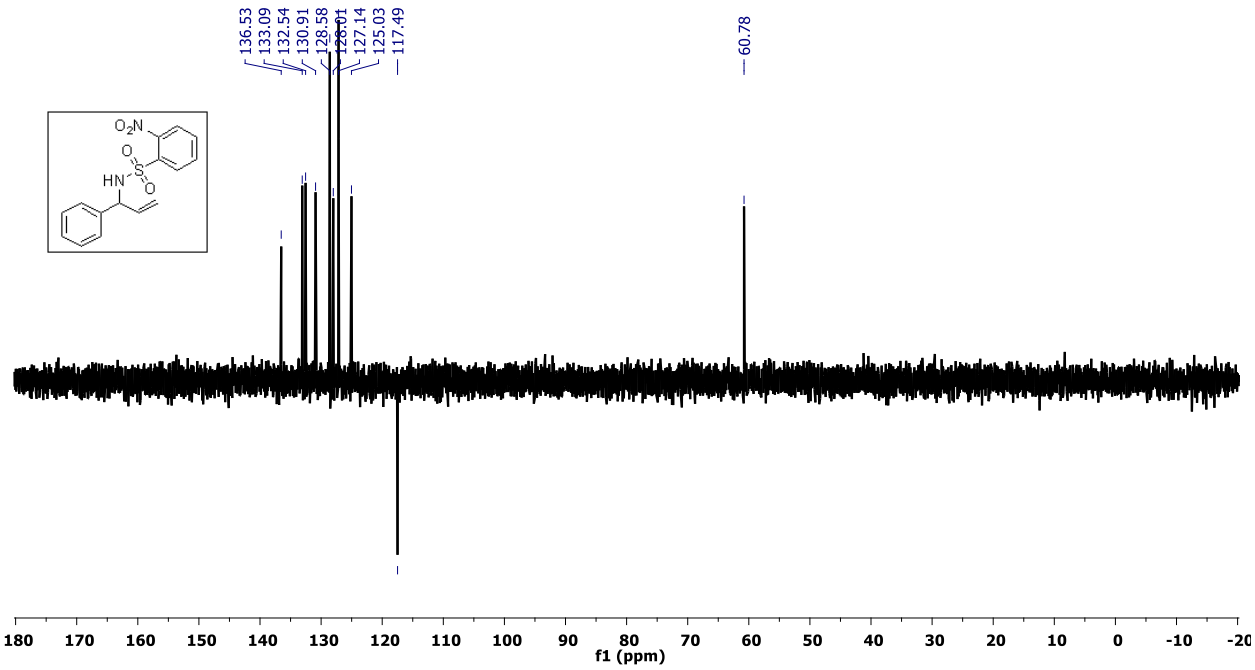


^{1}H and ^{13}C spectra of compound 3af:

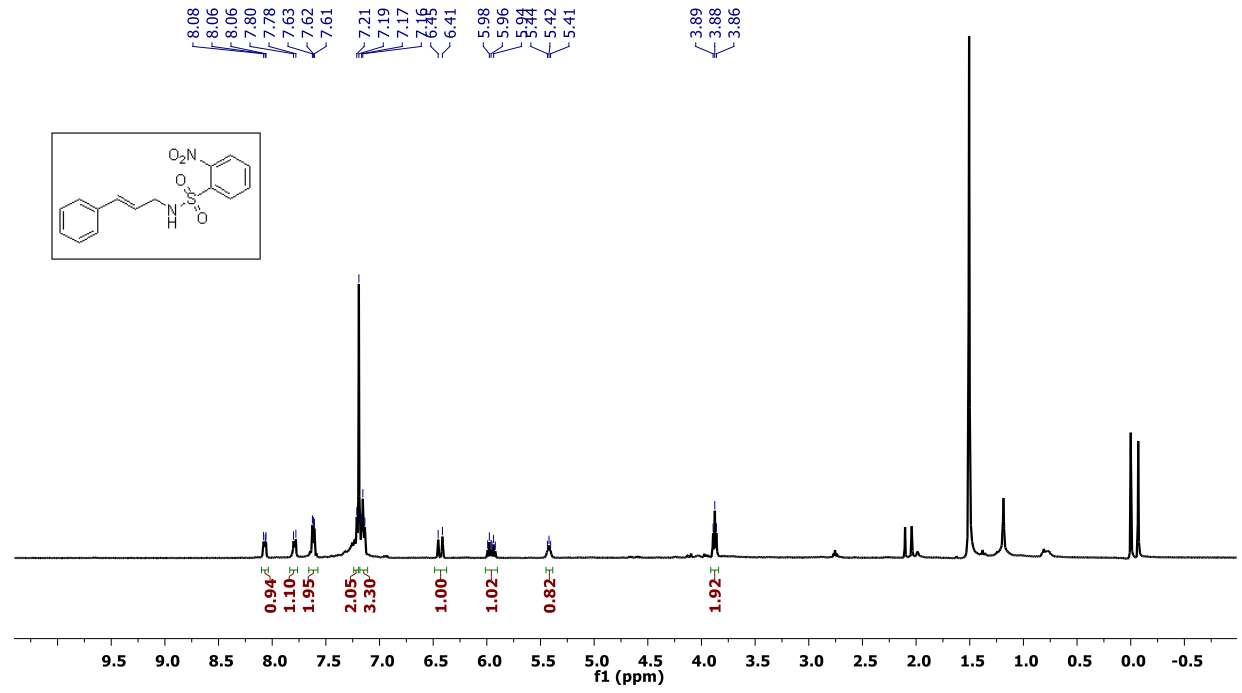




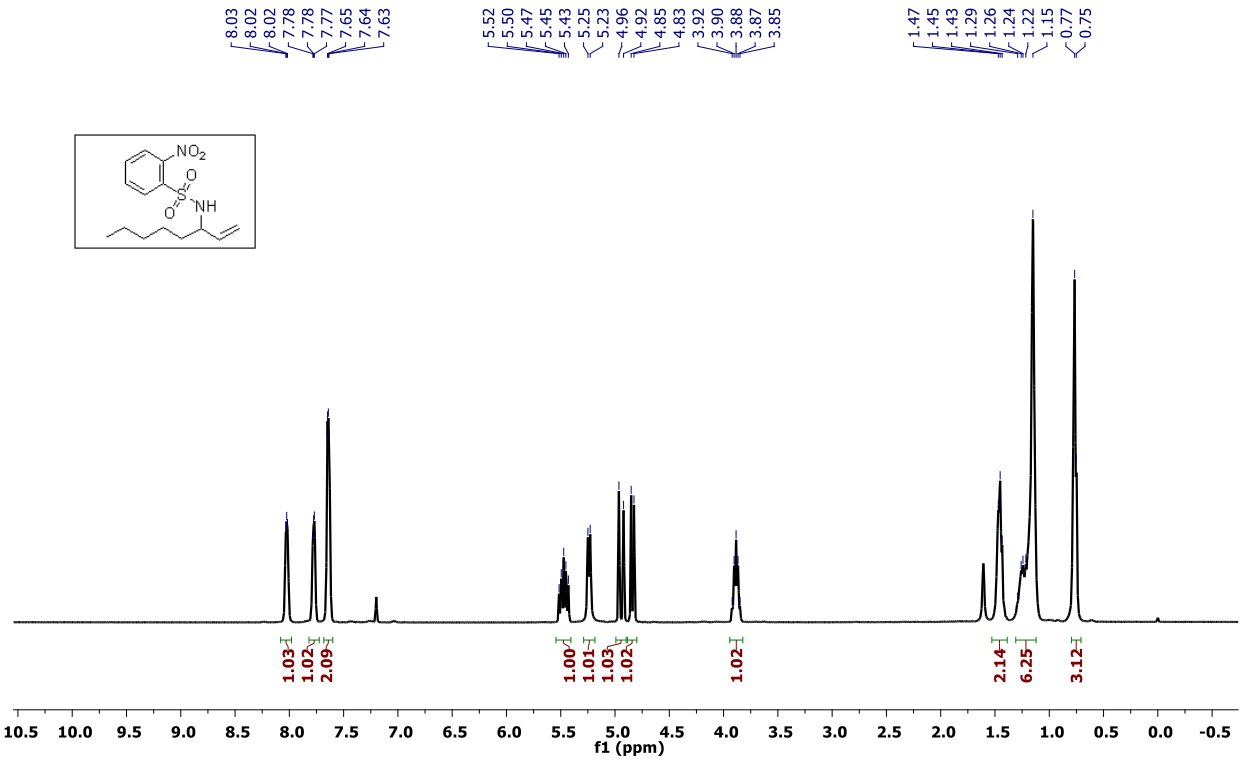
DEPT135 spectra of compound 3af:

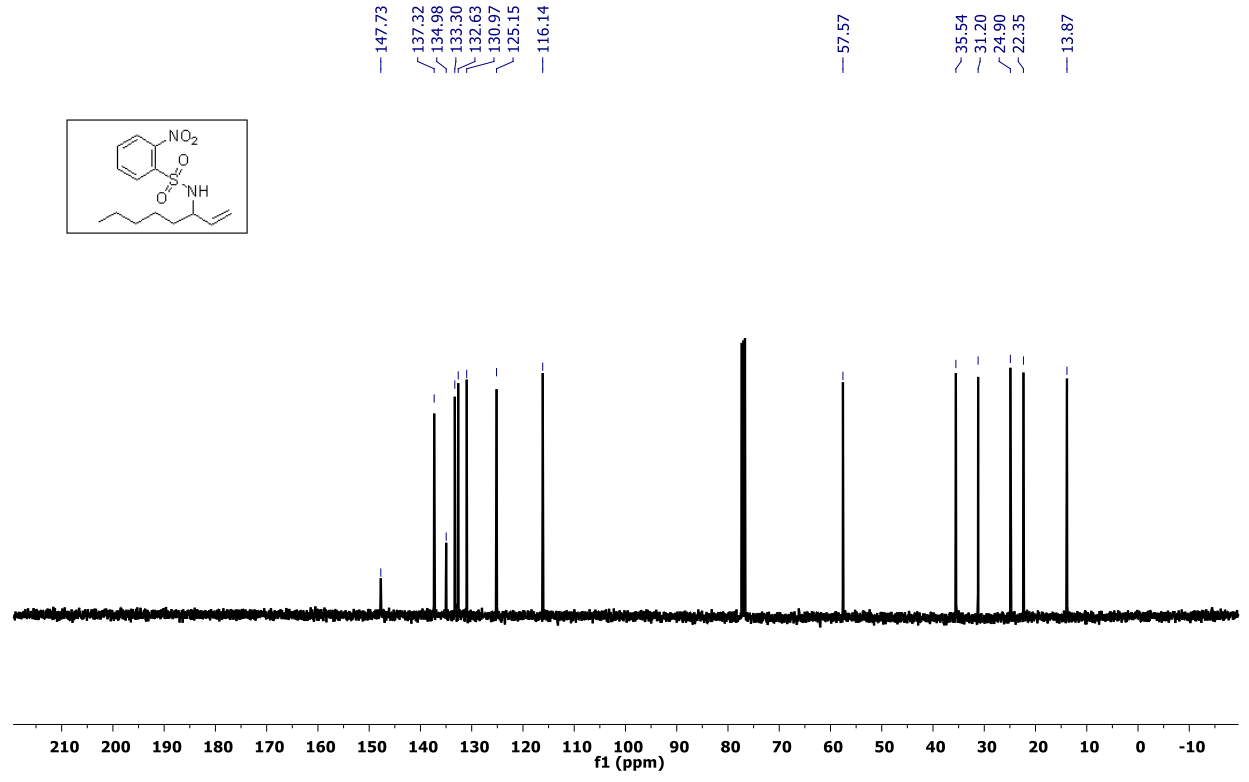


^{1}H spectra of compound 3af':

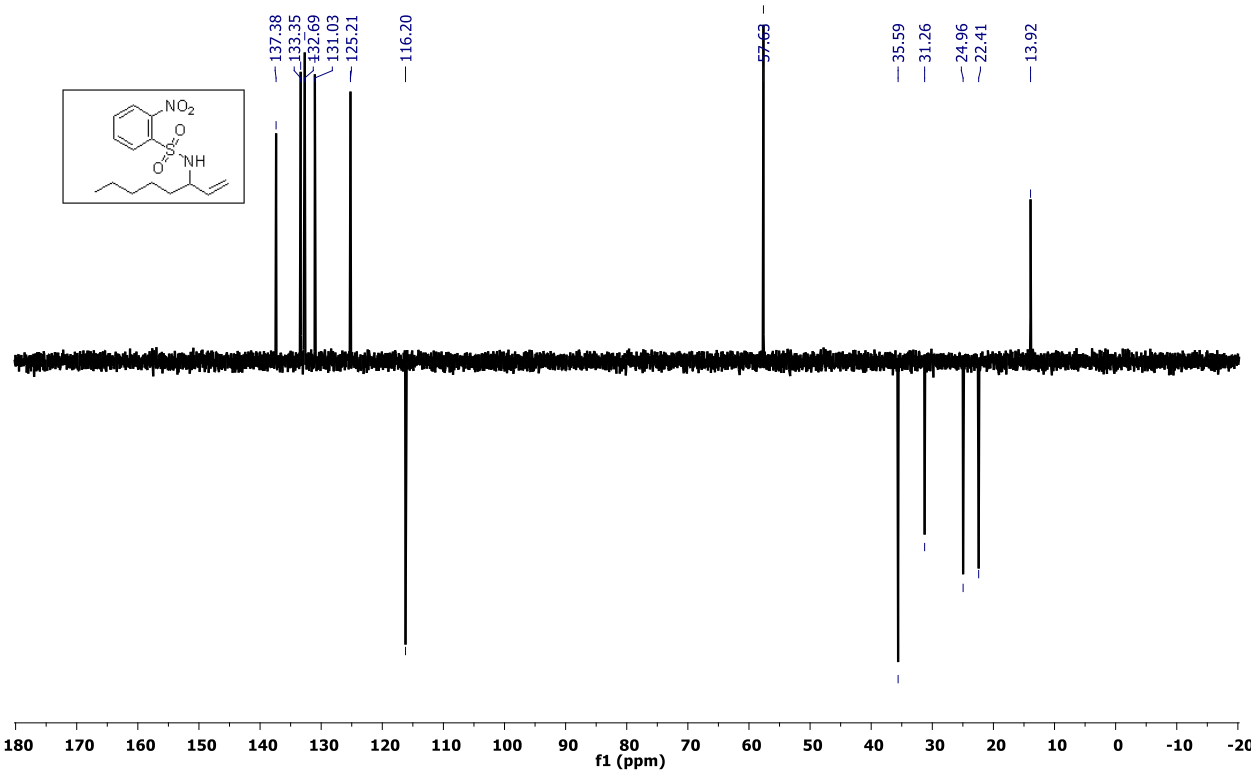


^{1}H and ^{13}C spectra of compound 3cf:

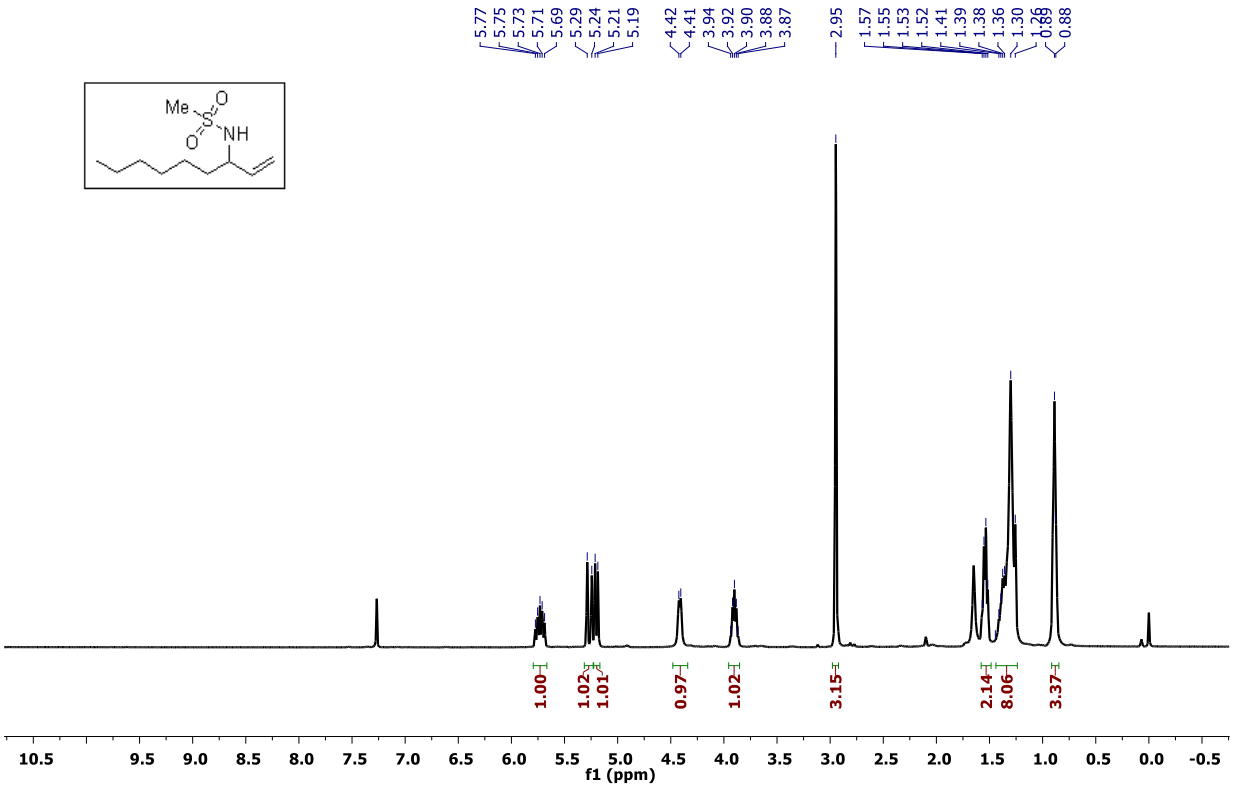


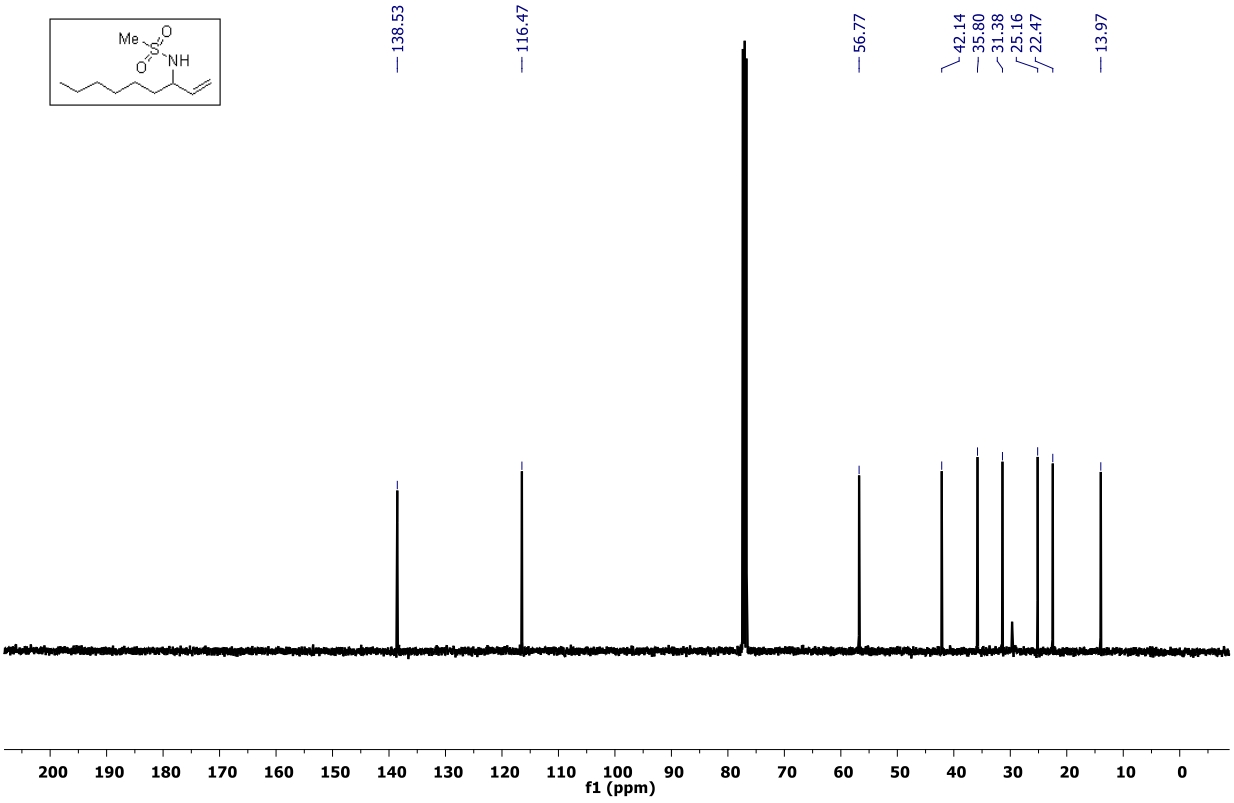


DEPT135 spectra of compound 3cf:

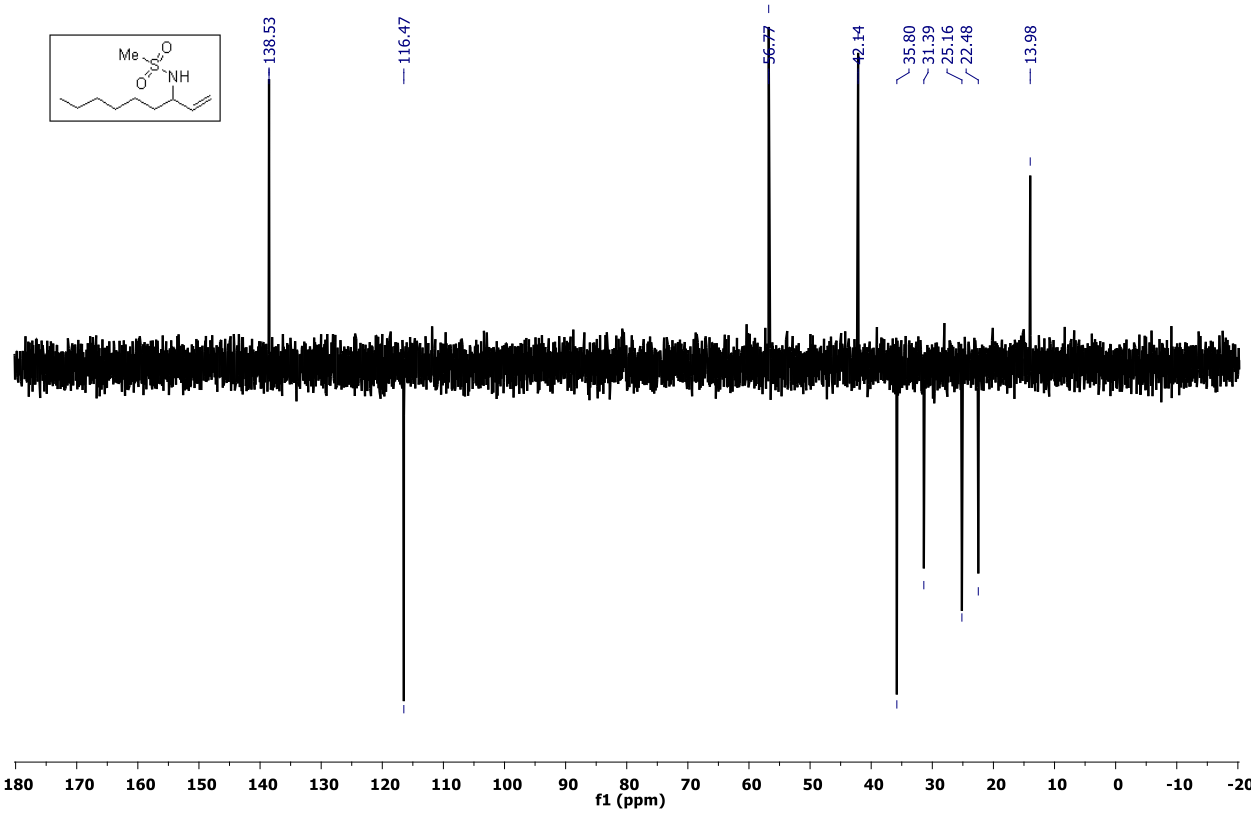


^{1}H and ^{13}C spectra of compound 3cg:

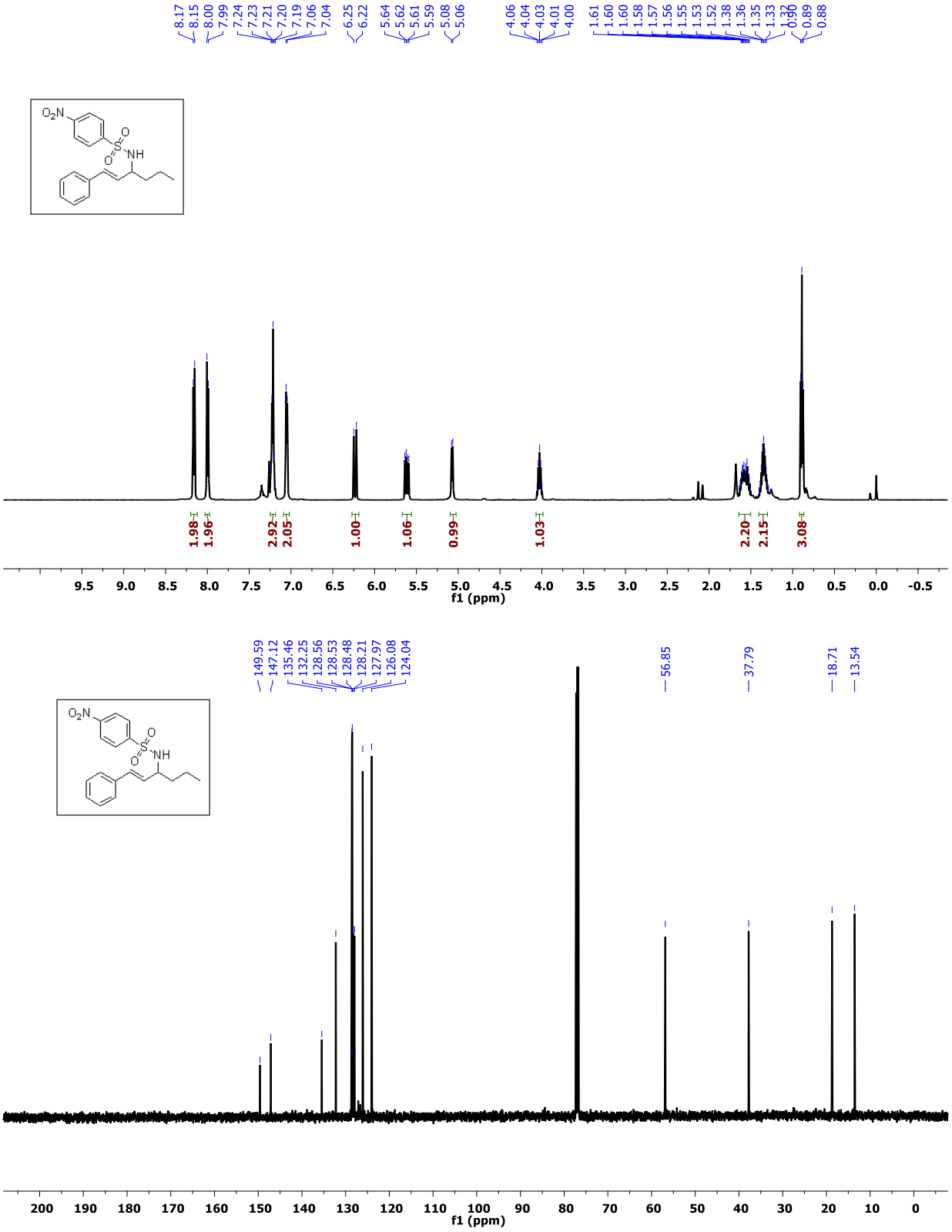




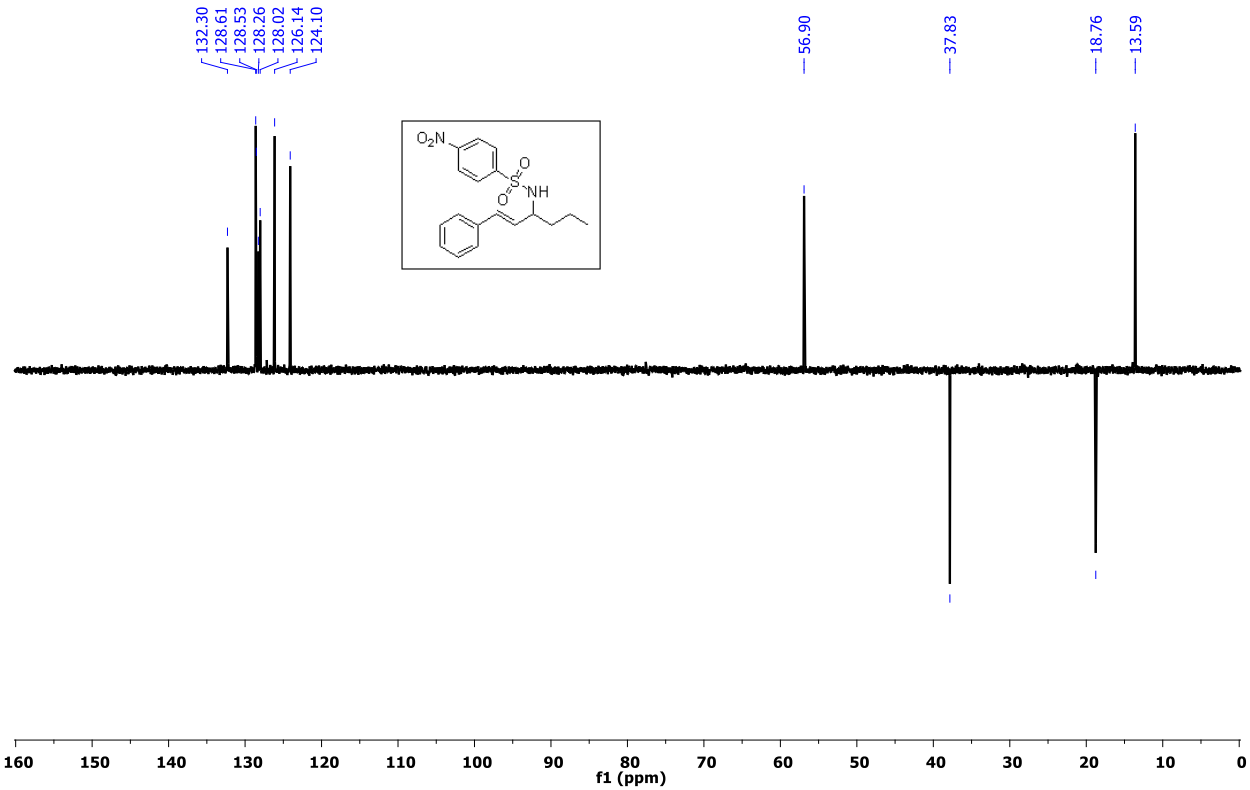
DEPT135 spectra of compound 3cg:



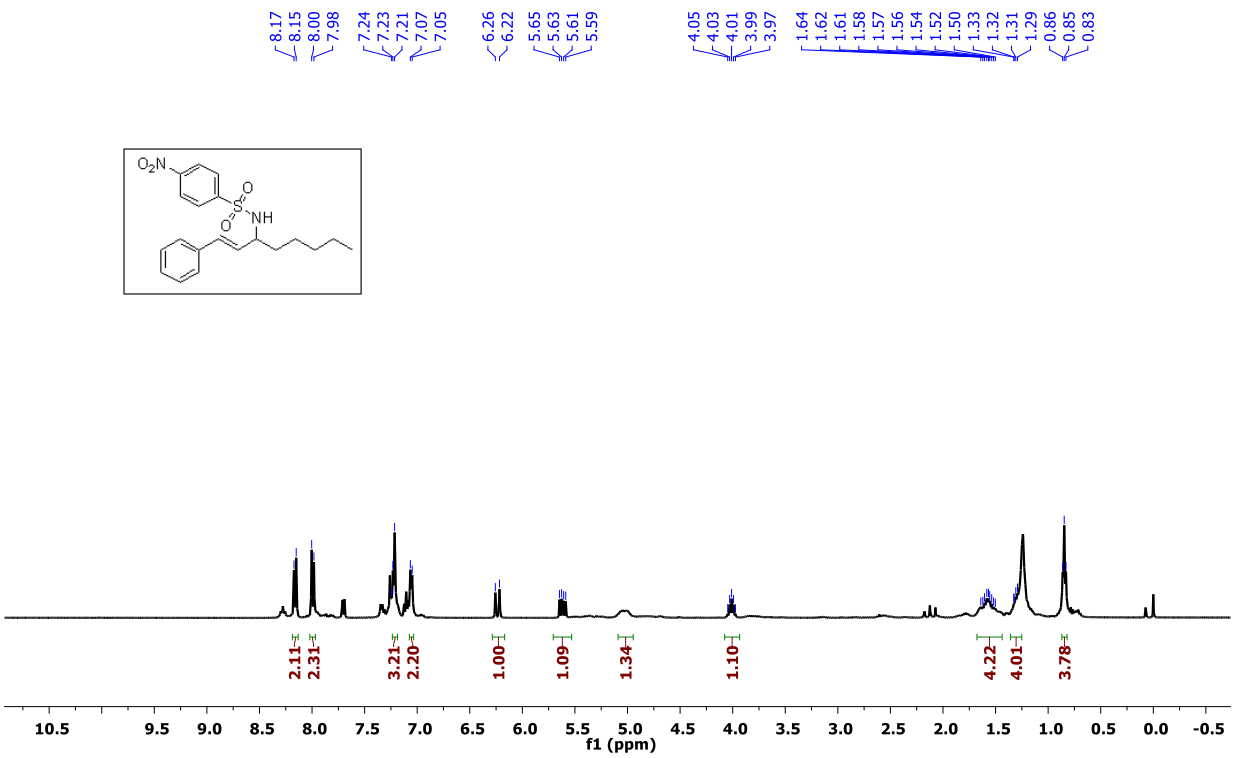
^{1}H and ^{13}C NMR spectra of compound 3ra:

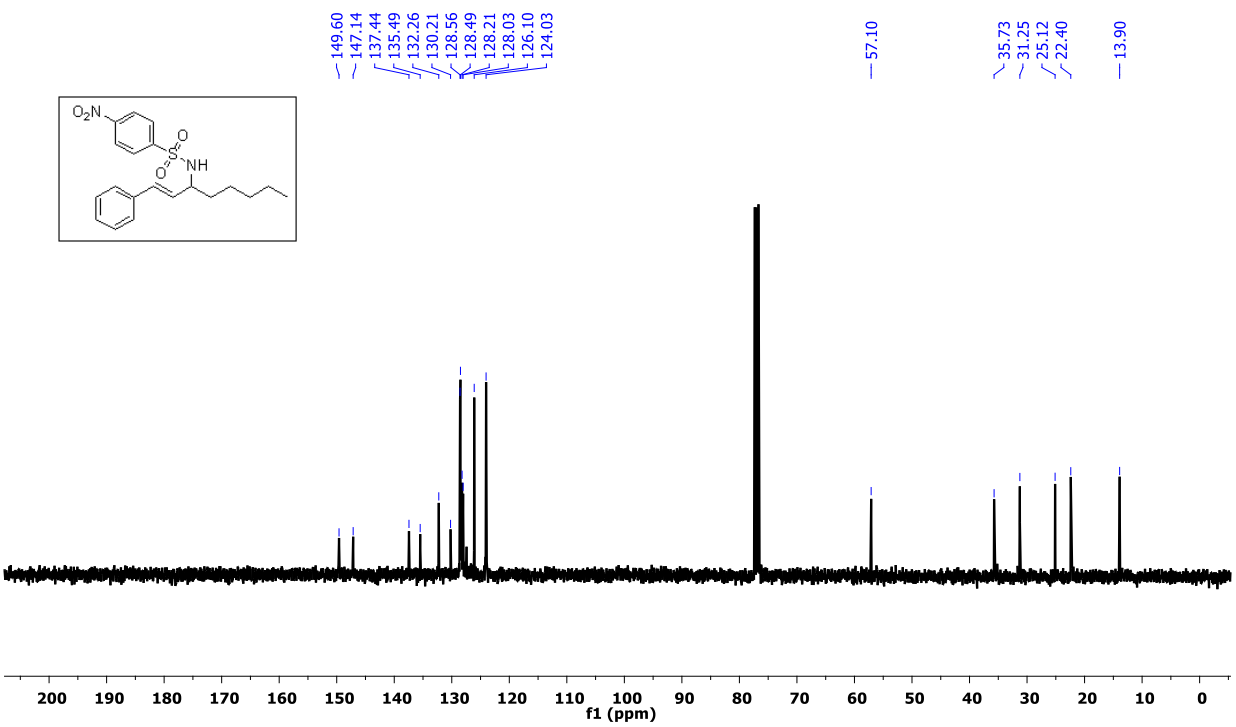


DEPT135 spectra of compound 3ra:

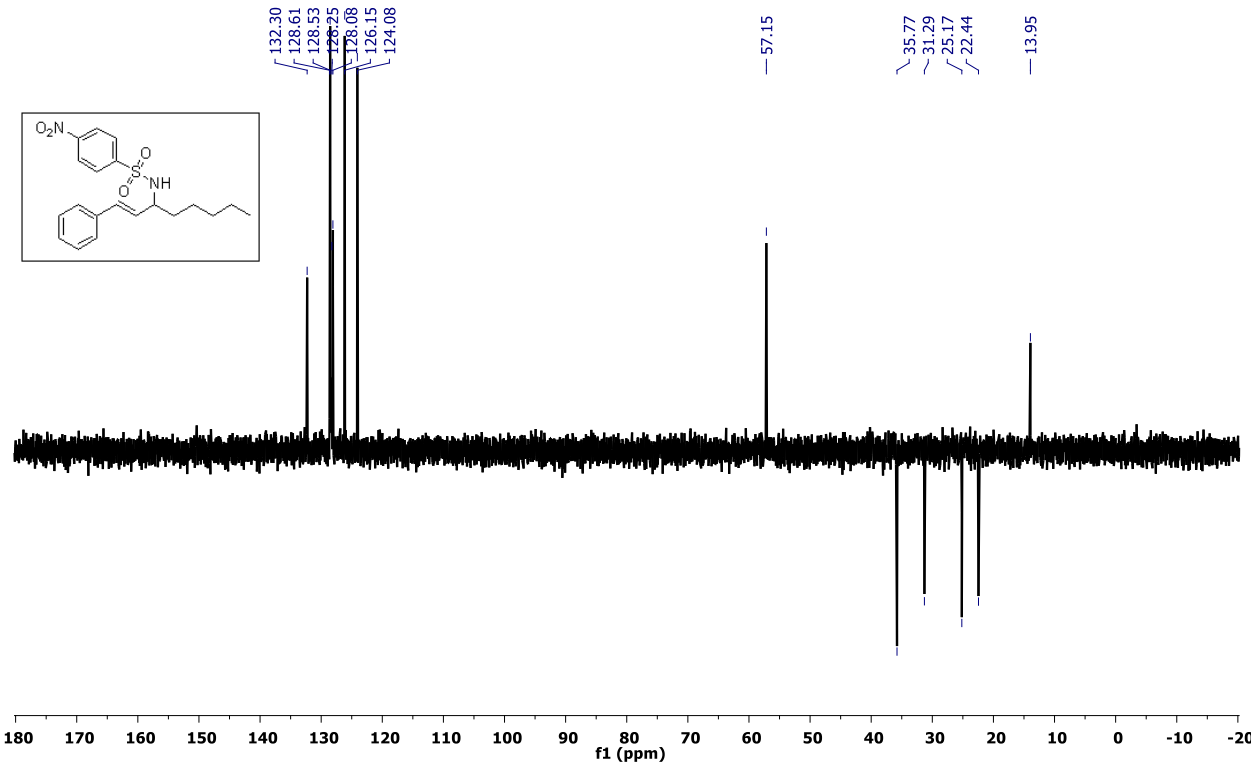


^{1}H and ^{13}C NMR spectra of compound 3sa:

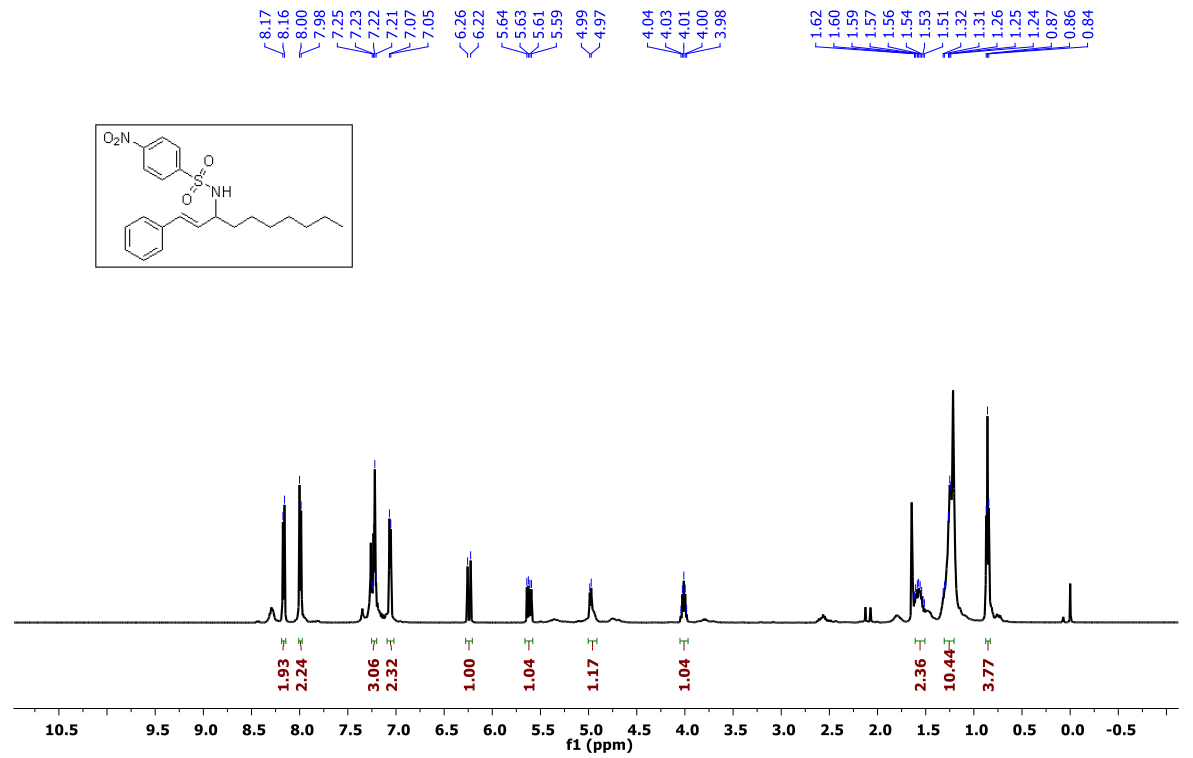


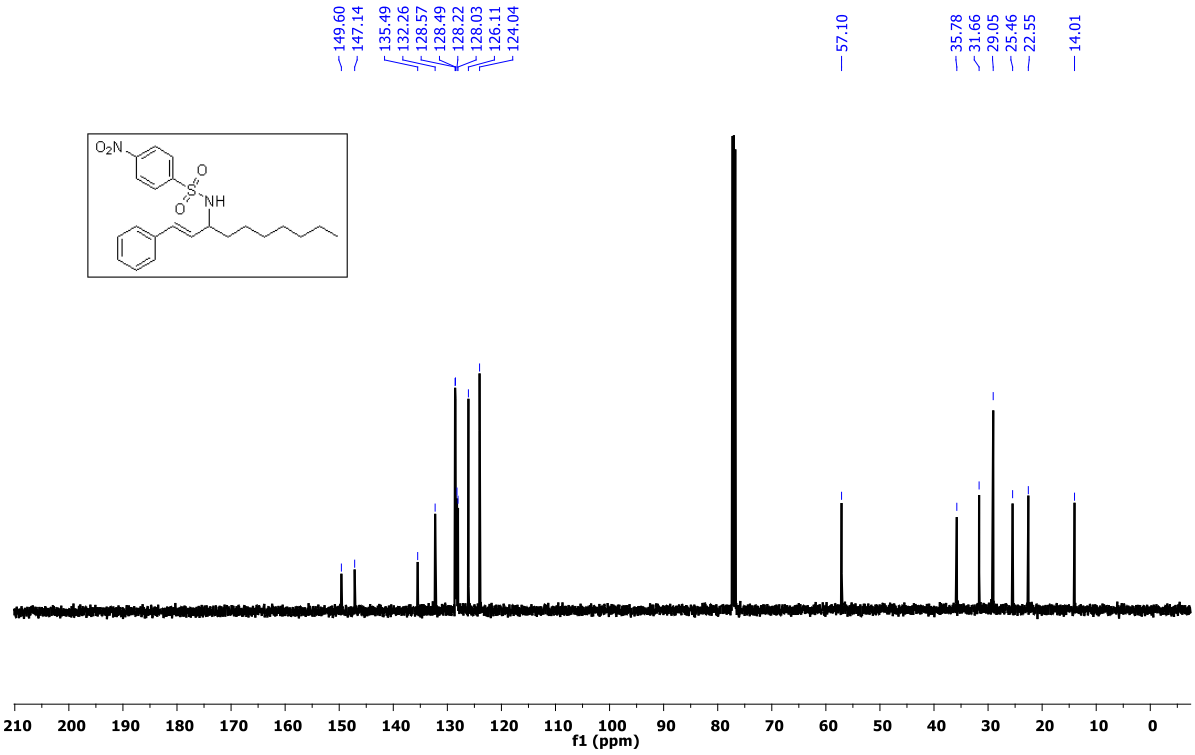


DEPT135 NMR spectra of compound 3sa:

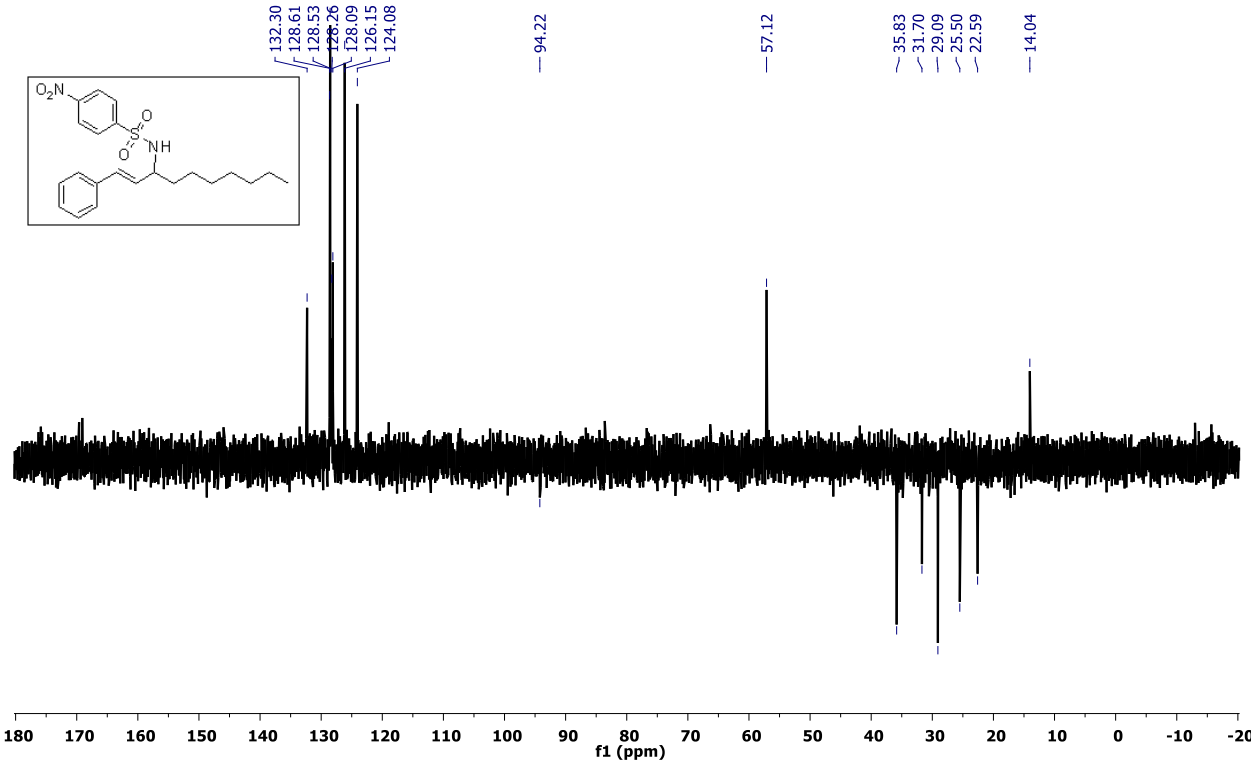


^{1}H and ^{13}C NMR spectra of compound 3ta:

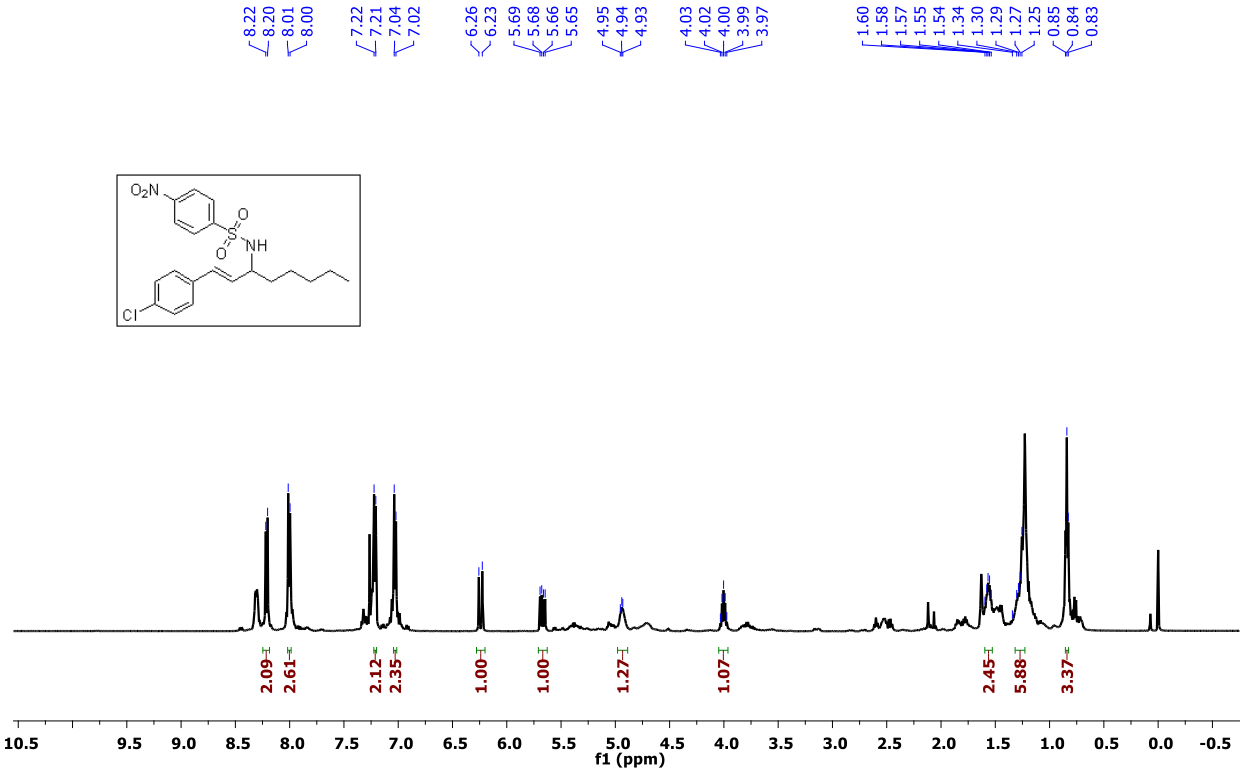


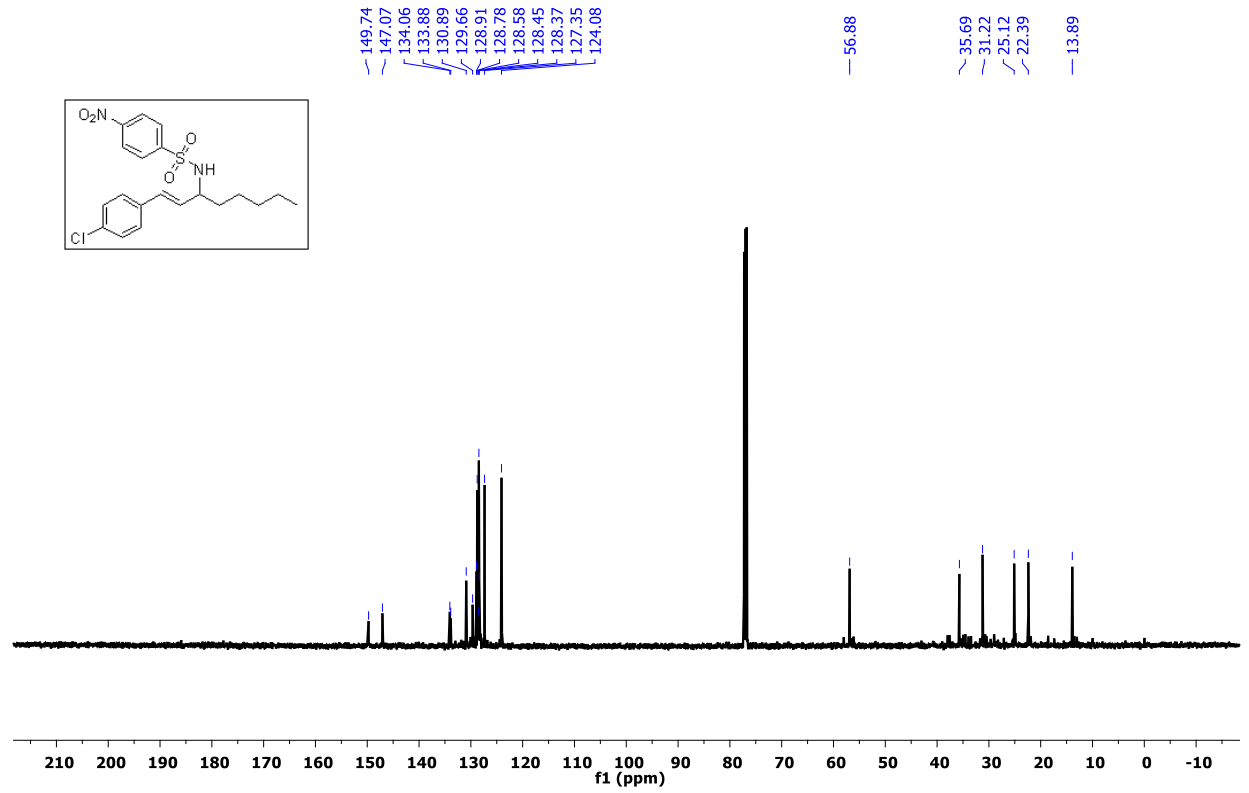


DEPT135 NMR spectra of compound 3ta:

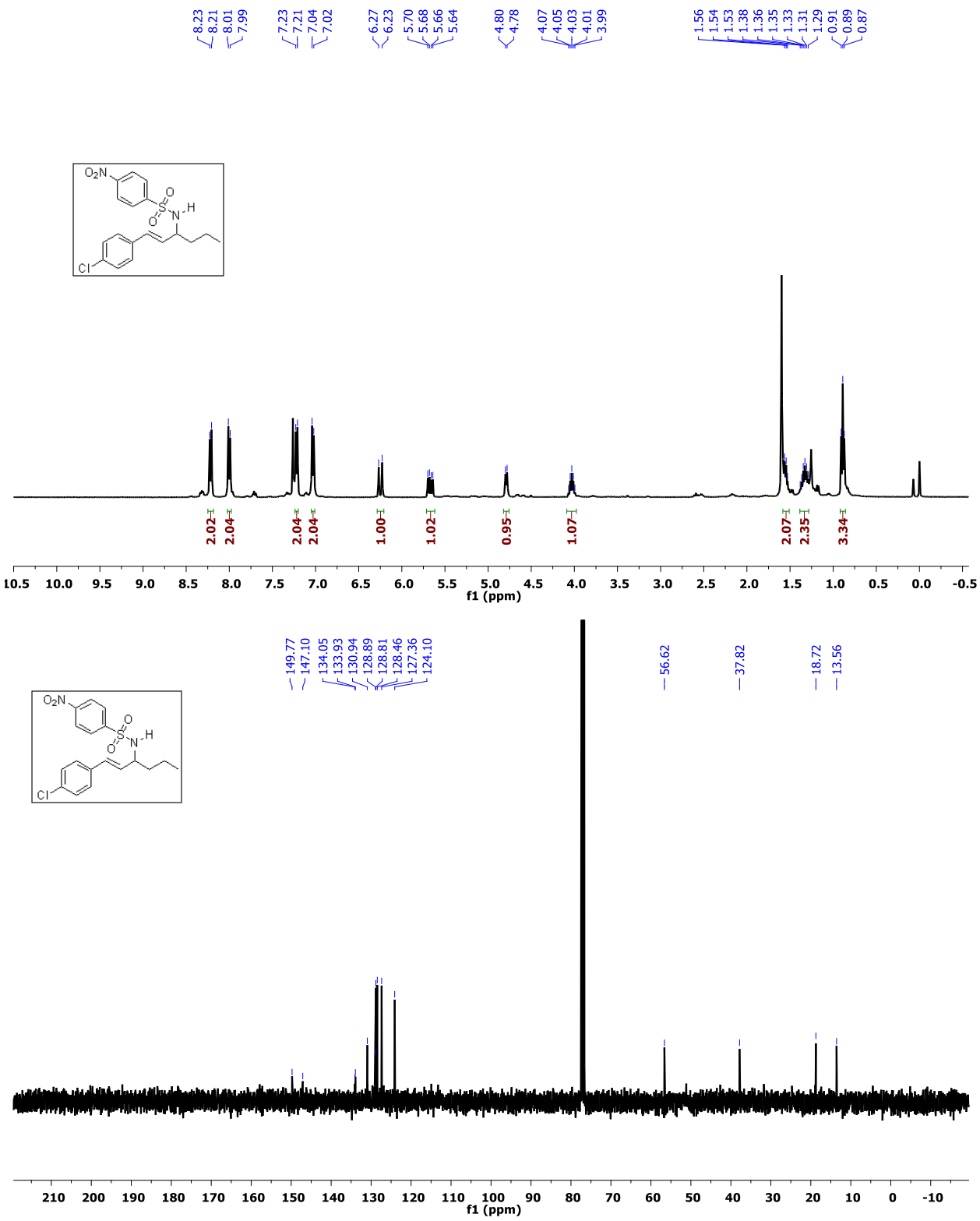


^{1}H and ^{13}C NMR spectra of compound 3ua:

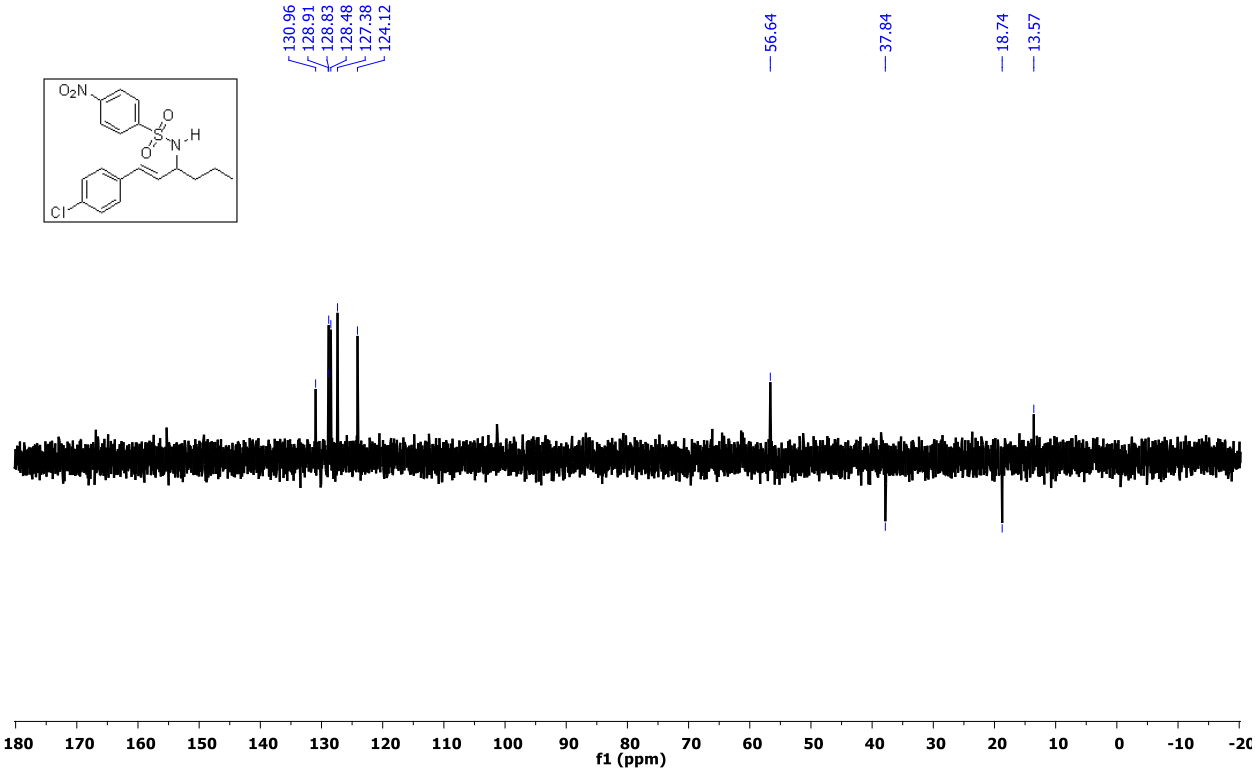




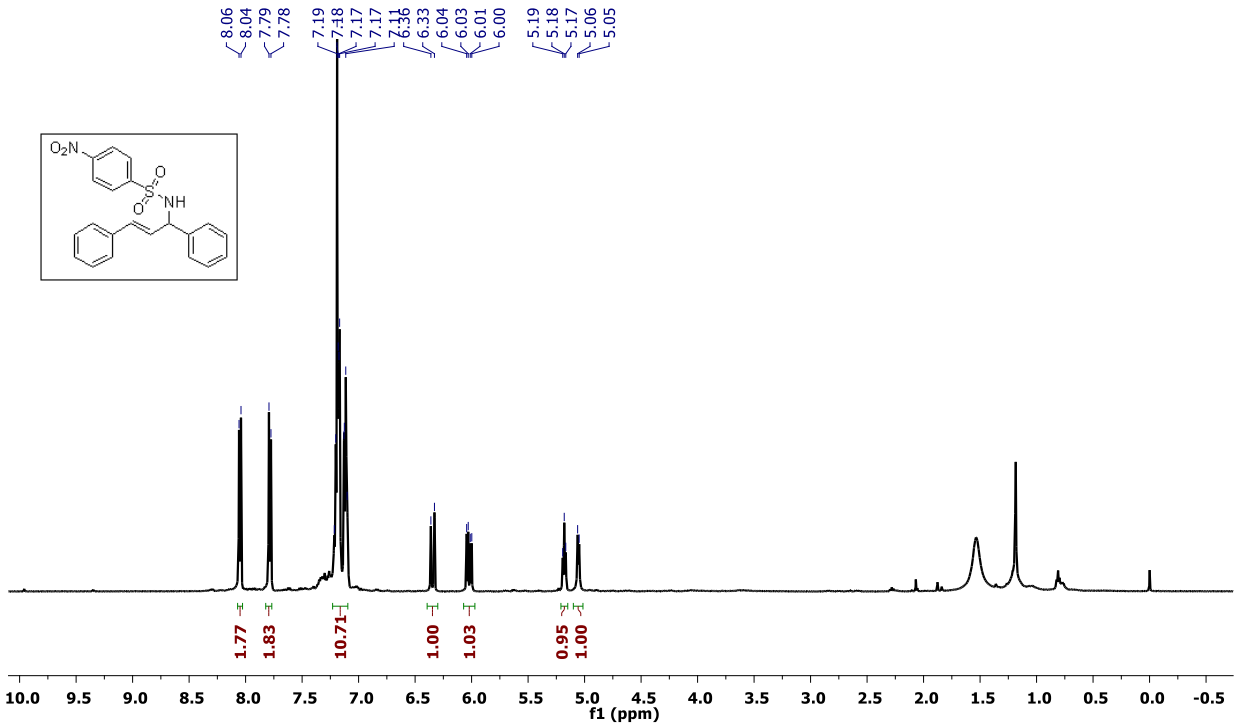
^{1}H and ^{13}C NMR spectra of compound 3va:

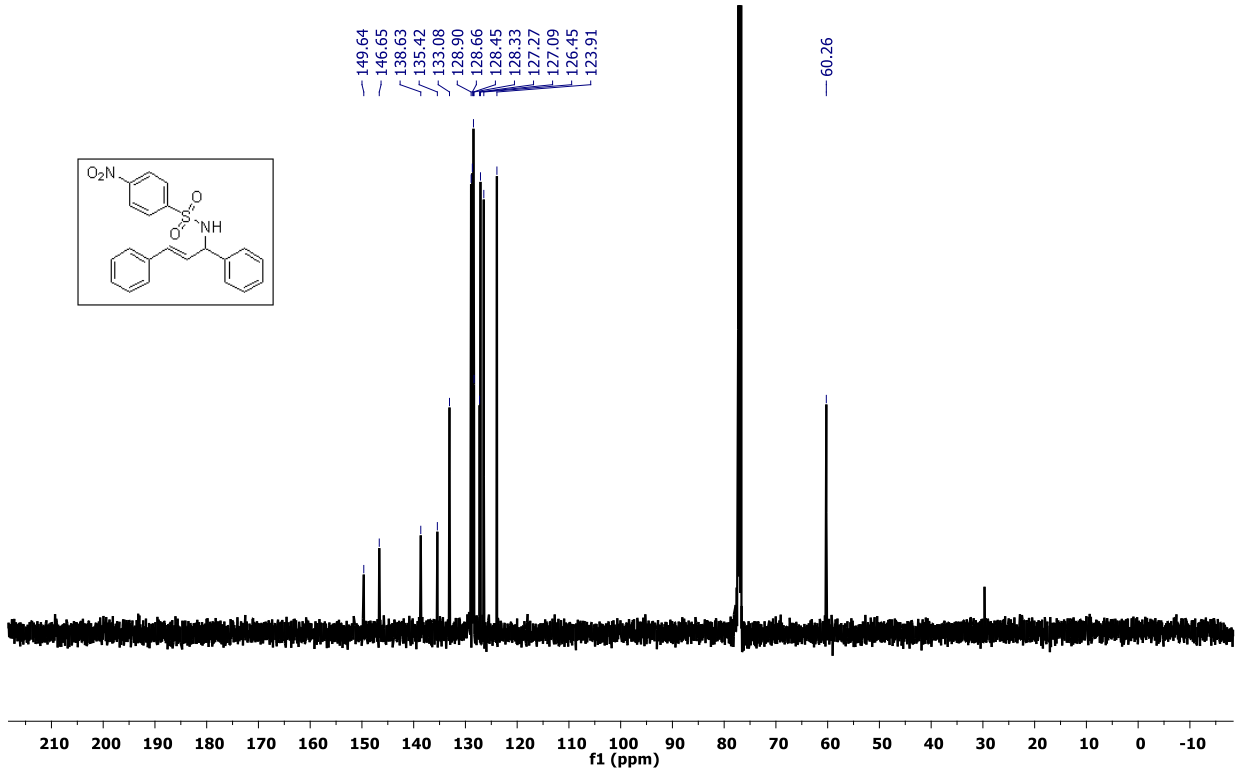


DEPT135 spectra of compound 3va:

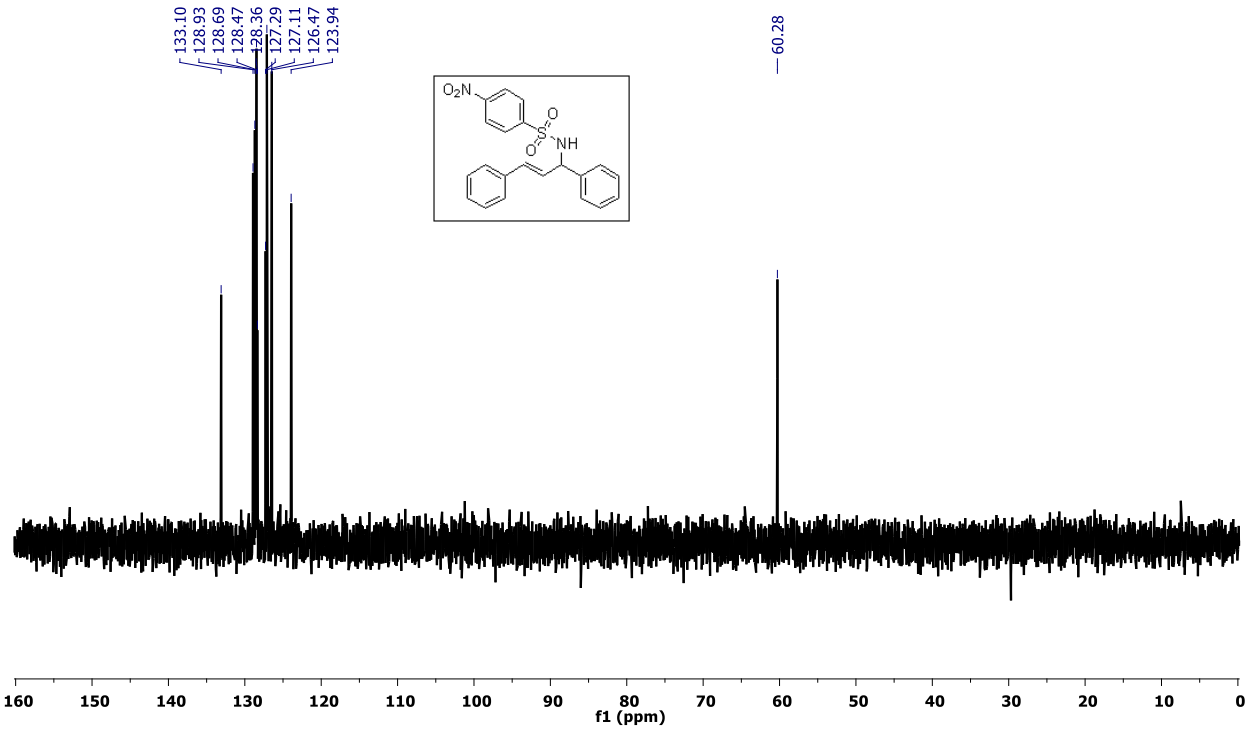


^{1}H and ^{13}C NMR spectra of compound 3wa:

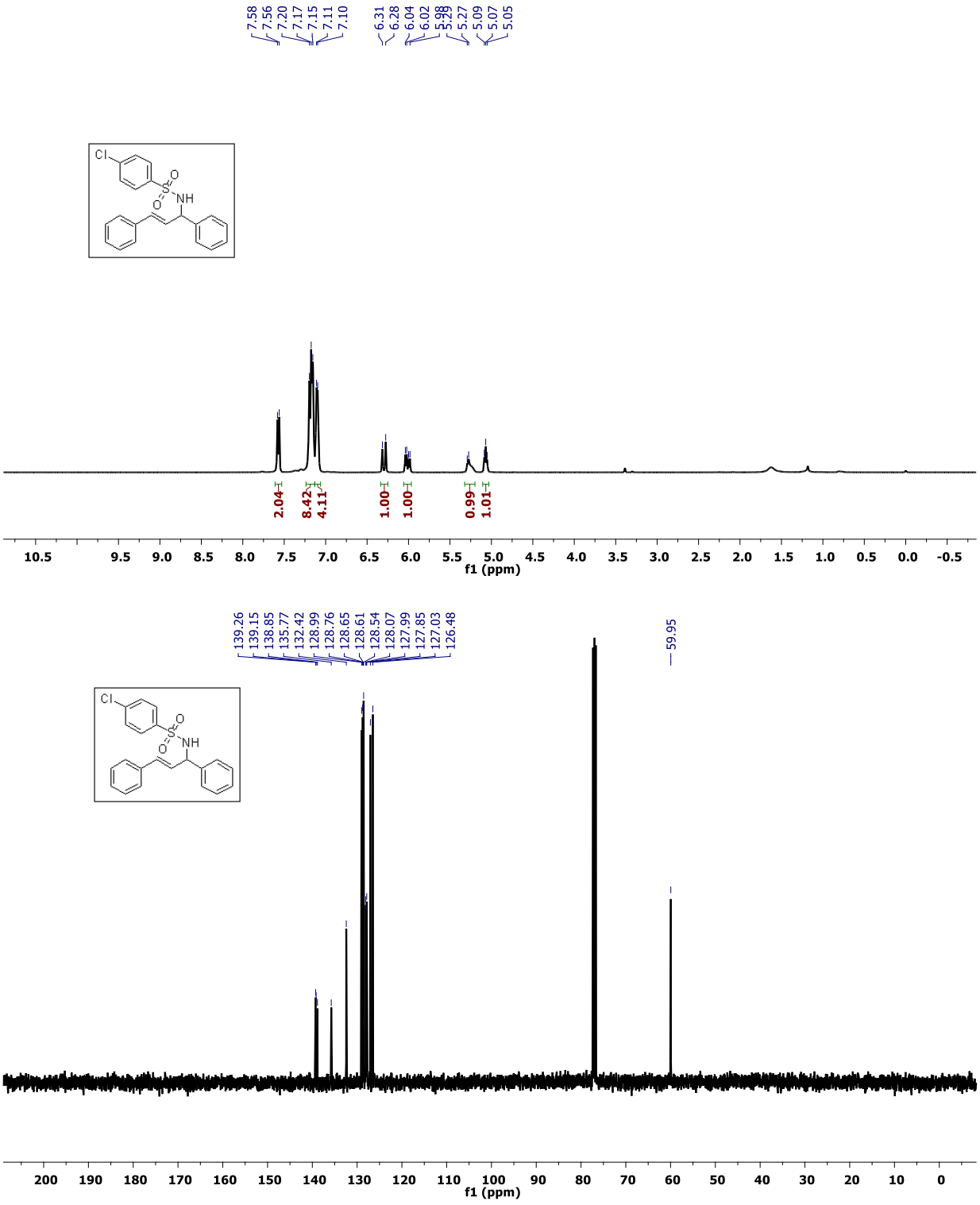




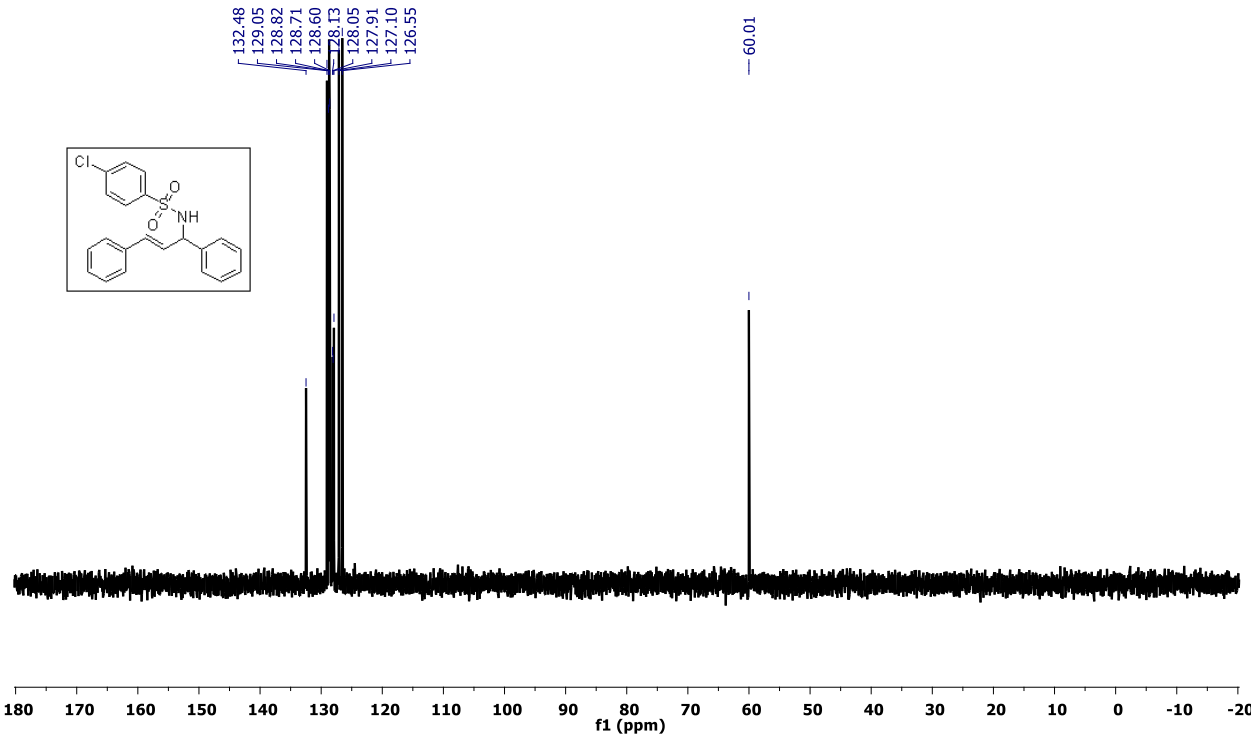
DEPT135 NMR spectra of compound 3wa:



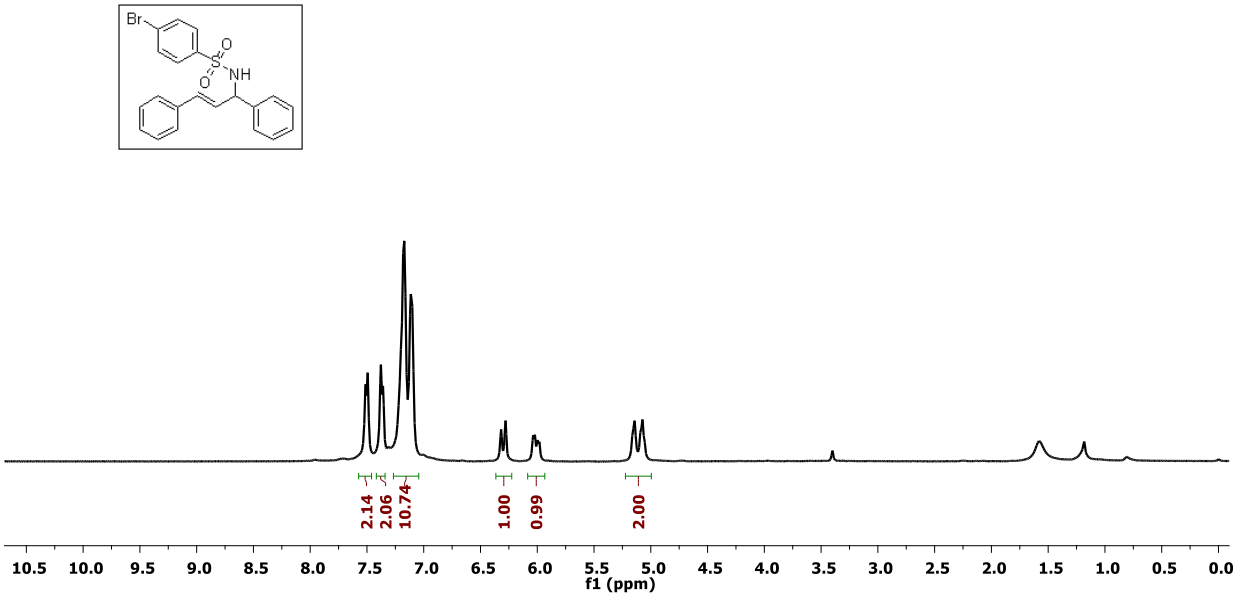
^{1}H and ^{13}C NMR spectra of compound 5wb:

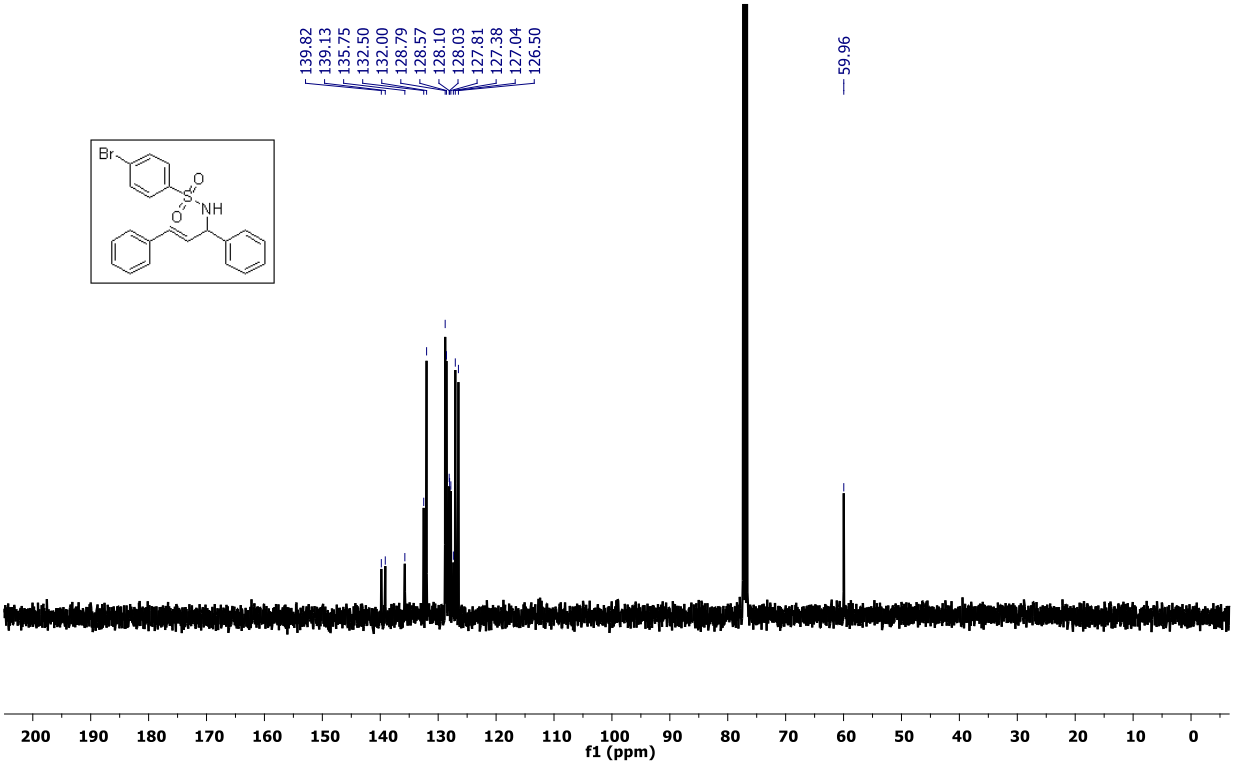


DEPT135 NMR spectra of compound 5wb:

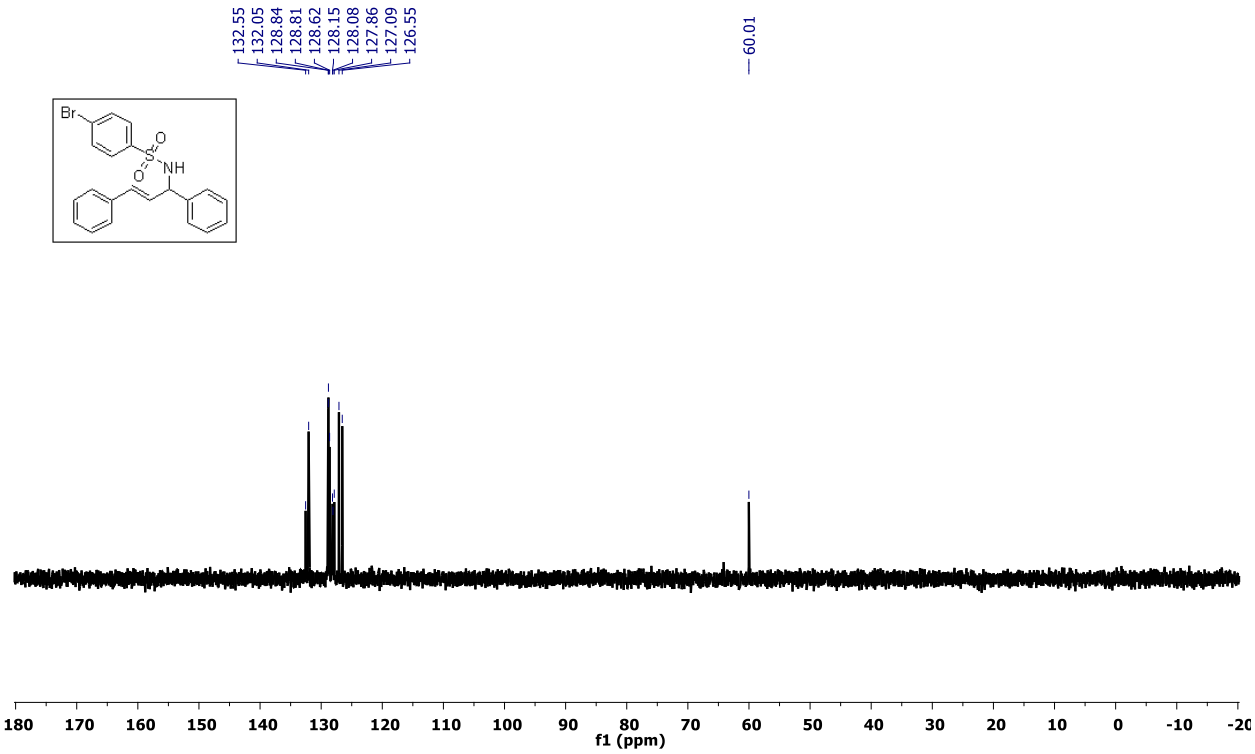


^{1}H and ^{13}C NMR spectra of compound 5wc:

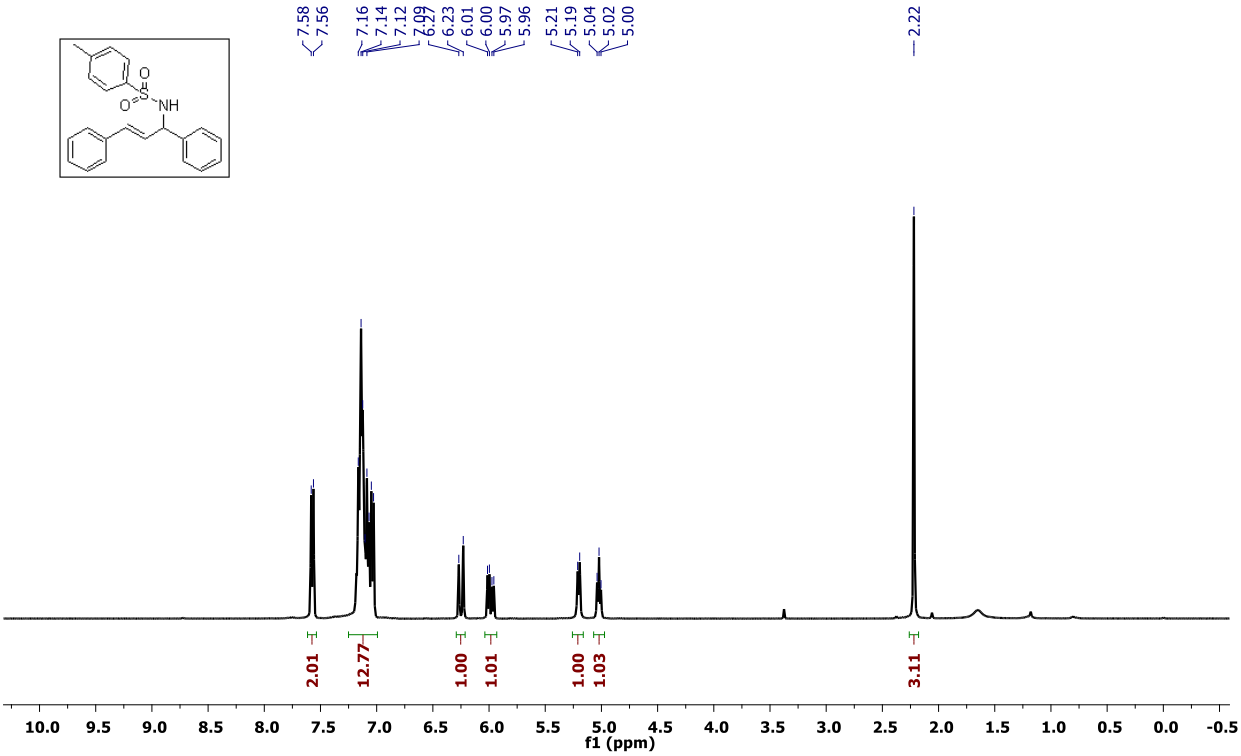


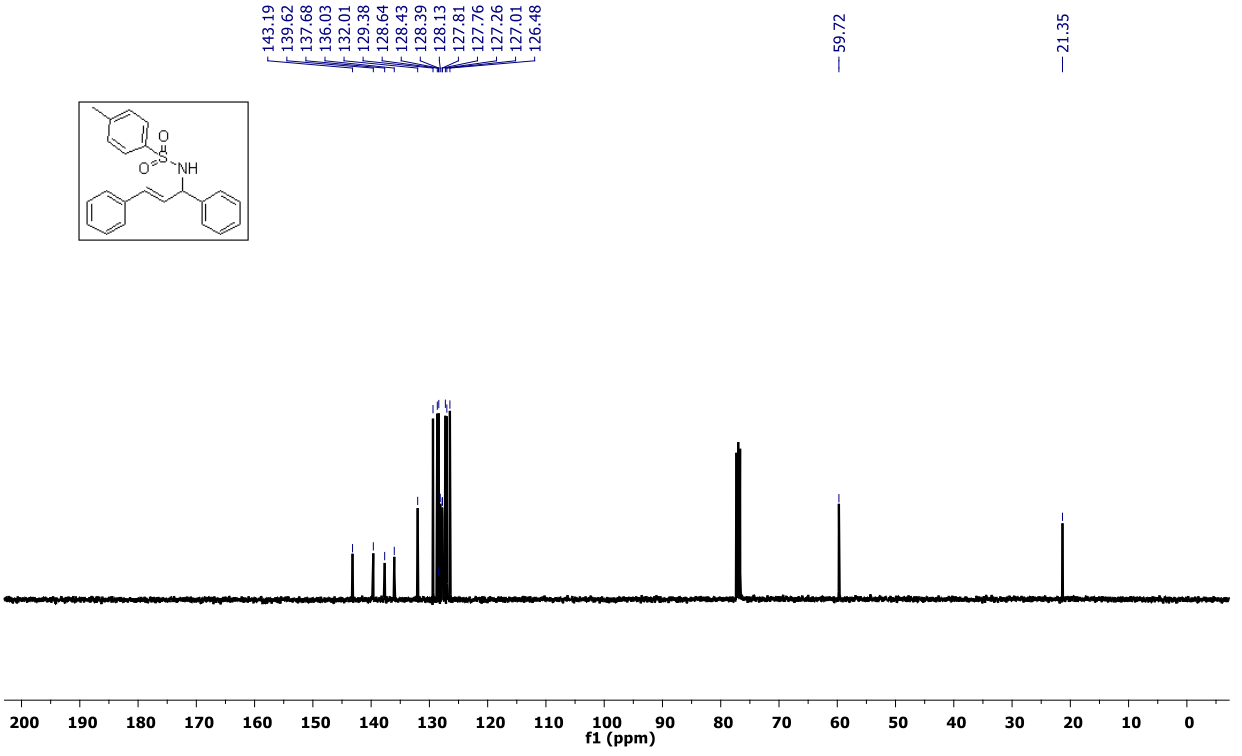


DEPT135 NMR spectra of compound 5wc:

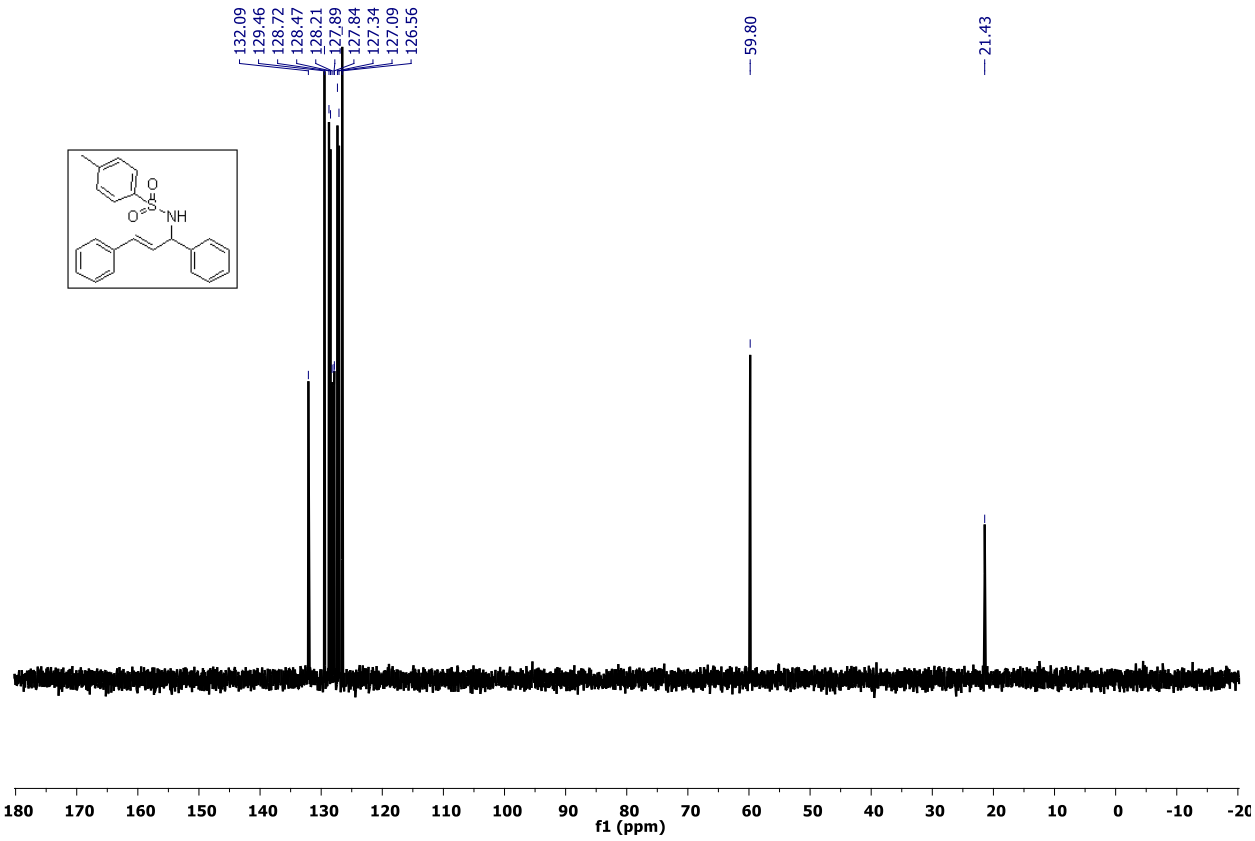


^{1}H and ^{13}C NMR spectra of compound 3wd:

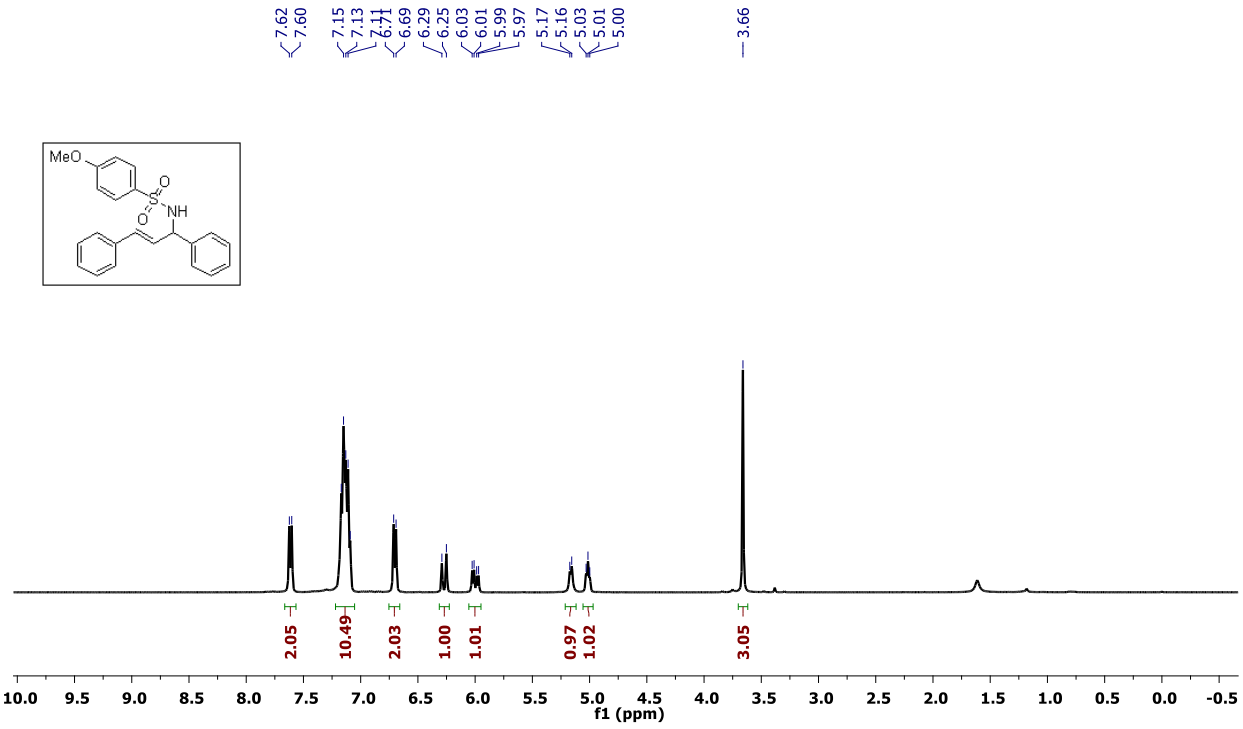


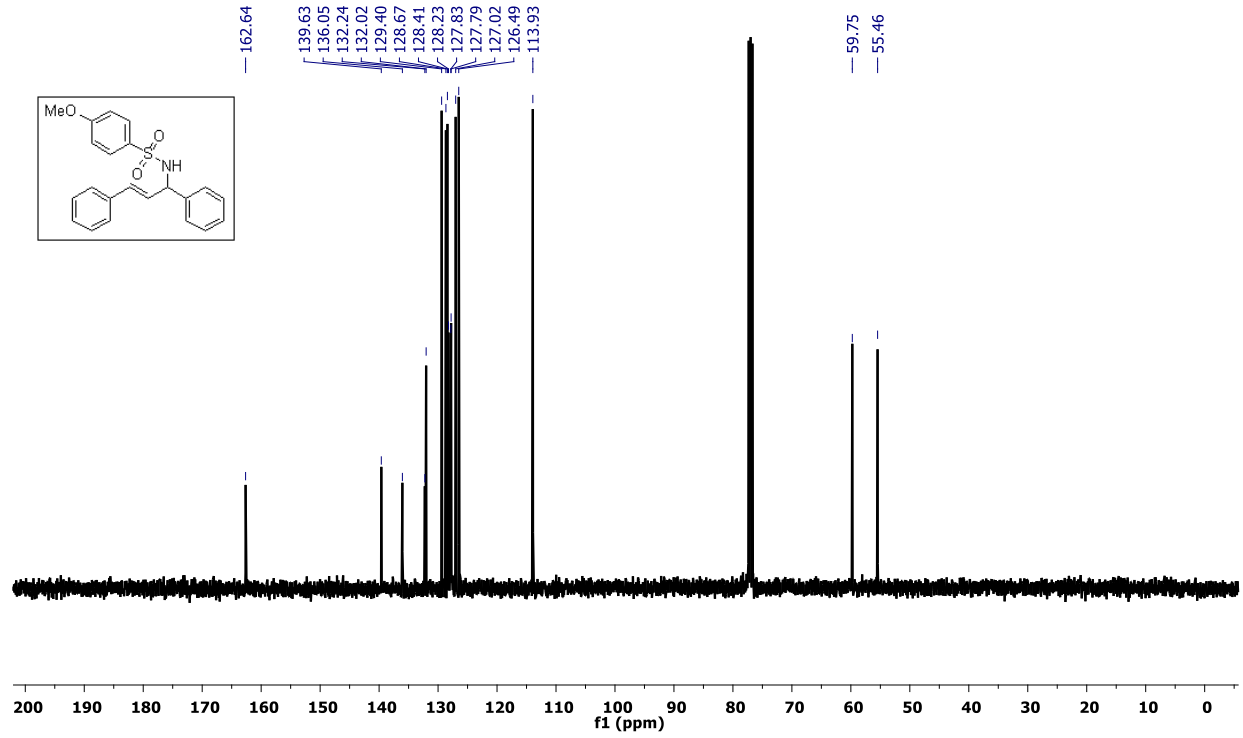


DEPT135 NMR spectra of compound 3wd:

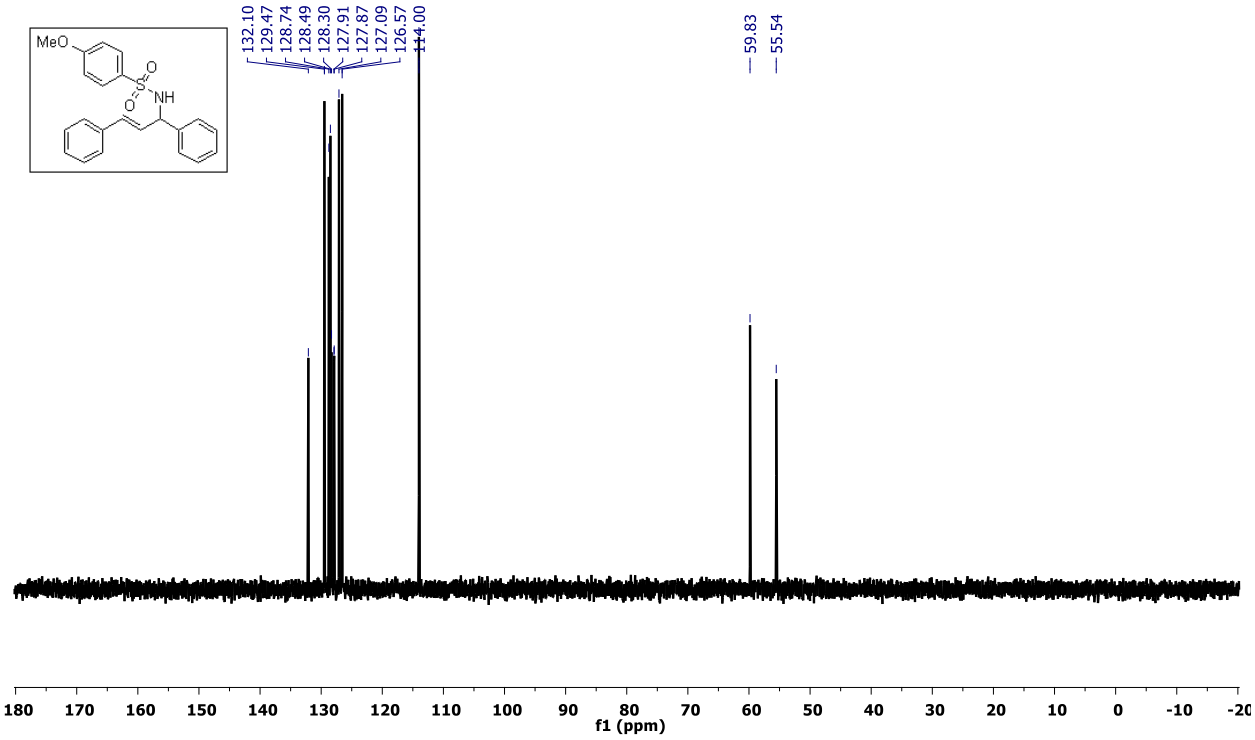


^{1}H and ^{13}C NMR spectra of compound 3we:

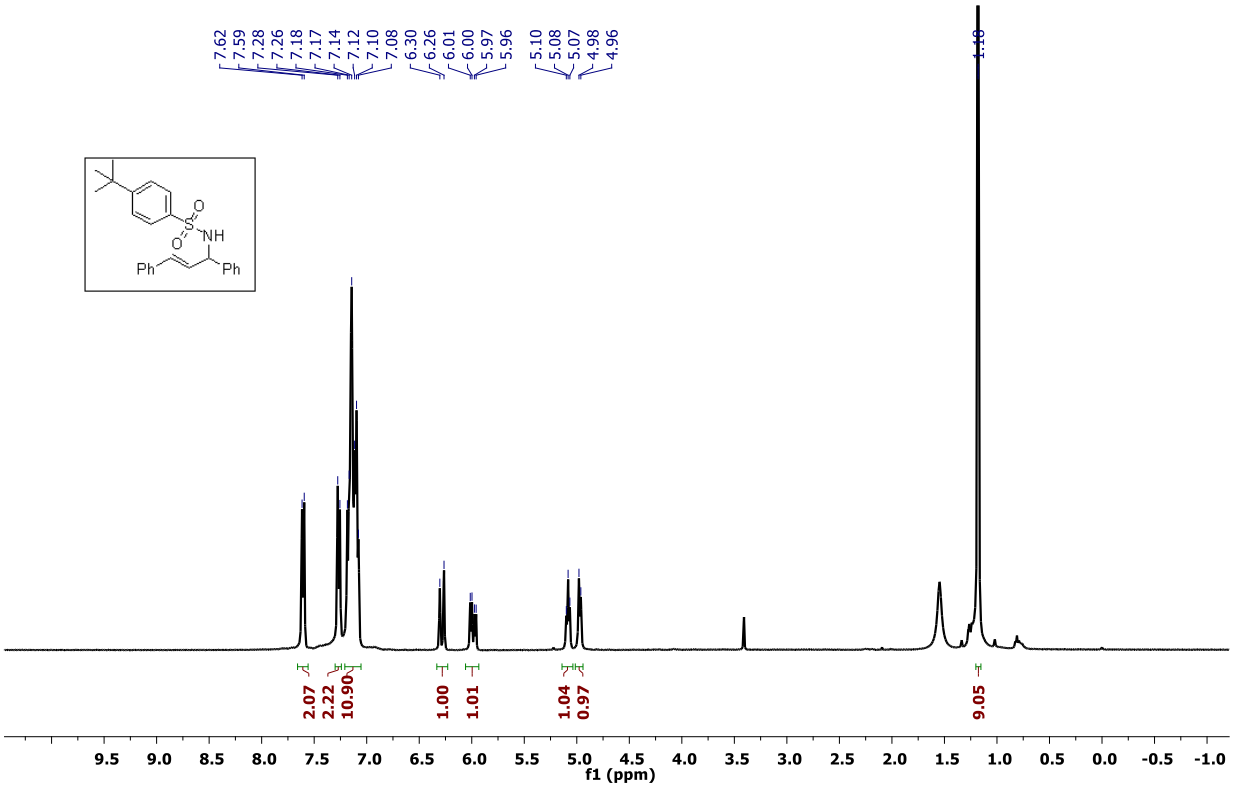


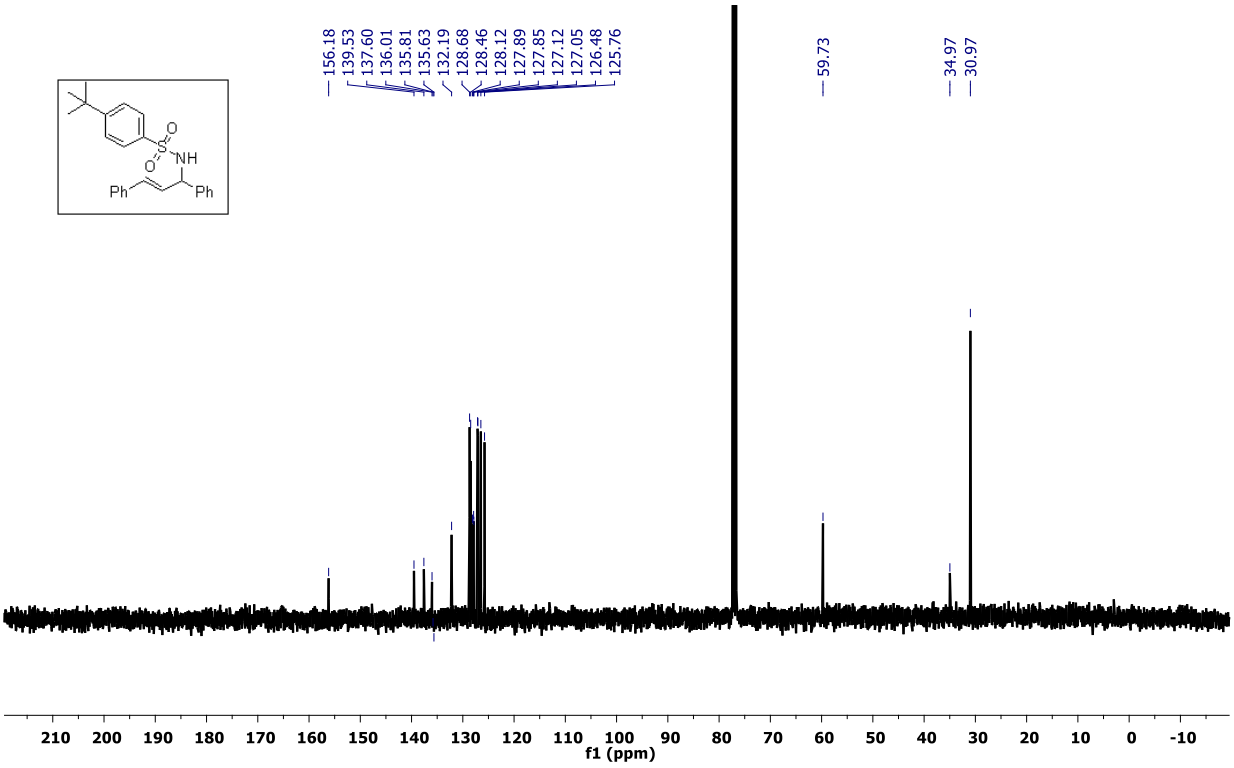


DEPT135 NMR spectra of compound 5we:



^{1}H and ^{13}C spectra of compound 3wf:





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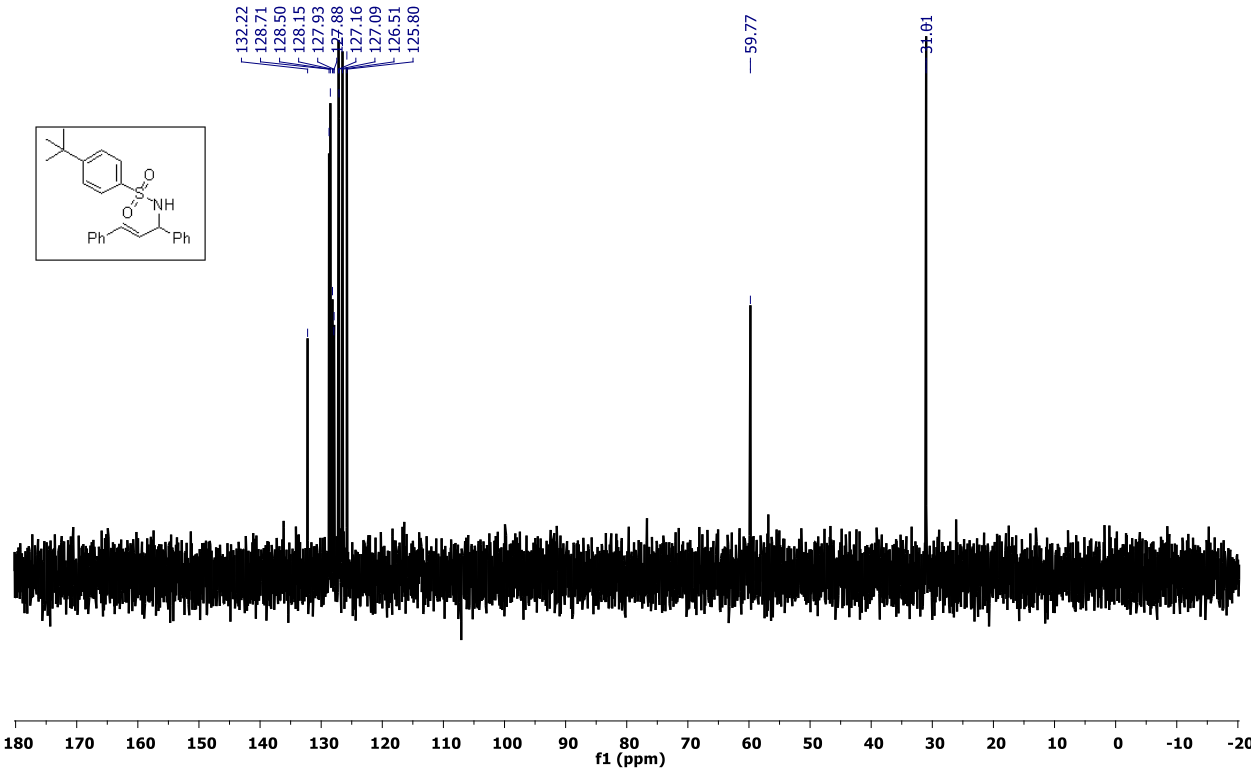
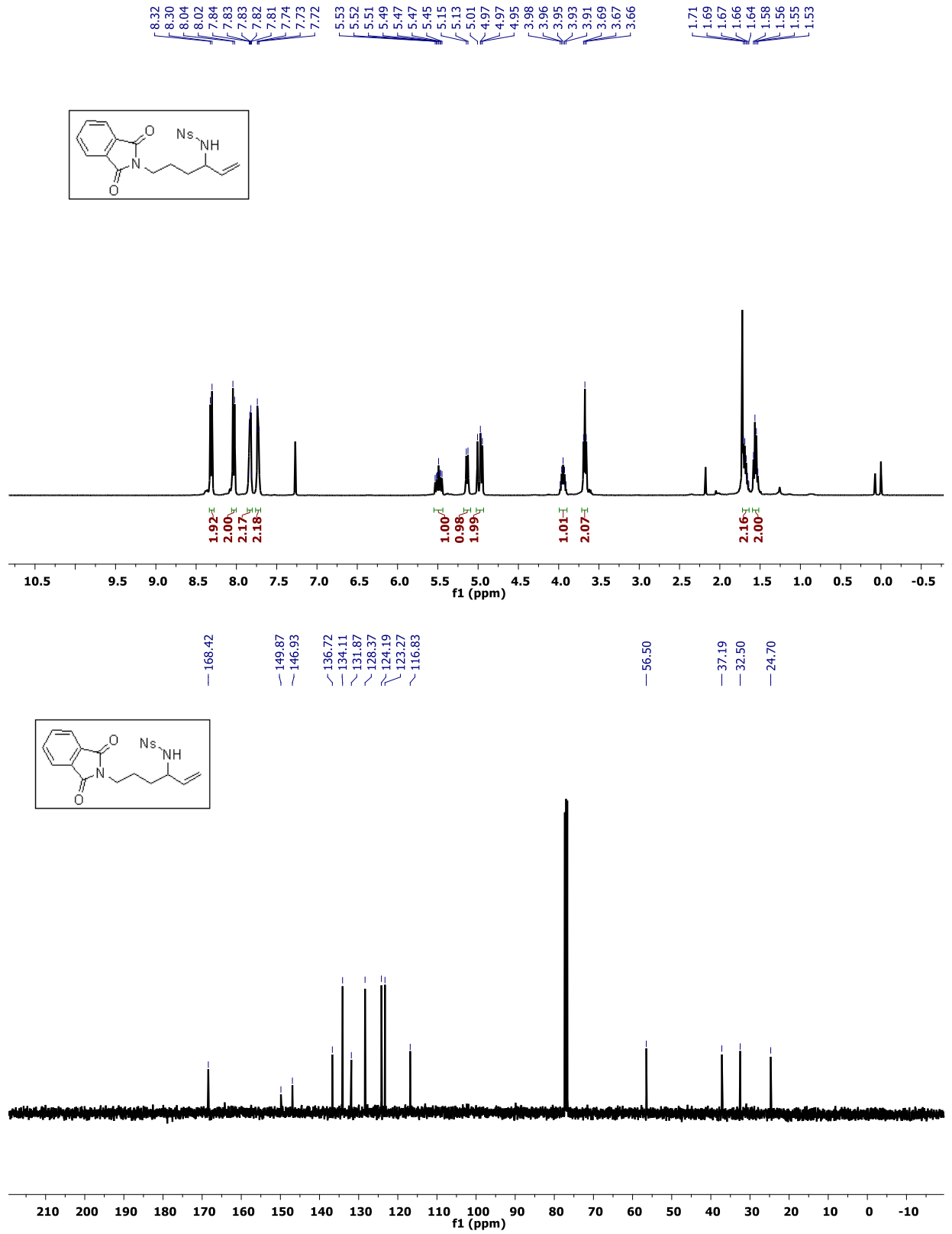
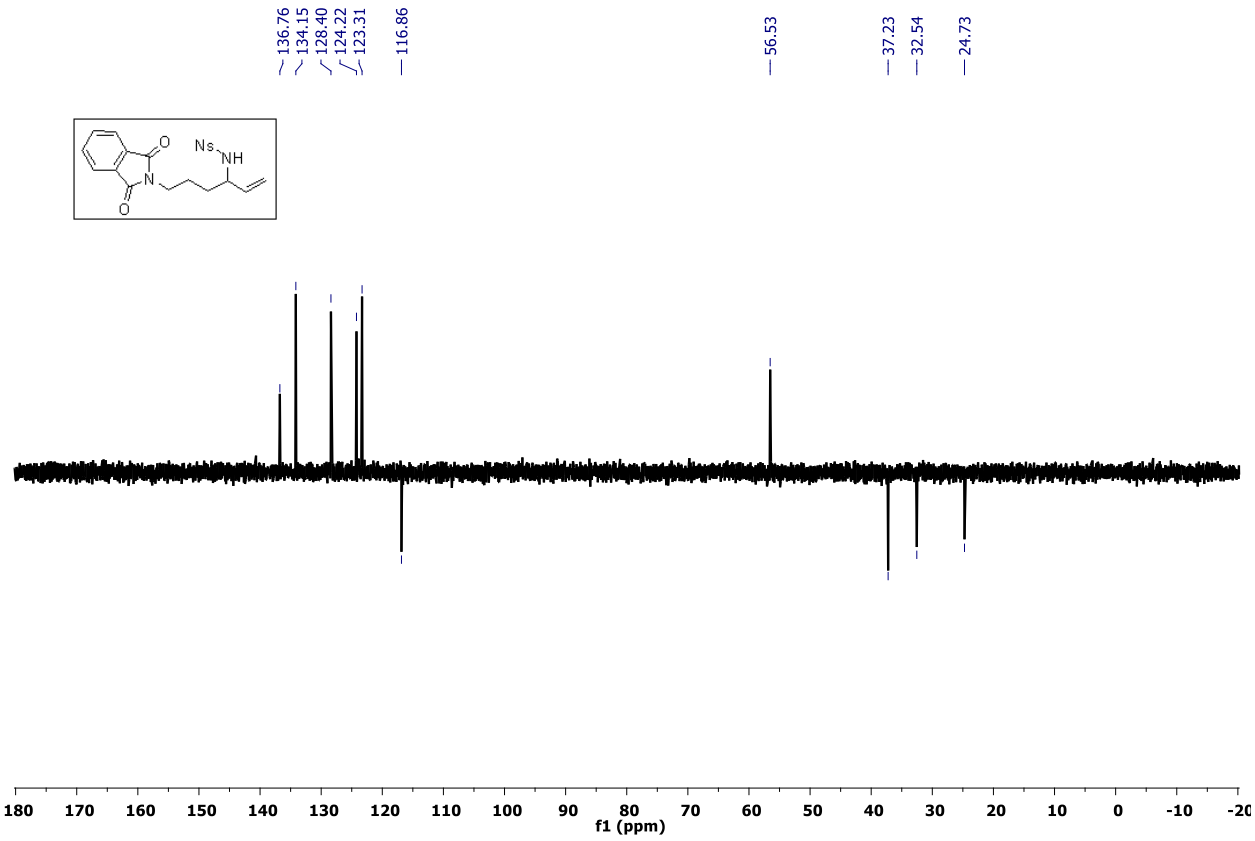


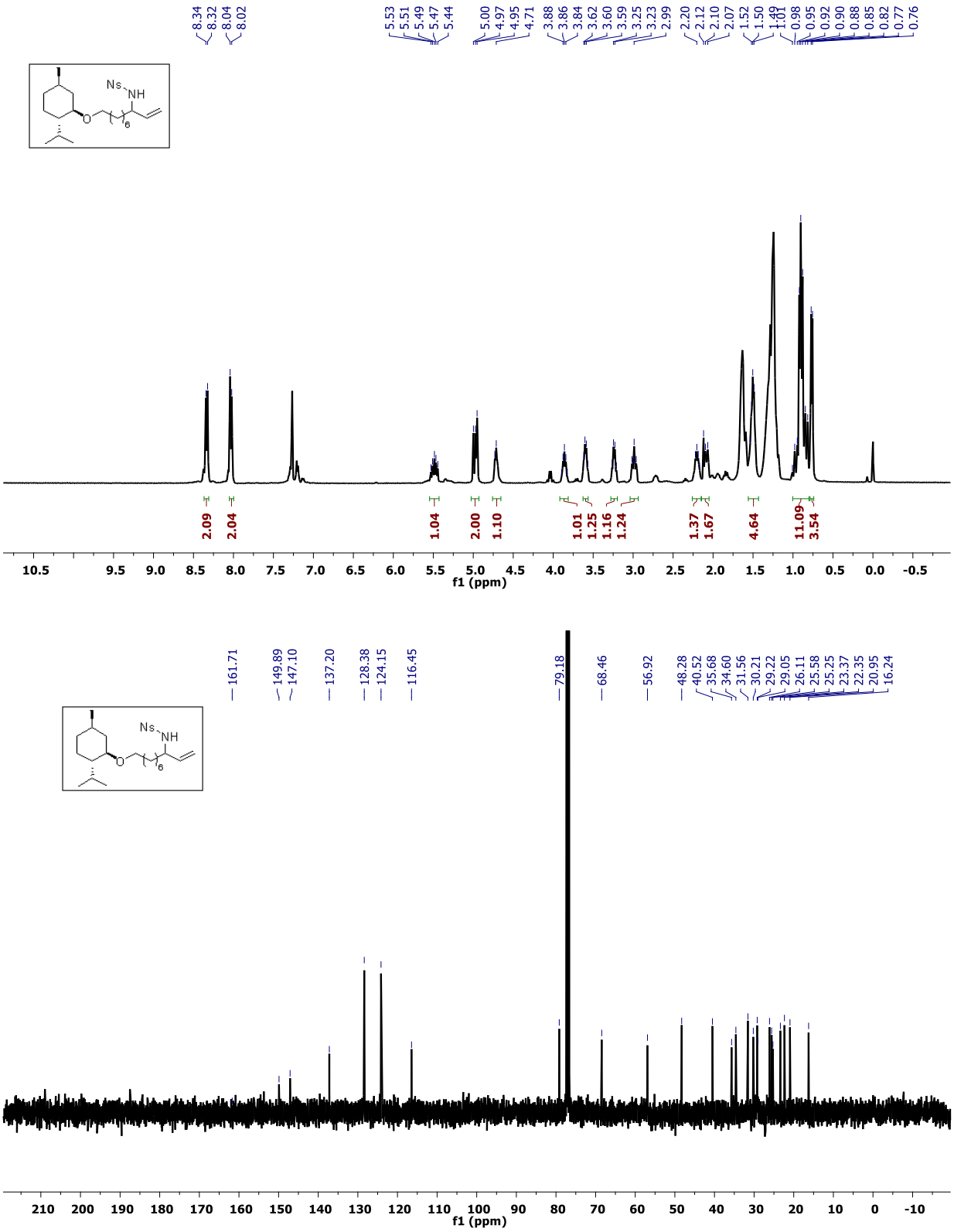
^{1}H and ^{13}C spectra of compound 5aa:



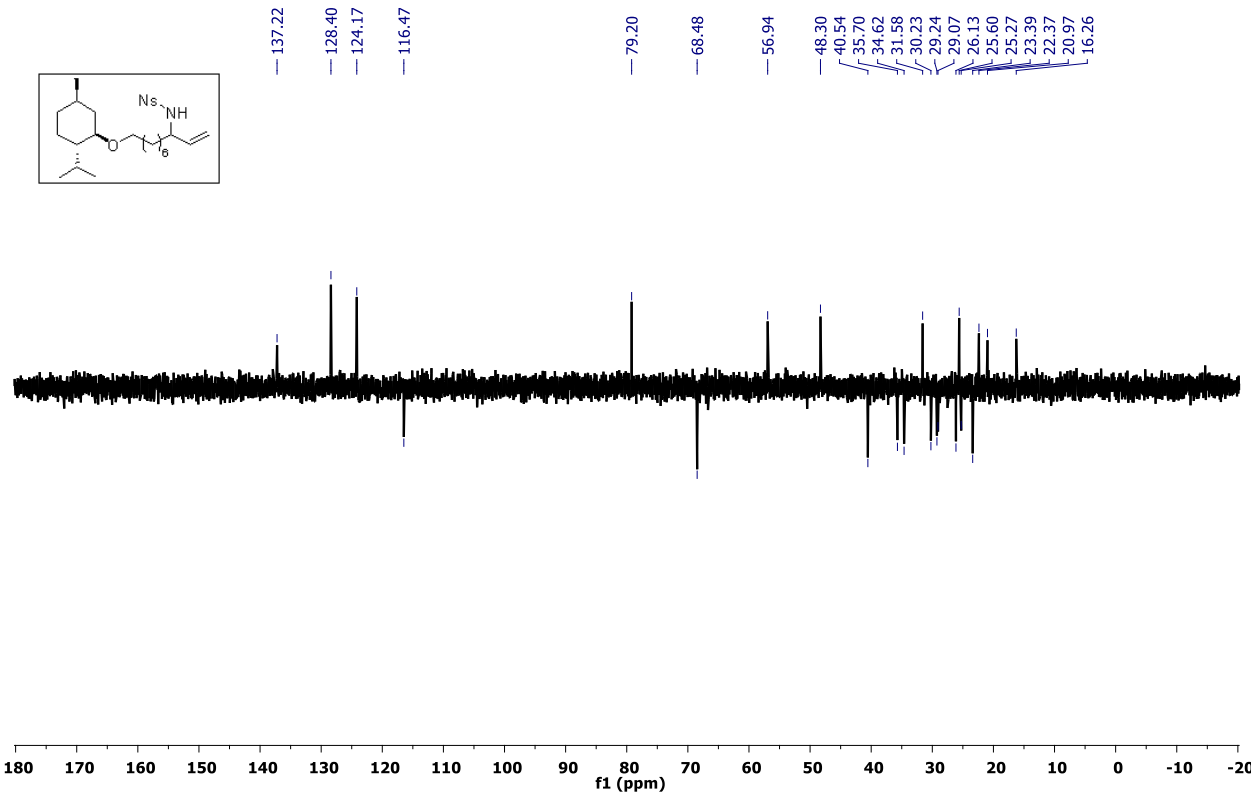
DEPT135 spectra of compound 5aa:



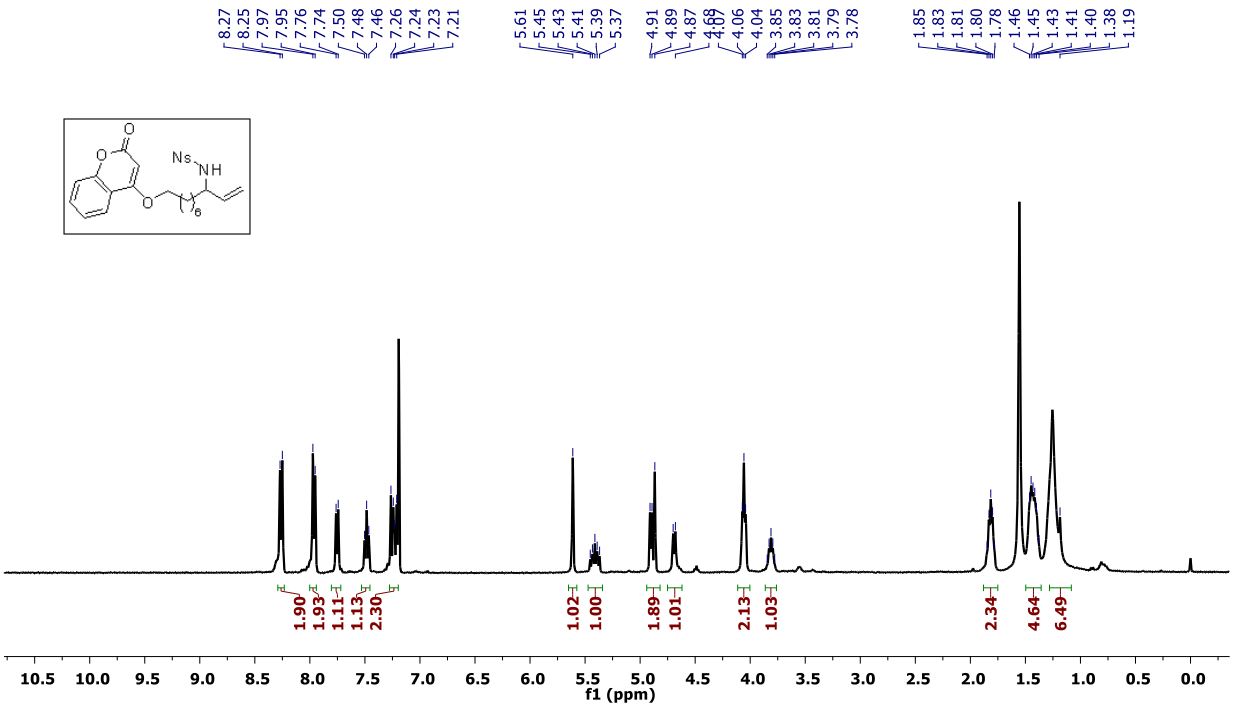
^{1}H and ^{13}C spectra of compound 5ba:

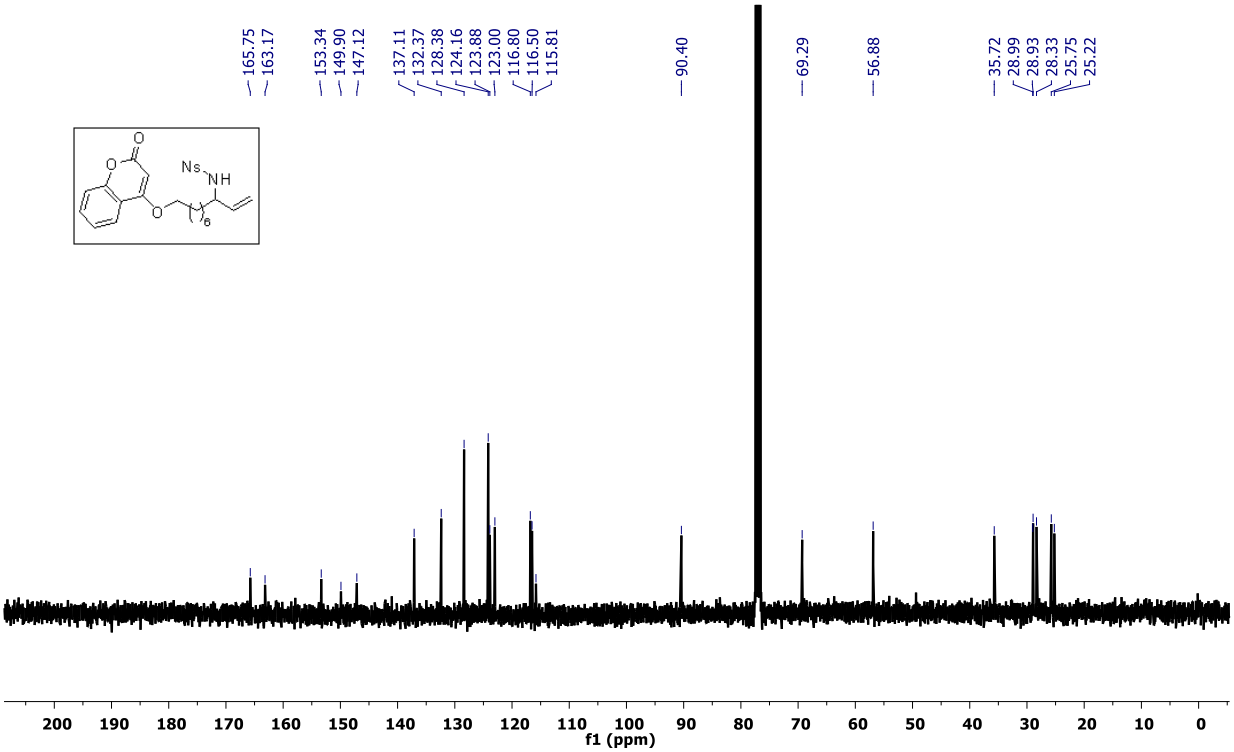


DEPT135 spectra of compound 5ba:

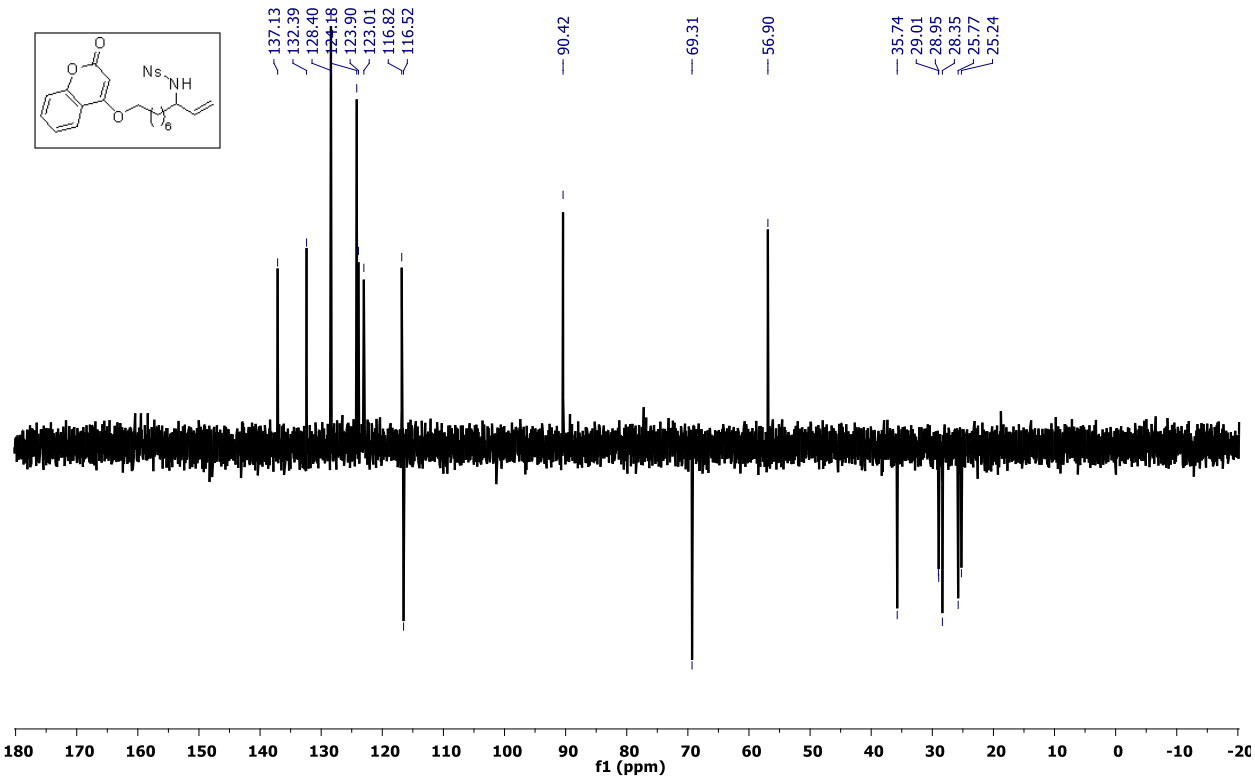


^{1}H and ^{13}C spectra of compound 5ca:

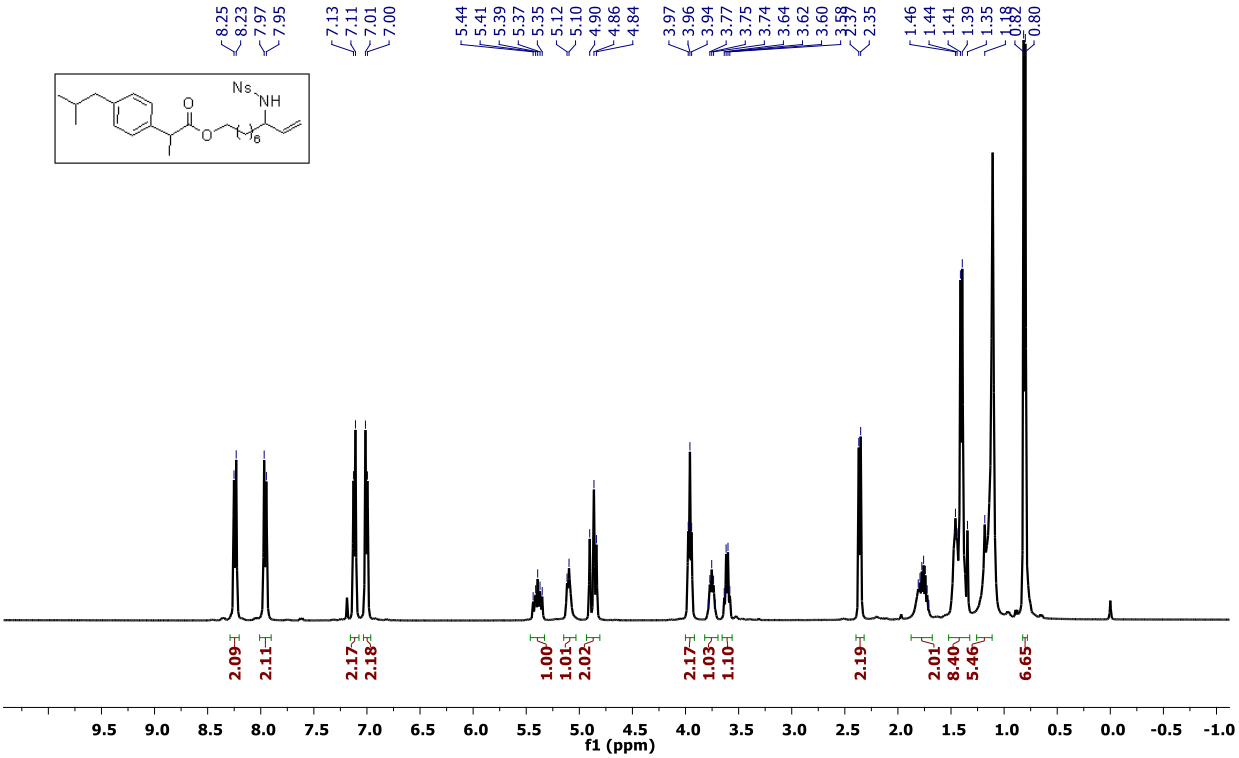


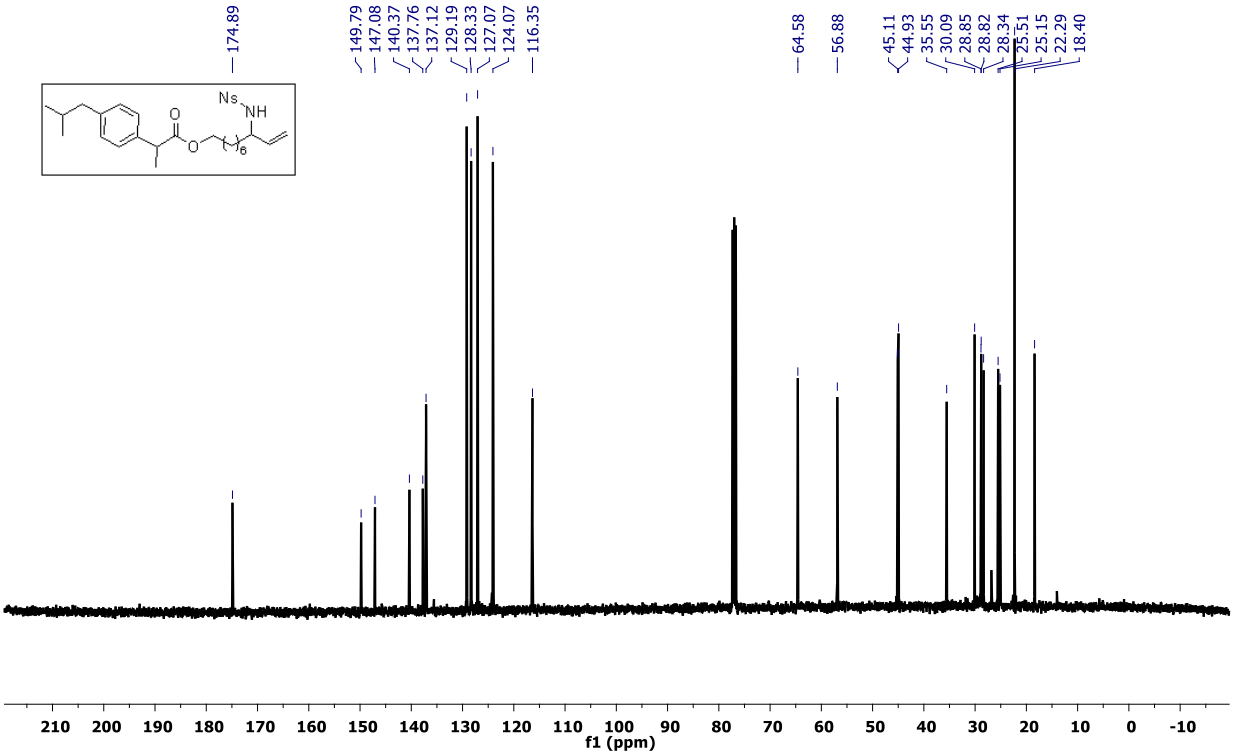


DEPT135 spectra of compound 5ca:



^{1}H and ^{13}C spectra of compound 5da:





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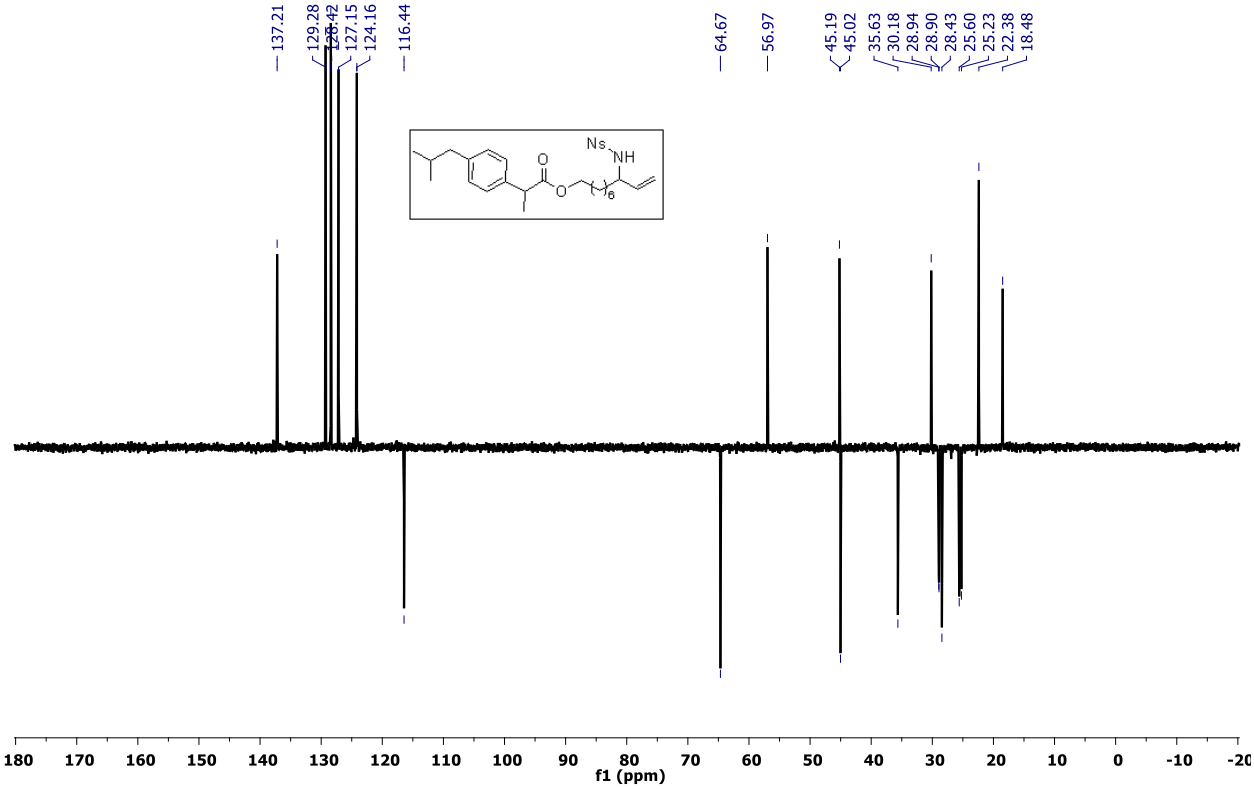
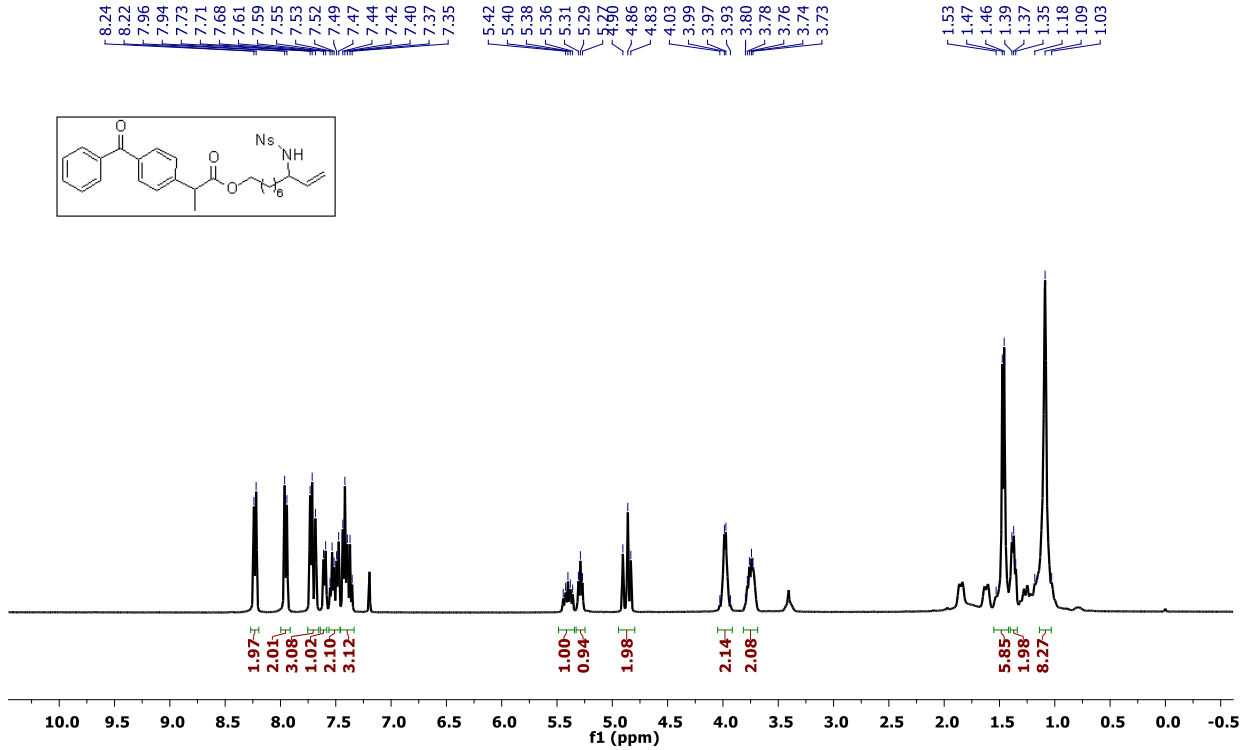
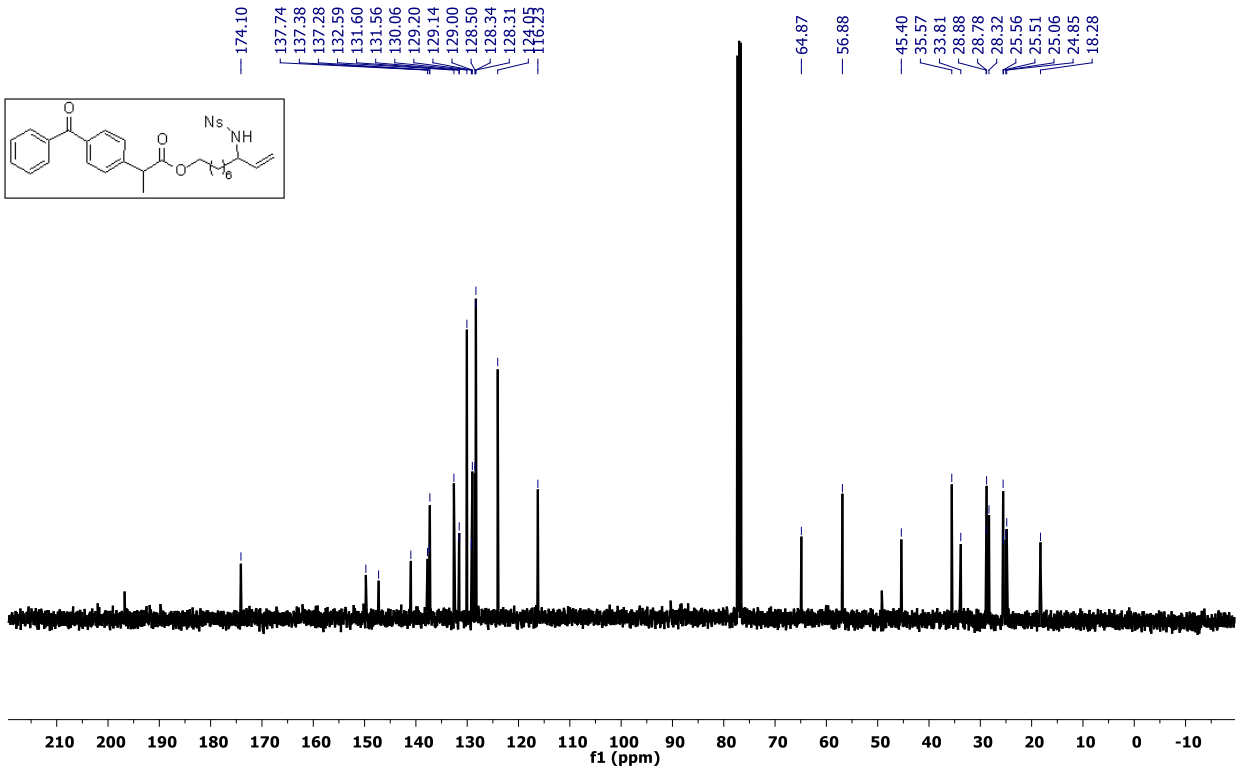
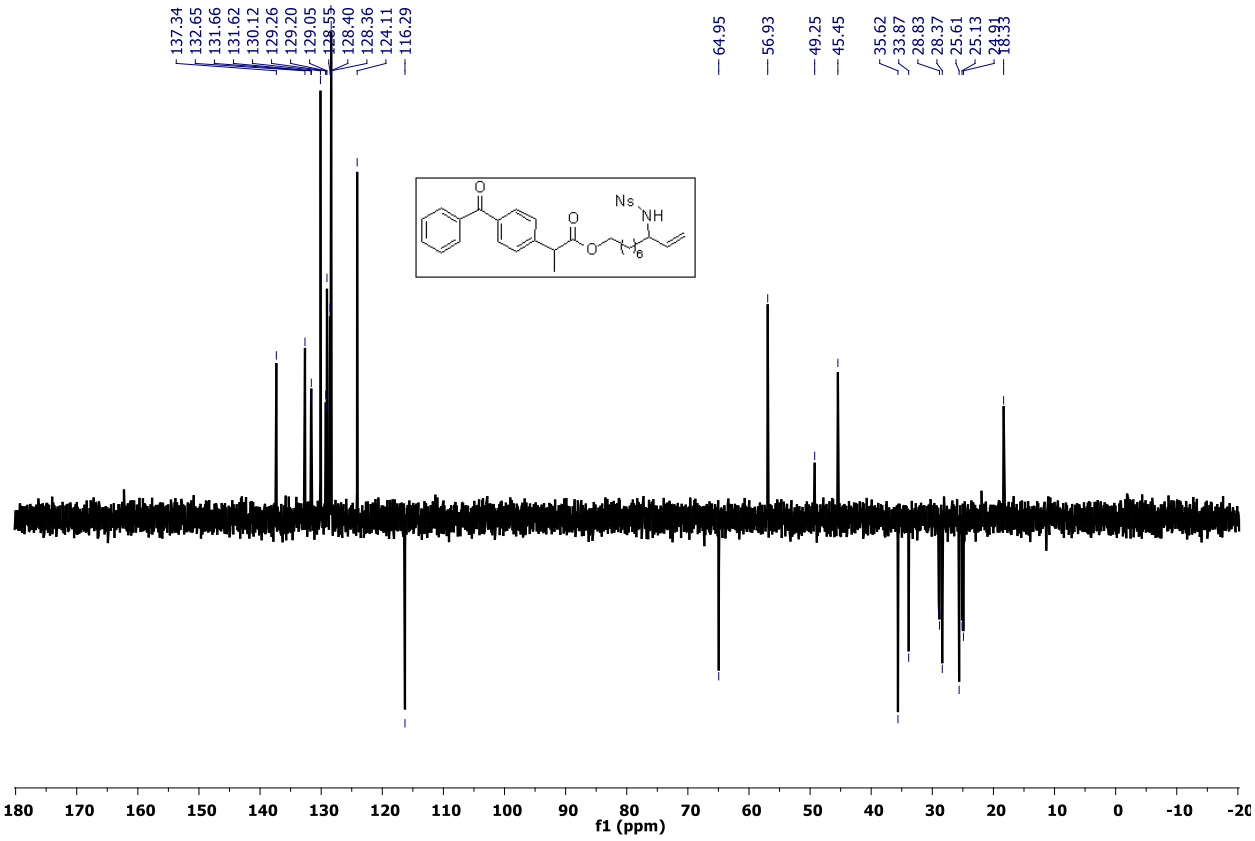


^{1}H and ^{13}C NMR spectra of compound 5ea:

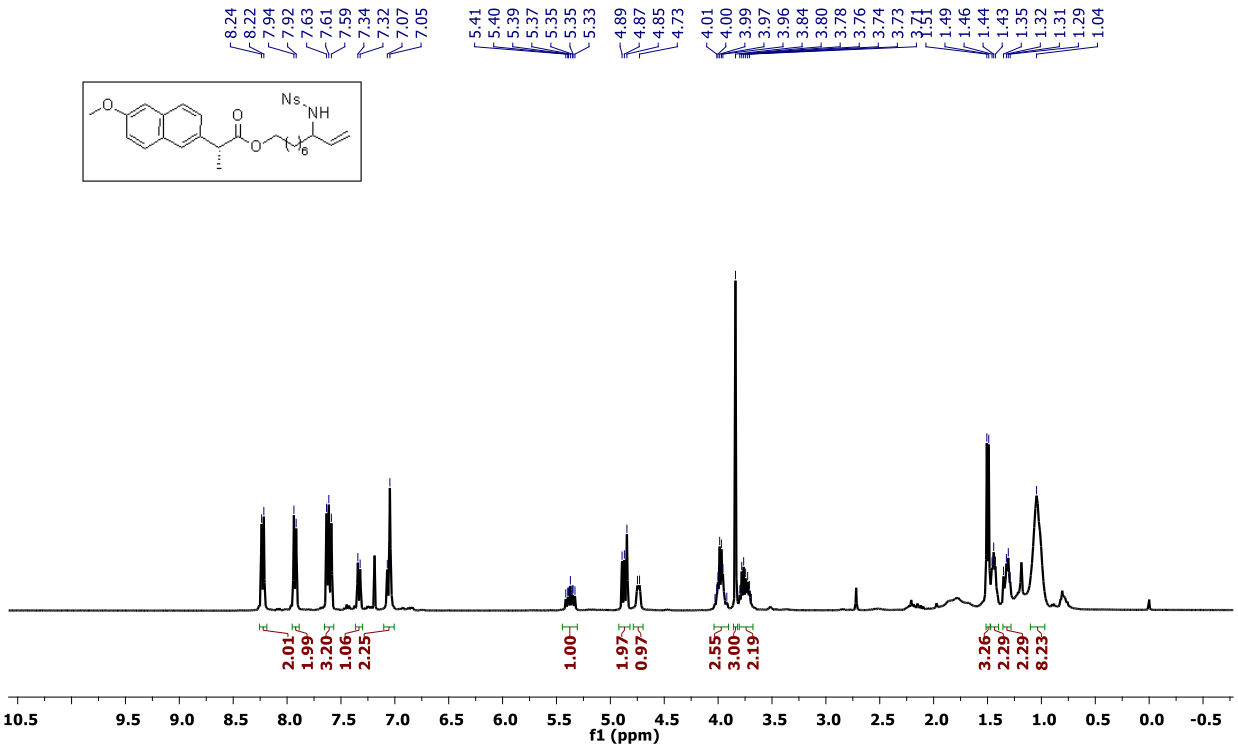


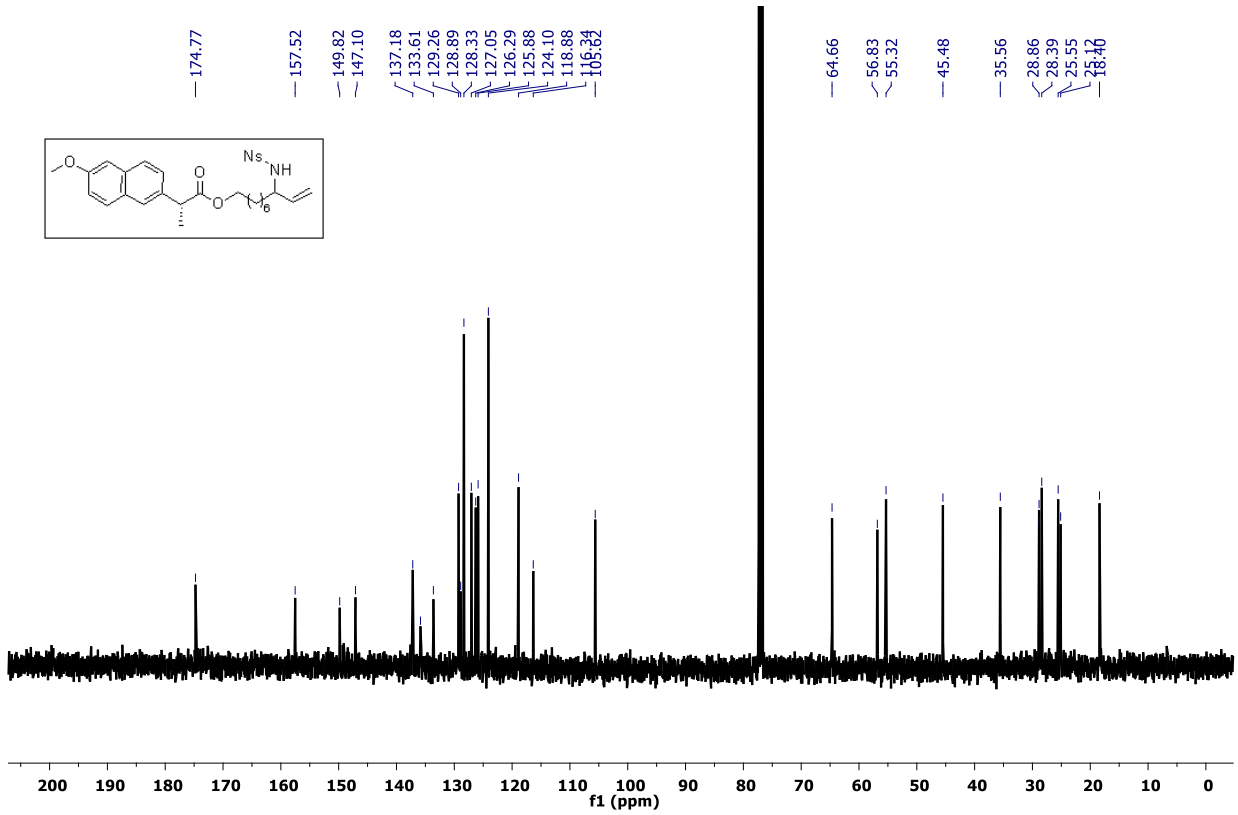


DEPT135 NMR spectra of compound 5ea:

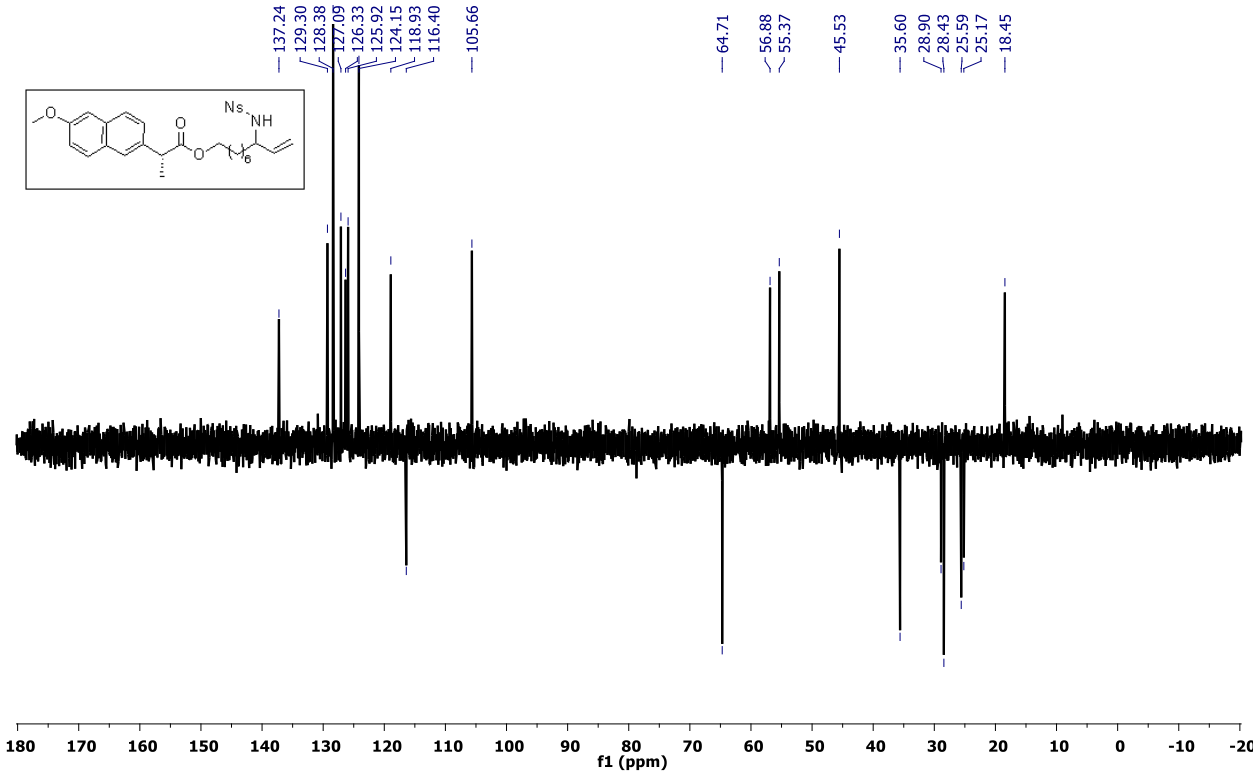


^{1}H and ^{13}C NMR spectra of compound 5fa:

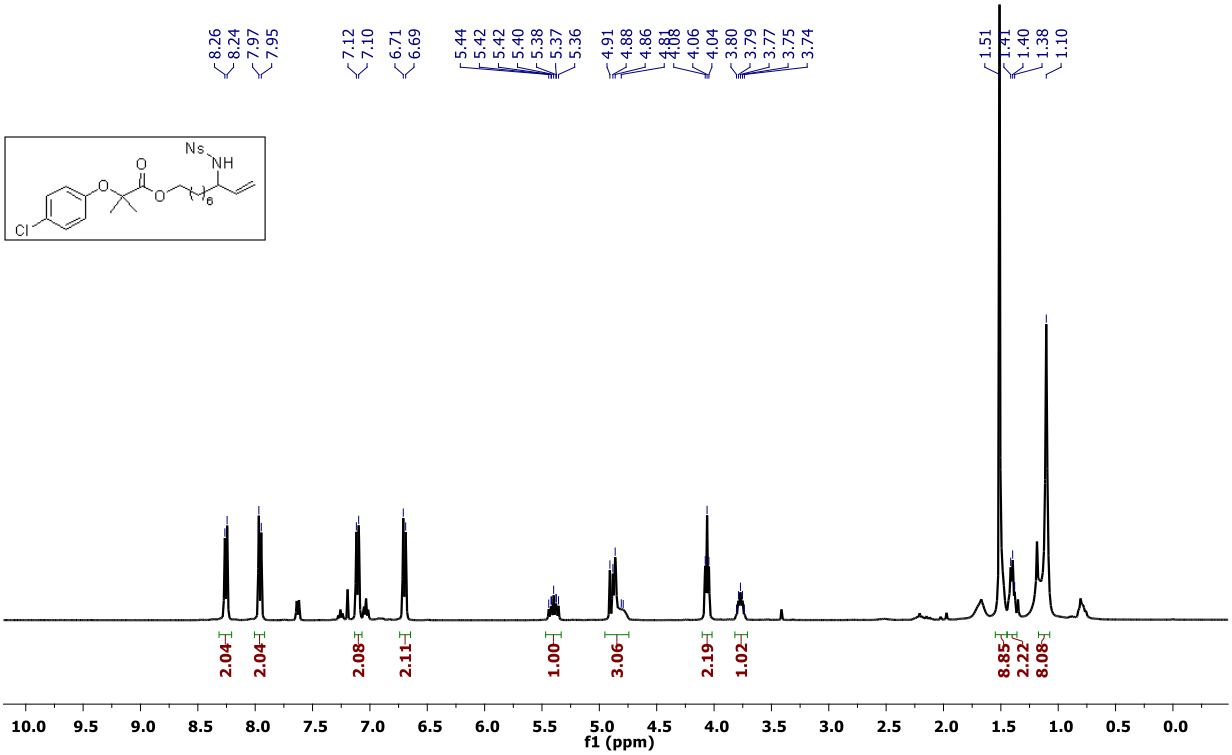


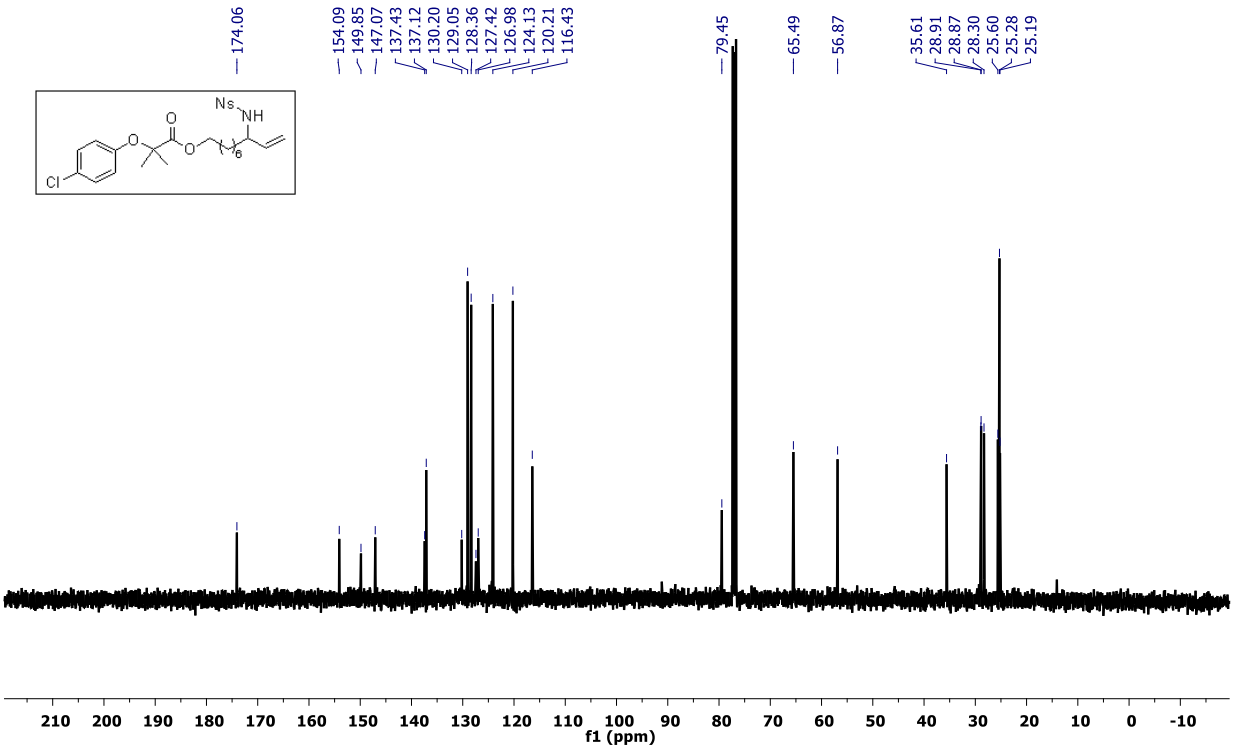


DEPT135 NMR spectra of compound 5fa:

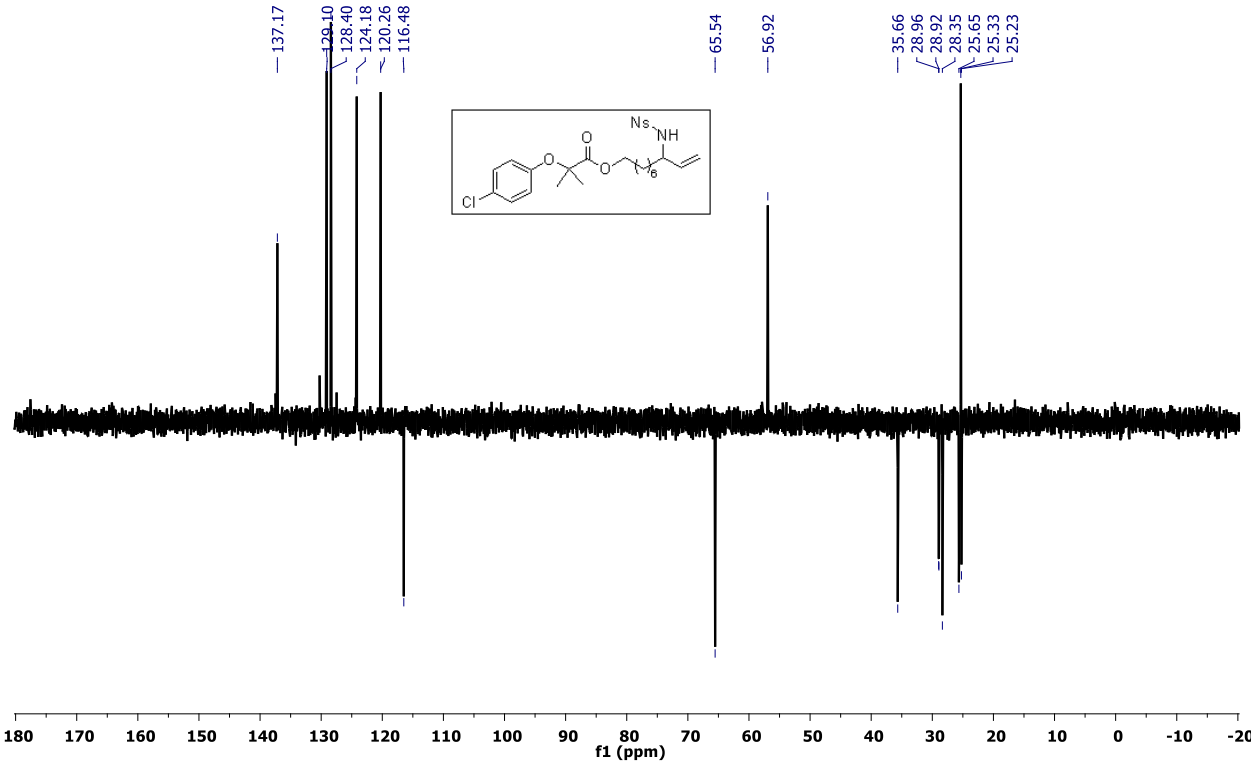


^{1}H and ^{13}C NMR spectra of compound 5ga:

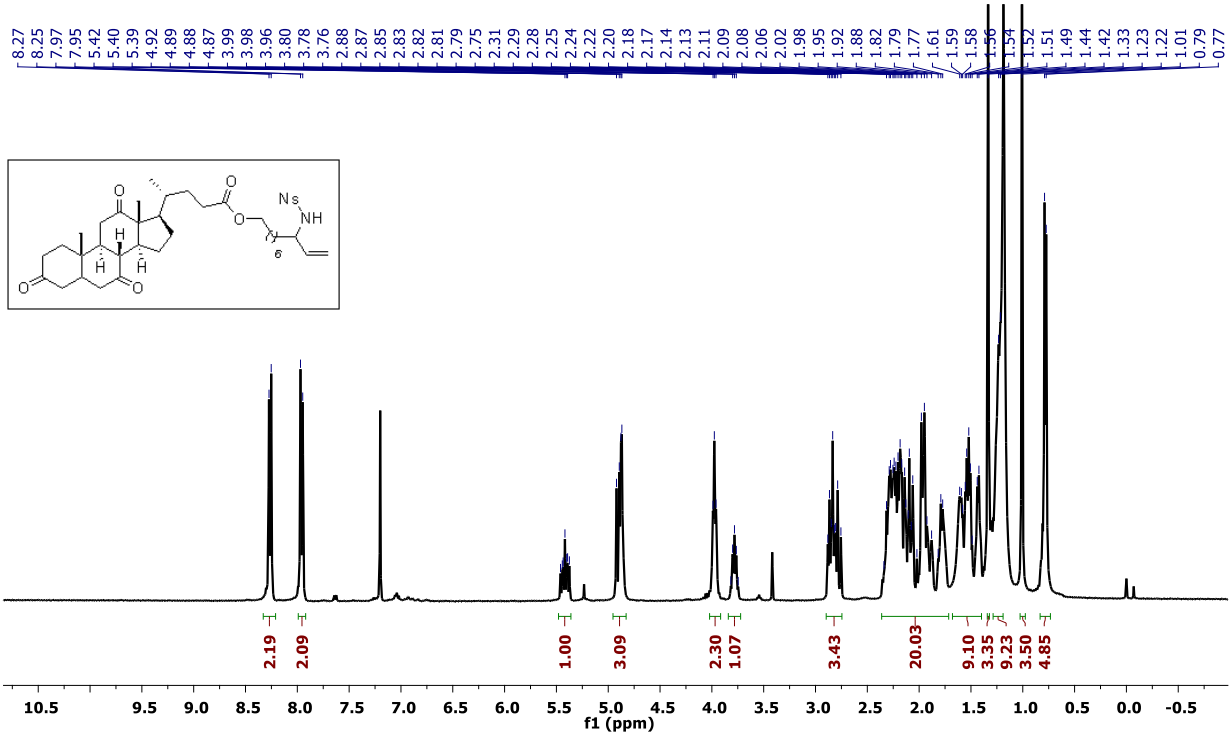


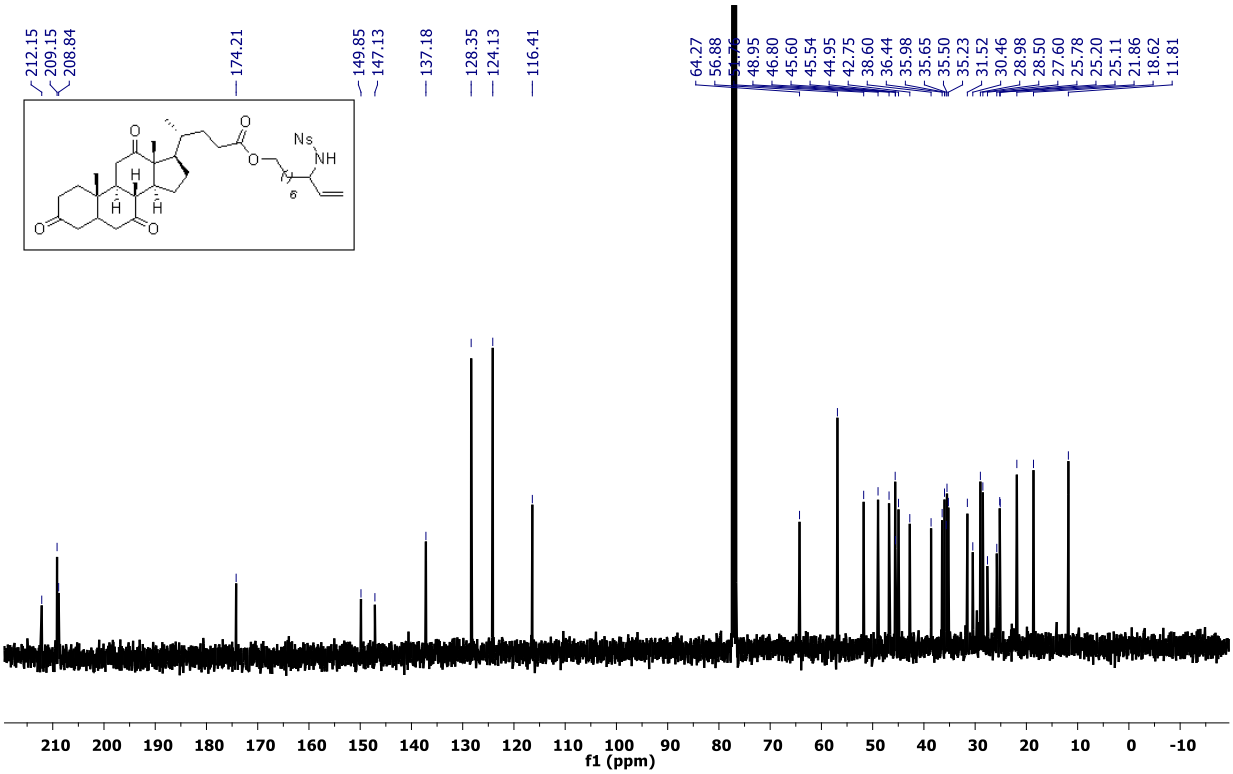


DEPT135 NMR spectra of compound 5ga:

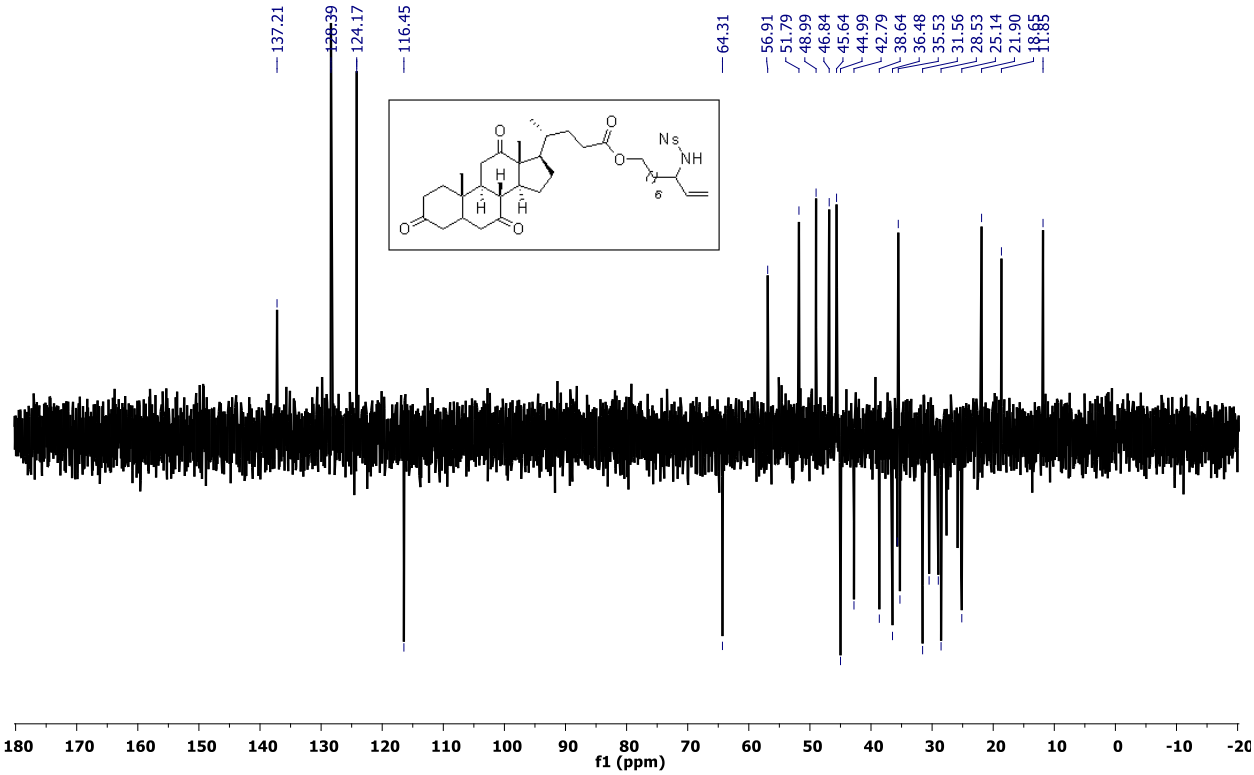


^{1}H and ^{13}C NMR spectra of compound 5ha:

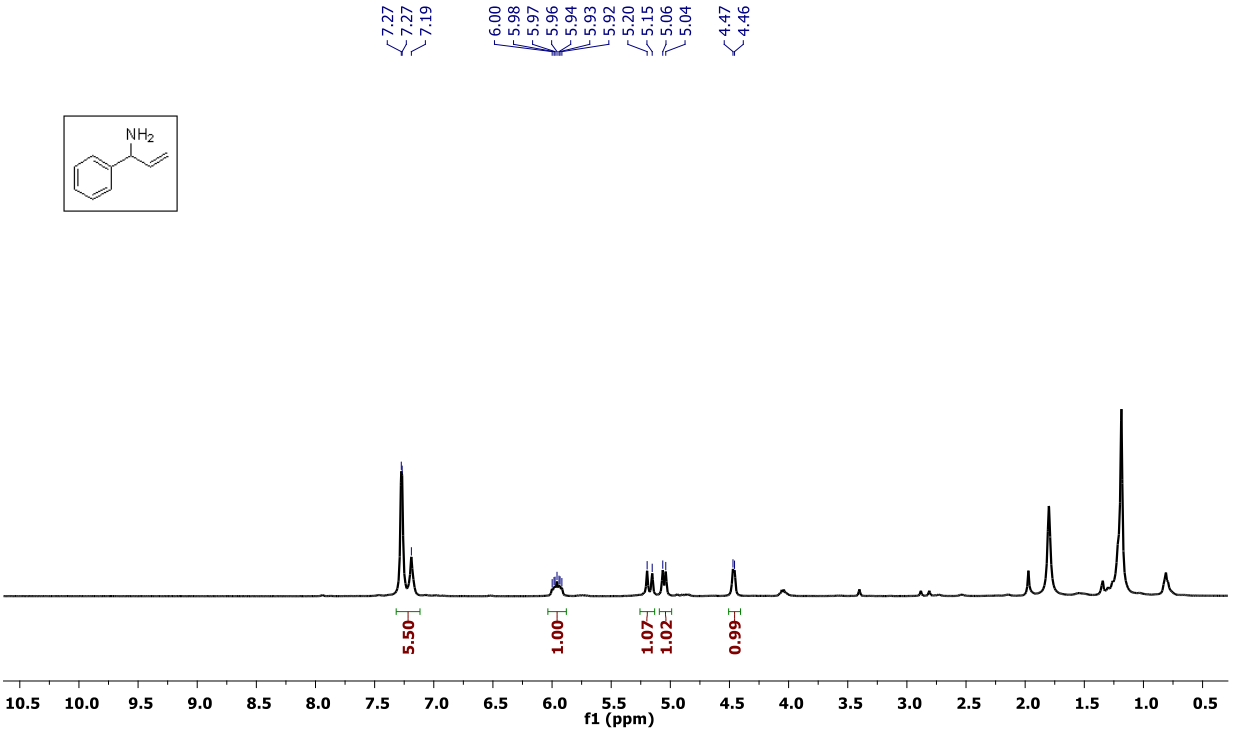


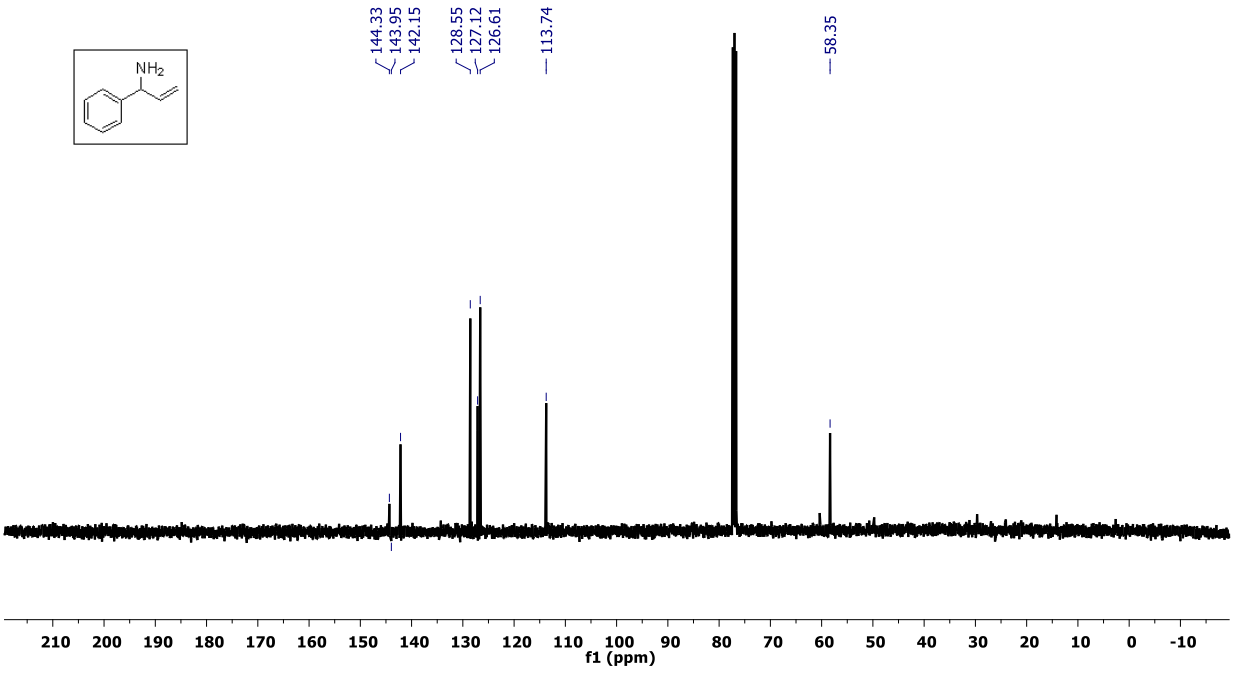


DEPT135 NMR spectra of compound 5ha:



^{1}H and ^{13}C NMR spectra of compound 6a:





^{1}H and ^{13}C NMR spectra of compound 6b: