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Supporting Information

Synergistic Cooperative Effect of CF_3SO_2Na and Bis(2-butoxyethyl)ether Towards Selective Oxygenation of Sulfides with Molecular Oxygen under Visible-Light Irradiation

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1. General Information

Unless otherwise specified, all reagents and solvents were obtained from commercial suppliers and used without further purification. All reagents were weighed and handled in air at room temperature. ^{1}H NMR spectra were recorded at 400 MHz and ^{13}C NMR spectra were recorded at 100 MHz by using a Bruker Avance 400 spectrometer. Chemical shifts were calibrated using residual undeuterated solvent as an internal reference (^{1}H NMR: $CDCl_3$ 7.26 ppm, ^{13}C NMR: $CDCl_3$ 77.0 ppm, ^{1}H NMR: DMSO 2.50 ppm, ^{13}C NMR: 40.0 ppm). The following abbreviations were used to describe peak splitting patterns when appropriate: s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, brs = broad singlet. Chromatographic purifications were carried out on a Biotage Isolera Four instrument. Mass spectra were performed on a spectrometer operating on ESI-TOF. GC-MS were obtained by EI on a Shimadzu GC-MS 2010, Conditions: Flow ripples：1 mL/min; column oven initial temperature 70℃; injection port temperature: 310℃; temperature range: 70~310℃. .

The Light Source and the Material of the Irradiation Vessel

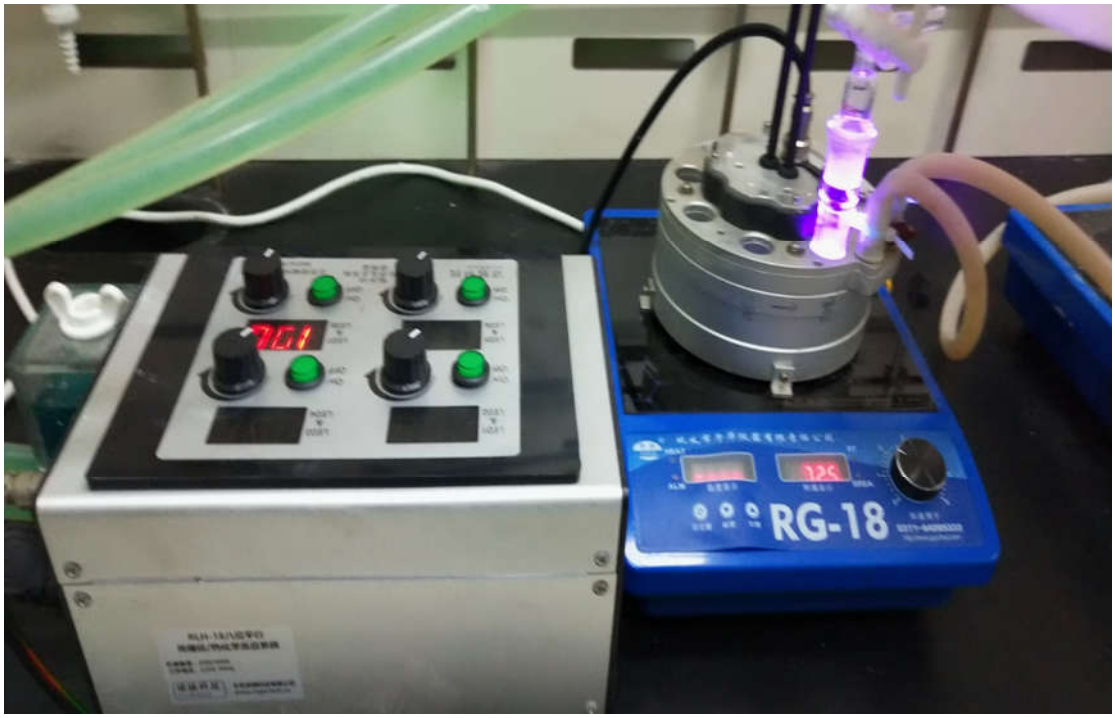
Manufacturer： Beijin Rogertech Ltd.

Model: RLH-18

Broadband source: λ= 385-390 nm

Material of the irradiation vessel：quartz tube

Not use any filters



2. Experimental Procedure

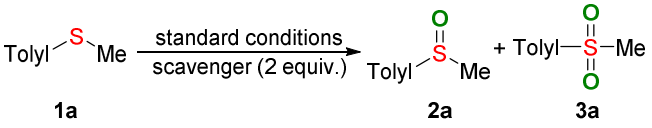
Typical procedure for the synthesis of 1-methyl-4-(methylsulfinyl)benzene (**2a**) and 1-methyl-4-(methylsulfonyl)benzene (**3a**)

A mixture of methyl(*p*-tolyl)sulfane **1a** (1.0 mmol), CF_3SO_2Na (0.25 mmol) and bis(2-butoxyethyl)ether (1.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 6 h. The progress was monitored by TLC or GC-MS. Upon completion, water (20 mL) was added to the reaction mixture, it was extracted with CH_2Cl_2 (5 mL x 3) and the organic extracts were dried over anhydrous Na_2SO_4, filtered and concentrated under reduced pressure. The crude product was purified by column chromatography on silica gel to obtain 1-methyl-4-(methylsulfinyl)benzene **2a** in 88% yields.

A mixture of methyl(*p*-tolyl)sulfane **1a** (1.0 mmol), CF_3SO_2Na (0.25 mmol) and bis(2-butoxyethyl)ether (1.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 24 h. The progress was monitored by TLC or GC-MS. Upon completion, water (20 mL) was added to the reaction mixture, it was extracted with CH_2Cl_2 (5 mL x 3) and the organic extracts were dried over anhydrous Na_2SO_4, filtered and concentrated under reduced pressure. The crude product was purified by column chromatography on silica gel to obtain 1-methyl-4-(methylsulfonyl)benzene **3a** in 98% yields.

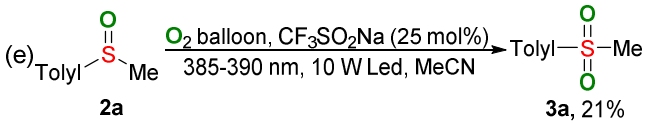
The solid starting materials gradually dissolve into reaction liquid during the oxidation reaction.

3. Mechanism Research



1a **2a** **3a**

	Scavenger	Inhibited species	2a	3a
(a)	TEMPO	Radical	7%	0
(b)	BHT	Radical	5%	0
(c)	1,4-dimethoxybenzene	$R_2\dot{S}^+$	12%	0
(d)	benzoquinone	$\dot{O}_2^-$	4%	<1%



2a **3a**, 21%

(a) Radical trapped experiment (TEMPO):

A mixture of methyl(*p*-tolyl)sulfane **1a** (1.0 mmol), CF_3SO_2Na (0.25 mmol), TEMPO (312 mg, 2.0 mmol) and bis(2-butoxyethyl)ether (1.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm)

for 24 h. GC-MS analysis of the reaction mixture showed that only 7% yield of **2a** was formed.

(b) Radical trapped experiment (BHT):

A mixture of methyl(*p*-tolyl)sulfane **1a** (1.0 mmol), CF_3SO_2Na (0.25 mmol), BHT (440 mg, 2 mmol) and bis(2-butoxyethyl)ether (1 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 24 h. GC-MS analysis of the reaction mixture showed that only 5% yield of **2a** was formed.

(c) Sulfide cation radical trapped experiment:

A mixture of methyl(*p*-tolyl)sulfane **1a** (1.0 mmol) , CF_3SO_2Na (0.25 mmol), 1,4-dimethoxybenzene (276 mg, 2.0 mmol) and bis(2-butoxyethyl)ether (1.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 24 h. GC-MS analysis of the reaction mixture showed that only 12% yield of **2a** was formed.

(d) Superoxide anion radical trapped experiment:

A mixture of methyl(*p*-tolyl)sulfane **1a** (1.0 mmol) , CF_3SO_2Na (0.25 mmol), 1,4-benzoquinone (216 mg, 2.0 mmol) and bis(2-butoxyethyl)ether (1.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 24 h. GC-MS analysis of the reaction mixture showed that 4% yield of **2a** and less than 1% yield of **3a** were formed.

(e) Oxidation of 2a to 3a

A mixture of 1-methyl-4-(methylsulfinyl)benzene **2a** (1.0 mmol), CF_3SO_2Na (0.25 mmol) and MeCN (1.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 24 h. The progress was monitored by TLC or GC-MS. GC-MS analysis of the reaction mixture showed that 21 % yield of **3a** was formed.

(f) UV/Vis Absorption Experiment

(1) The UV-vis absorption spectrum of BE was recorded in 1 cm path quartz cuvette by using a SHIMADZU UV-2600 UV-visible spectrophotometer, respectively. The obtained

bands in UV/vis absorption spectra were shown in Figure S1.

(2) The UV-vis absorption spectrum of O-BE was recorded on SHIMADZU UV-2600 UV-visible spectrophotometer, respectively. BE (3.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 12 h. The resulted solution was stored in 1 cm path quartz cuvette, and UV-vis absorption spectrum was recorded. As shown in Figure S1.

(3) The UV-vis absorption spectrum of CF_3SO_2Na (0.75 mmol) and bis(2-butoxyethyl)ether (3.0 mL) were recorded in 1 cm path quartz cuvette by using a SHIMADZU UV-2600 UV-visible spectrophotometer, respectively. The obtained bands in UV/vis absorption spectra were shown in Figure S1.

(4) The UV-vis absorption spectrum of O-CF_3SO_2Na was recorded on SHIMADZU UV-2600 UV-visible spectrophotometer, respectively. A mixture of F_3CSO_2Na (0.75 mmol) and bis(2-butoxyethyl)ether (3.0 mL) was added to a 10 mL quartz tube with an O_2 balloon at room temperature under the irradiation of 10 W LED lamps (385 – 390 nm) for 12 h. and the reaction mixture was filtered with a filter. The resulted solution was stored in 1 cm path quartz cuvette, and UV-vis absorption spectrum was recorded. As shown in Figure S1.

(5) The UV-vis absorption spectrum of PhSMe (3.0 mmol) and bis(2-butoxyethyl)ether (3.0 mL) were recorded in 1 cm path quartz cuvette by using a SHIMADZU UV-2600 UV-visible spectrophotometer, respectively. The obtained bands in UV/vis absorption spectra were shown in Figure S1.

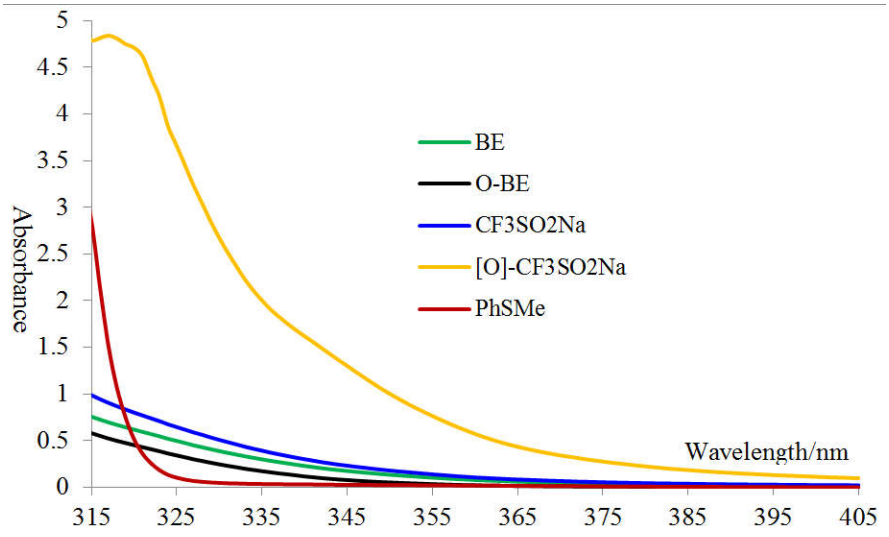


Figure S1. UV-Vis Spectroscopic

4. Characterization data of products

(methylsulfinyl)benzene (2b)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 - 7.59 (m, 2H), 7.48 - 7.46 (m, 3H), 2.67 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.5, 130.9, 129.2, 123.3, 43.8.

1-methyl-4-(methylsulfinyl)benzene (2a)[2]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.53 (d, J = 8.4 Hz, 2H), 7.32 (d, J = 8.0 Hz, 2H), 2.70 (s, 3H), 2.41 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.4, 141.5, 130.0, 123.5, 43.9, 21.4.

1-methoxy-4-(methylsulfinyl)benzene (2c)[2]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (d, J = 8.4 Hz, 2H), 7.03 (d, J = 8.8 Hz, 2H), 3.86 (s, 3H), 2.70 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 161.9, 136.5, 125.4, 114.8, 55.5, 44.0.

1-fluoro-4-(methylsulfinyl)benzene (2d)[3]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 - 7.63 (m, 2H), 7.25 - 7.20 (m, 2H), 2.71 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 164.3 (d, J = 249.8 Hz), 141.1, 125.9 (d, J = 8.9 Hz), 116.7 (d, J = 22.4 Hz), 44.1; ^{19}F NMR (376 MHz, $CDCl_3$) δ -108.6.

1-chloro-4-(methylsulfinyl)benzene (2e)[3]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (d, J = 8.8 Hz, 2H), 7.51 (d, J =8.8 Hz, 2H), 2.71 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.2, 137.2, 129.6, 124.9, 44.0.

1-bromo-4-(methylsulfinyl)benzene (2f)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 (d, J = 8.8 Hz, 2H), 7.52 (d, J = 8.8 Hz, 2H), 2.71 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.8, 132.6, 125.4, 125.1, 43.9.

1-(4-(methylsulfinyl)phenyl)ethanone (2g)[4]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.11 (d, J = 8.8 Hz, 2H), 7.75 (d, J = 8.8 Hz, 2H), 2.76 (s, 3H), 2.65 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 197.1, 150.9, 139.1, 129.2, 123.7, 43.8, 26.8.

methyl 4-(methylsulfinyl)benzoate (2h)[3]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19 (d, J = 8.8 Hz, 2H), 7.71 (d, J = 8.4 Hz, 2H), 3.94 (s, 3H), 2.75 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ

166.0, 150.8, 132.6, 130.5, 123.5, 52.5, 43.8.

4-(methylsulfinyl)benzonitrile (2i)[3]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.4 Hz, 2H), 7.76 (d, *J* = 8.8 Hz, 2H), 2.75 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.4, 133.0, 124.3, 117.6, 114.8, 43.8.

1-methyl-3-(methylsulfinyl)benzene (2j)[5]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47 (s, 1H), 7.40 - 7.37 (m, 2H), 7.30 - 7.28 (m, 1H), 2.70 (s, 3H), 2.42 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.5, 139.6, 131.8, 129.1, 123.7, 120.6, 43.9, 21.4.

1-chloro-3-(methylsulfinyl)benzene (2k)[6]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 - 7.66 (m, 1H), 7.52 - 7.46 (m, 3H), 2.74 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.9, 135.7, 131.2, 130.6, 123.7, 121.6, 44.0.

1-methyl-2-(methylsulfinyl)benzene (2l)[7]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94 (d, *J* = 7.6 Hz, 1H), 7.45 - 7.35 (m, 2H), 7.19 (d, *J* = 7.6 Hz, 1H), 2.67 (s, 3H), 2.36 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.9, 133.9, 130.7, 130.6, 127.4, 122.9, 42.0, 18.0.

1-bromo-2-(methylsulfinyl)benzene (2m)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 (dd, *J* = 8.0, 1.6 Hz, 1H), 7.53 - 7.48 (m, 2H), 7.32 - 7.28 (m, 1H), 2.74 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.1, 132.7, 132.1, 128.5, 125.4, 118.2, 41.7.

1,4-bis(methylsulfinyl)benzene (2n)[8]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (s, 4H), 2.77 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.2, 124.5, 44.0 (d, *J* = 3.7 Hz).

2-(methylsulfinyl)naphthalene (2o)[3]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.22 (s, 1H), 7.99 (d, *J* = 8.8 Hz, 1H), 7.96 - 7.90 (m, 2H), 7.62 - 7.59 (m, 3H), 2.80 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 134.4, 132.9, 129.6, 128.5, 128.1, 127.8, 127.4, 124.1, 119.4, 43.8.

6-(methylsulfinyl)quinoline (2p)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.01 (s, 1H), 8.28 - 8.22 (m, 3H), 7.79 - 7.77 (m, 1H), 7.52 (q, *J* = 4.0 Hz, 1H), 2.80 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 152.0, 149.0, 143.7, 136.5, 131.1, 128.1, 124.0, 123.1, 122.3, 43.7.

2-(methylsulfinyl)pyridine (2q)[9]: Flash chromatography (200-300 mesh silica gel, eluent

(petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (d, *J* = 4.0 Hz, 1H), 8.02 (d, J = 8.0 Hz, 1H), 7.96 - 7.92 (m, 1H), 7.40 - 7.36 (m, 1H), 2.85 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.9, 149.5, 138.1, 124.6, 119.3, 41.3.

2-methyl-3-(methylsulfinyl)furan (2r)[9]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 1 : 2); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 (d, *J* = 2.1 Hz, 1H), 6.72 (d, *J* = 2.0 Hz, 1H), 2.81 (s, 3H), 2.46 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.2, 142.6, 123.7, 106.1, 40.9, 12.3.

2-(methylsulfinyl)thiophene (2s)[9]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 1 : 2); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 - 7.63 (m, 1H), 7.49 - 7.48 (m, 1H), 7.13 - 7.10 (m, 1H), 2.92 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 147.3, 130.8, 129.3, 127.4, 44.4.

(ethylsulfinyl)benzene (2t)[2]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 - 7.58 (m, 2H), 7.54 - 7.46 (m, 3H), 2.94 - 2.85 (m, 1H), 2.81 - 2.72 (m, 1H), 1.19 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.2, 130.9, 129.1, 124.1, 50.3, 5.9.

(cyclopropylsulfinyl)benzene (2u)[6]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66 - 7.58 (m, 2H), 7.49 - 7.42 (m, 3H), 2.24 - 2.18 (m, 1H), 1.21 - 1.14 (m, 1H), 1.01 - 0.95 (m, 1H), 0.91 - 0.83 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 130.8, 129.0, 123.8, 33.6, 3.2, 2.6.

((2-chloroethyl)sulfinyl)benzene (2v)[10]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 3 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 - 7.58 (m, 2H), 7.54 - 7.47 (m, 3H), 3.97 - 3.90 (m, 1H), 3.65 - 3.59 (m, 1H), 3.17 - 3.12 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.6, 131.3, 129.4, 123.8, 59.2, 36.6.

2-(phenylsulfinyl)ethanol (2w)[11]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, DMSO-*d6*) δ 7.66 - 7.64 (m, 2H), 7.60 - 7.53 (m, 3H), 5.16 (dd, *J* = 5.6, 4.8 Hz, 1H), 3.84 - 3.76 (m, 1H), 3.66 - 3.61 (m, 1H), 3.02 – 2.95 (m, 1H), 2.89 - 2.83 (m, 1H); ^{13}C NMR (100 MHz, DMSO-*d6*) δ 145.1, 131.5, 130.0, 124.6, 60.6, 55.0.

dibenzo[*b,d*]thiophene 5-oxide (2x)[12]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 7.6 Hz, 2H), 7.79 (d, *J* = 8.0 Hz, 2H), 7.65 - 7.61 (m, 2H), 7.54 - 7.50 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.7, 133.9, 131.6, 130.3, 122.1, 121.6.

thianthrene 5-oxide (2y)[13]: Flash chromatography (200-300 mesh silica gel, eluent

(petroleum ether/ethyl acetate = 3 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94 (dd, *J* = 7.6, 1.2 Hz, 2H), 7.64 (dd, *J* = 8.0, 0.8 Hz, 2H), 7.56 (td, *J* = 7.6, 1.2 Hz, 2H), 7.44 (td, *J* = 7.6, 1.6 Hz, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.4, 129.8, 129.0, 128.4, 124.5.

sulfinyldibenzene (2z)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66 - 7.63 (m, 4H), 7.48 - 7.43 (m, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.6, 131.0, 129.3, 124.8.

1-methyl-4-(phenylsulfinyl)benzene (2aa)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 - 7.59 (m, 2H), 7.51 (d, *J* = 8.4 Hz, 4H), 7.44 - 7.38 (m, 3H), 7.22 (d, *J* = 8.0 Hz, 2H), 2.32 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.6, 142.3, 141.5, 130.7, 129.9, 129.1, 124.8, 124.5, 21.2.

1-(*tert*-butyl)-4-(phenylsulfinyl)benzene (2ab)[14]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64 - 7.62 (m, 2H), 7.55 (d, *J* = 8.4 Hz, 4H), 7.45 - 7.37 (m, 5H), 1.26 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.5, 145.4, 142.1, 130.7, 129.1, 126.2, 124.6, 124.5, 34.7, 31.0.

1-methoxy-4-(phenylsulfinyl)benzene (2ac)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.62 - 7.59 (m, 2H), 7.57 (d, *J* = 9.2 Hz, 2H), 7.48 - 7.42 (m, 3H), 6. 95 (d, *J* = 8.8 Hz, 2H), 3.81 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.0, 145.8, 136.8, 130.7, 129.2, 127.2, 124.6, 114.8, 55.5.

1-bromo-4-(phenylsulfinyl)benzene (2ad)[14]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64 - 7.58 (m, 4H), 7.52 7.46 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.2, 144.8, 132.5, 131.4, 129.5, 126.2, 125.6, 124.7.

4,4'-sulfinylbis(methylbenzene) (2ae)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 8.4 Hz, 4H), 7.25 (d, *J* = 8.4 Hz, 4H), 2.36 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.6, 141.4, 129.9, 124.9, 21.4.

2-(phenylsulfinyl)naphthalene (2af)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.31 (s, 1H), 7.96 - 7.92 (m, 1H), 7.87 - 7.82 (m, 2H), 7.70 - 7.68 (m, 2H), 7.58 - 7.55 (m, 2H), 7.52 - 7.42 (m, 4H); ^{13}C NMR (100 MHz, CDCl3) δ 145.3, 142.4, 134.3, 132.7, 131.1, 129.7, 129.3, 128.6, 128.0, 127.9, 127.2, 125.3, 124.9, 120.6.

6-(phenylsulfinyl)quinoline (2ag)[15]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, CDCl3) δ 8.99 (s, 1H), 8.34 (d, J

= 2.0 Hz, 1H), 8.29 (d, J = 7.6 Hz, 1H), 8.15 (d, J = 8.8 Hz, 1H), 7.72 - 7.69 (m, 3H), 7.53 - 7.46 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 151.9, 148.9, 145.0, 143.6, 136.8, 131.5, 131.1, 129.5, 125.1, 124.8, 124.5, 122.3.

(methylsulfonyl)benzene (3b)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 - 7.93 (m, 2H), 7.68 - 7.63 (m, 1H), 7.59 - 7.55 (m, 2H), 3.05 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.5, 133.7, 129.3, 127.3, 44.4.

1-methyl-4-(methylsulfonyl)benzene (3a)[16]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.4 Hz, 2H), 7.36 (d, *J* = 8.0 Hz, 2H), 3.03 (s, 3H), 2.44 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.6, 137.7. 129.9, 127.3, 44.6, 21.6.

1-methoxy-4-(methylsulfonyl)benzene (3c)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 (d, *J* = 9.2 Hz, 2H), 7.02 (d, *J* = 9.2 Hz, 2H), 3.88 (s, 3H), 3.03 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 163.7, 132.3, 129.5, 114.5, 55.7, 44.8.

1-fluoro-4-(methylsulfonyl)benzene (3d)[18]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.97 - 7.93 (m, 2H), 7.25 - 7.21 (m, 2H), 3.04 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.8 (d, *J* = 254.7 Hz), 136.7 (d, *J* = 3.2 Hz), 130.3 (d, *J* = 9.6 Hz), 116.7 (d, *J* = 22.6 Hz), 44.6; ^{19}F NMR (376 MHz, $CDCl_3$) δ -103.5.

1-chloro-4-(methylsulfonyl)benzene (3e)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 (d, *J* = 8.8 Hz, 2H), 7.53 (d, *J* = 8.4 Hz, 2H), 3.04 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.3, 138.9, 129.6, 128.8, 44.4.

1-bromo-4-(methylsulfonyl)benzene (3f)[19]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, *J* = 8.8 Hz, 2H), 7.72 (d, *J* = 8.8 Hz, 2H), 3.05 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.5, 132.7, 129.0, 44.5.

1-(4-(methylsulfonyl)phenyl)ethanone (3g)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.12 (d, *J* = 8.0 Hz, 2H), 8.04 (d, *J* = 8.0 Hz, 2H), 3.08 (s, 3H), 2.66 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 196.6, 144.2, 140.9, 129.1, 127.8, 44.3, 26.9.

methyl 4-(methylsulfonyl)benzoate (3h)[17]: Flash chromatography (200-300 mesh silica gel,

eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.23 (d, *J* = 8.8 Hz, 2H), 8.03 (d, *J* = 8.4 Hz, 2H), 3.97 (s, 3H), 3.08 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 165.4, 144.3, 134.9, 130.5, 127.5, 52.7, 44.3.

4-(methylsulfonyl)benzonitrile (3i)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.08 (d, *J* = 8.8 Hz, 2H), 7.89 (d, *J* = 8.8 Hz, 2H), 3.09 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.5, 133.2, 128.2, 117.6, 117.0, 44.2.

1-methyl-3-(methylsulfinyl)benzene (3j)[5]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (s, 1H), 7.73 - 7.71 (m, 1H), 7.45 - 7.44 (m, 2H), 3.03 (s, 3H), 2.44 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.4, 139.6, 134.4, 129.2, 127.6, 124.4, 44.4, 21.3.

1-chloro-3-(methylsulfonyl)benzene (3k)[20]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94 (t, *J* = 2.0 Hz, 1H), 7.85 - 7.83 (m, 1H), 7.65 - 7.62 (m, 1H), 7.53 (t, *J* = 8.0 Hz, 1H), 3.07 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 142.2, 135.6, 133.9, 130.7, 127.6, 125.5, 44.4.

1-methyl-2-(methylsulfinyl)benzene (3l)[7]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (dd, J = 8.0, 1.2 Hz, 1H), 7.51 (td, J = 7.6, 1.6 Hz, 1H), 7.39 - 7.32 (m, 2H), 3.06 (s, 3H), 2.70 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.6, 137.5, 133.6, 132.7, 129.2, 126.7, 43.6, 20.2.

2-(methylsulfonyl)naphthalene (3m)[20]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.53 (s, 1H), 8.01 (t, *J* = 8.0 Hz, 2H), 7.95 - 7.89 (m, 2H), 7.70 - 7.62 (m, 2H), 3.12 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 137.4, 135.3, 132.2, 129.7, 129.4, 129.3, 129.0, 128.0, 127.8, 122.1, 44.5.

6-(methylsulfonyl)quinoline (3n)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 6 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.10 (dd, *J* = 4.4, 1.6 Hz, 1H), 8.54 (d, *J* = 2.0 Hz, 1H), 8.35 - 8.30 (m, 2H), 8.16 (dd, *J* = 8.8, 2.0 Hz, 1H), 7.59 (q, *J* = 4.0 Hz, 1H), 3.15 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.5, 149.7, 138.3, 137.5, 131.5, 129.2, 127.3, 126.0, 122.8, 44.5.

(ethylsulfonyl)benzene (3o)[18]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 8 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 - 7.89 (m, 2H), 7.67 - 7.63 (m, 1H), 7.59 - 7.54 (m, 2H), 3.11 (q, *J* = 7.6 Hz, 2H), 1.27 (t, *J* = 7.6 Hz, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.5, 133.6, 129.2, 128.2, 50.5, 7.4.

sulfonyldibenzene (3p)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum

ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 - 7.92 (m, 4H), 7.56 - 7.52 (m, 2H), 7.50 - 7.46 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.5, 133.1, 129.2, 127.5.

1-methyl-4-(phenylsulfonyl)benzene (3q)[21]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 - 7.90 (m, 2H), 7.82 (d, *J* = 8.4 Hz, 4H), 7.53 - 7.45 (m, 3H), 7.28 (d, *J* = 8.0 Hz, 2H), 2.37 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.1, 141.9, 138.5, 132.9, 129.8, 129.1, 127.6, 127.4, 21.5.

1-(*tert*-butyl)-4-(phenylsulfonyl)benzene (3r)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 (d, *J* = 7.2 Hz, 2H), 7.86 (d, *J* = 8.4 Hz, 2H), 7.56 - 7.47 (m, 5H), 1.29 (s, 9H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.0, 141.9, 138.5, 132.9, 129.2, 127.5, 127.5, 126.2, 35.1, 31.0.

1-methoxy-4-(phenylsulfonyl)benzene (3s)[21]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.89 - 7.83 (m, 4H), 7.51 - 7.41 (m, 3H), 6. 92 (d, *J* = 9.2 Hz, 2H), 3.78 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 163.2, 142.1, 132.8, 132.7, 129.6, 129.0, 127.1, 114.5, 55.5.

1-bromo-4-(phenylsulfonyl)benzene (3t)[1]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.93 (d, J = 8.8 Hz, 2H), 7.80 (d, J = 8.8 Hz, 2H), 7.64 (d, J = 8.8 Hz, 2H), 7.58 (t, *J* = 7.2 Hz, 1H), 7.53 - 7.49 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.1, 140.7, 133.4, 132.6, 129.4, 129.2, 128.4, 127.6.

4,4'-sulfonylbis(methylbenzene) (3u)[21]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, *J* = 8.0 Hz, 4H), 7.28 (d, *J* = 8.0 Hz, 4H), 2.38 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.9, 139.0, 129.8, 127.5, 21.5.

2-(phenylsulfonyl)naphthalene (3v)[21]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58 (s, 1H), 8.02 - 7.97 (m, 3H), 7.94 - 7.84 (m, 3H), 7.65 - 7.47 (m, 5H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 141.6, 138.4, 135.0, 133.1, 132.2, 129.6, 129.4, 129.3, 129.1, 129.1, 127.9, 127.7, 127.6, 122.6.

6-(phenylsulfonyl)quinoline (3w)[17]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.02 (dd, J = 4.4, 1.6 Hz, 1H), 8.57 (d, J = 2.0 Hz, 1H), 8.29 (dd, J = 8.4, 0.8 Hz, 1H), 8.18 (d, J = 9.2 Hz, 1H), 8.08 (dd, J = 8.8, 2.0 Hz, 1H), 8.01 - 7.99 (m, 2H), 7.58 - 7.48 (m, 4H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.2, 149.4, 141.0, 139.2, 137.3, 133.4, 131.3, 129.4, 129.0, 127.8, 127.3, 126.4,

122.6.

dibenzo[*b,d*]thiophene 5,5-dioxide (3x)[16]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 10 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00 (d, *J* = 7.6 Hz, 2H), 7.82 (d, *J* = 7.6 Hz, 2H), 7.63 - 7.59 (m, 2H), 7.53 - 7.49 (m, 2H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.2, 137.1, 132.6, 129.6, 127.6, 121.9.

isopropyl 2-methyl-2-(4-(4-(methylsulfinyl)benzoyl)phenoxy)propanoate (4a)[22]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 1 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (d, *J* = 8.4 Hz, 2H), 7.77 - 7.74 (m, 4H), 6.88 (d, *J* = 8.8 Hz, 2H), 5.13 - 5.04 (m, 1H), 2.78 (s, 3H), 1.67 (s, 6H), 1.21 (d, *J* = 6.4 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 194.3, 173.0, 160.0, 149.5, 140.7, 132.1, 130.4, 129.8, 123.4, 117.3, 79.5, 69.4, 43.9, 25.4, 21.5.

isopropyl 2-methyl-2-(4-(4-(methylsulfonyl)benzoyl)phenoxy)propanoate (4b)[22]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.05 (d, *J* = 8.8 Hz, 2H), 7.88 (d, *J* = 8.4 Hz, 2H), 7.74 (d, *J* = 9.2 Hz, 2H), 6.87 (d, *J* = 8.8 Hz, 2H), 5.11 - 5.04 (m, 1H), 3.10 (s, 3H), 1.66 (s, 6H), 1.20 (d, *J* = 6.4 Hz, 6H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 193.8, 172.9, 160.3, 143.0, 143.0, 132.1, 130.1, 129.3, 127.4, 117.3, 79.5, 69.4, 44.4, 25.3, 21.5.

2-((4-methoxyphenyl)sulfonyl)-1,3,5-trimethylbenzene (4c)[23]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 5 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 9.2 Hz, 2H), 6.95 - 6.91 (m, 4H), 3.84 (s, 3H), 2.59 (s, 6H), 2.28 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 162.7, 143.0, 139.8, 135.2, 134.5, 132.1, 128.5, 114.0, 55.6, 22.8, 21.0.

2-(4-(methylsulfonyl)phenyl)imidazo[1,2-a]pyridine (4d)[24]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 4 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.17 - 8.14 (m, 3H), 8.01 - 7.99 (m, 3H), 7.69 (d, *J* = 9.2 Hz, 1H), 7.27 - 7.23 (m, 2H), 6.88 - 6.84 (m, 1H), 3.09 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 145.8, 143.2, 139.4, 138.9, 127.9, 126.6, 125.9, 125.8, 117.7, 113.3, 109.7, 44.6.

5-chloro-6'-methyl-3-(4-(methylsulfonyl)phenyl)-2,3'-bipyridine (4e)[25]: Flash chromatography (200-300 mesh silica gel, eluent (petroleum ether/ethyl acetate = 2 : 1); ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.72 (d, *J* = 2.4 Hz, 1H), 8.38 (d, *J* = 2.0 Hz, 1H), 7.90 (d, *J* = 8.8 Hz, 2H), 7.73 (d, *J* = 2.4 Hz, 1H), 7.57 (dd, *J* = 8.0, 2.4 Hz, 1H), 7.40 (d, *J* = 8.4 Hz, 2H), 7.10 (d, *J* = 8.0 Hz, 1H), 3.08 (s, 3H), 2.54 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.5, 152.3, 149.7, 148.4, 143.8, 140.2, 138.0, 137.4, 135.3, 31.3, 131.1, 130.3, 127.9, 122.9, 44.5, 24.2.

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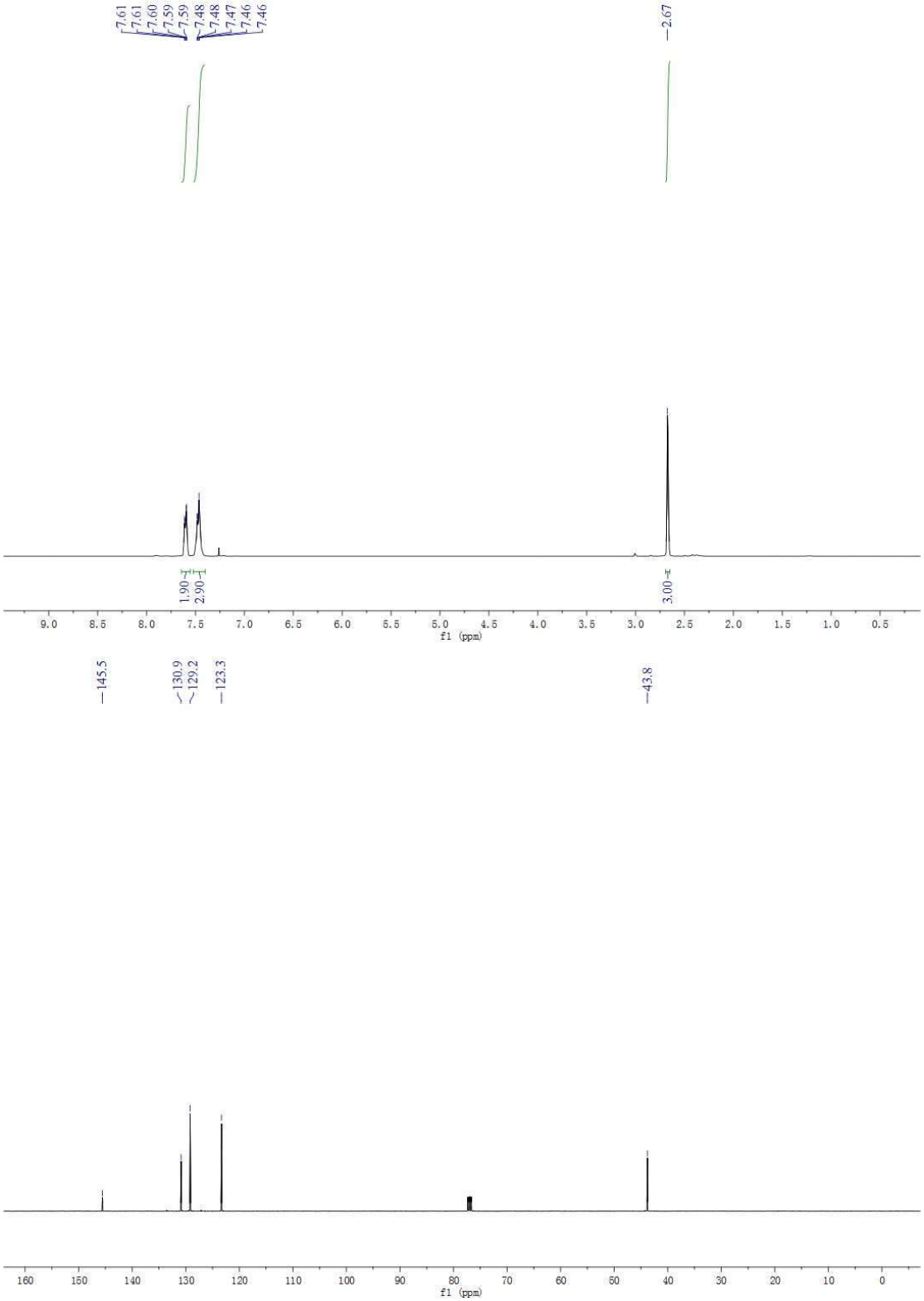
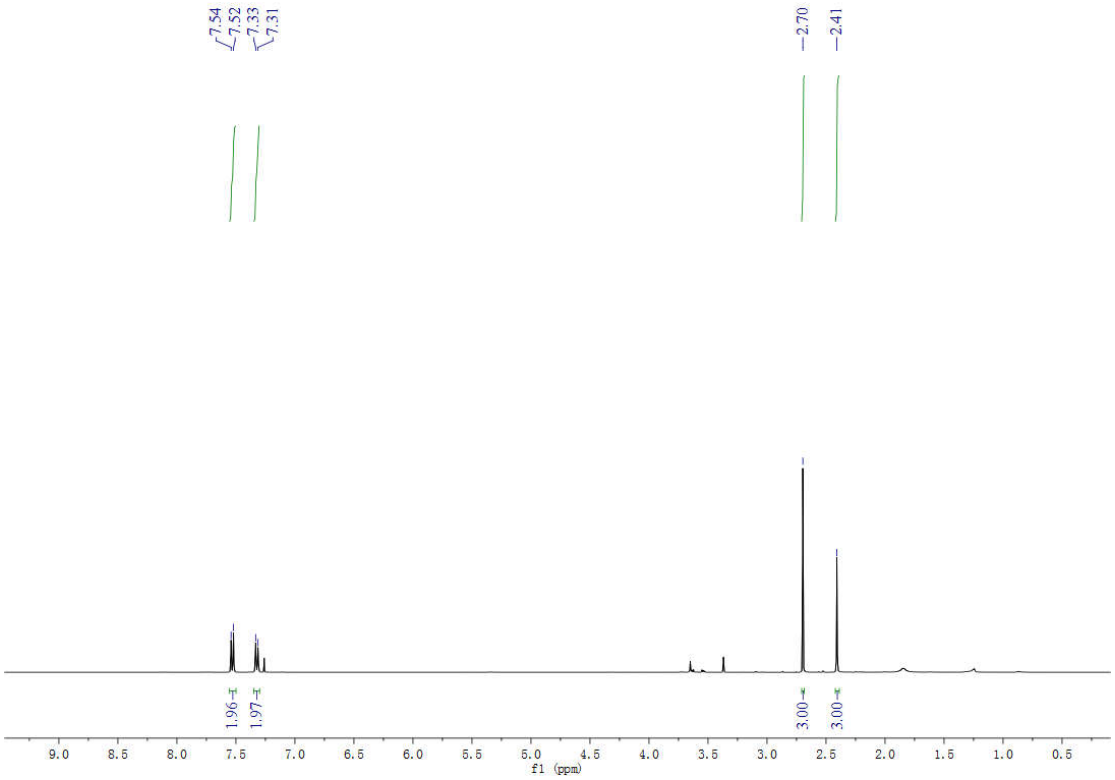
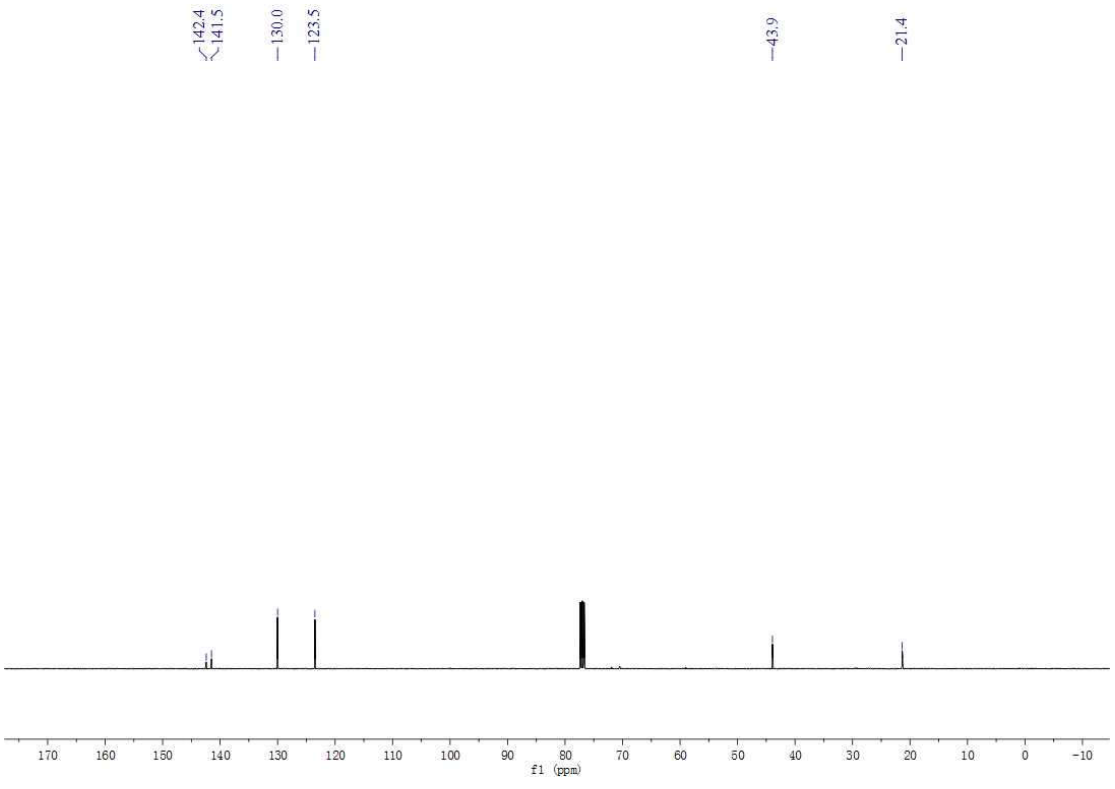
6. ^{1}H and ^{13}C NMR spectra of products

(methylsulfinyl)benzene (2b)



1-methyl-4-(methylsulfinyl)benzene (2a)





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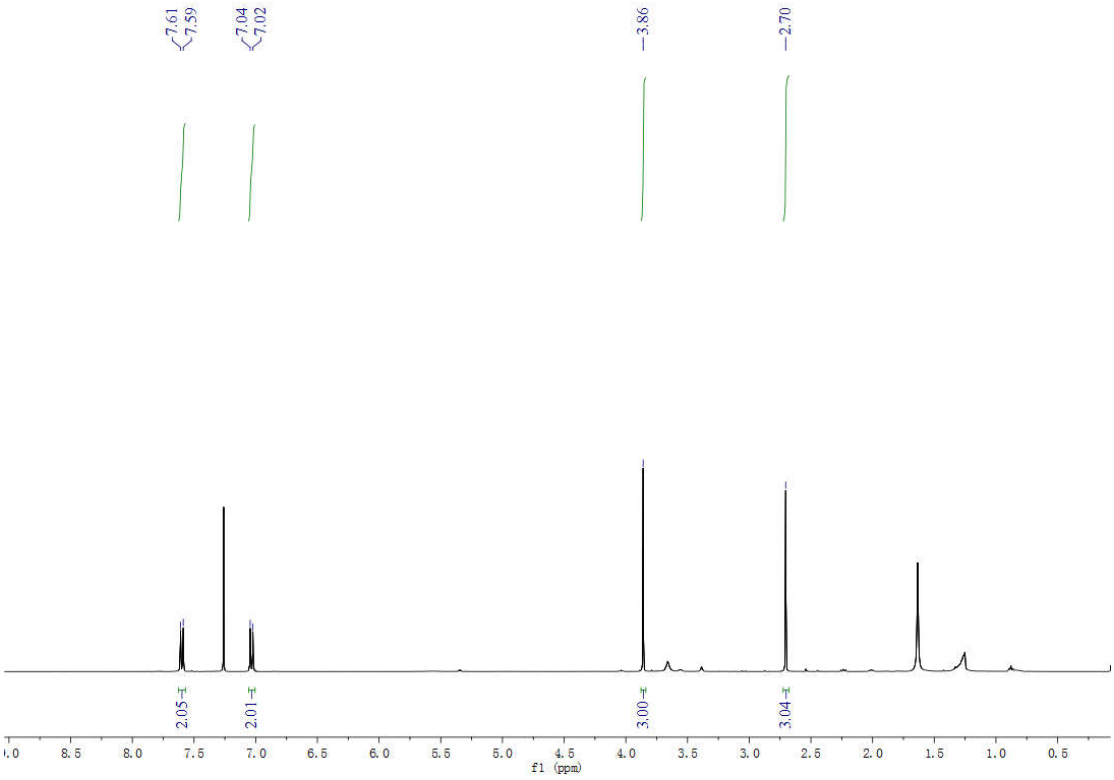
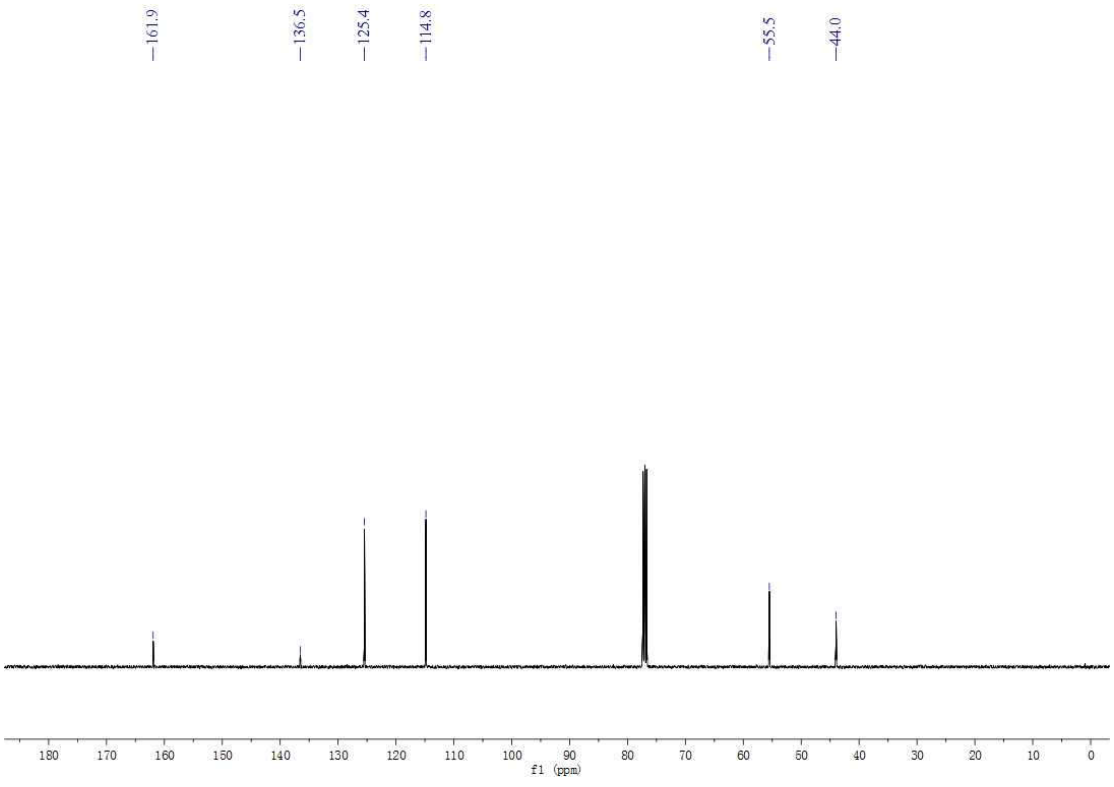
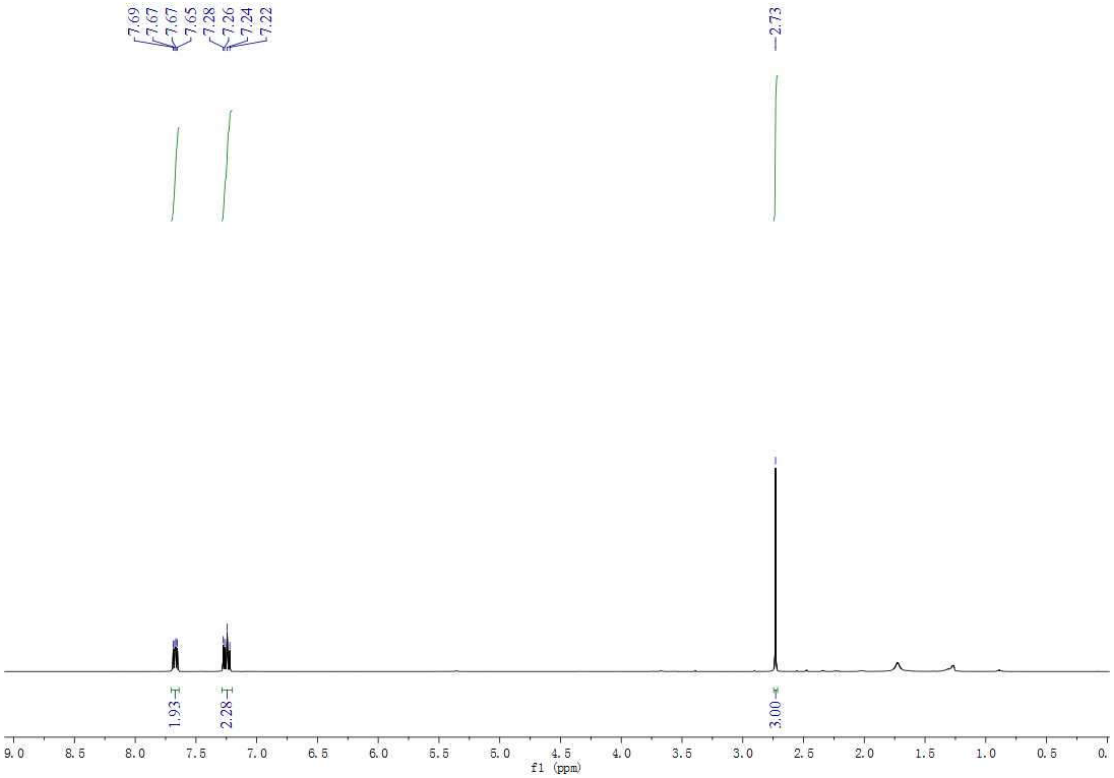
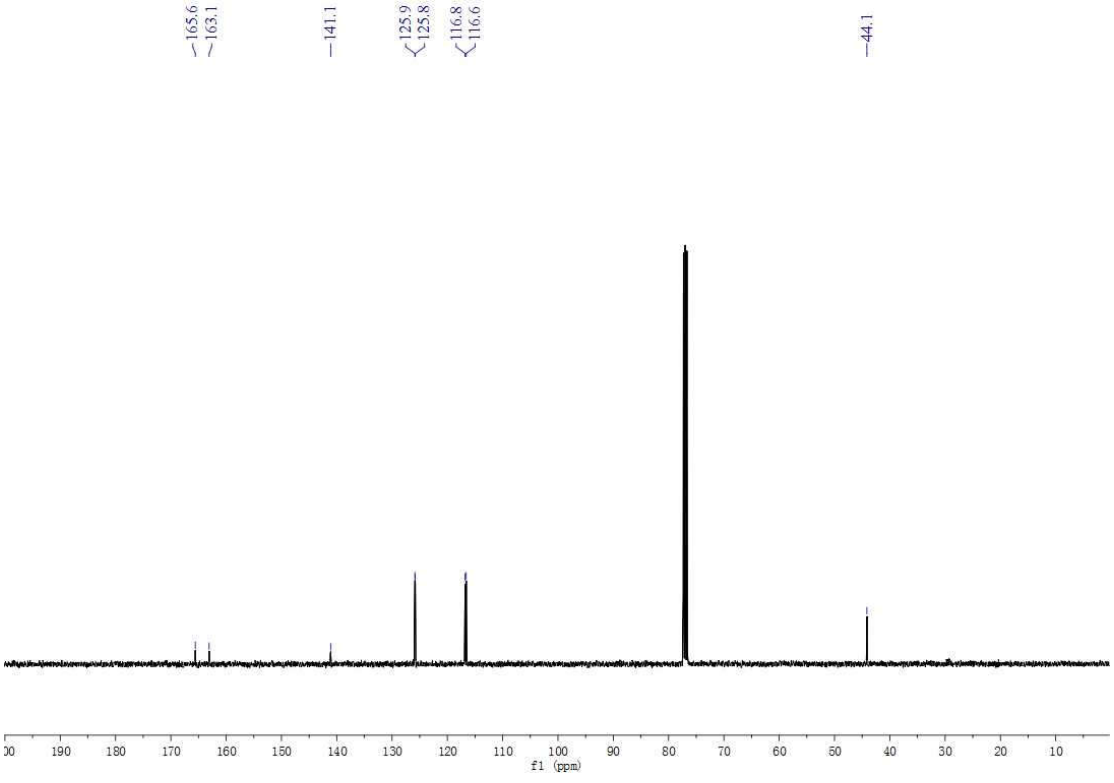
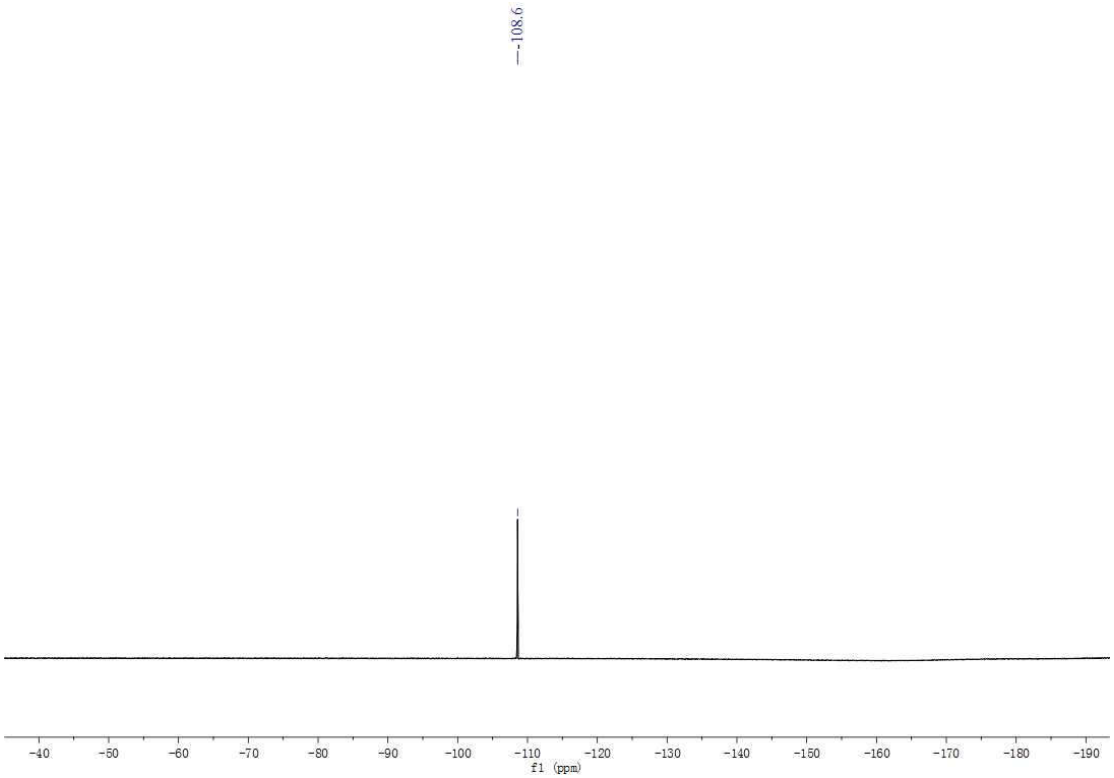




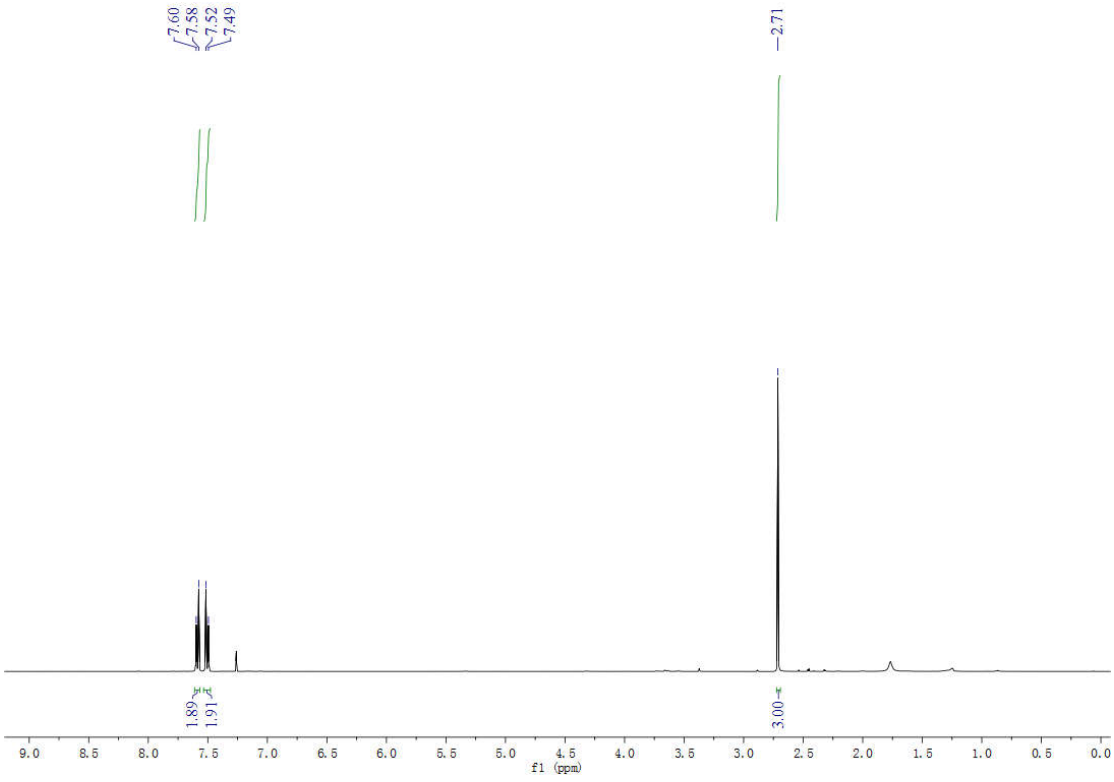
1-fluoro-4-(methylsulfinyl)benzene (2d)

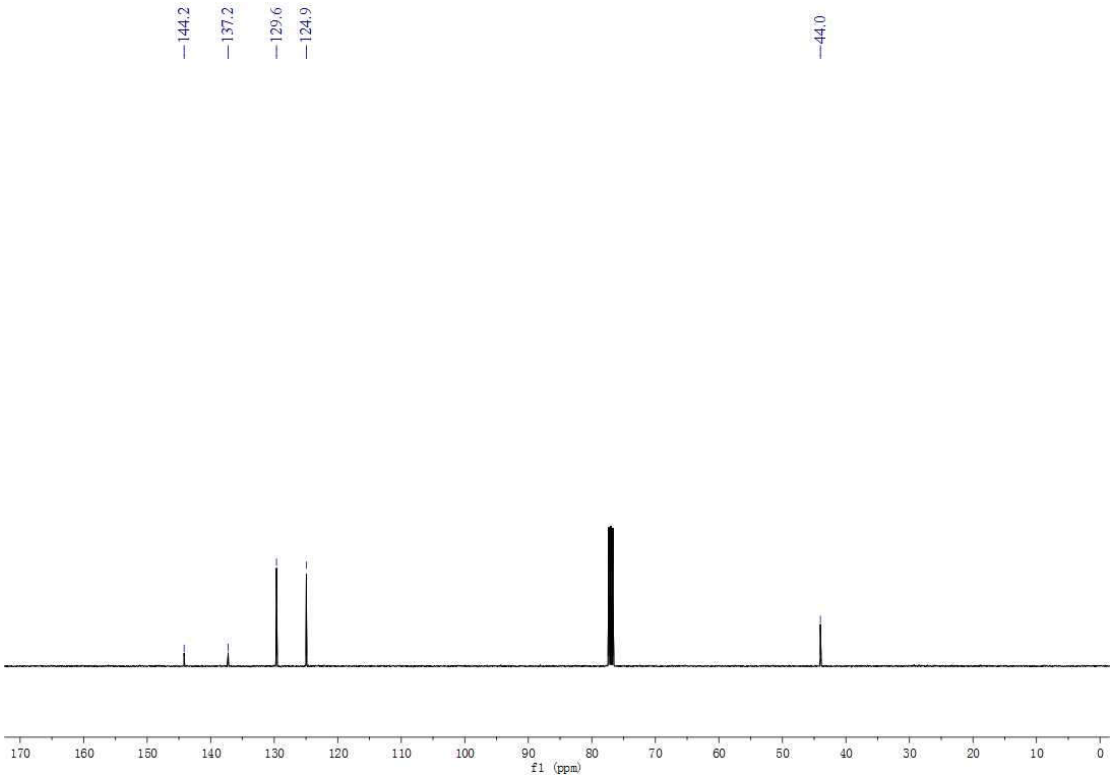




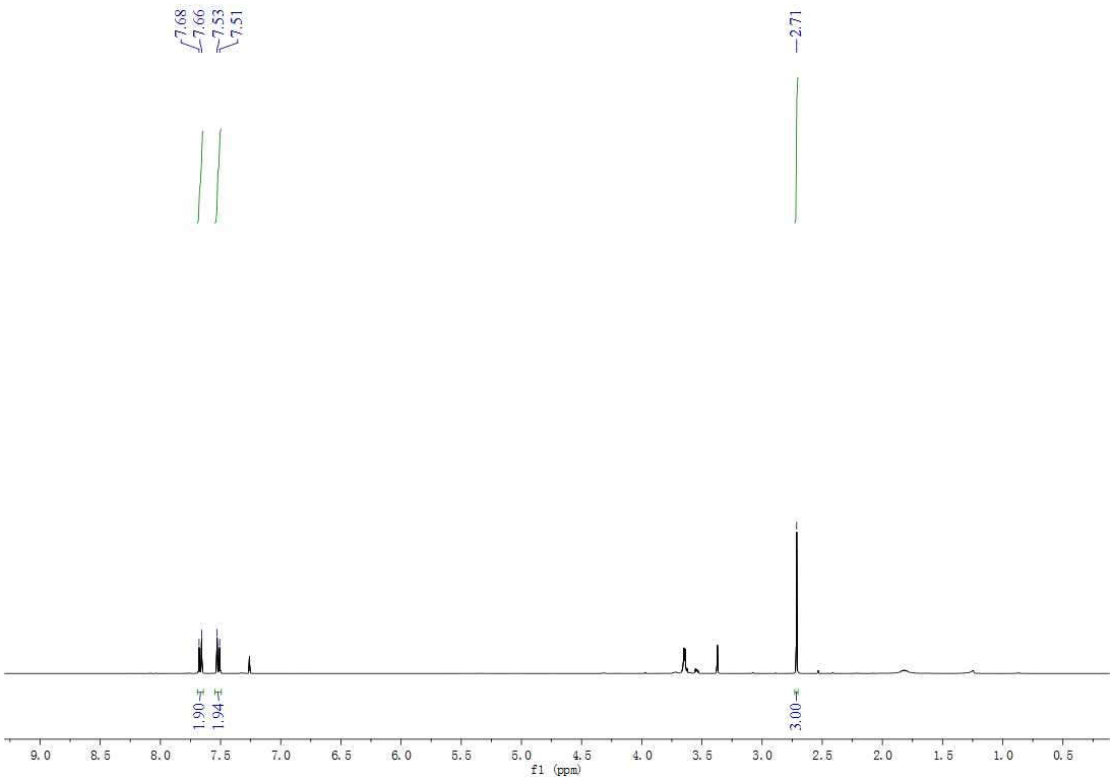


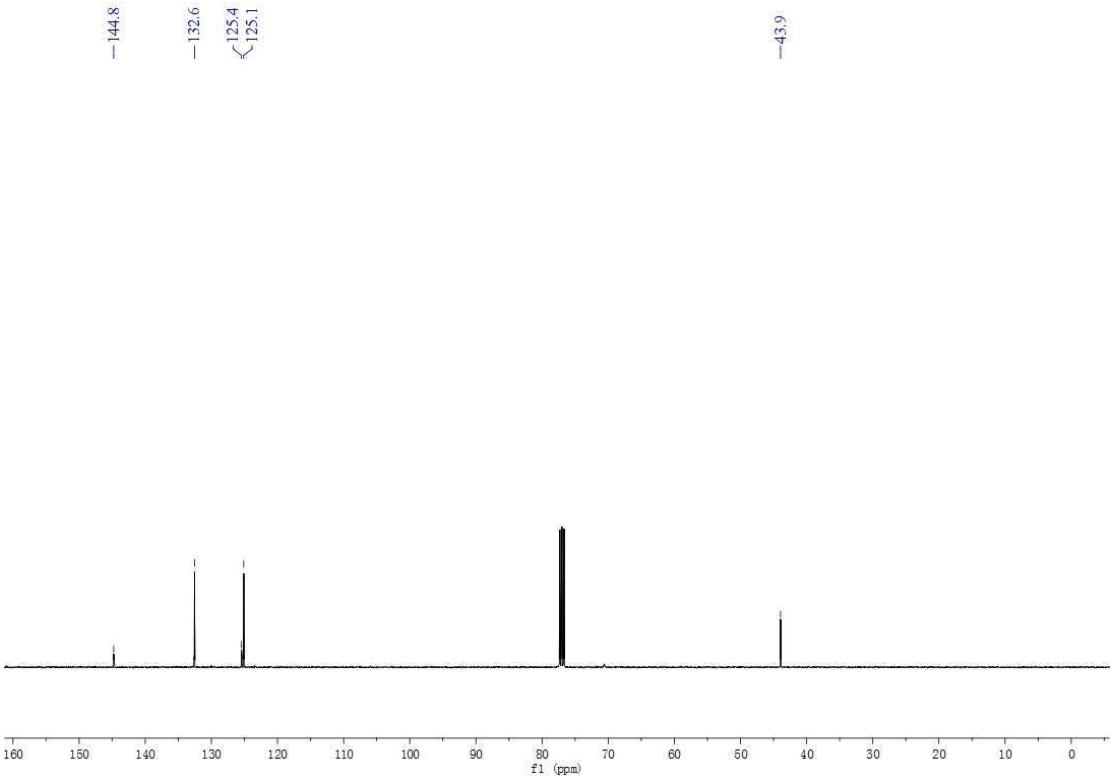
1-chloro-4-(methylsulfinyl)benzene (2e)



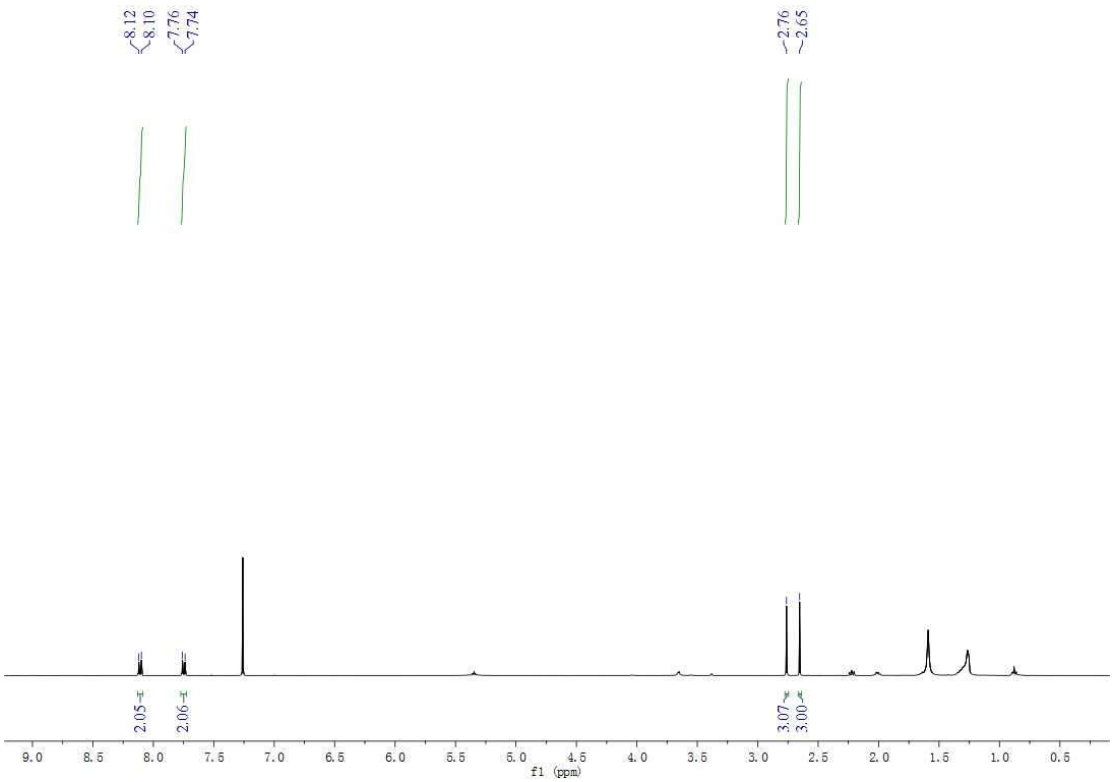


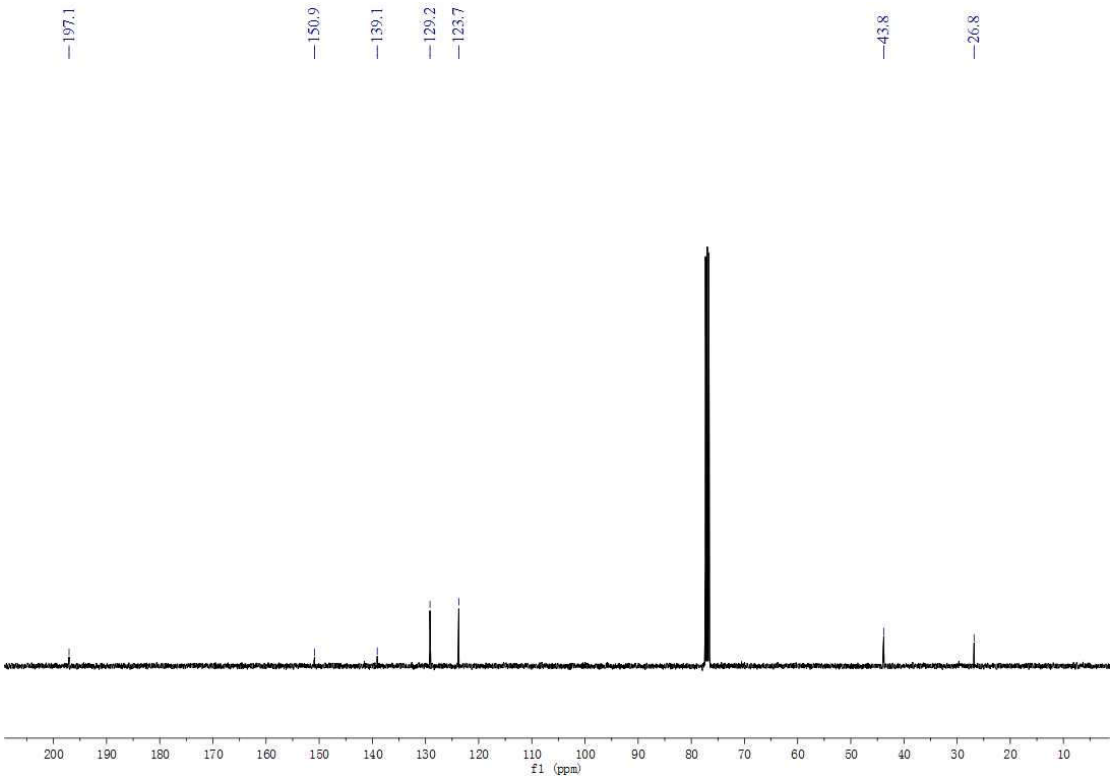
1-bromo-4-(methylsulfinyl)benzene (2f)



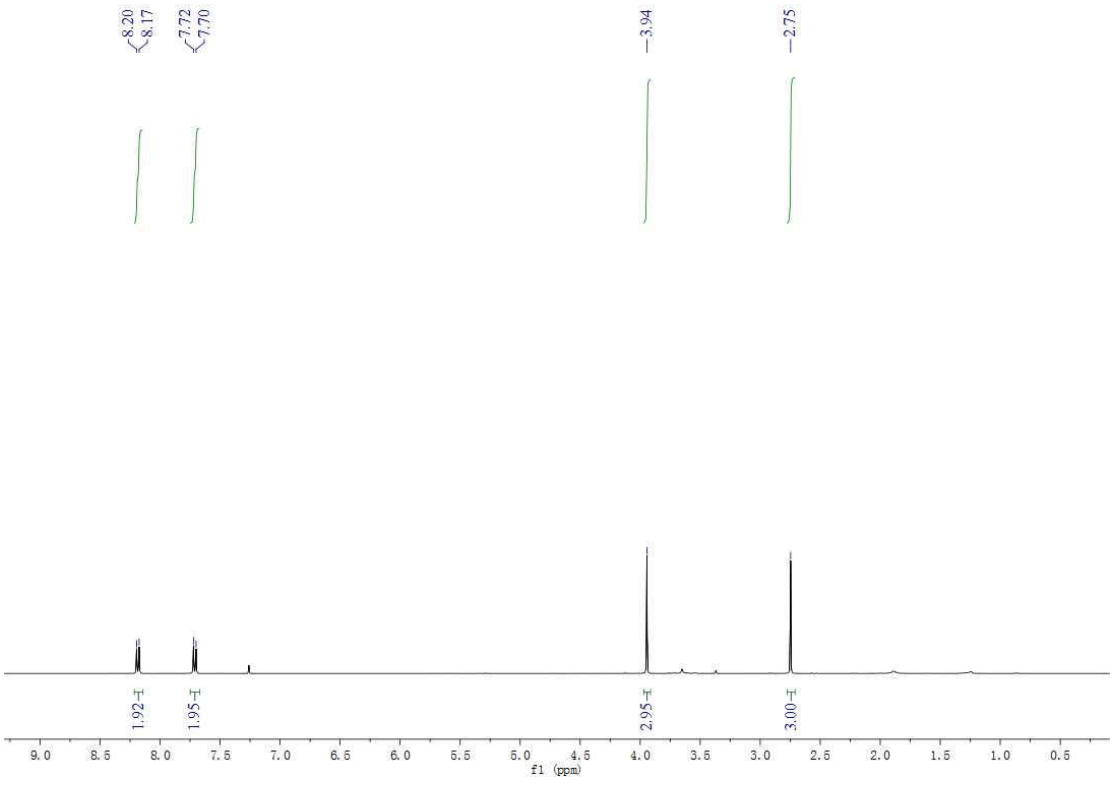


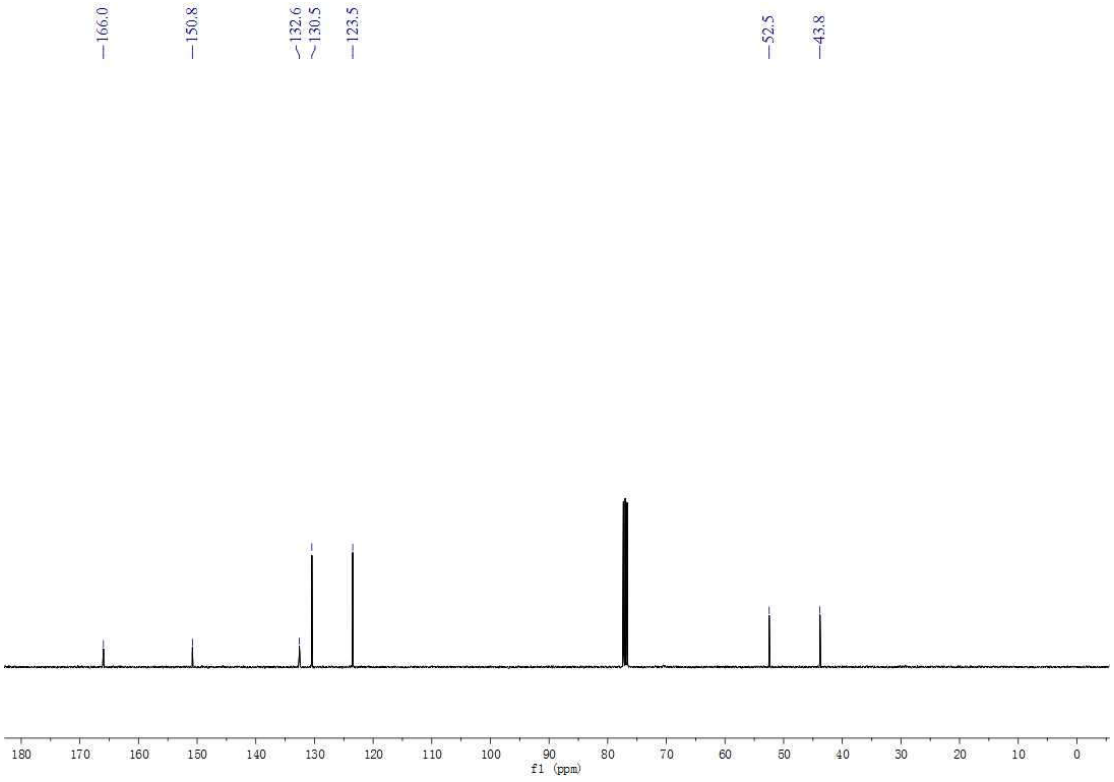
1-(4-(methylsulfinyl)phenyl)ethanone (2g)



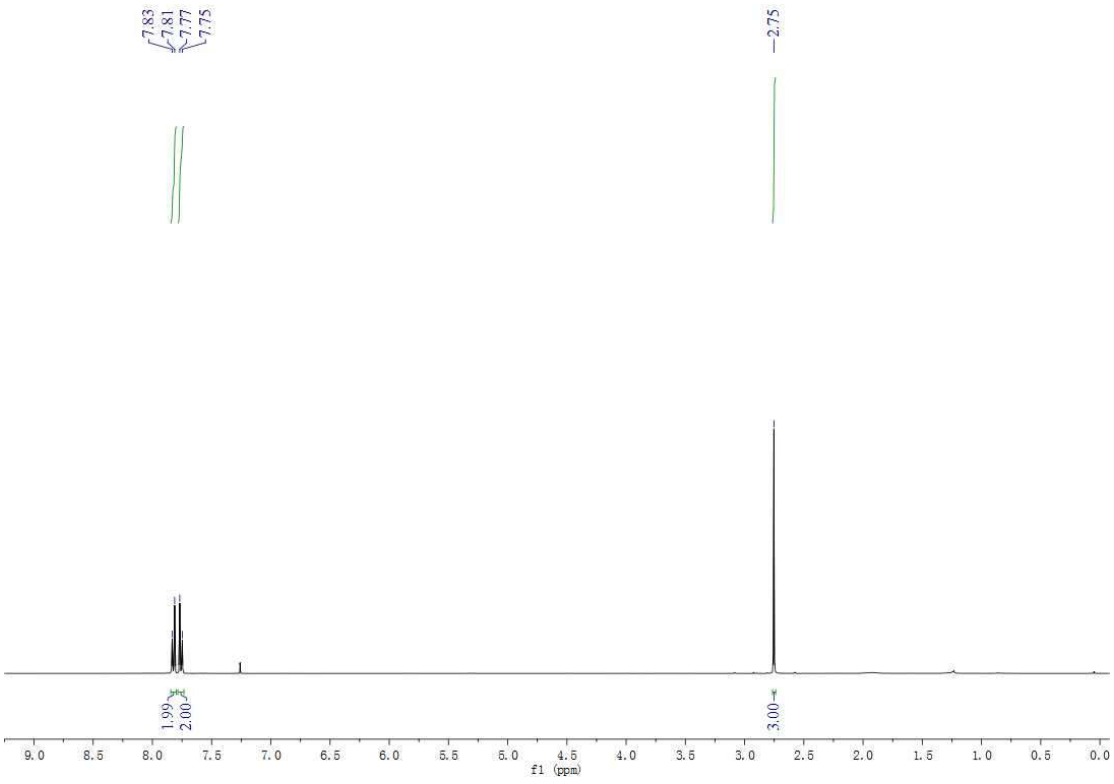


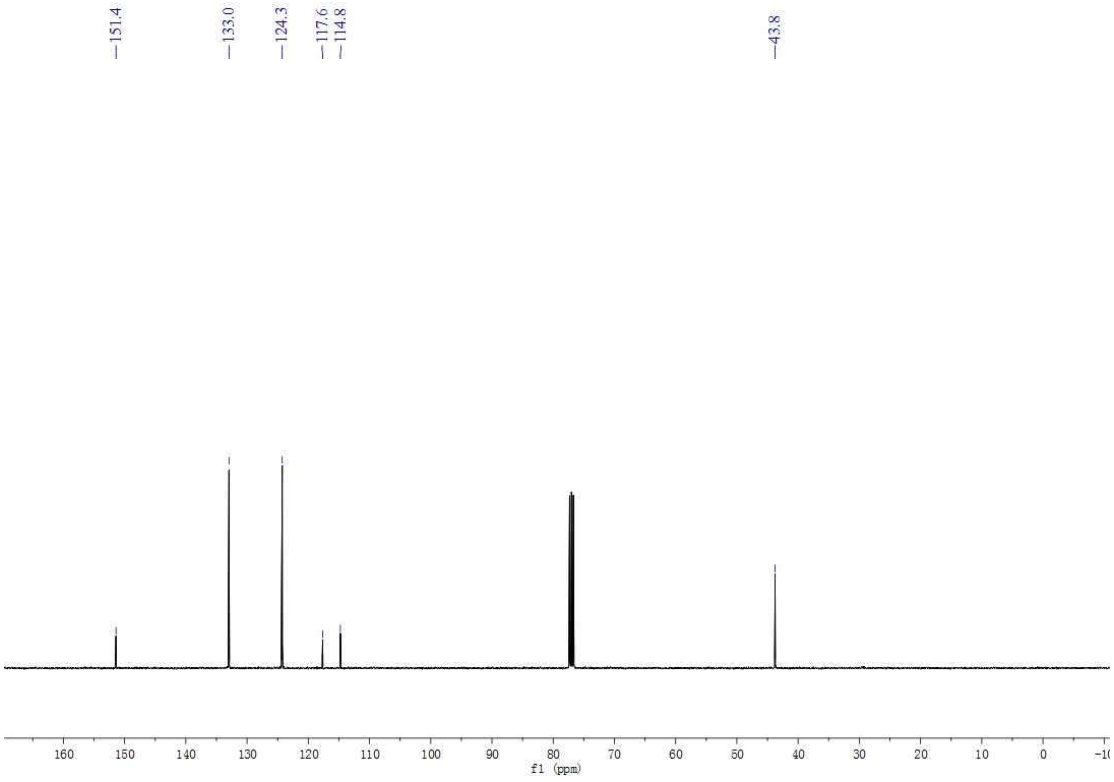
methyl 4-(methylsulfinyl)benzoate (2h)



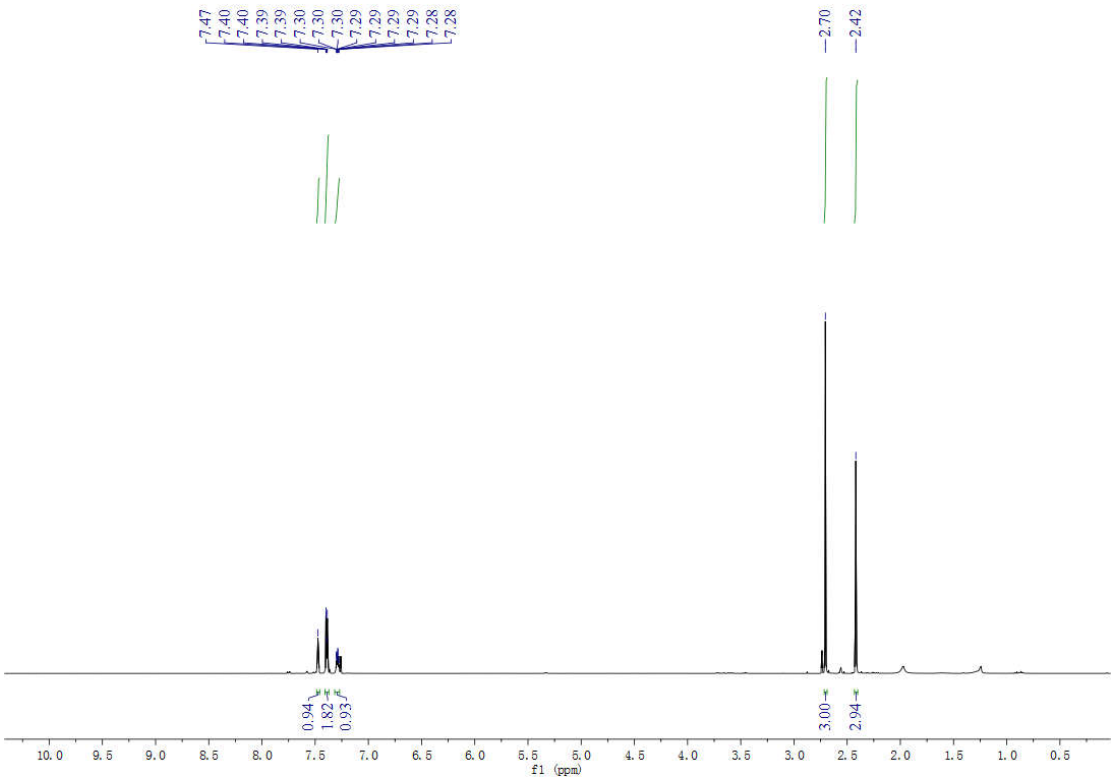


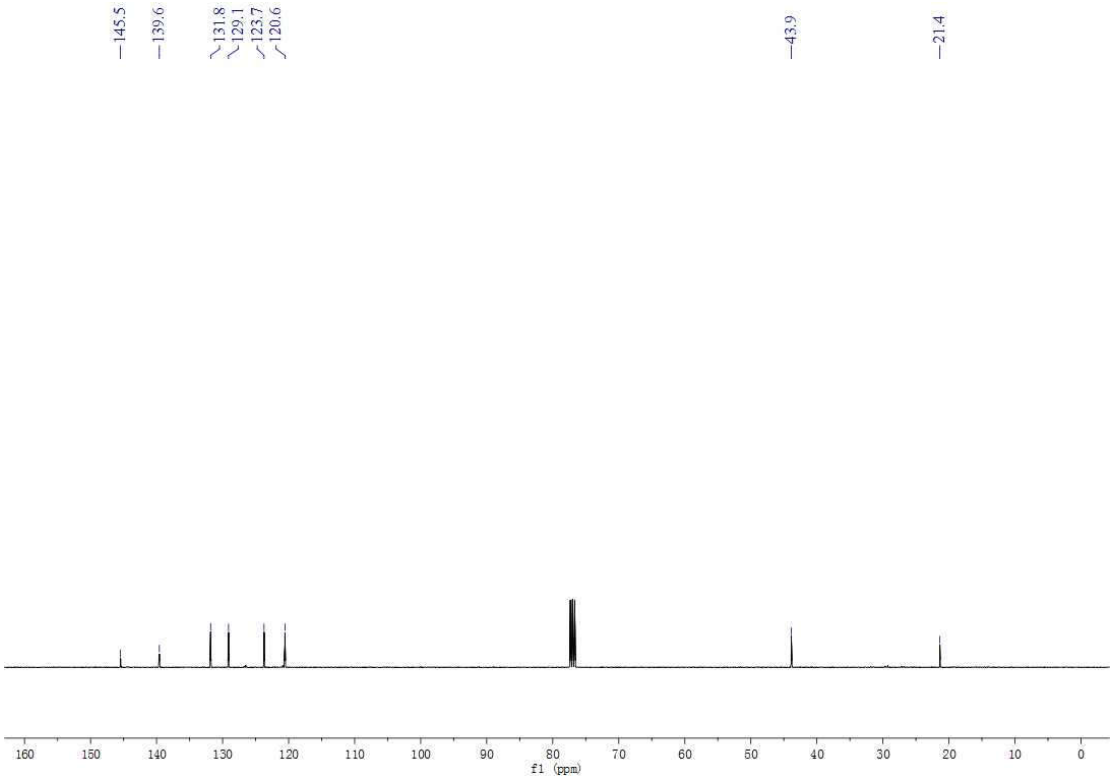
4-(methylsulfinyl)benzonitrile (2i)



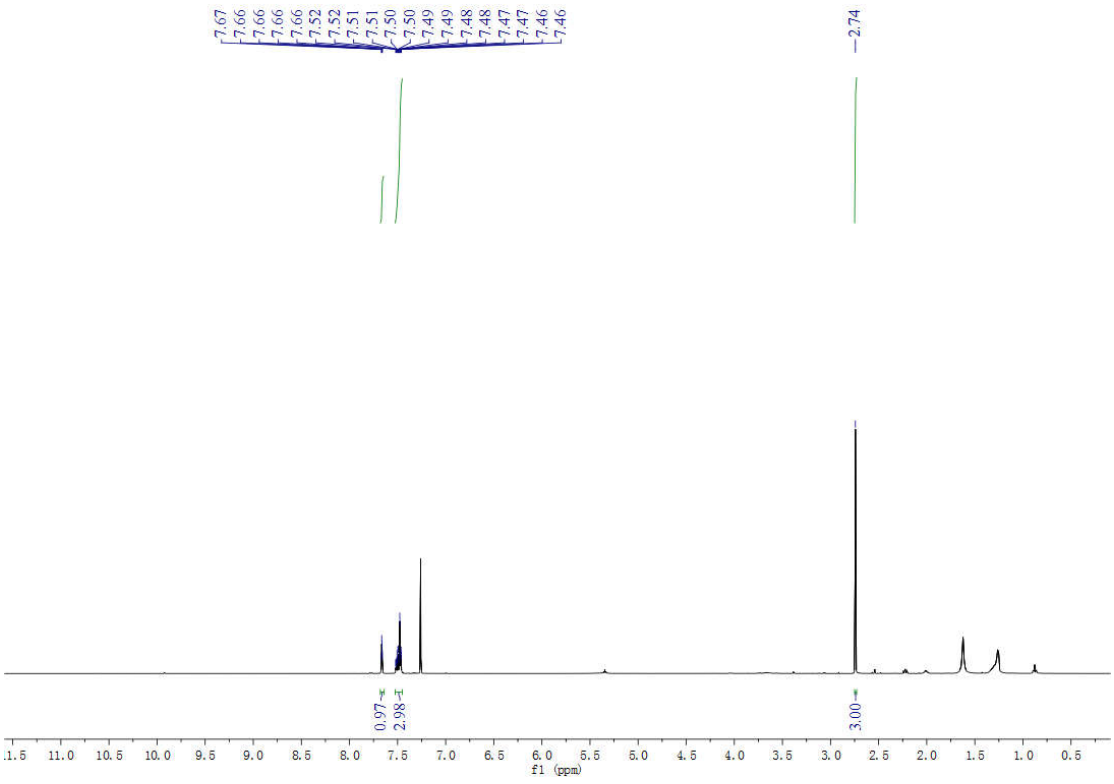


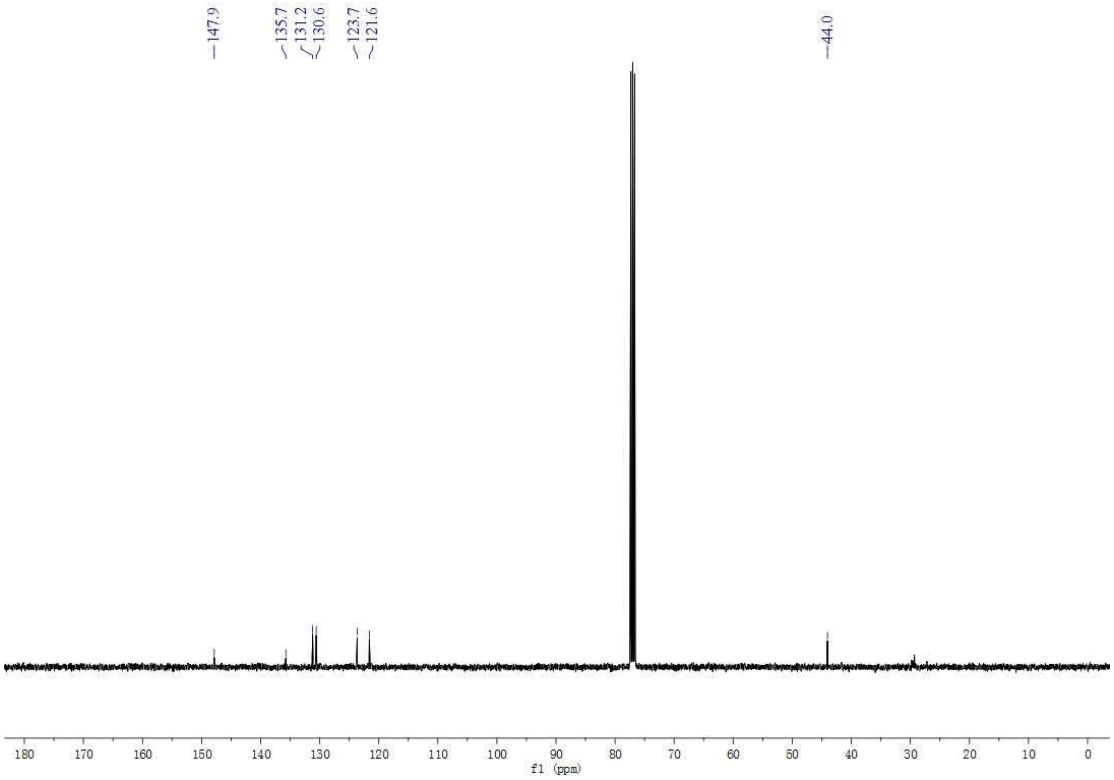
1-methyl-3-(methylsulfinyl)benzene (2j)



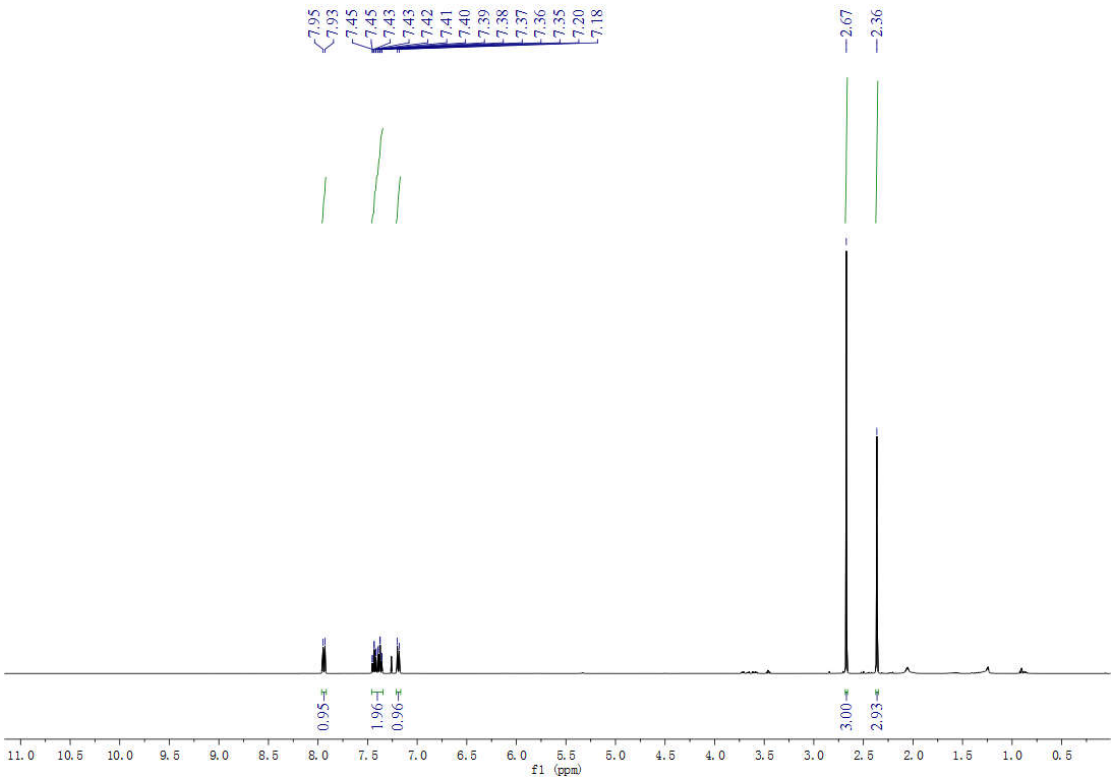


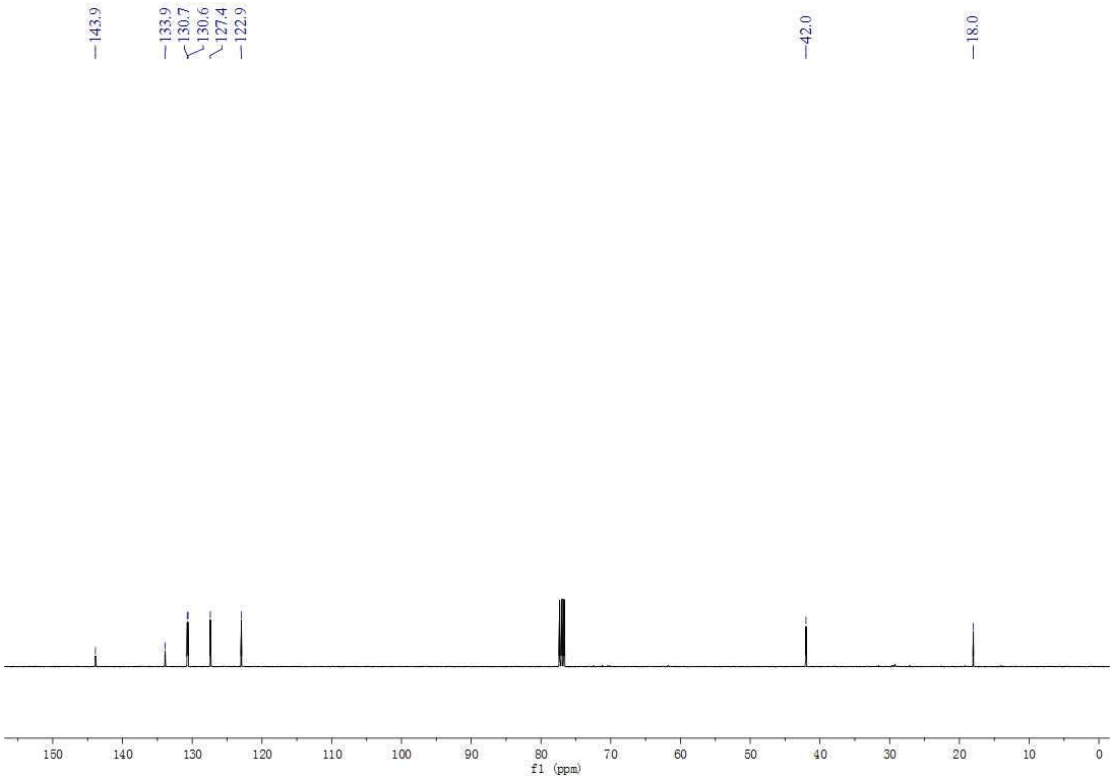
1- chloro -3-(methylsulfinyl)benzene (2k)



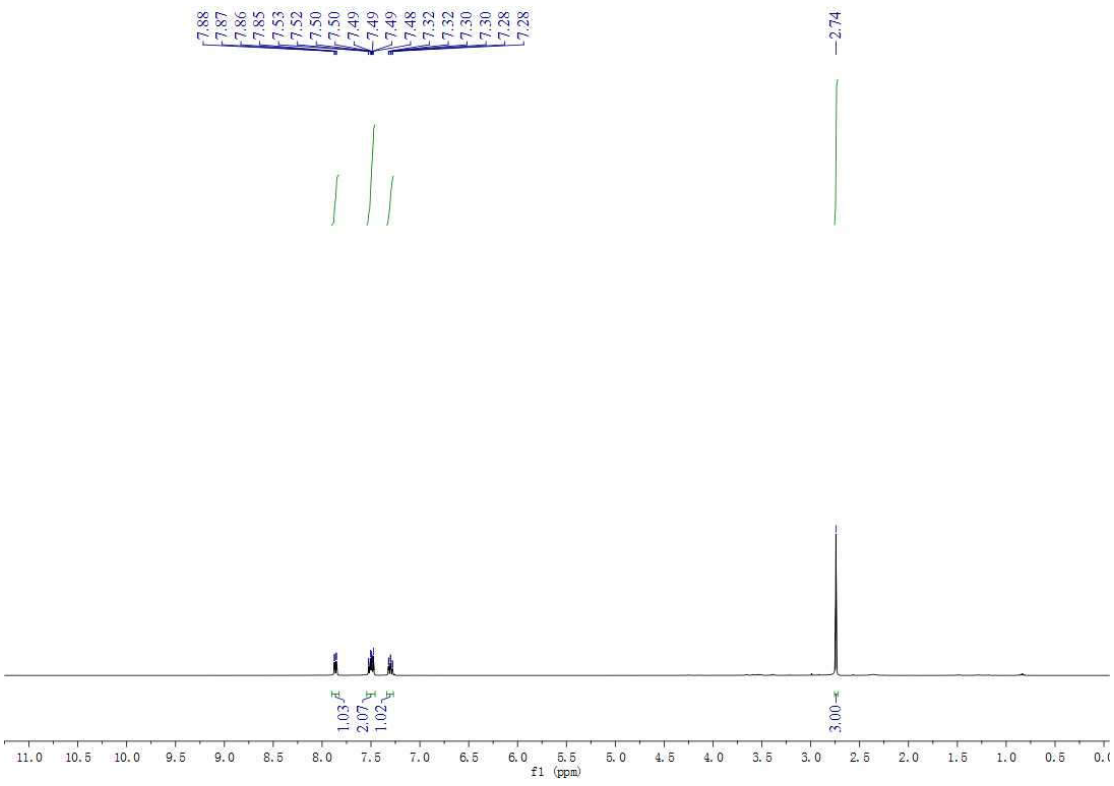


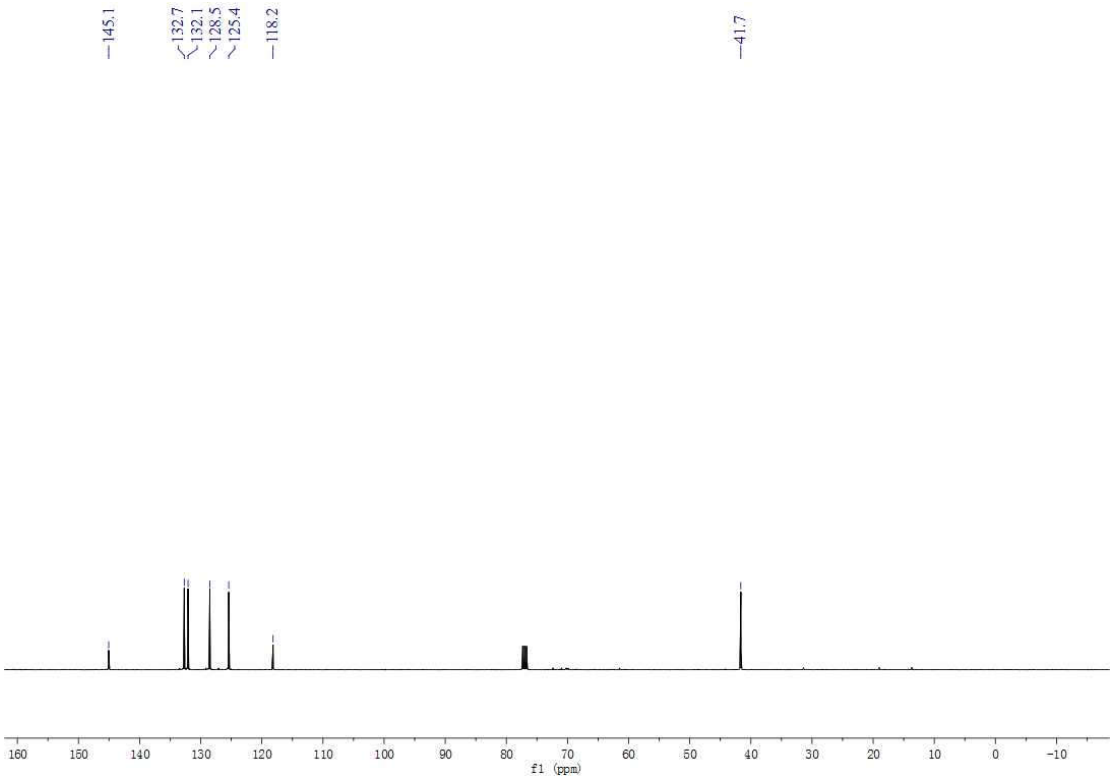
1-methyl-2-(methylsulfinyl)benzene (2l)



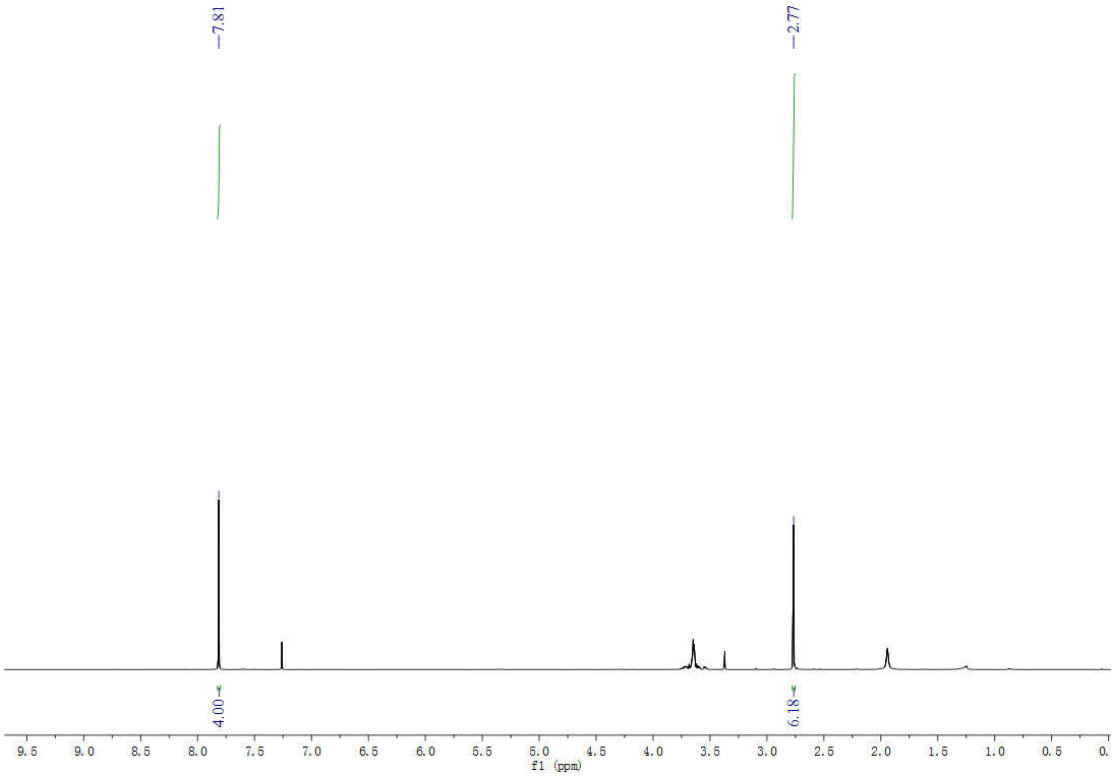


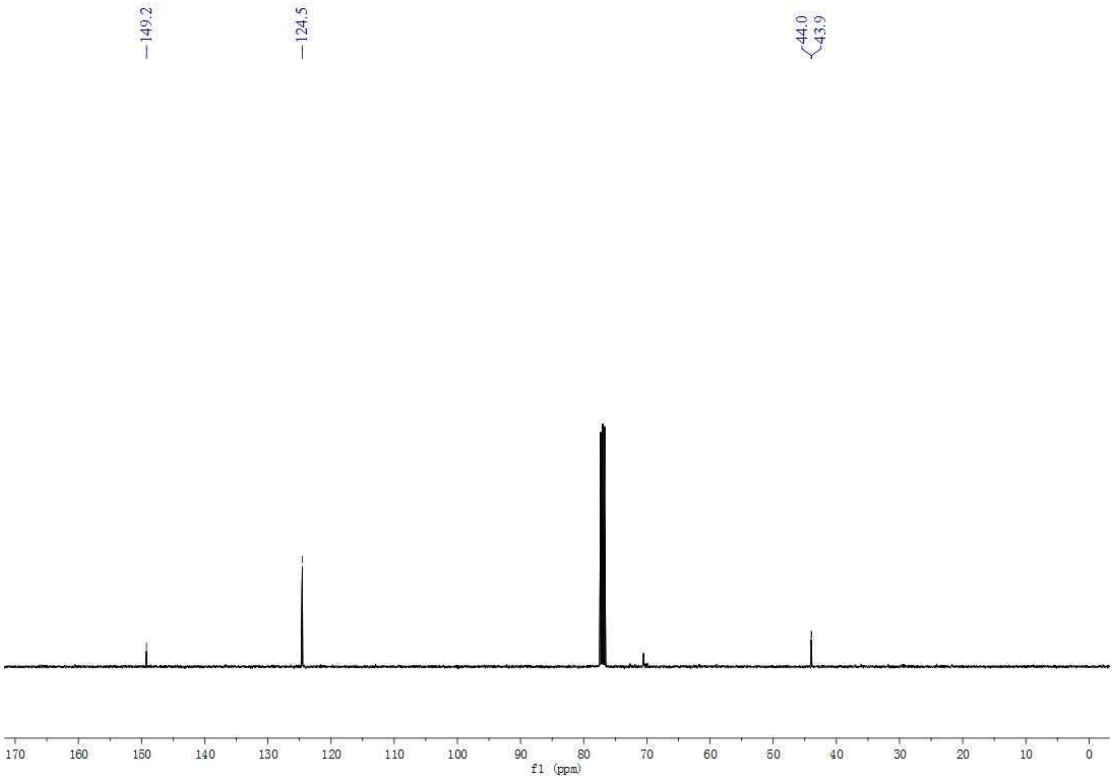
1-bromo-2-(methylsulfinyl)benzene (2m)



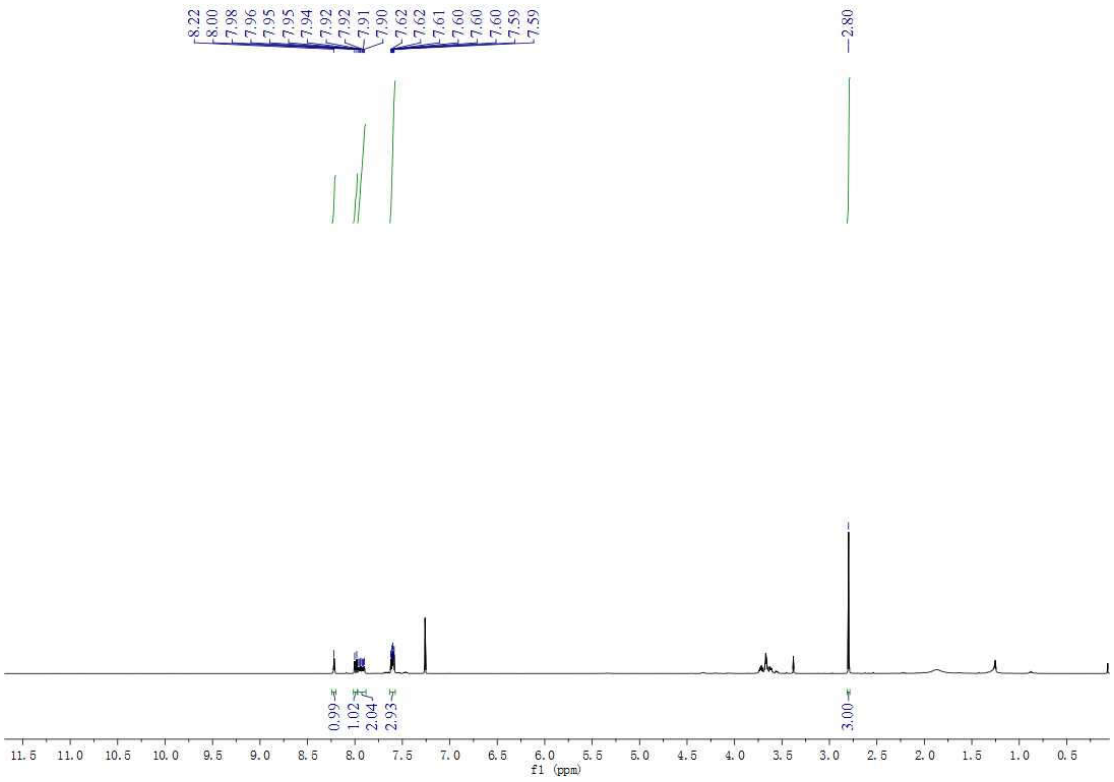


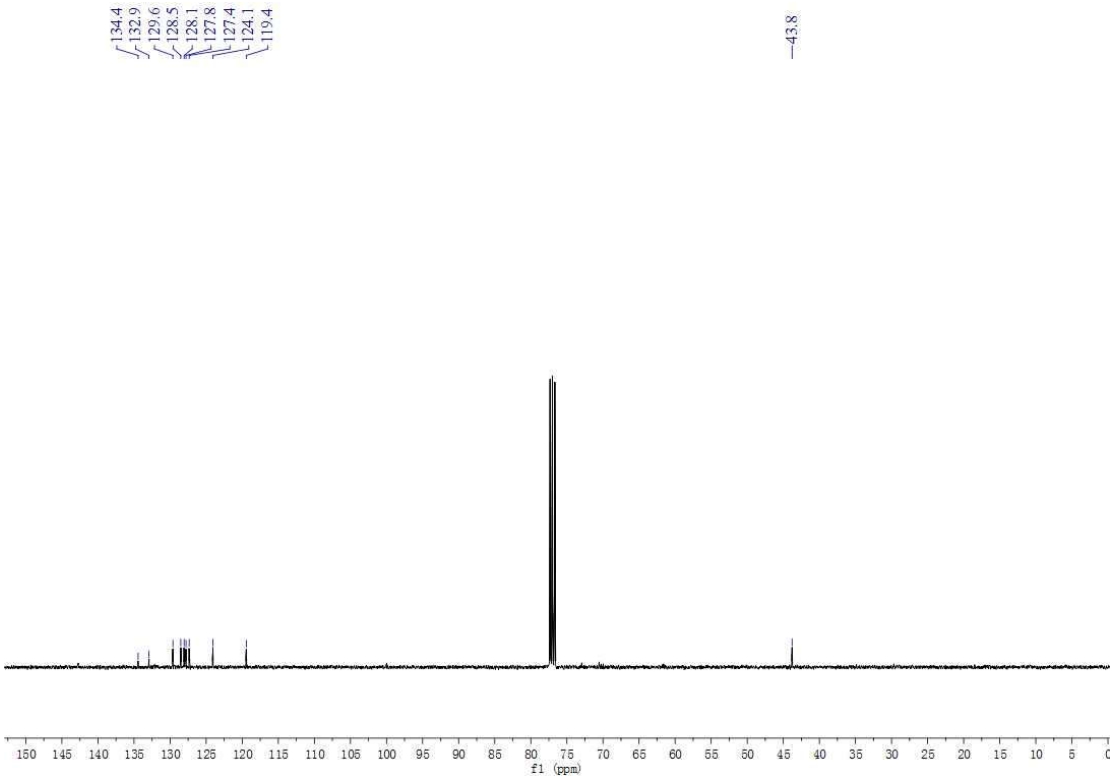
1,4-bis(methylsulfinyl)benzene (2n)



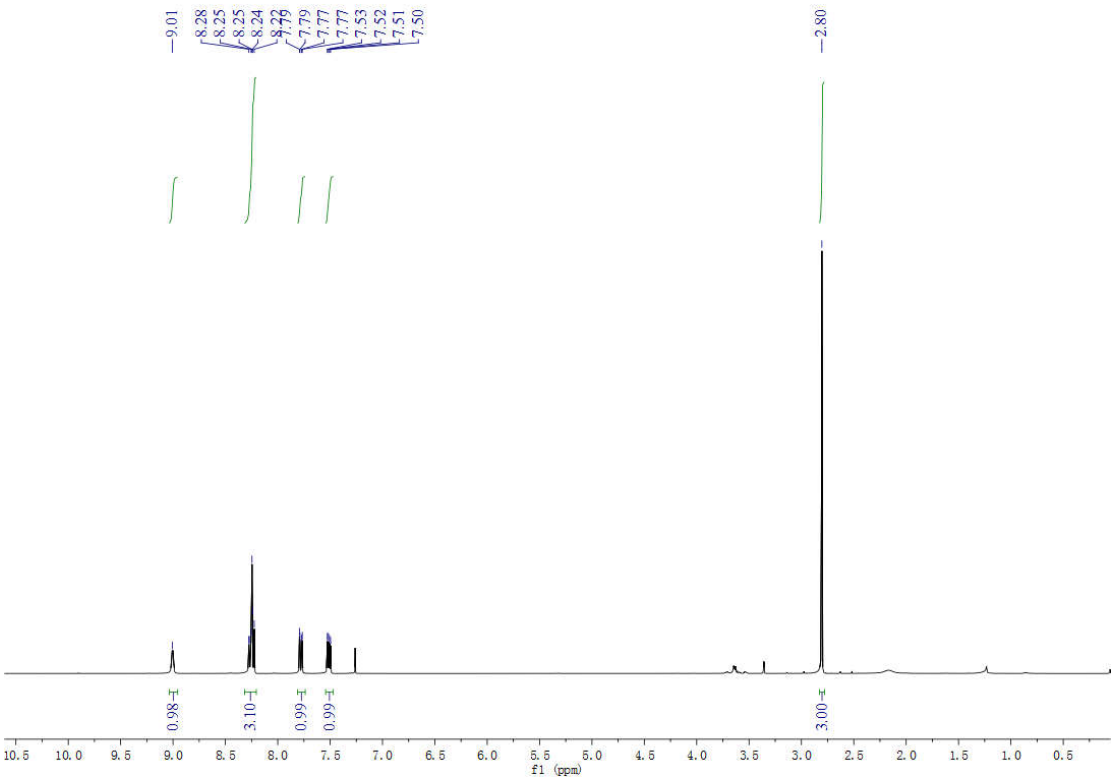


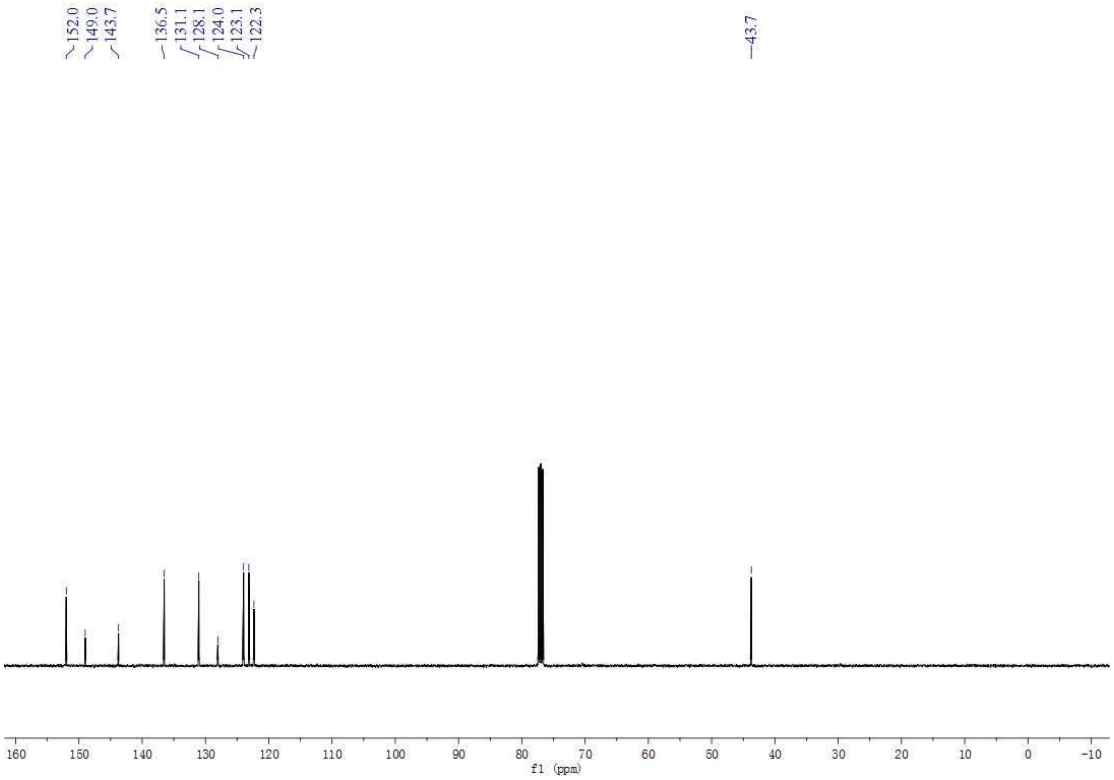
2-(methylsulfinyl)naphthalene (2o)



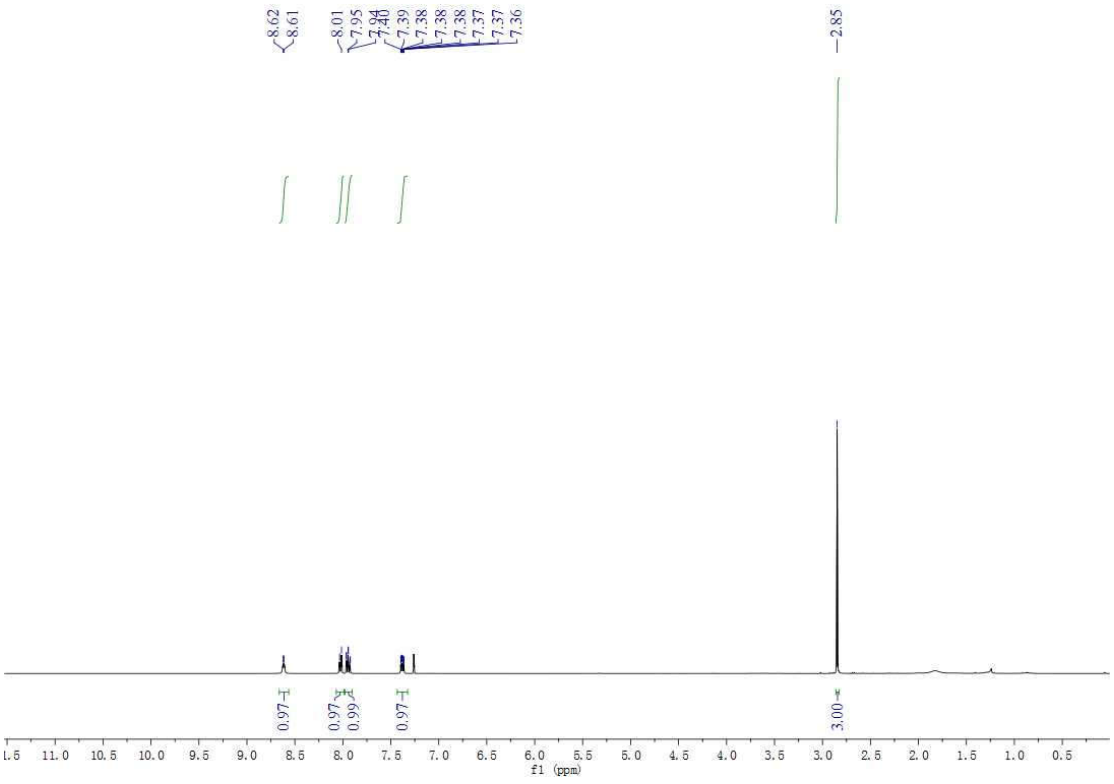


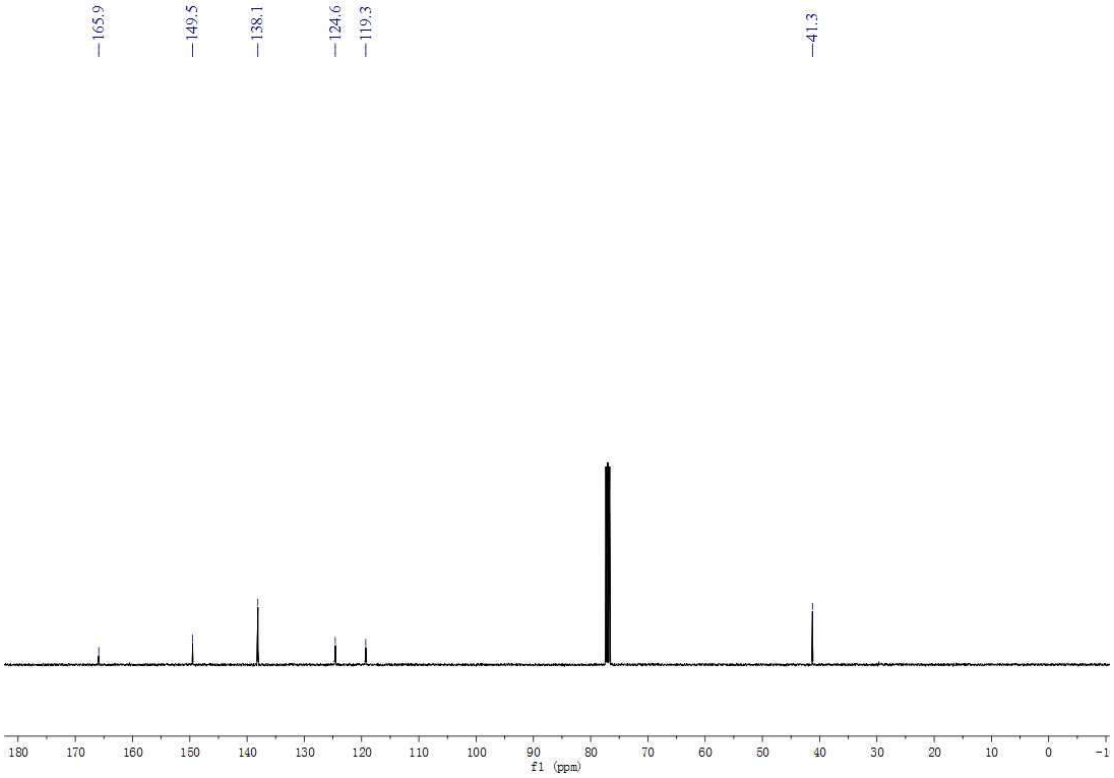
6-(methylsulfinyl)quinoline (2p)



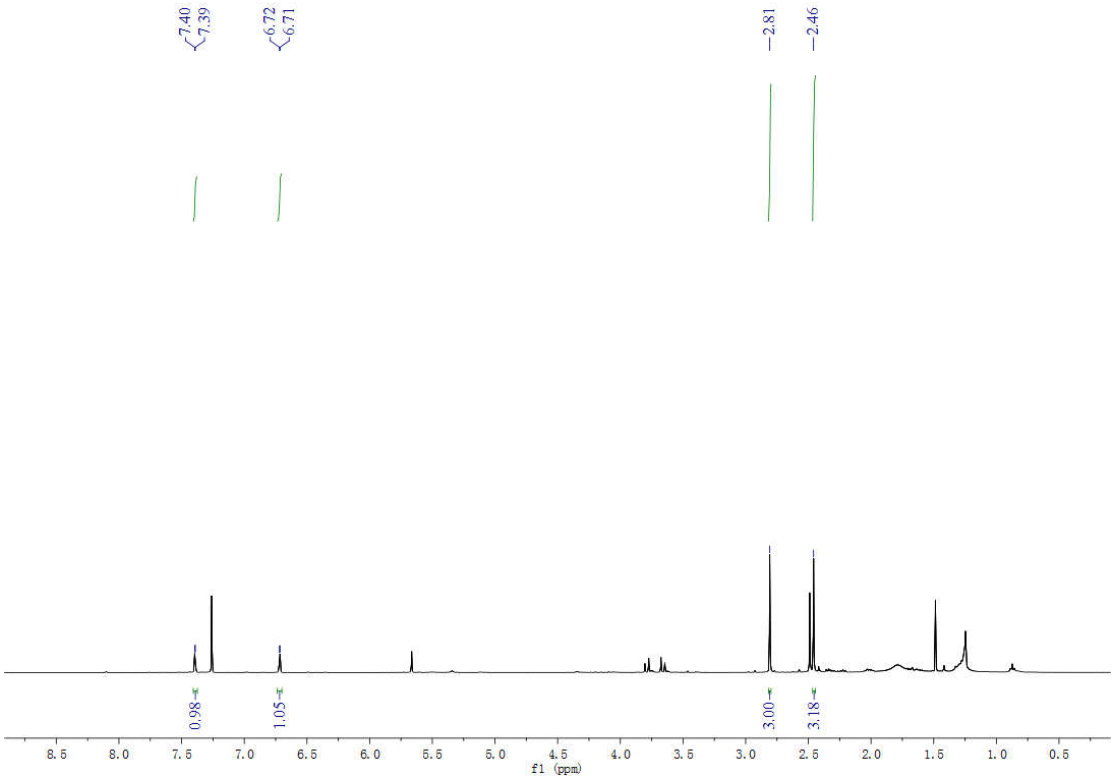


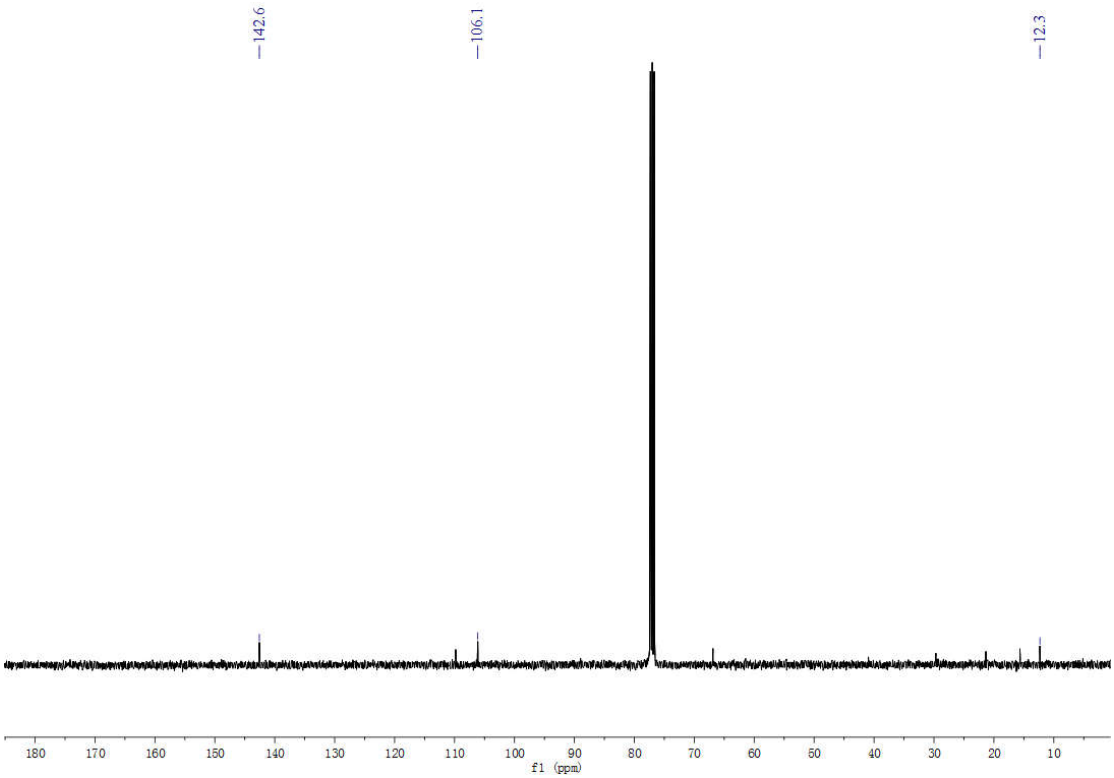
2-(methylsulfinyl)pyridine (2q)



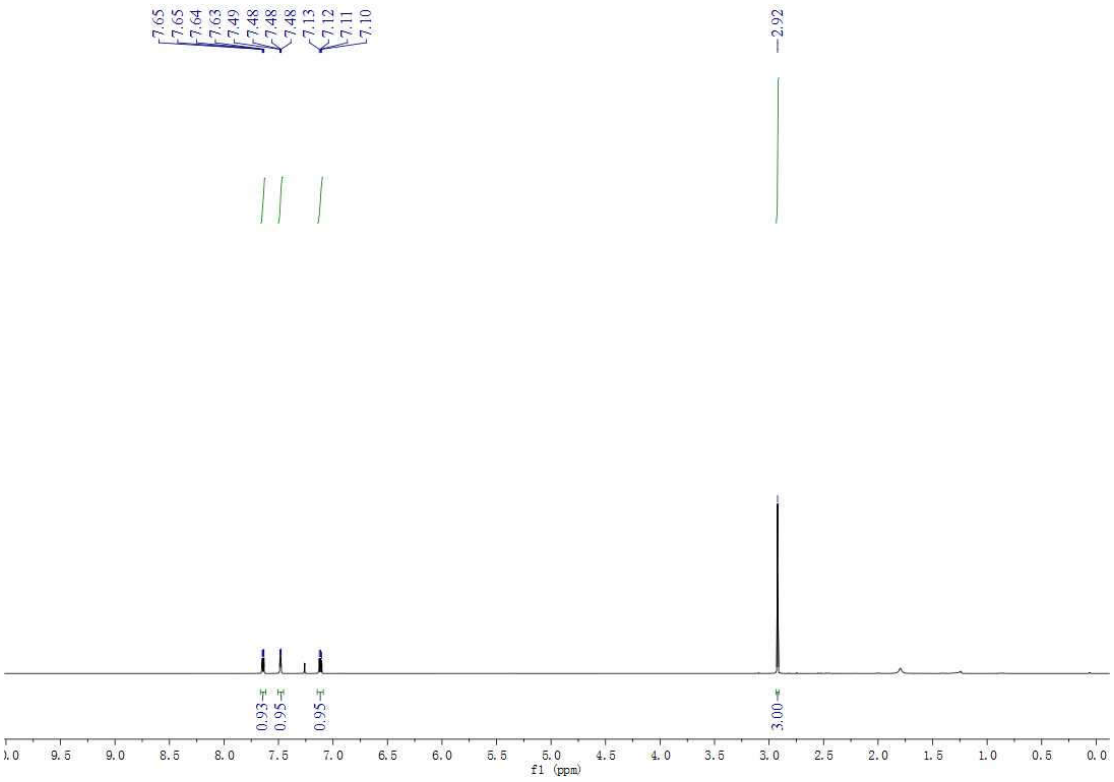


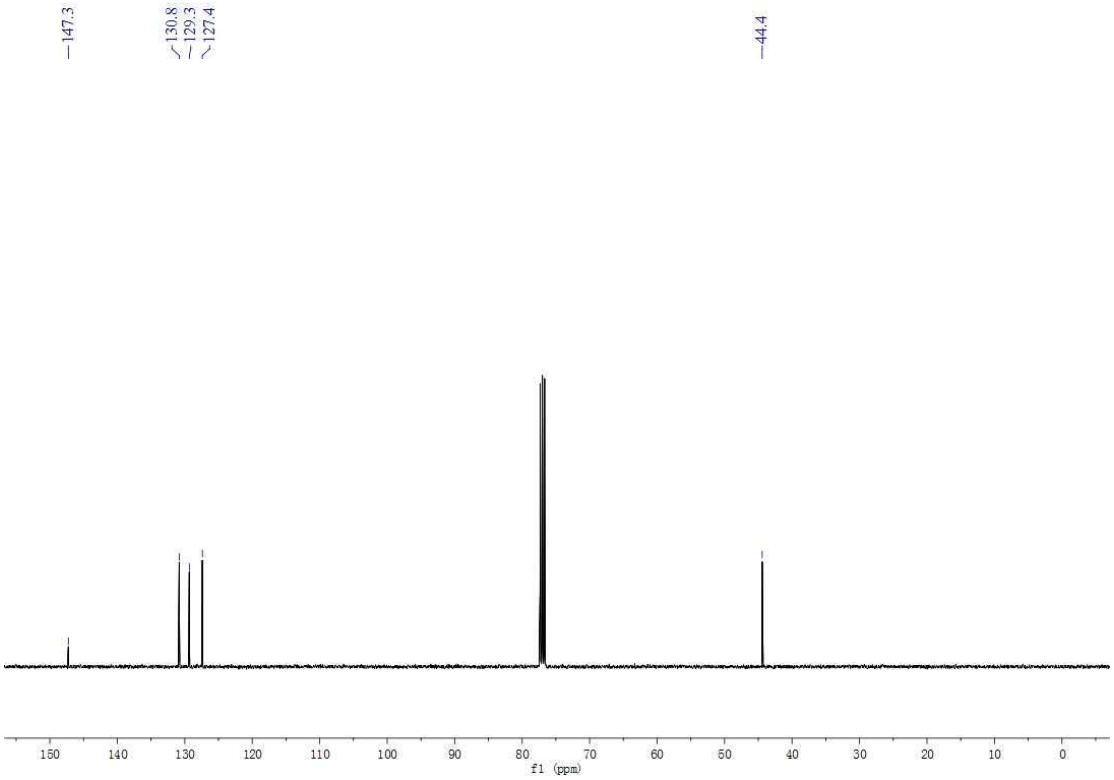
2-methyl-3-(methylsulfinyl)furan (2r)



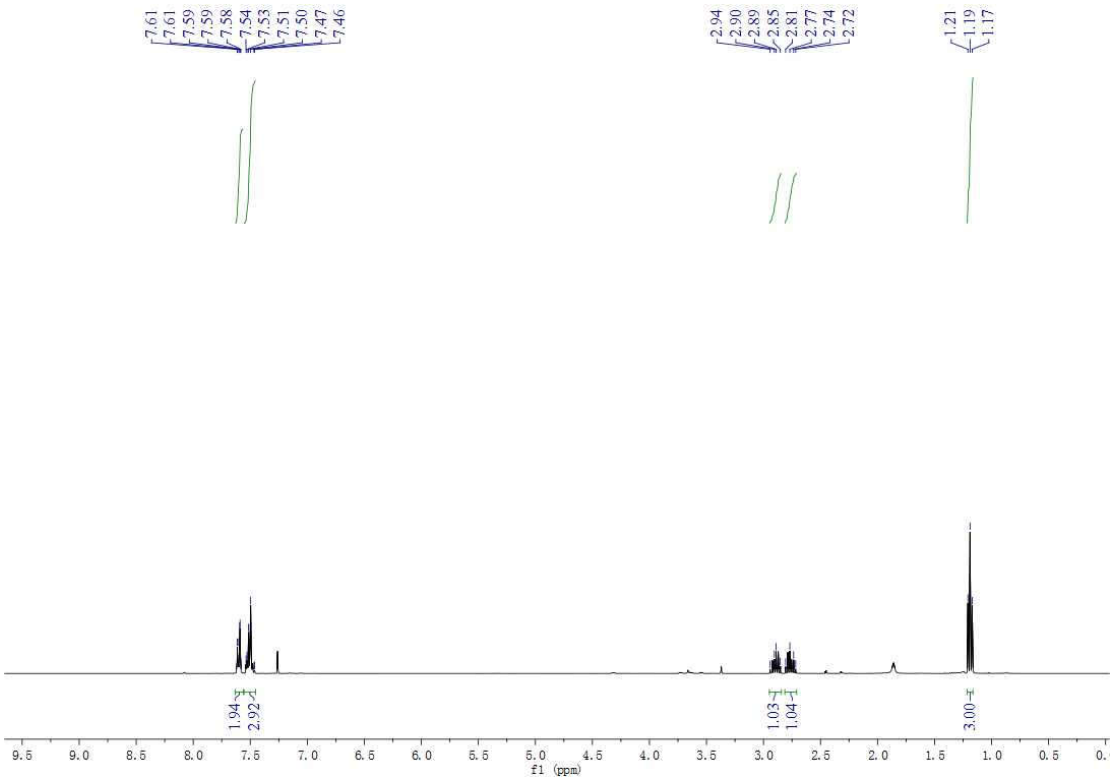


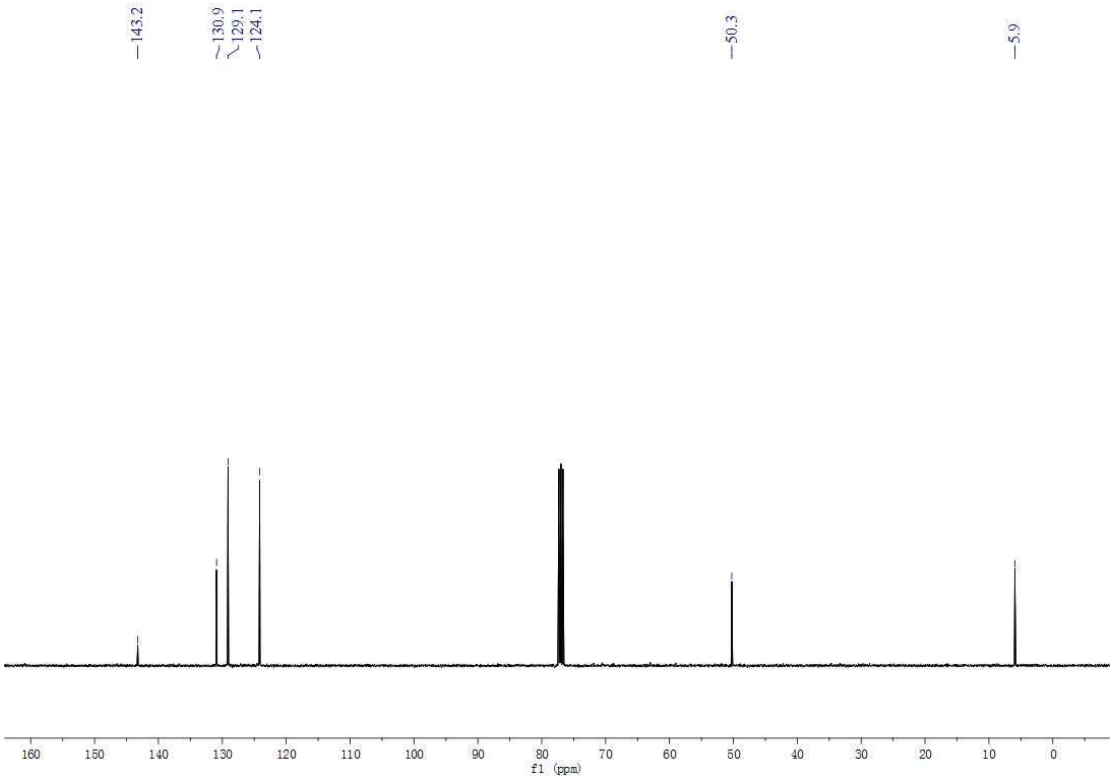
2-(methylsulfinyl)thiophene (2s)



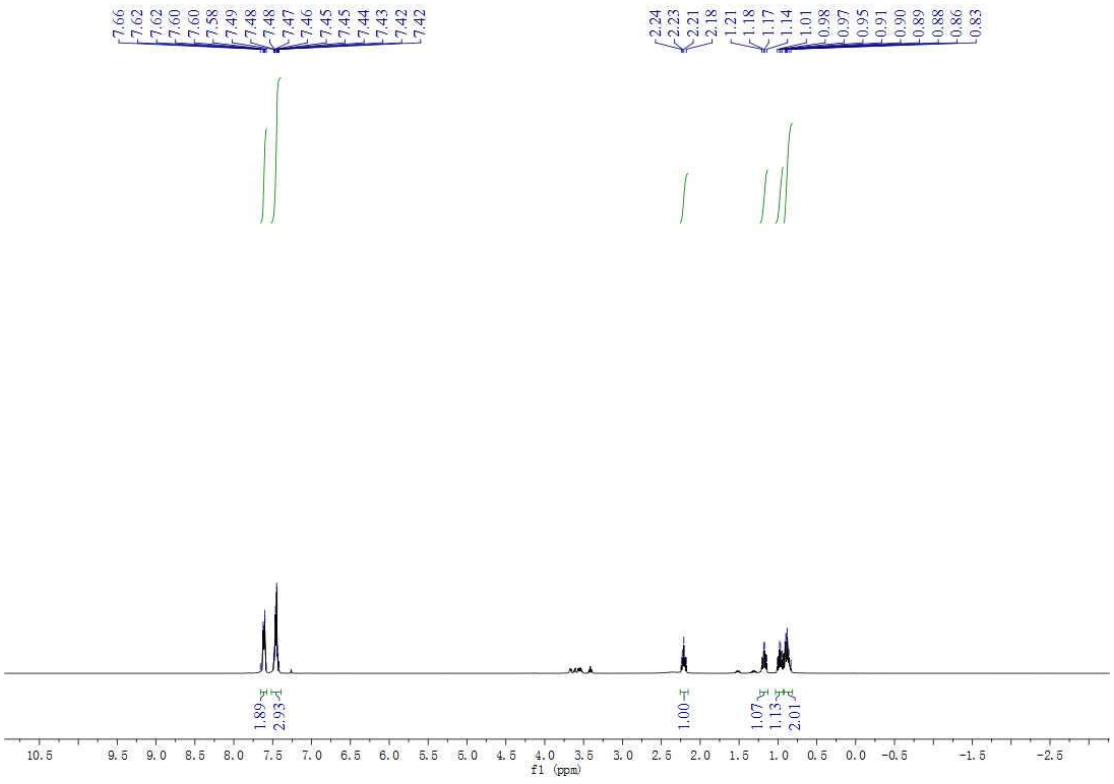


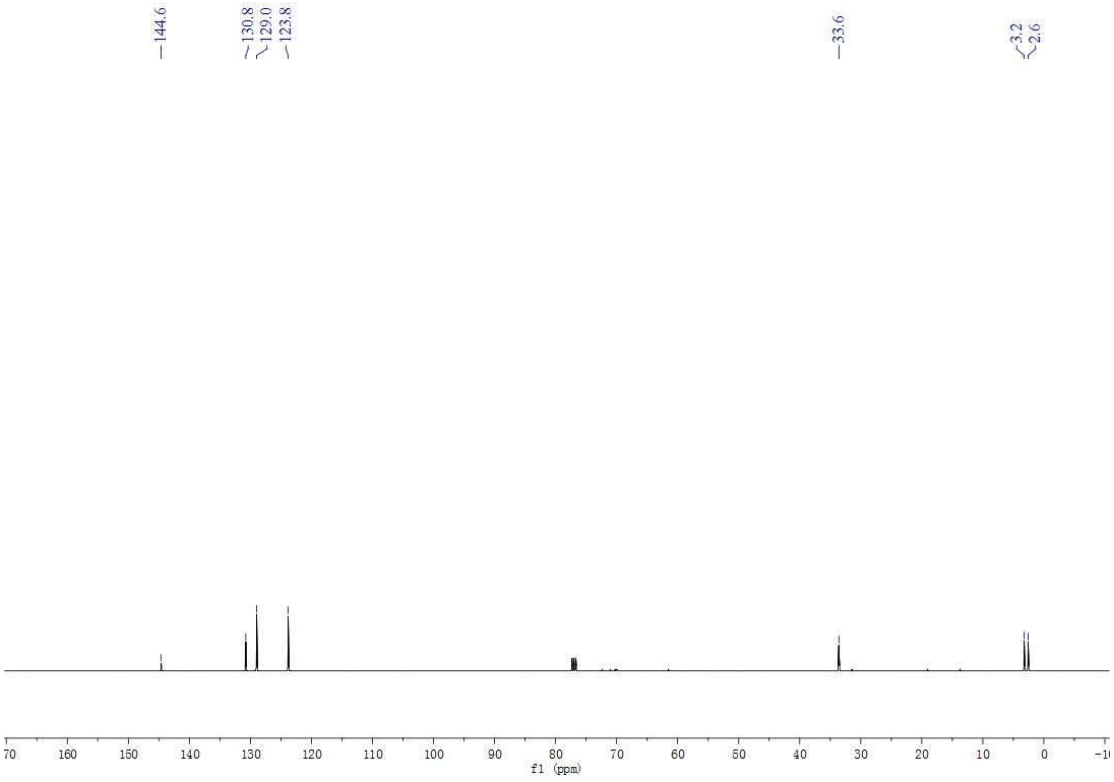
(ethylsulfinyl)benzene (2t)



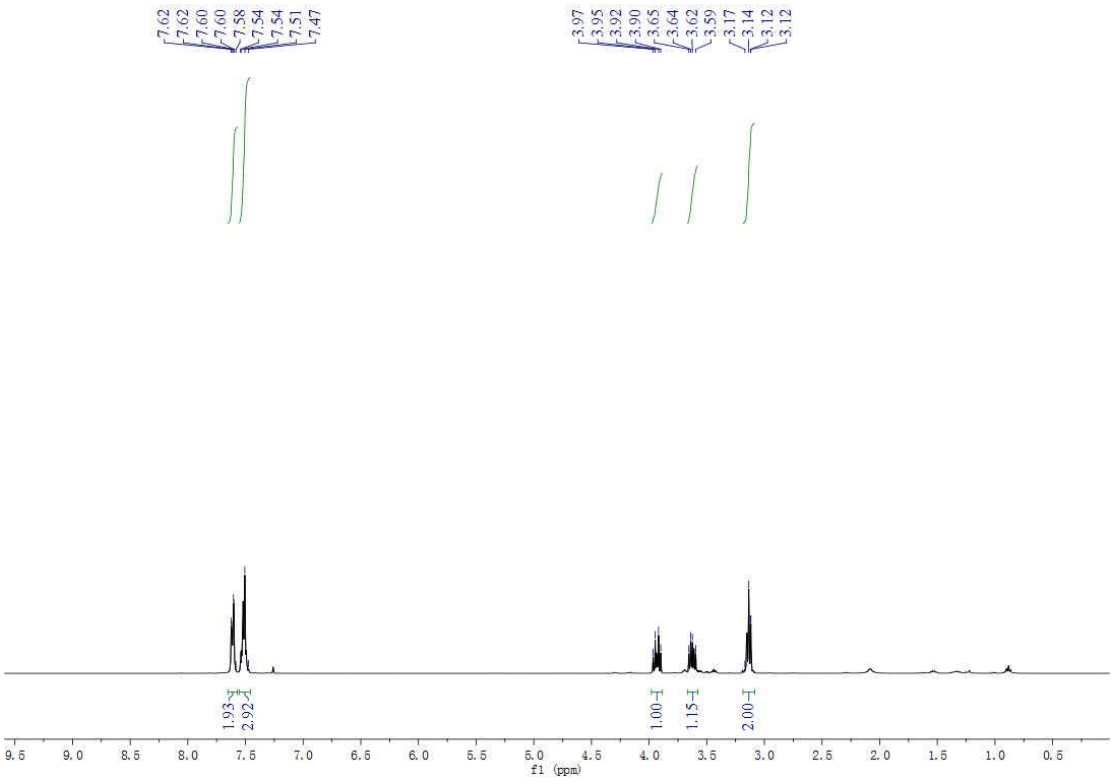


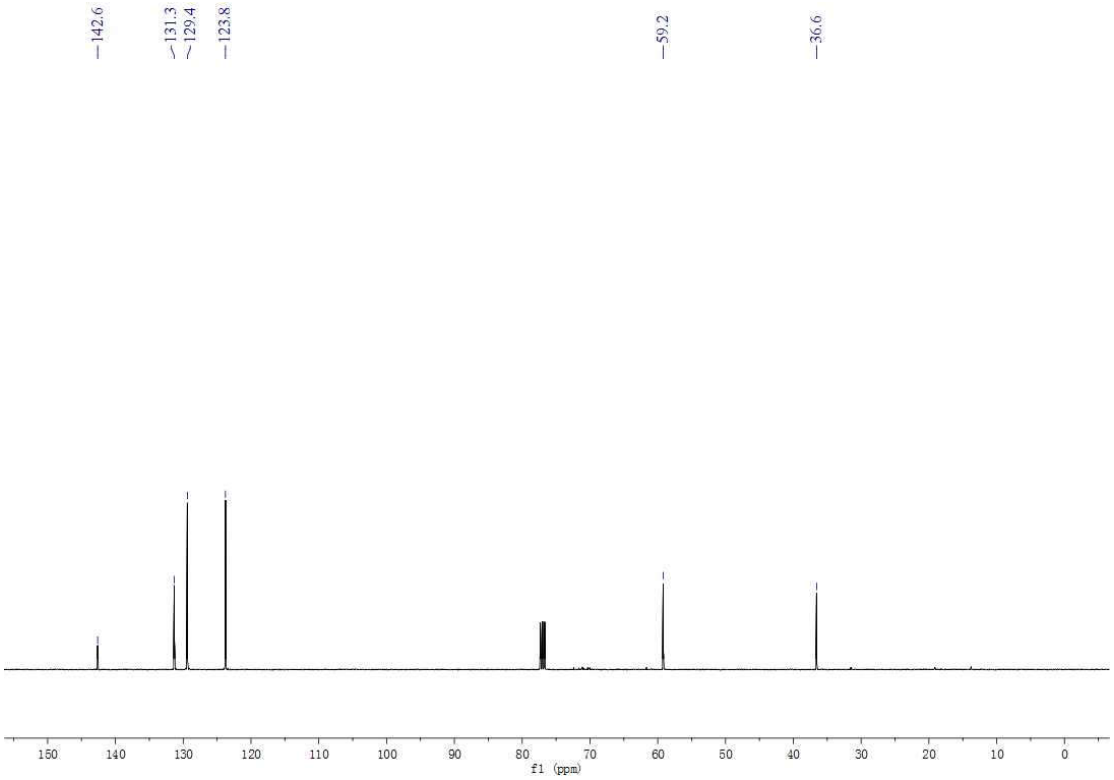
(cyclopropylsulfinyl)benzene (2u)



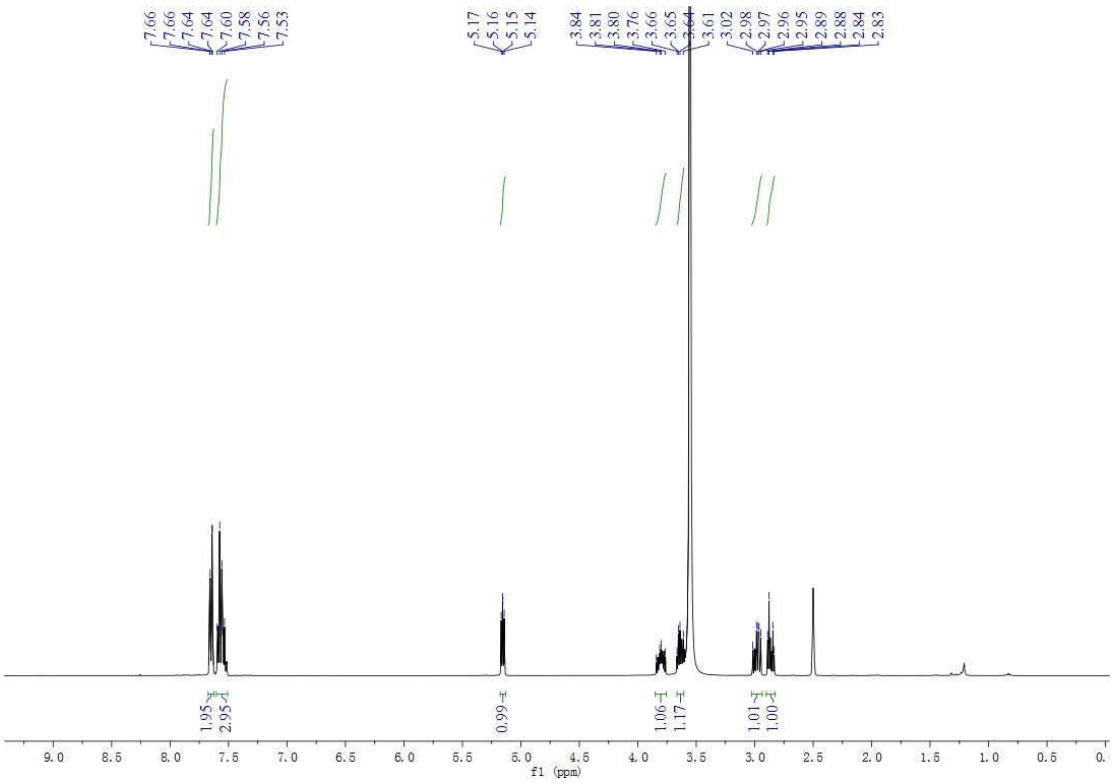


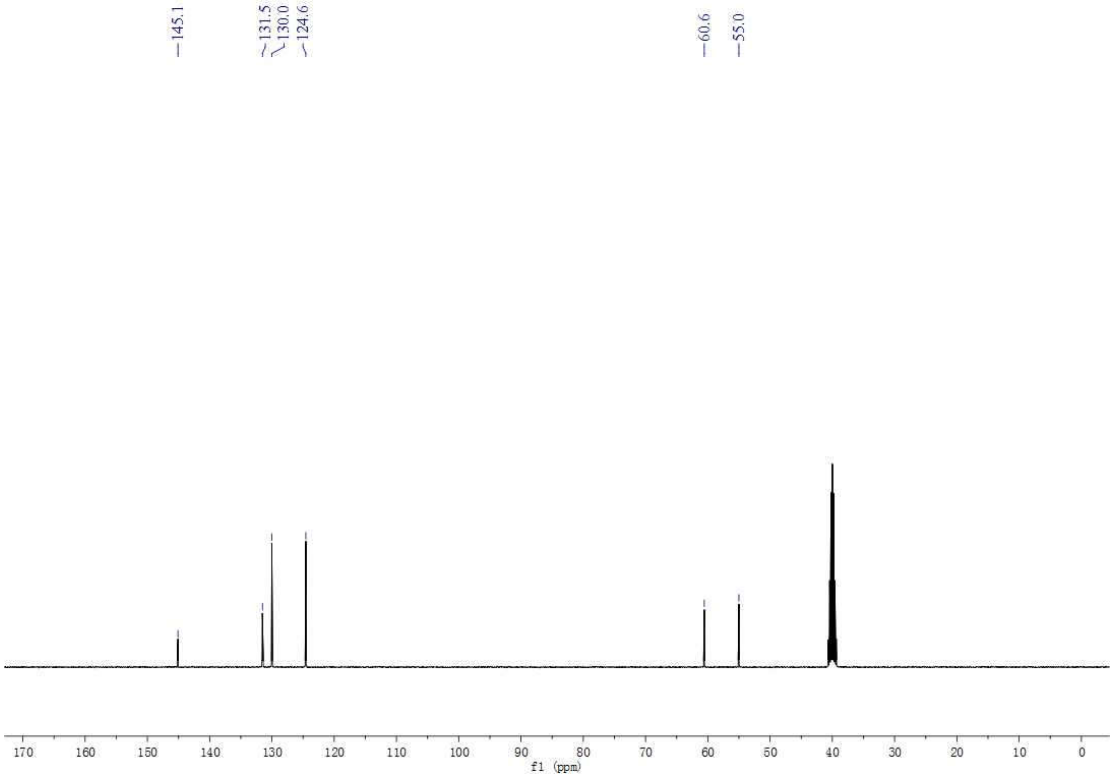
((2-chloroethyl)sulfinyl)benzene (2v)



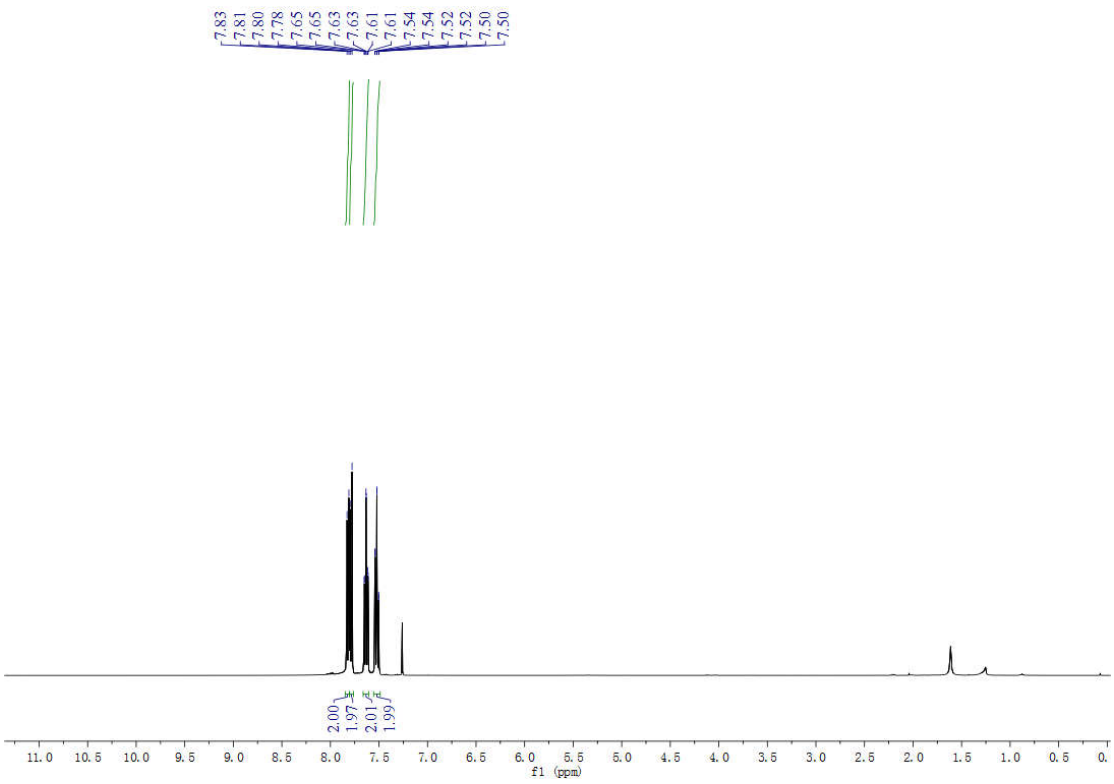


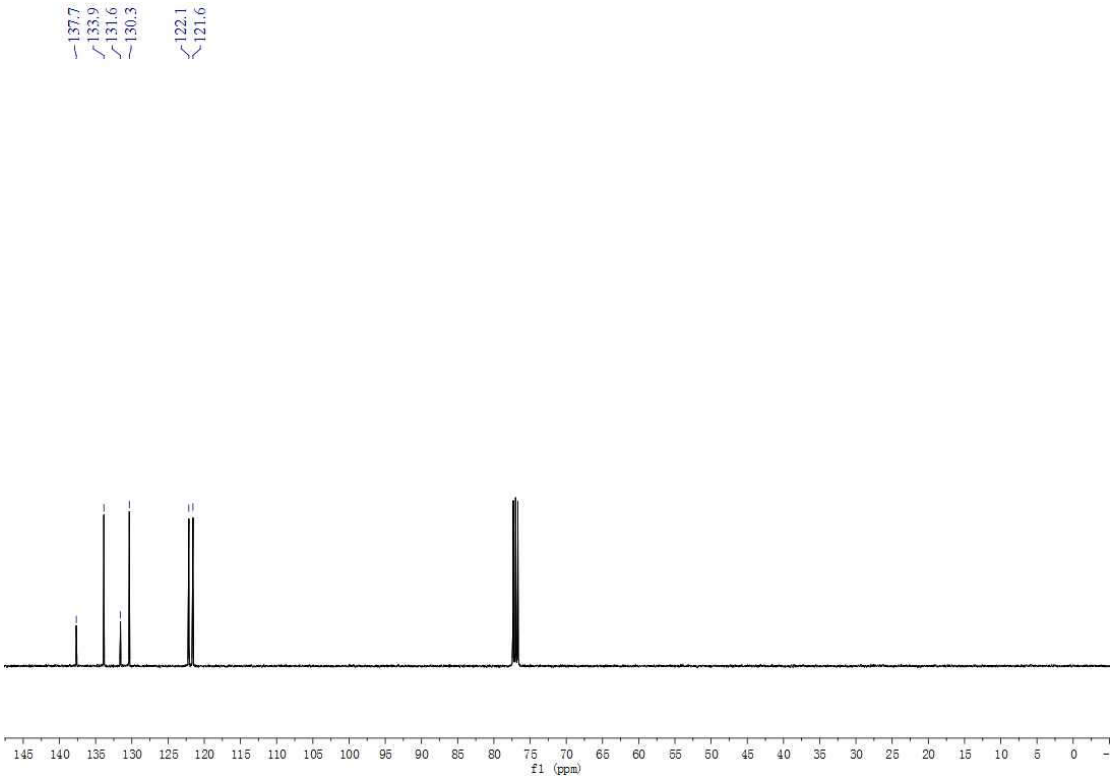
2-(phenylsulfinyl)ethanol (2w)



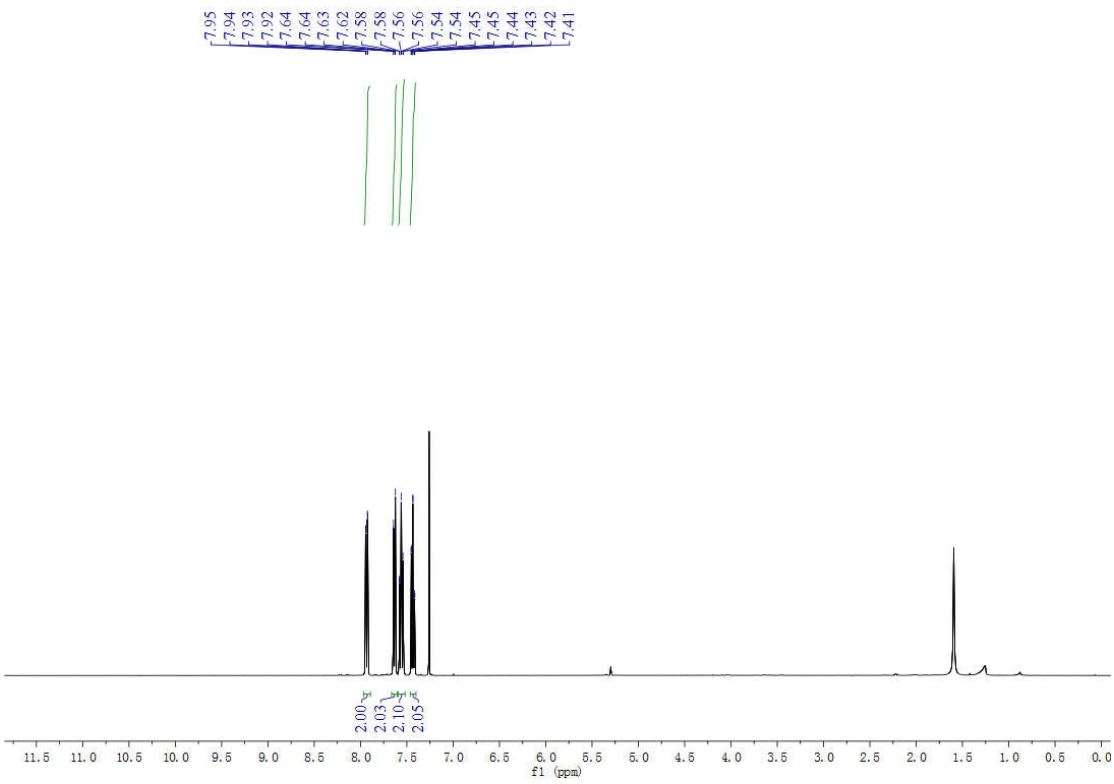


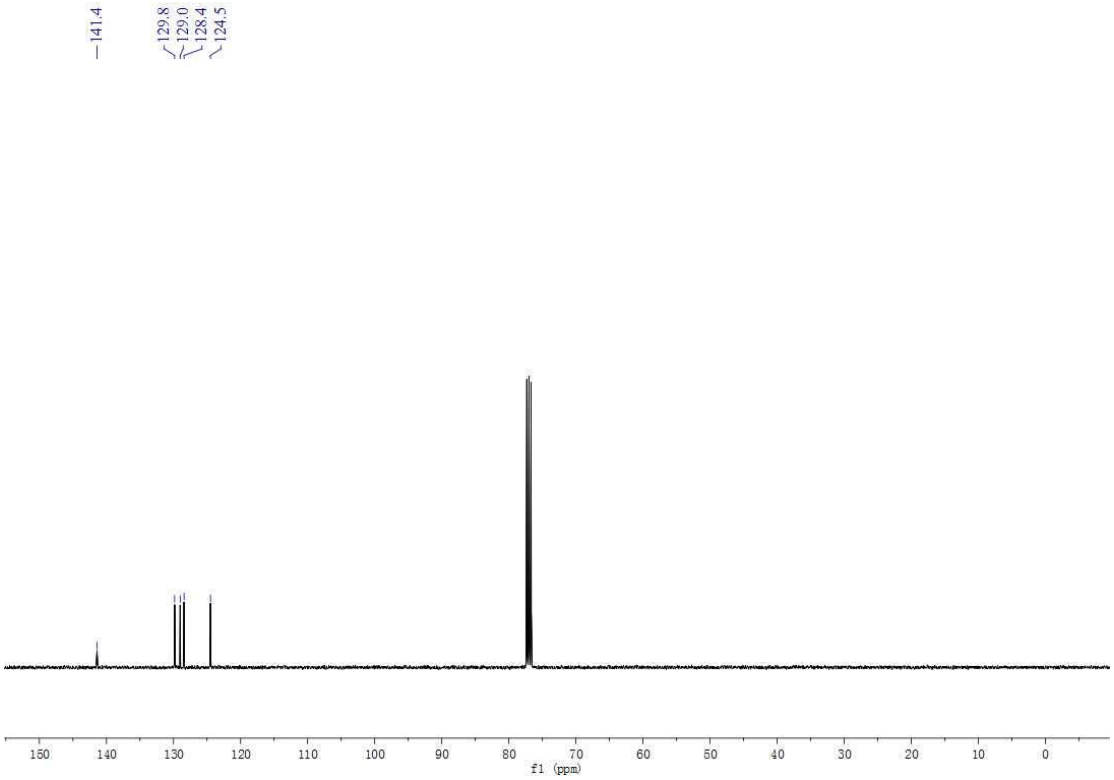
dibenzo[*b*,*d*]thiophene 5-oxide (2x)



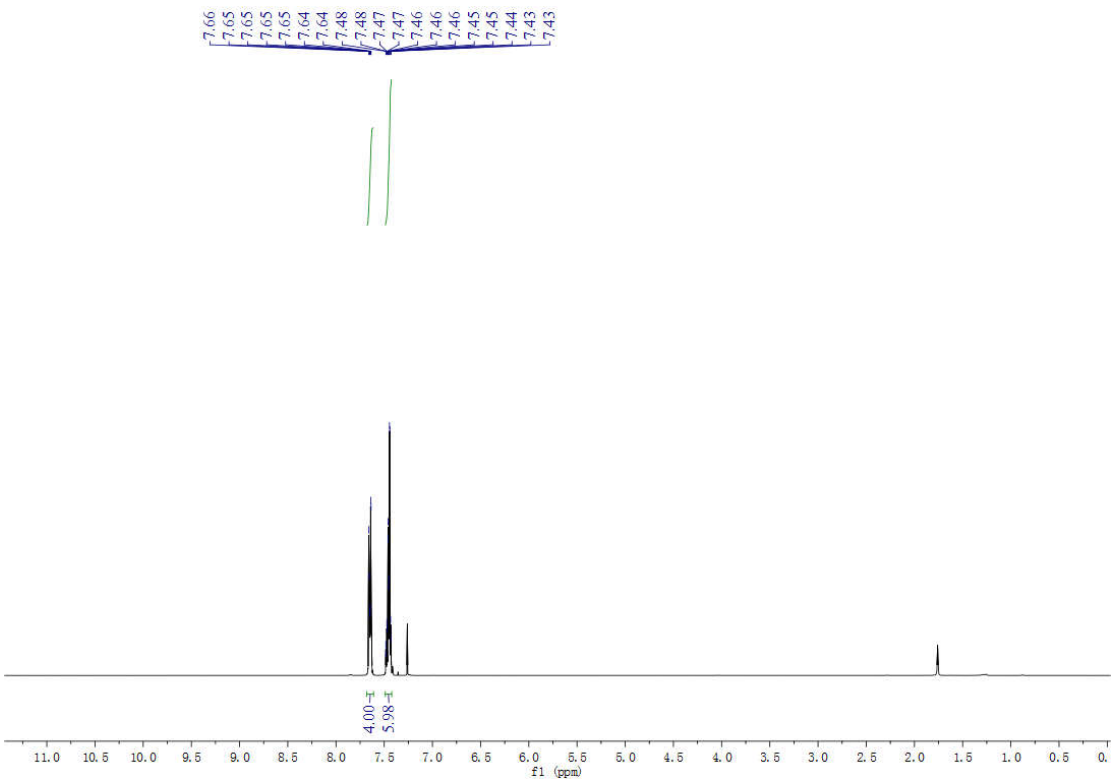


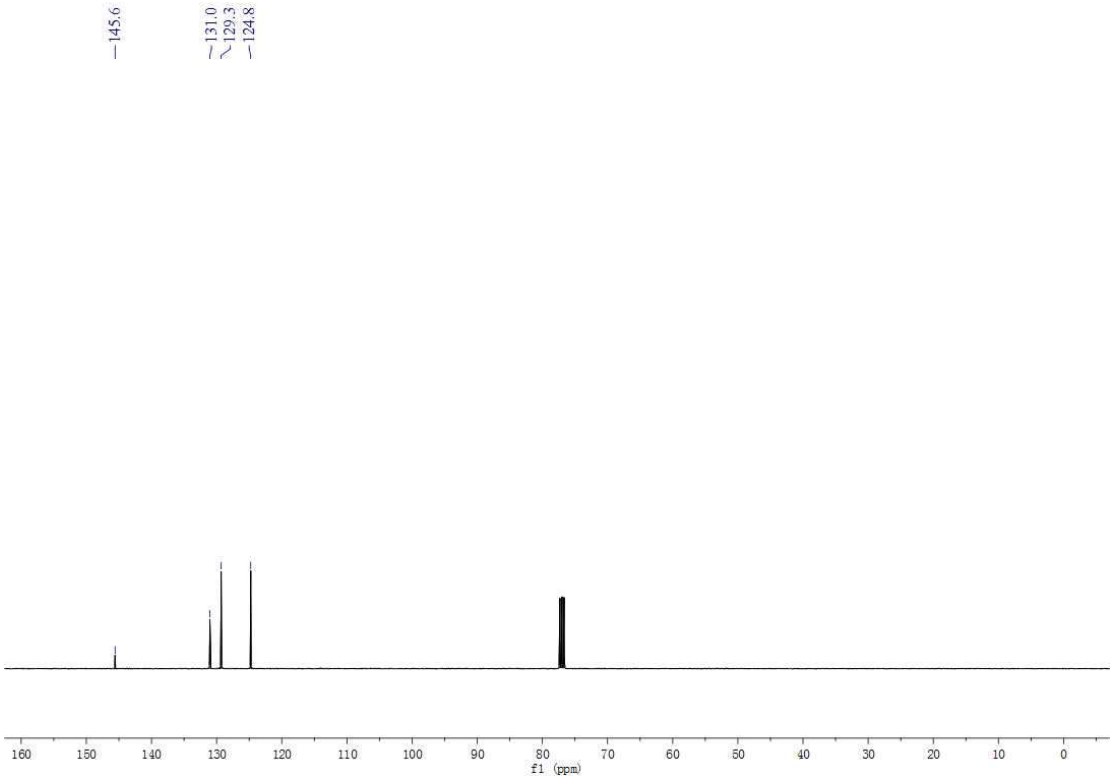
thianthrene 5-oxide (2y)



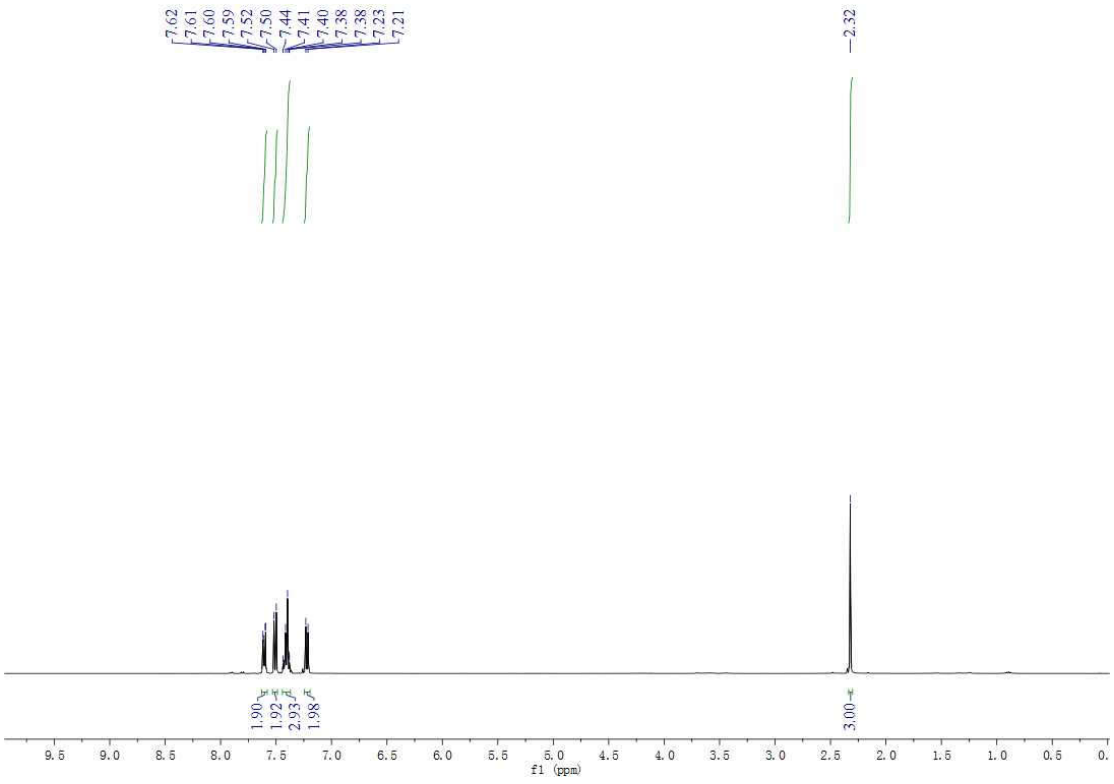


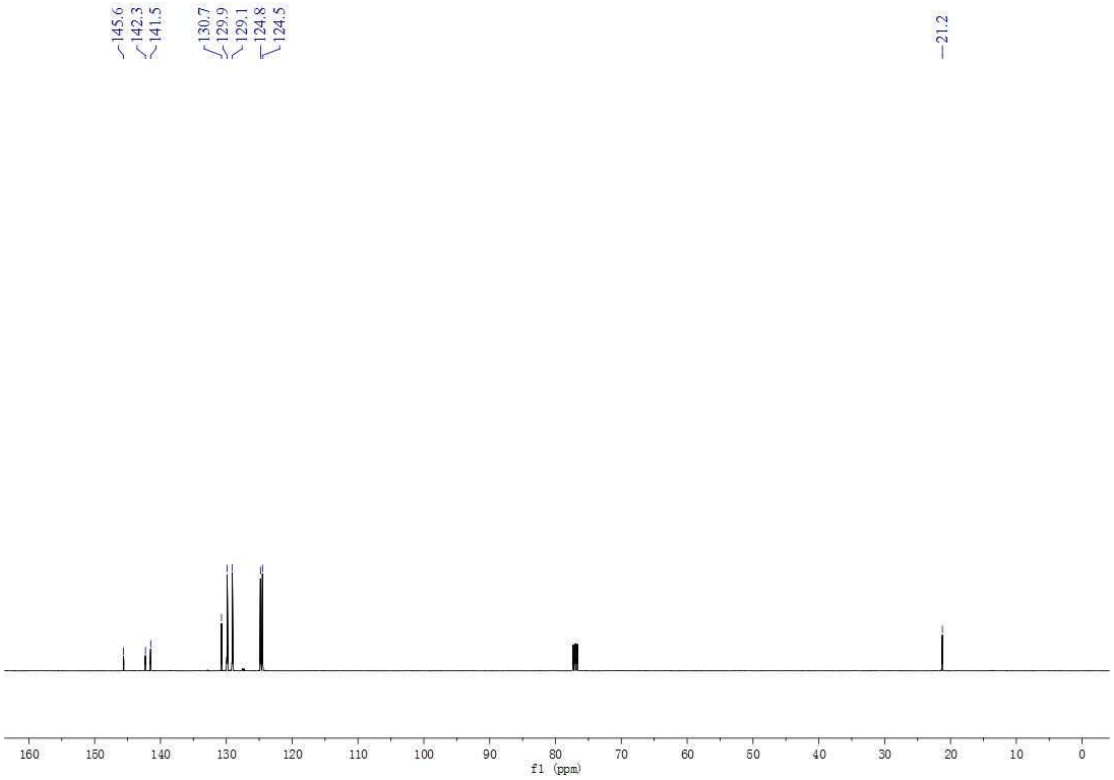
sulfinyldibenzene (2z)



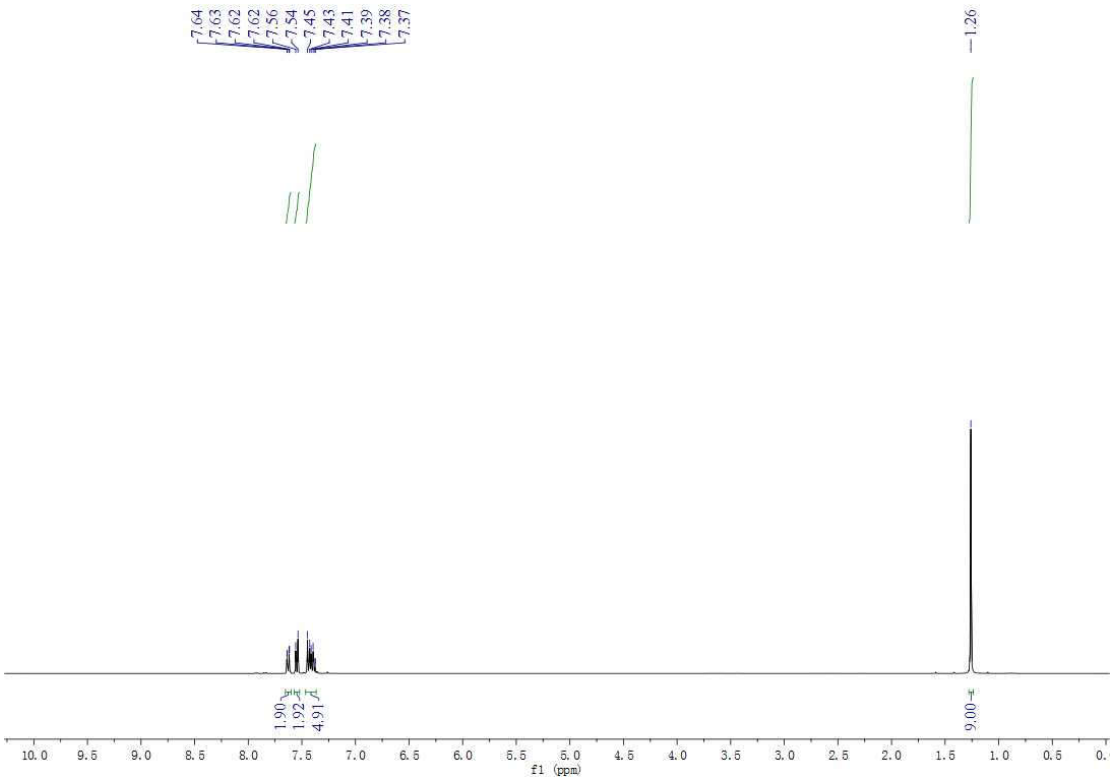


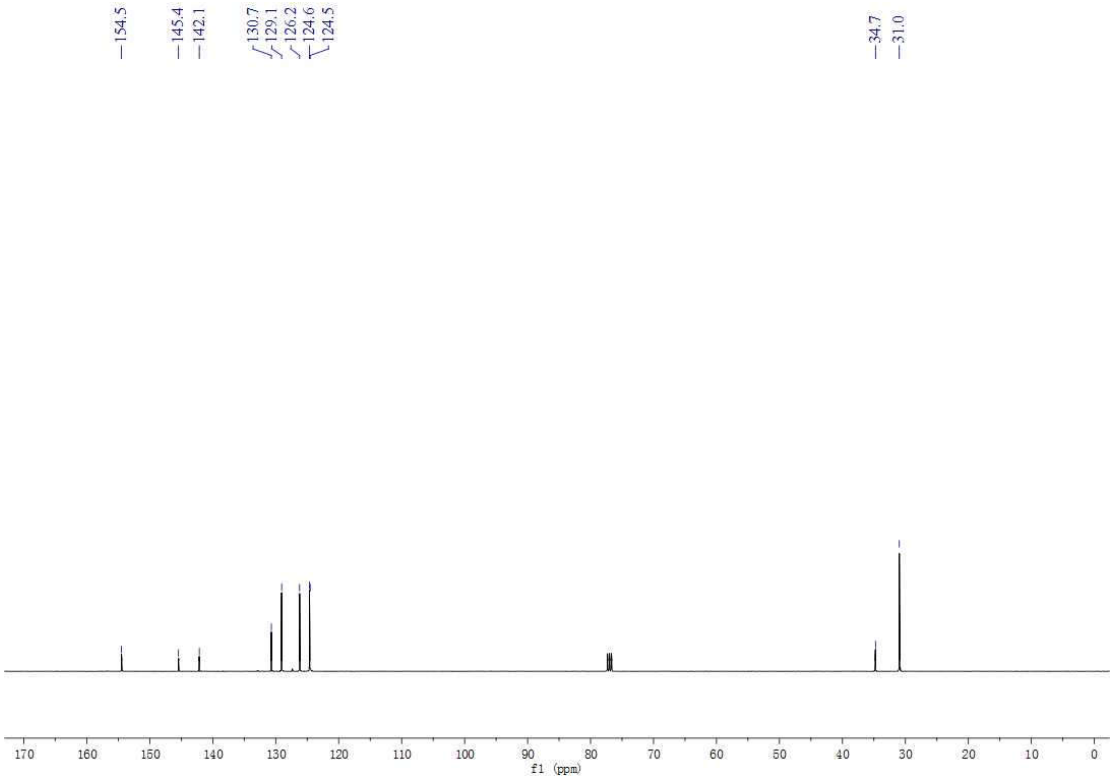
1-methyl-4-(phenylsulfinyl)benzene (2aa)



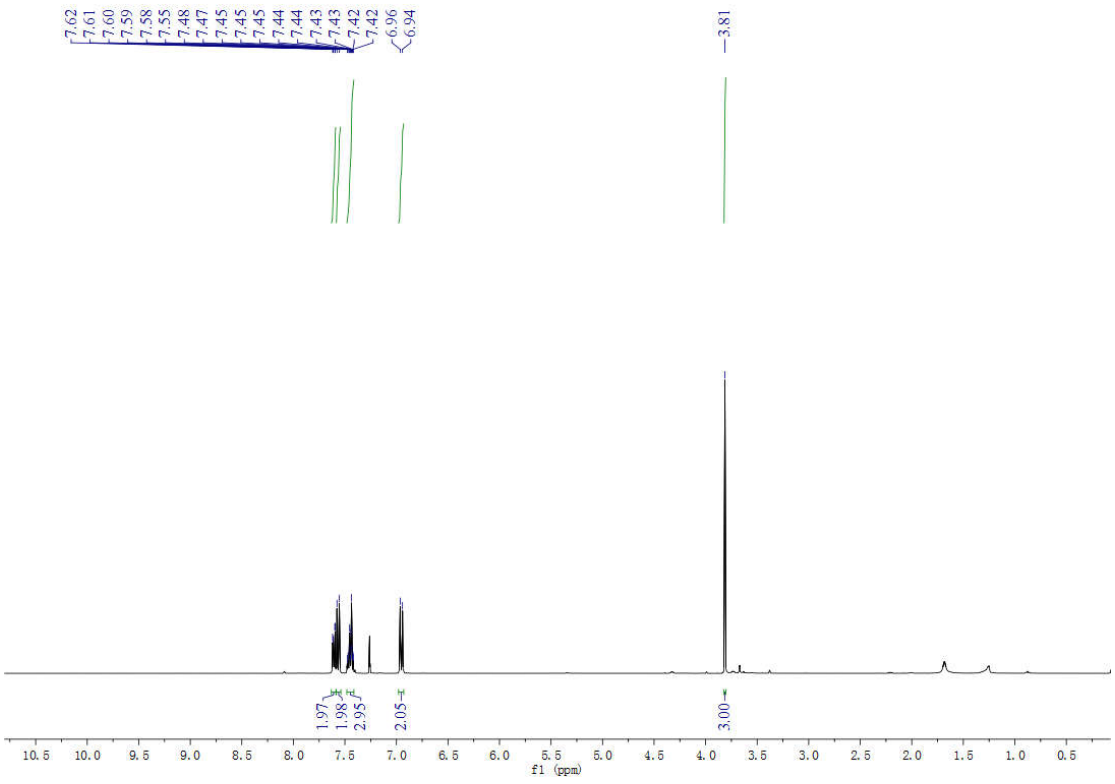


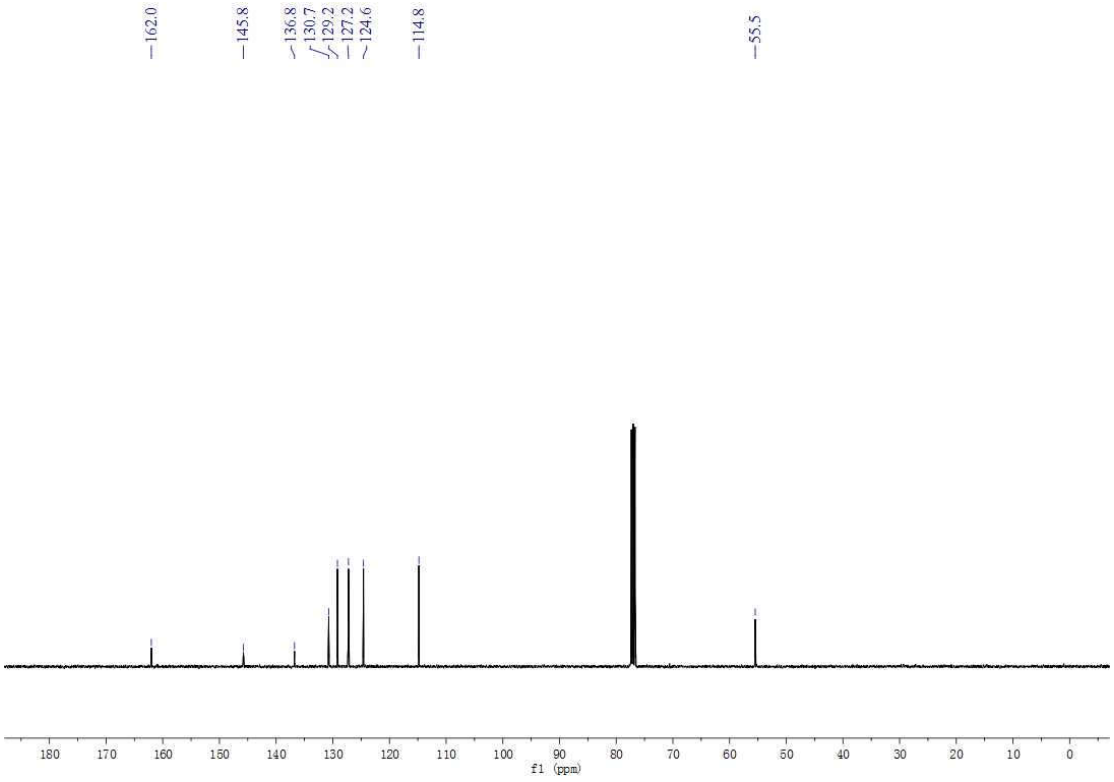
1-(*tert*-butyl)-4-(phenylsulfinyl)benzene (2ab)



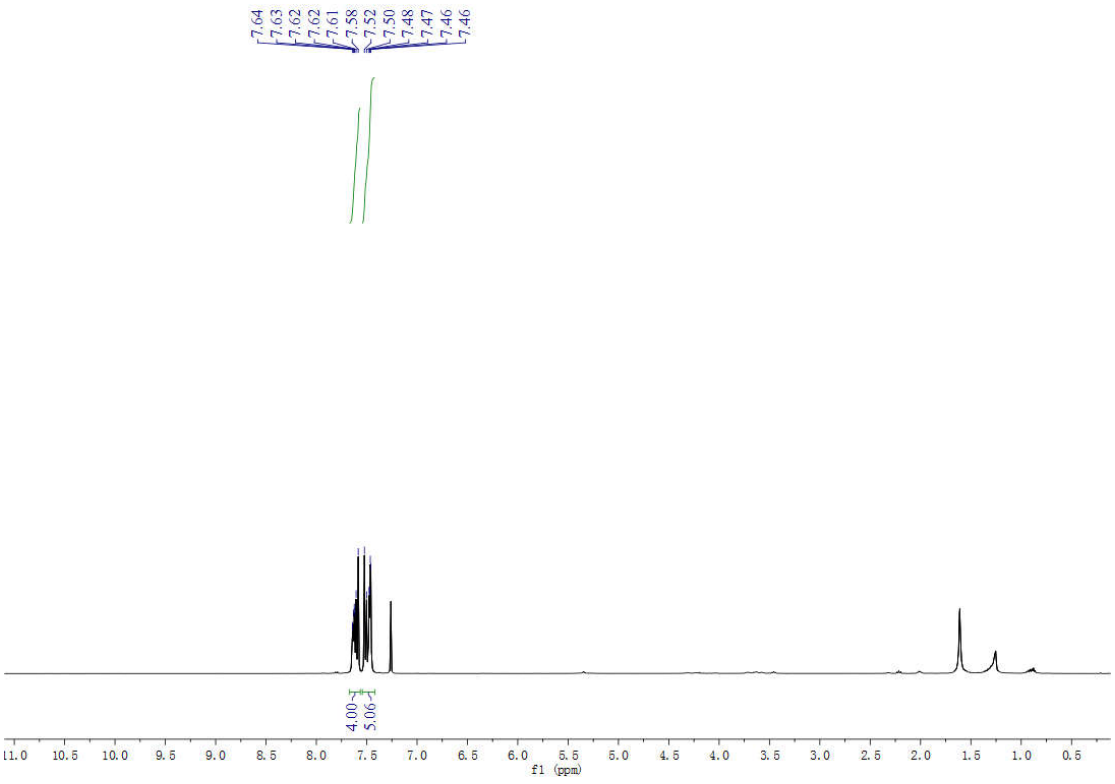


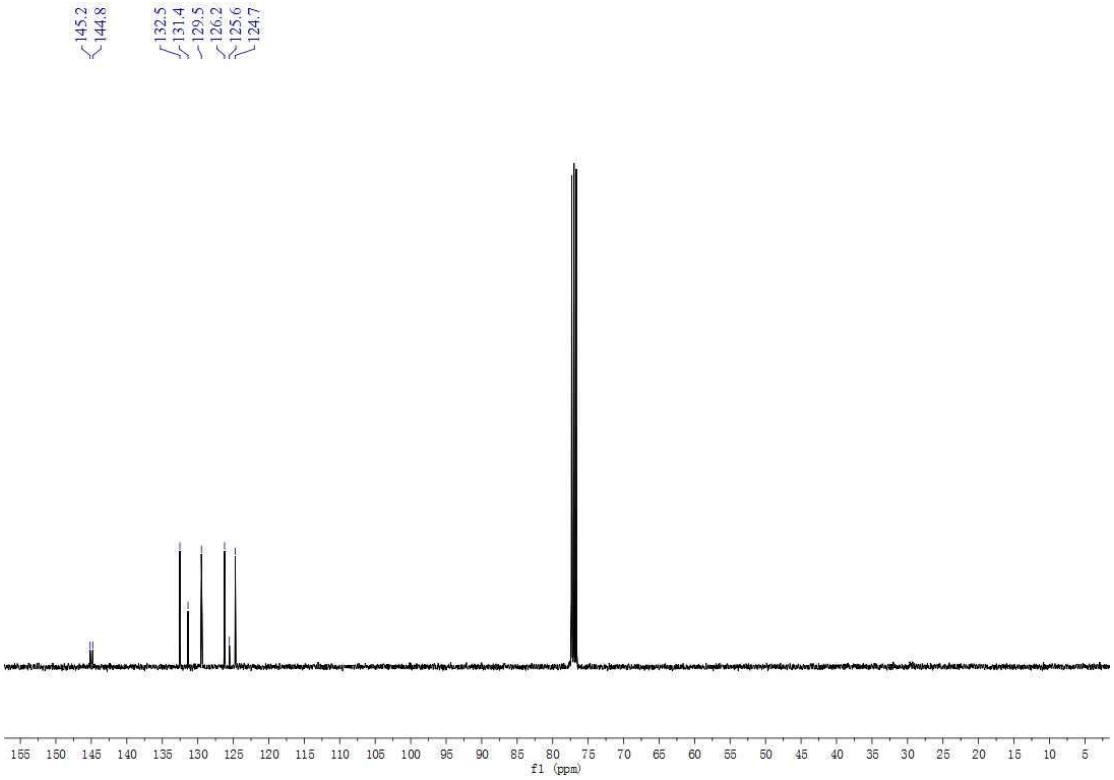
1-methoxy-4-(phenylsulfinyl)benzene (2ac)



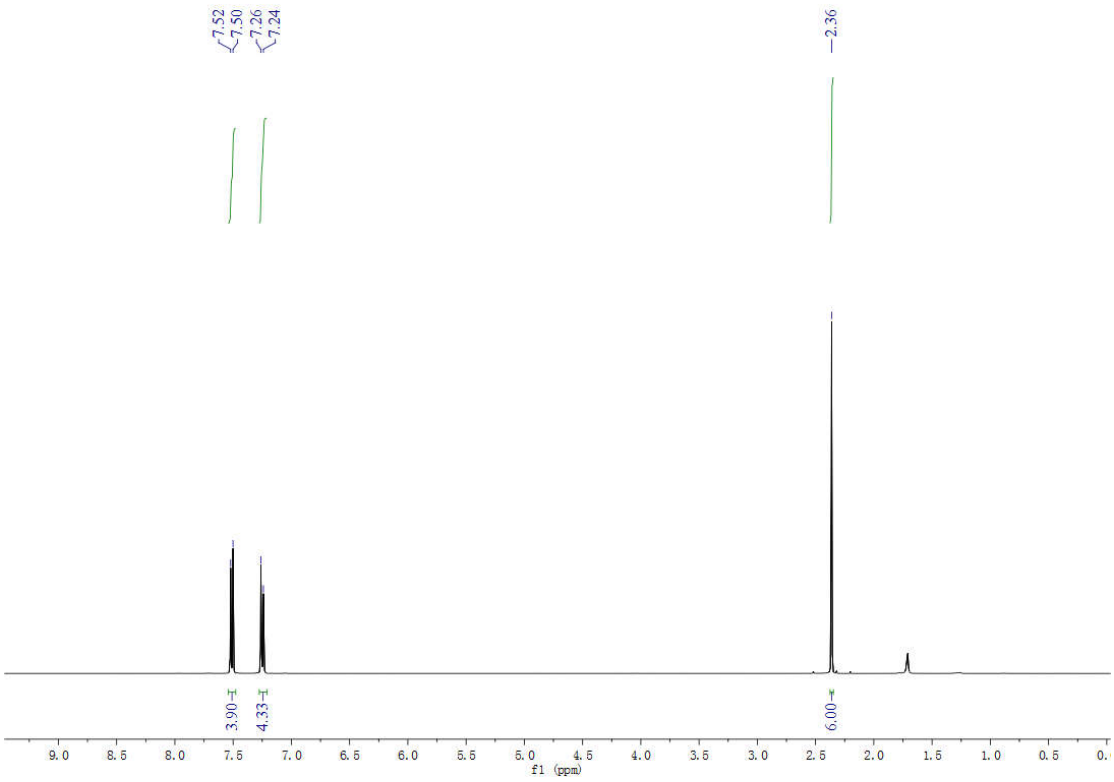


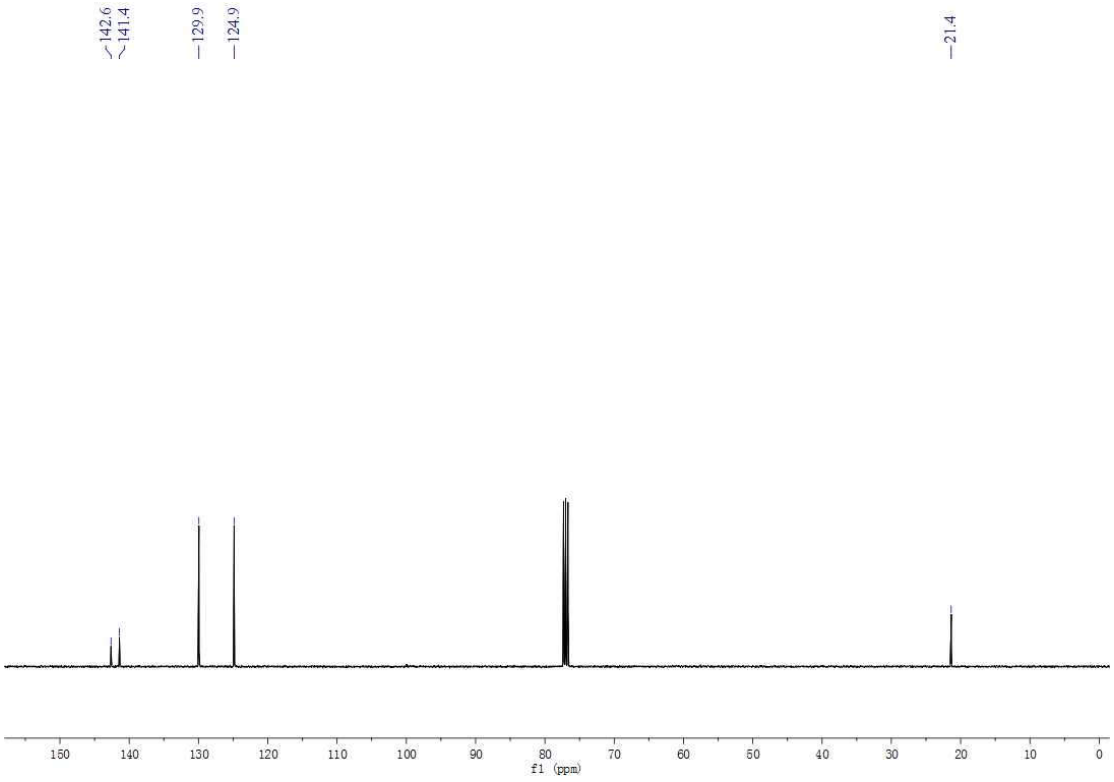
1-bromo-4-(phenylsulfinyl)benzene (2ad)



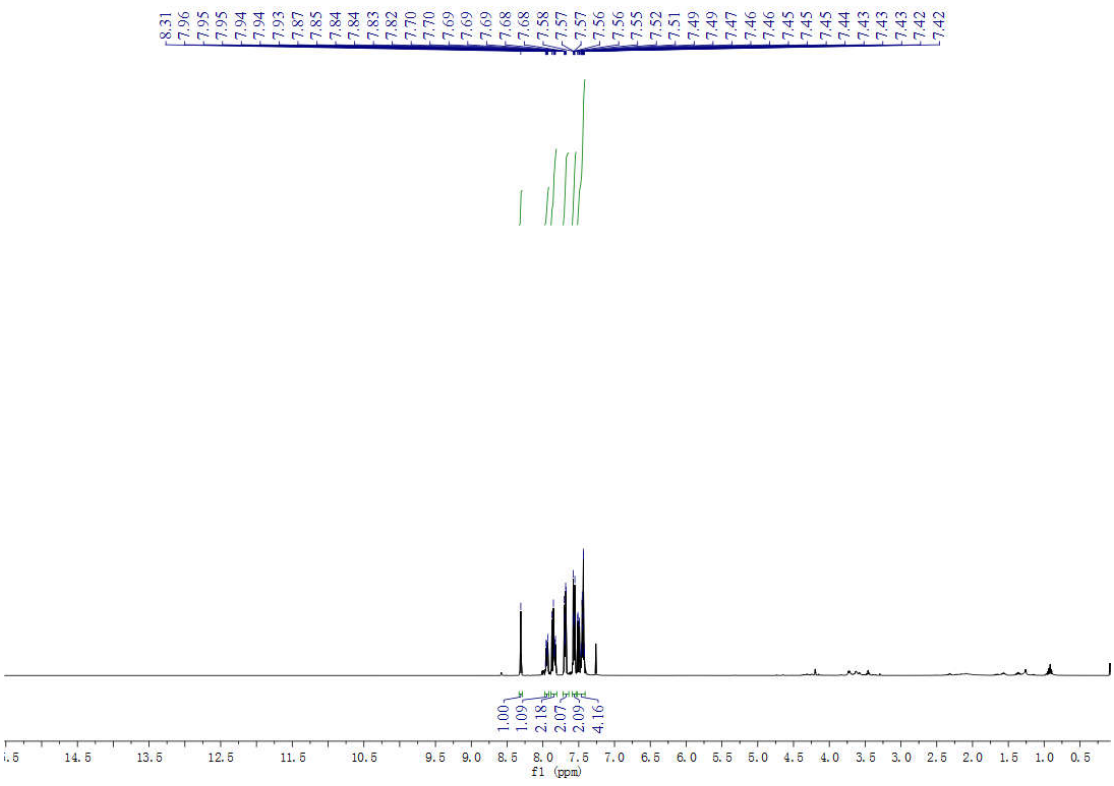


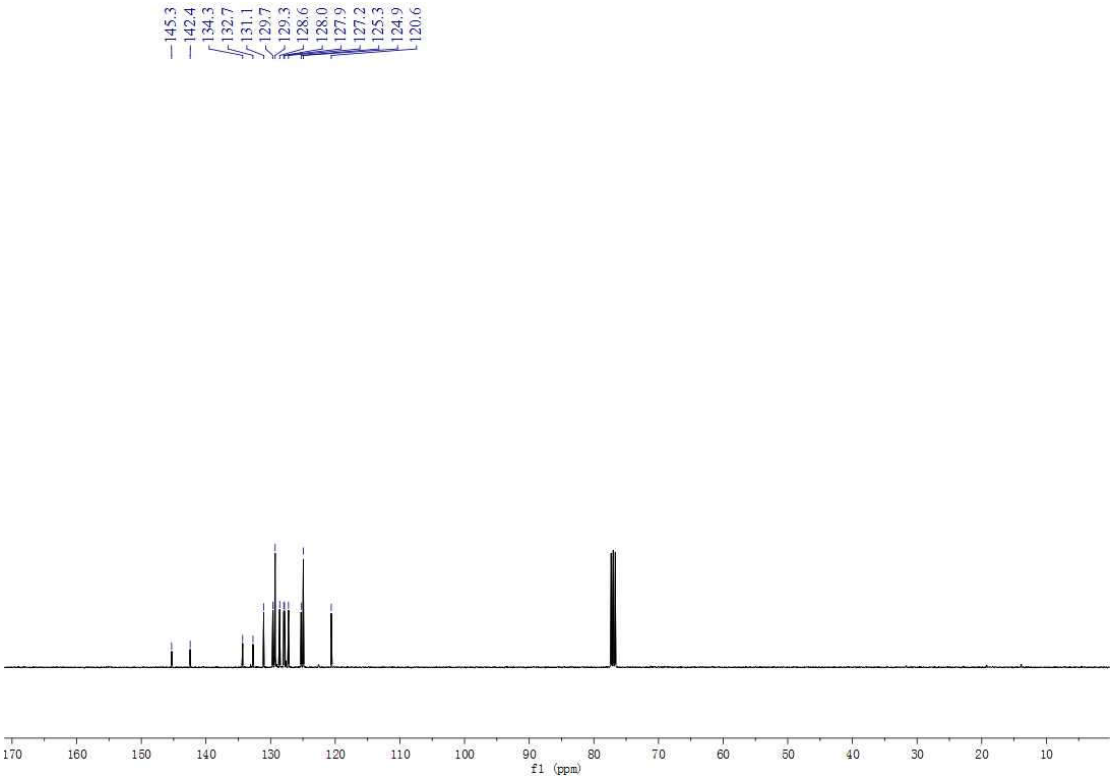
4,4'-sulfinylbis(methylbenzene) (2ae)



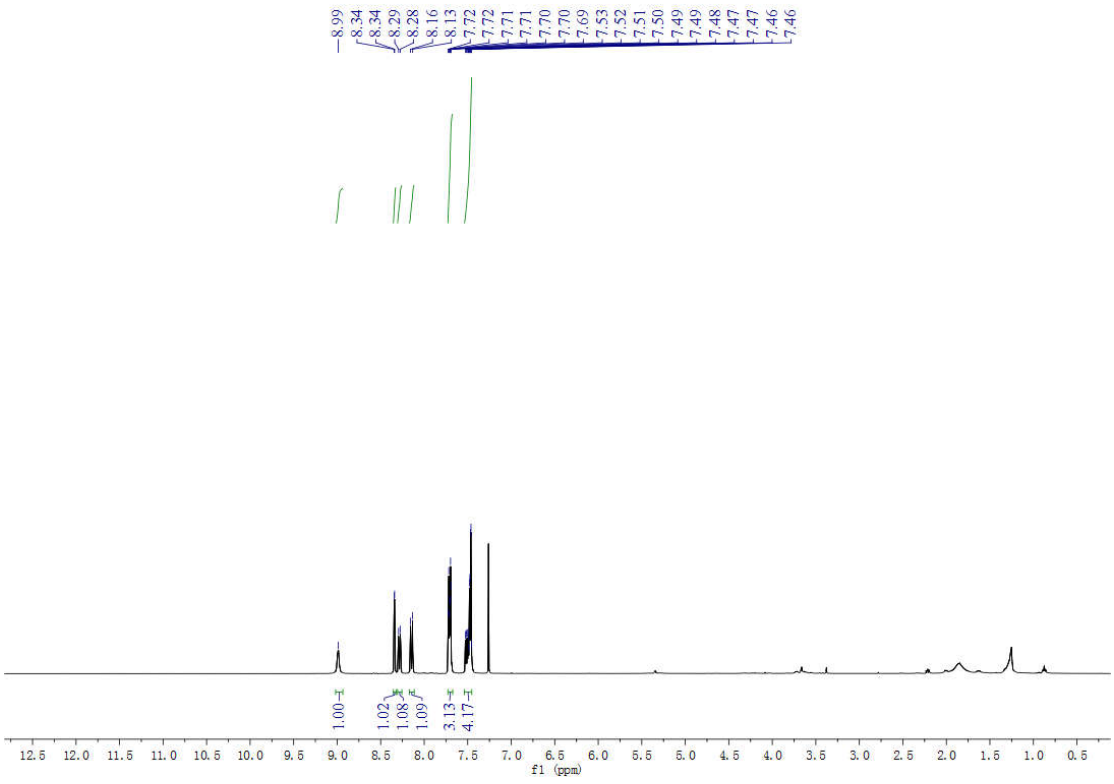


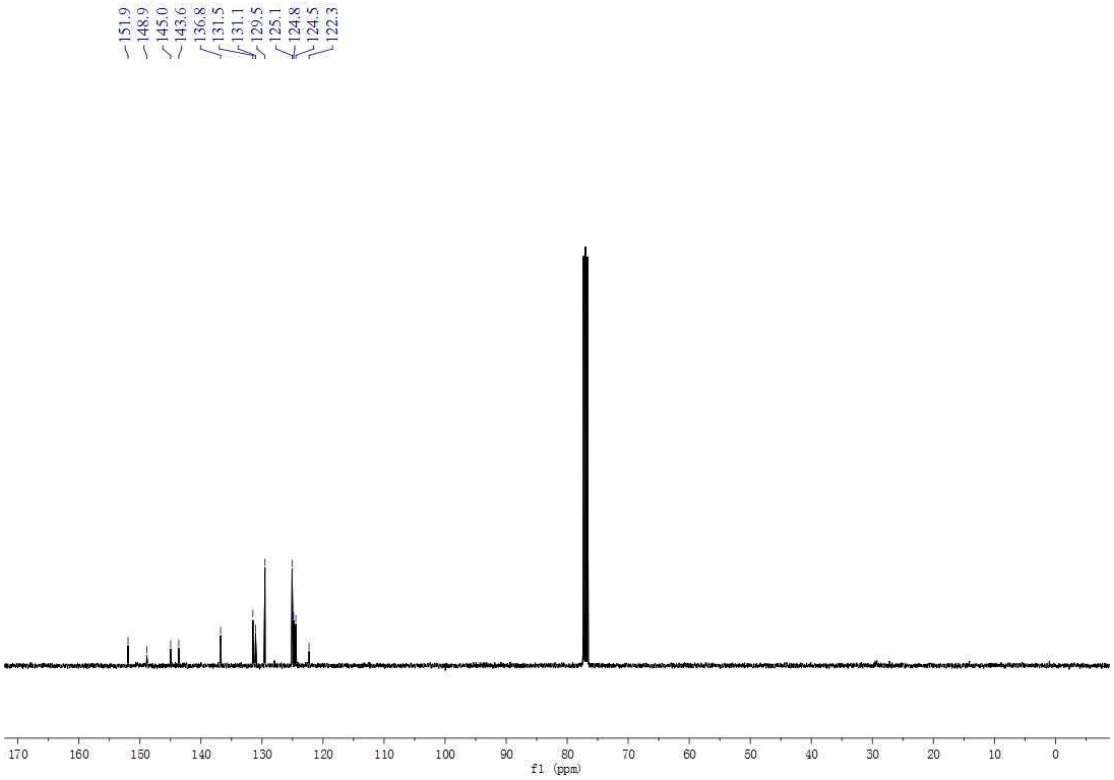
2-(phenylsulfinyl)naphthalene (2af)



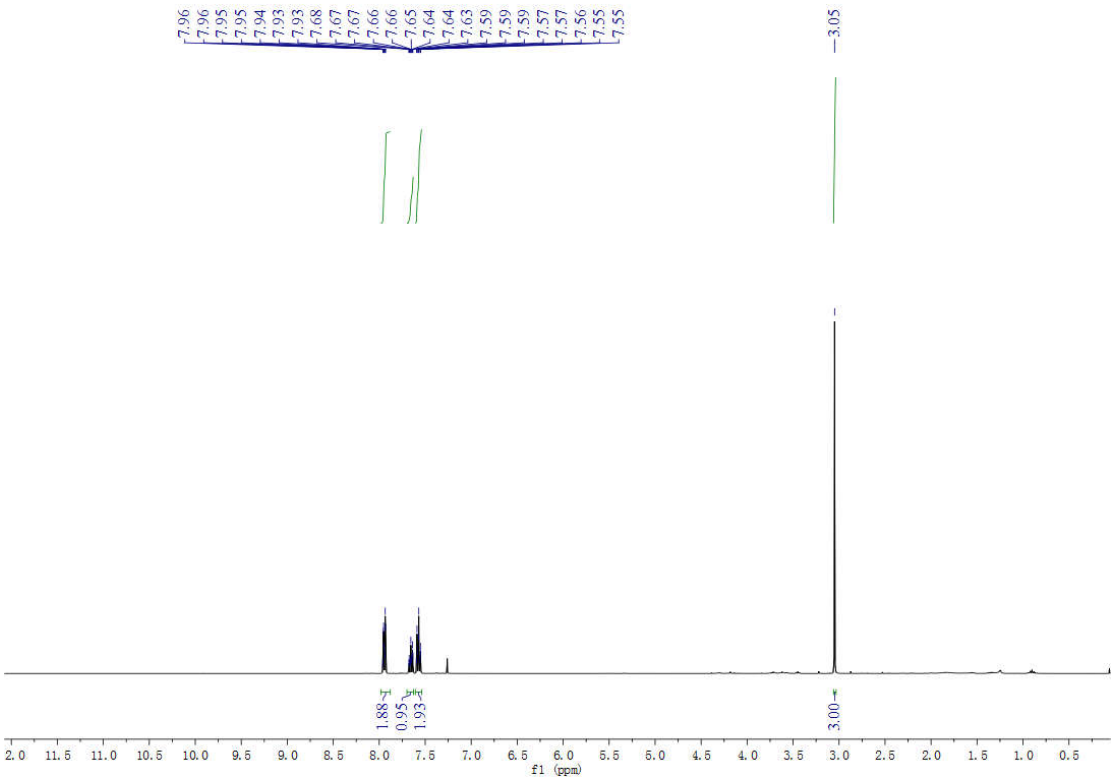


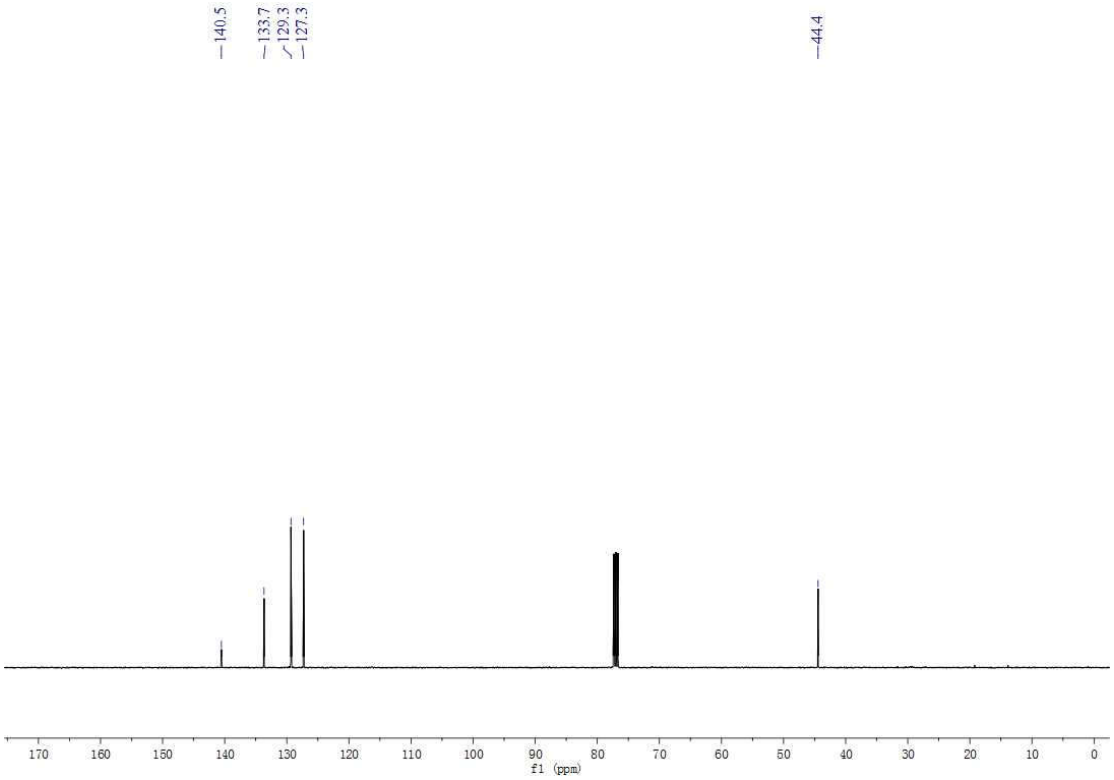
6-(phenylsulfinyl)quinoline (2ag)



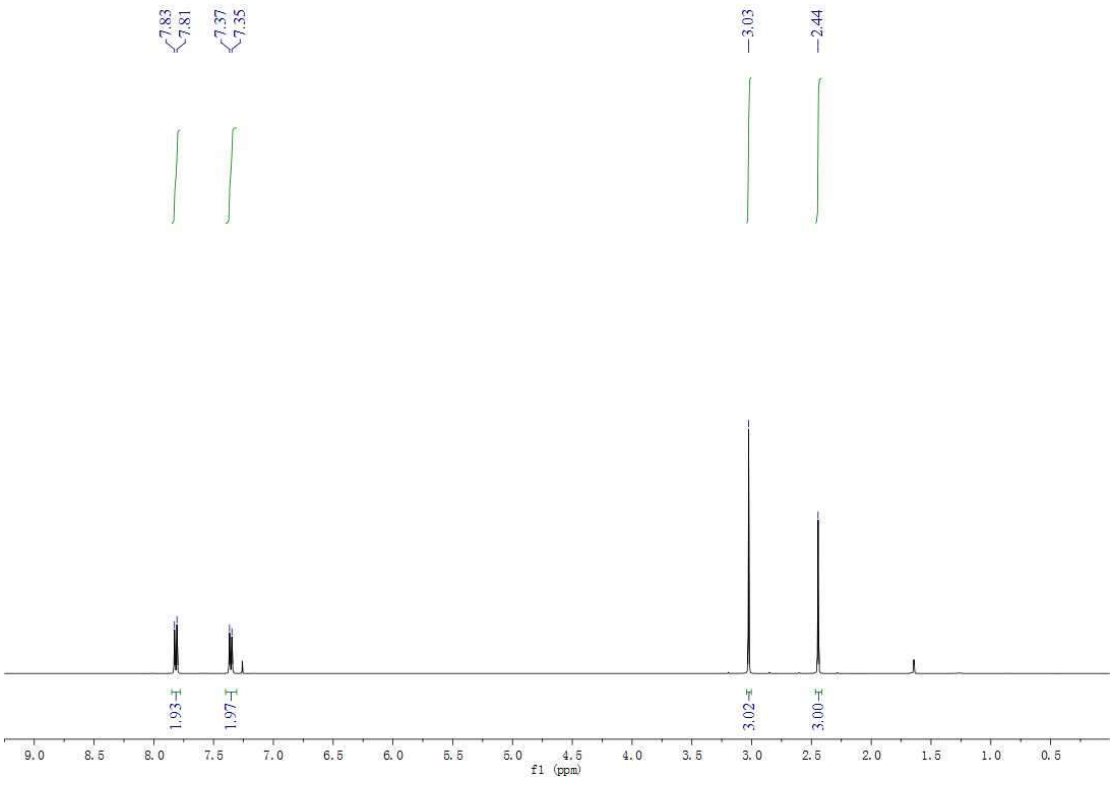


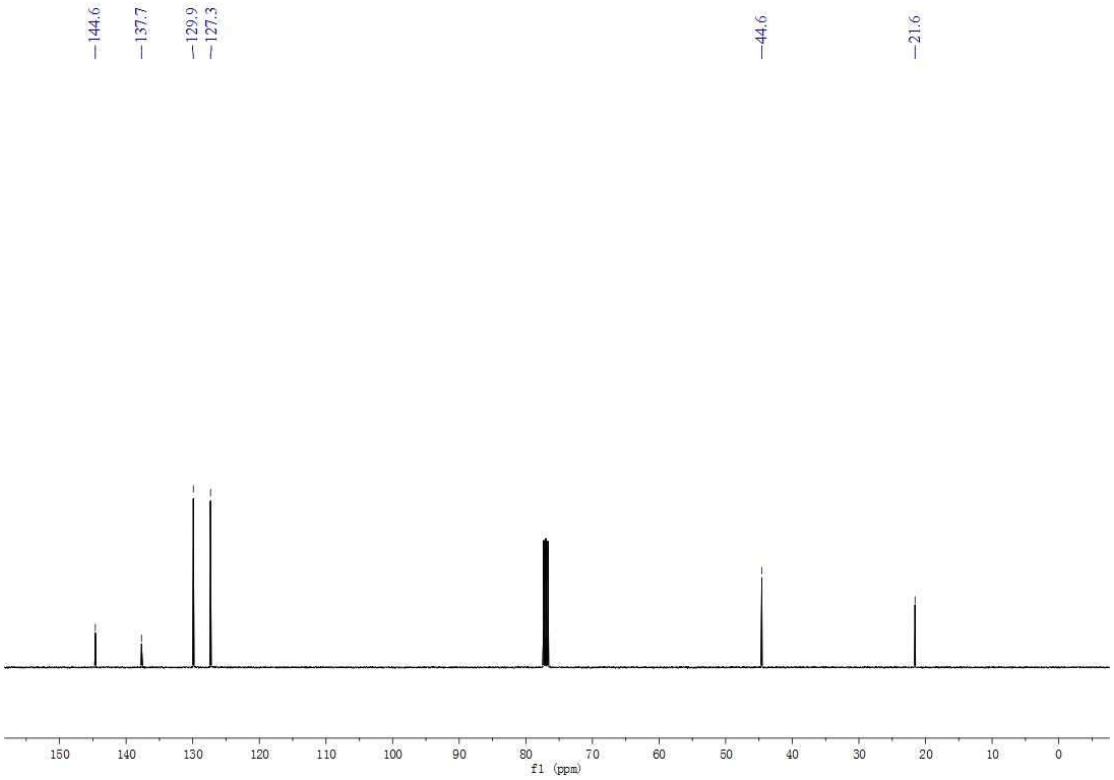
(methylsulfonyl)benzene (3b)



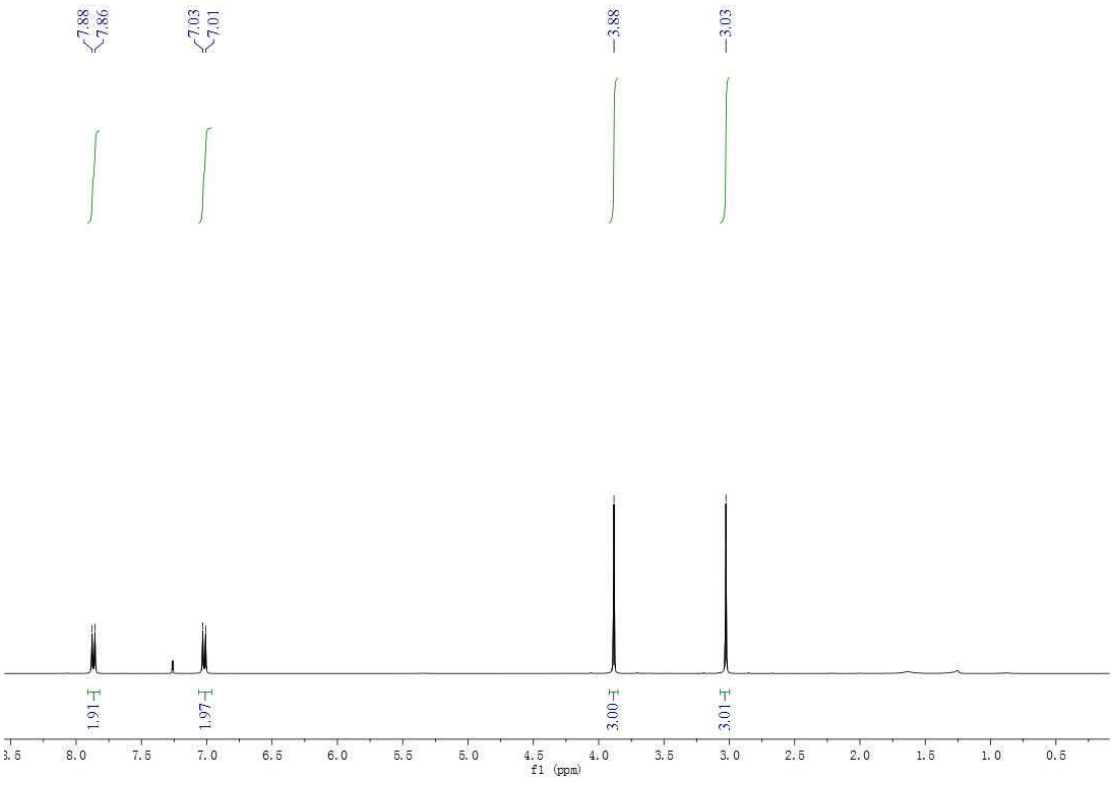


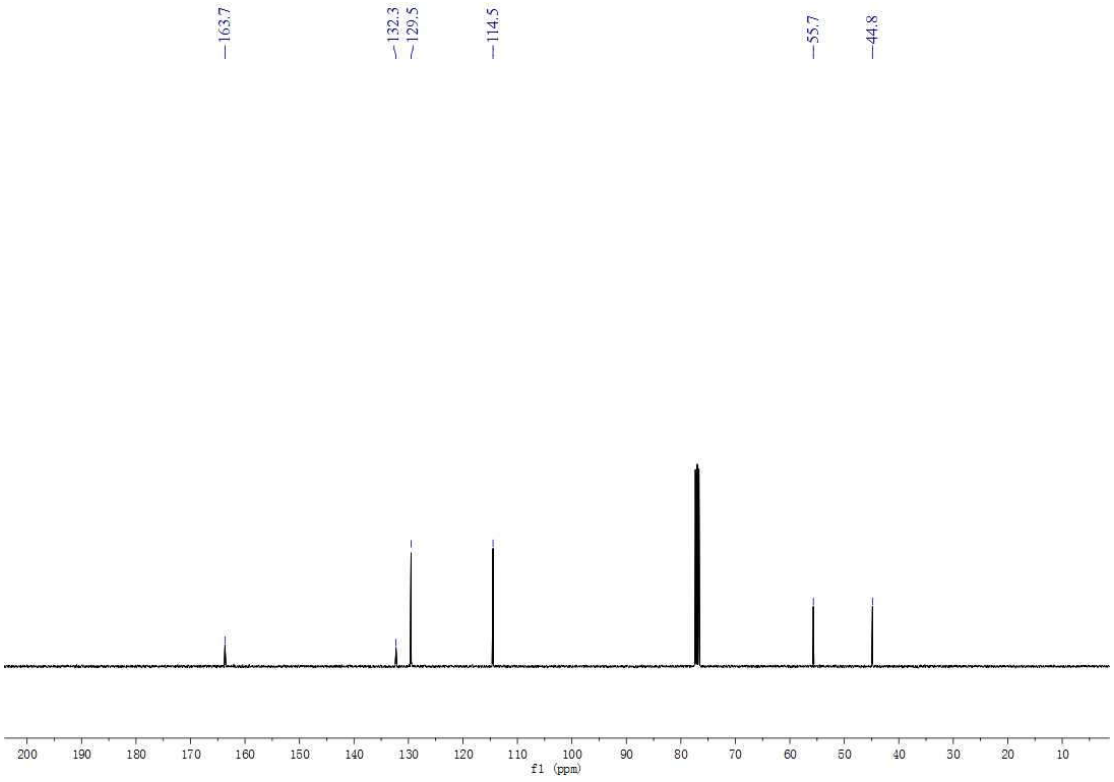
1-methyl-4-(methylsulfonyl)benzene (3a)



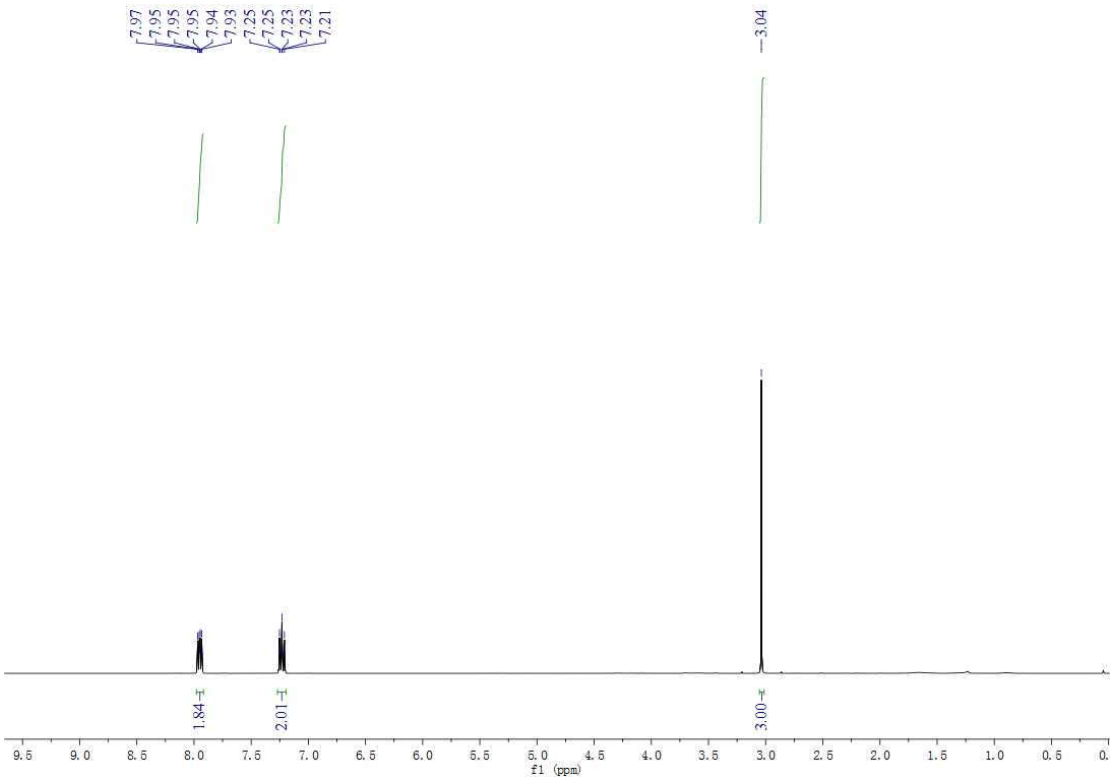


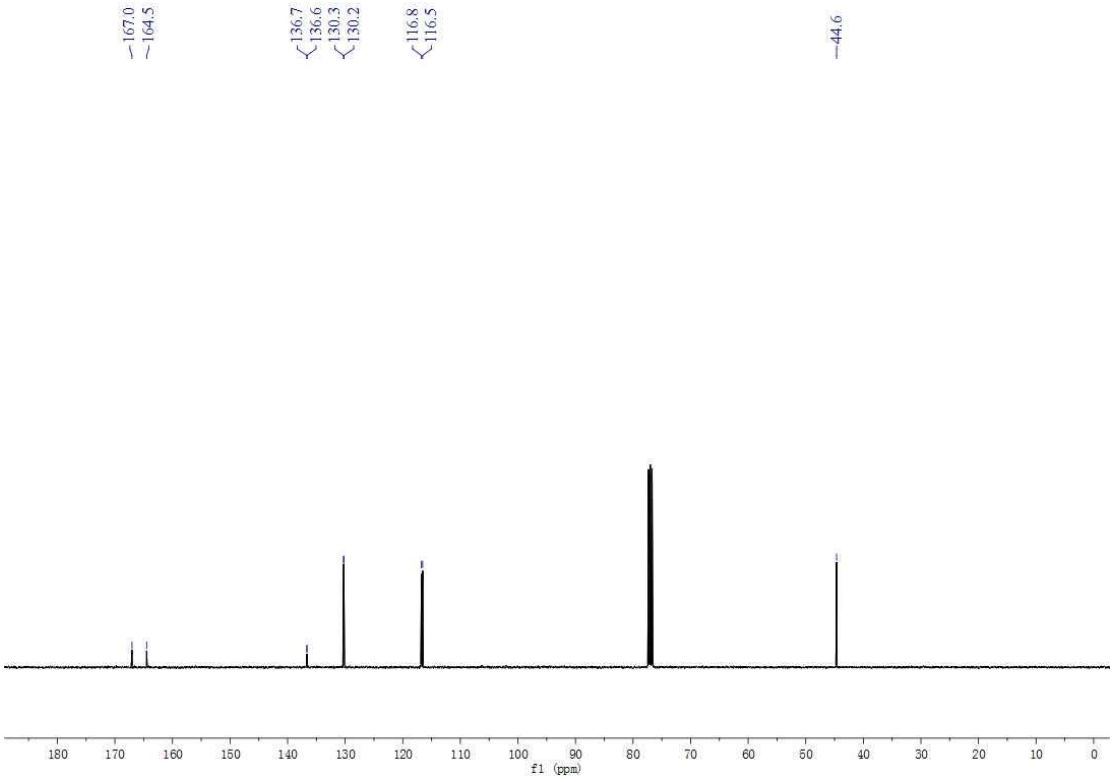
1-methoxy-4-(methylsulfonyl)benzene (3c)

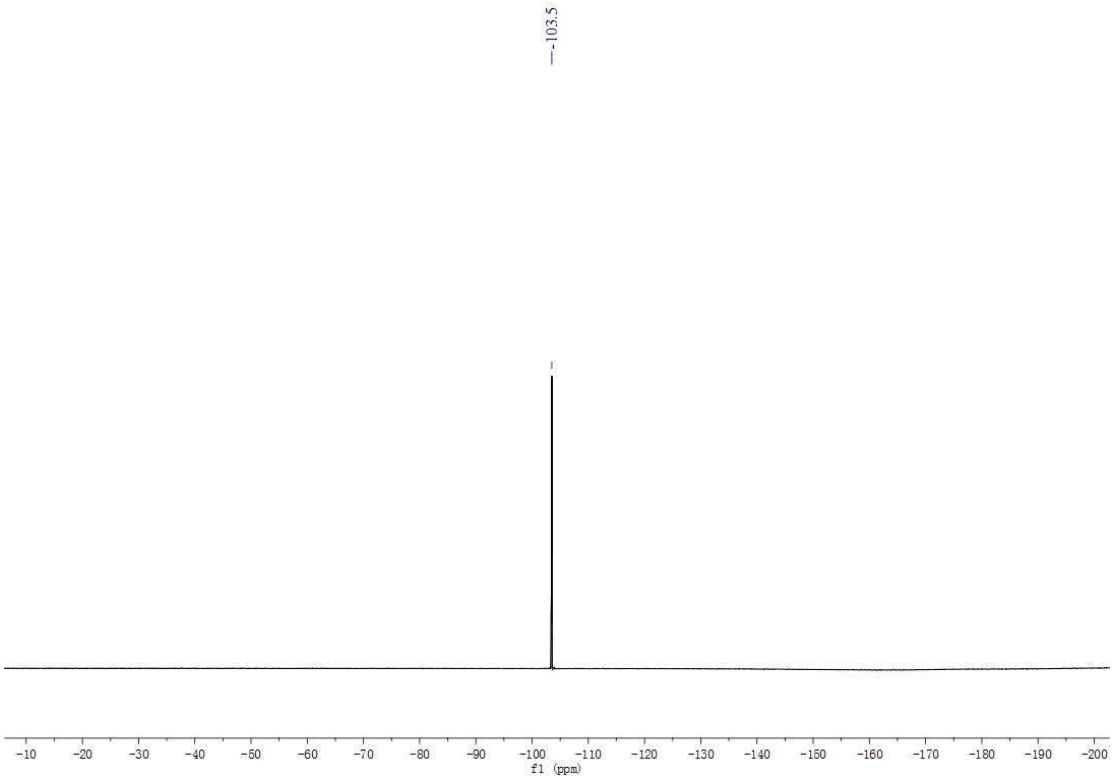




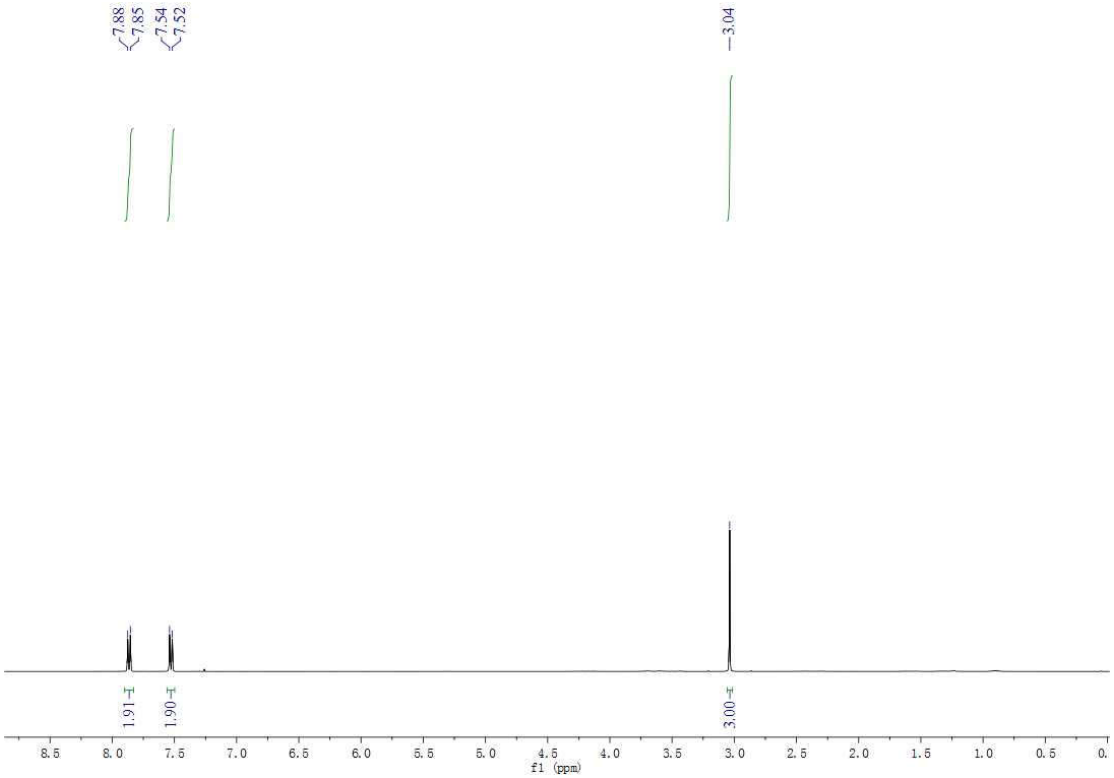
1-fluoro-4-(methylsulfonyl)benzene (3d)

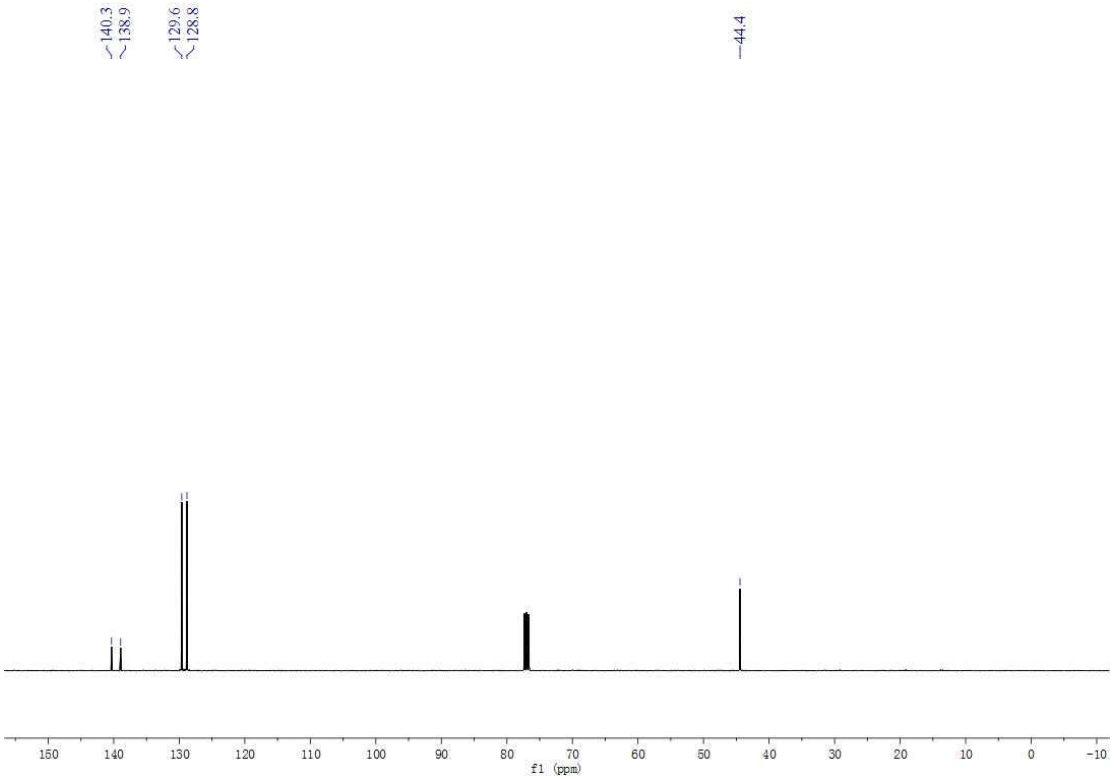



167.0
164.5
136.7
136.6
130.3
130.2
116.8
116.5
44.6
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

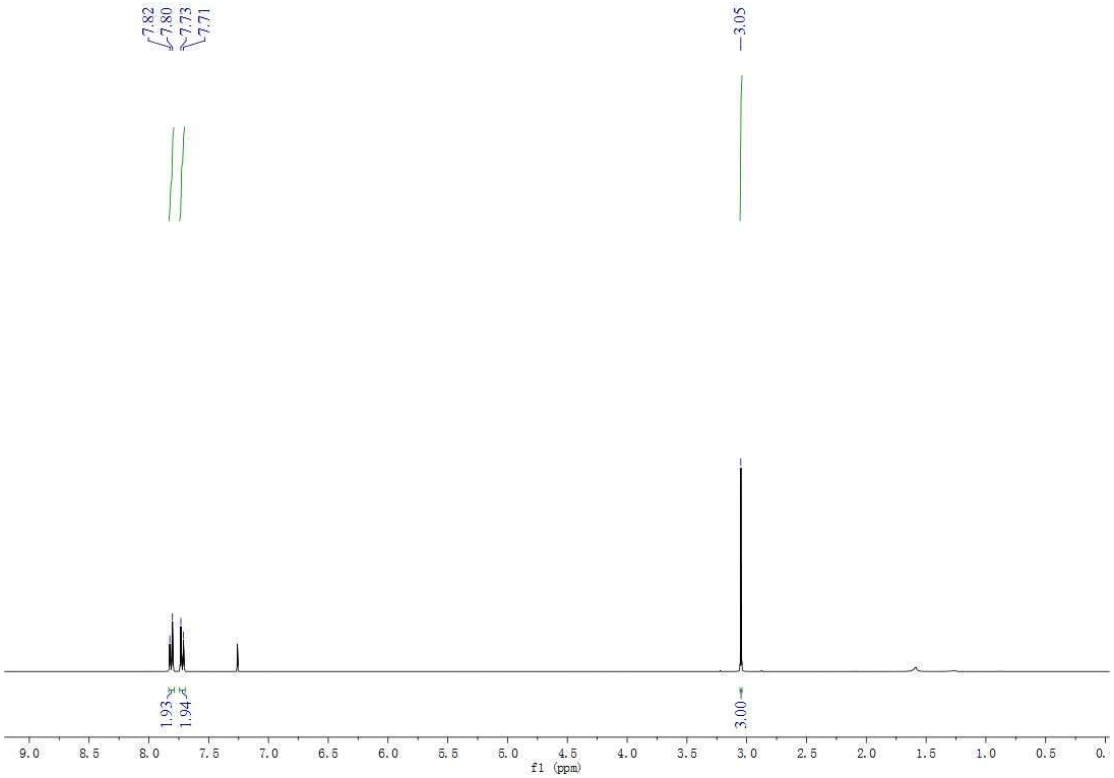

-103.5
-10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190 -200
f1 (ppm)

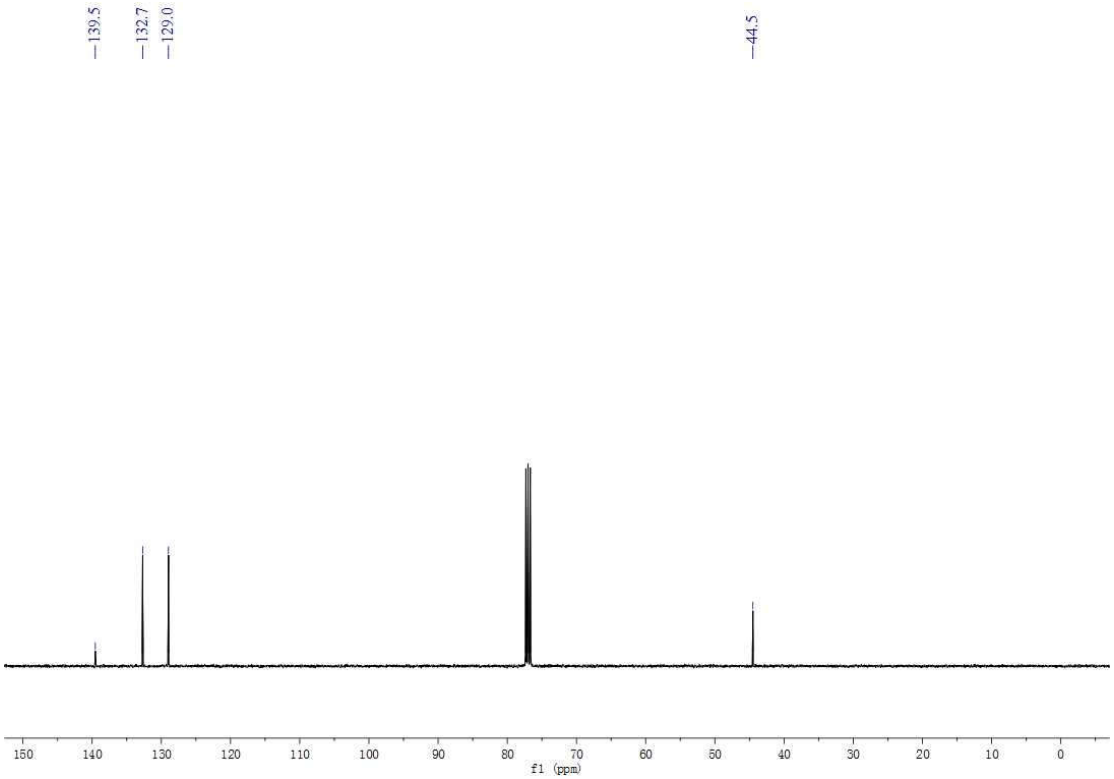
1-chloro-4-(methylsulfonyl)benzene (3e)



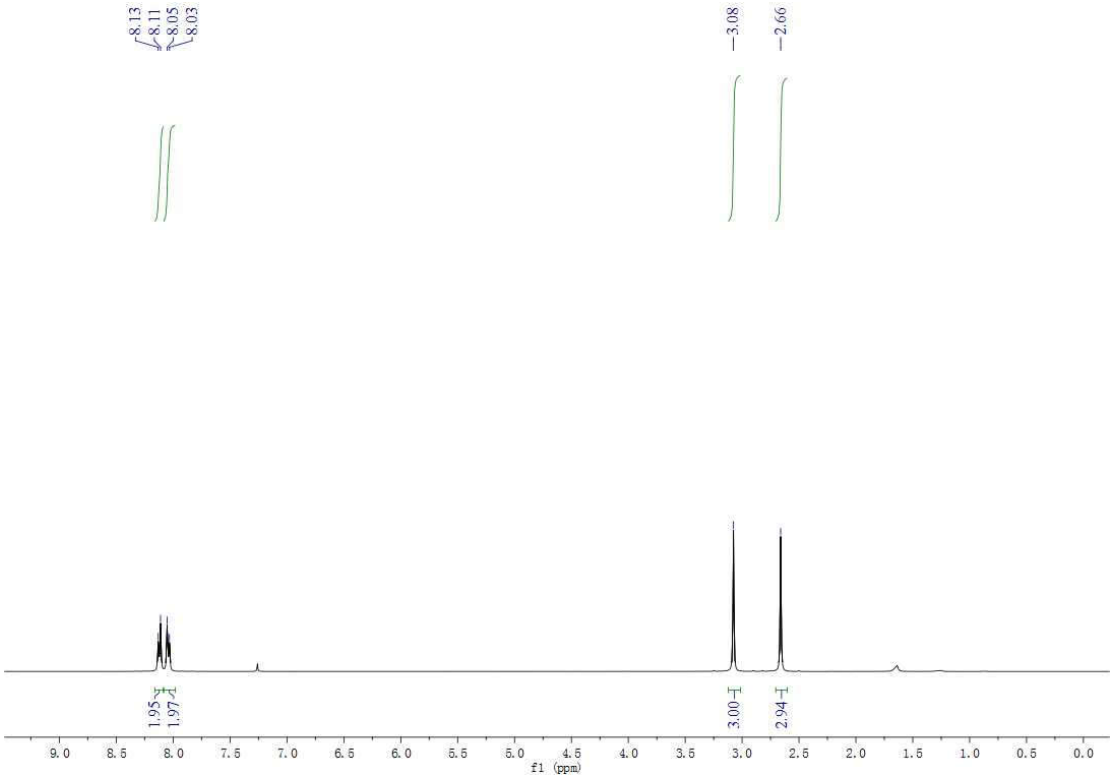


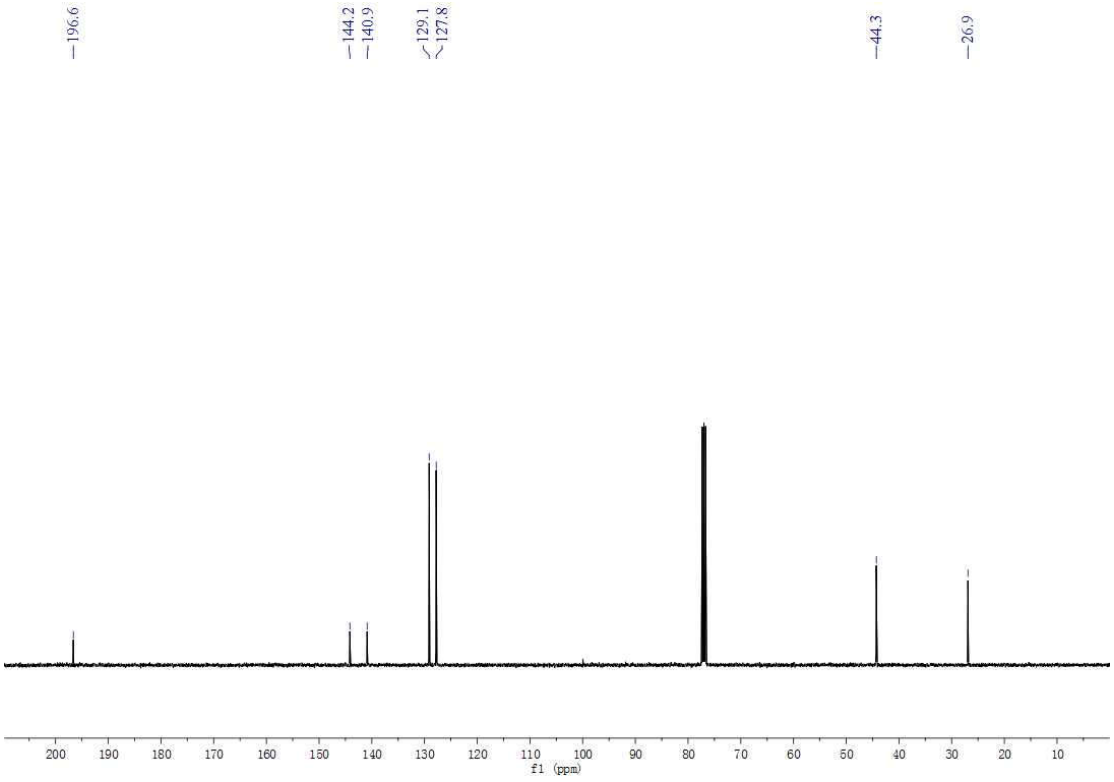
1-bromo-4-(methylsulfonyl)benzene (3f)



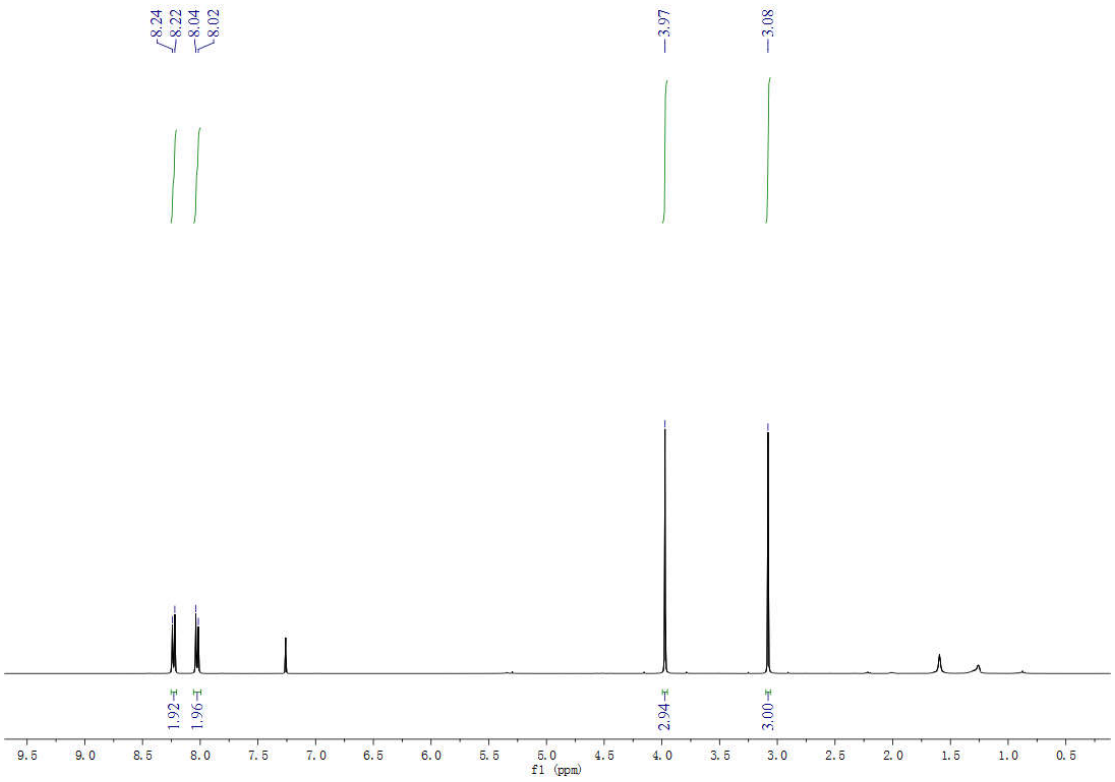


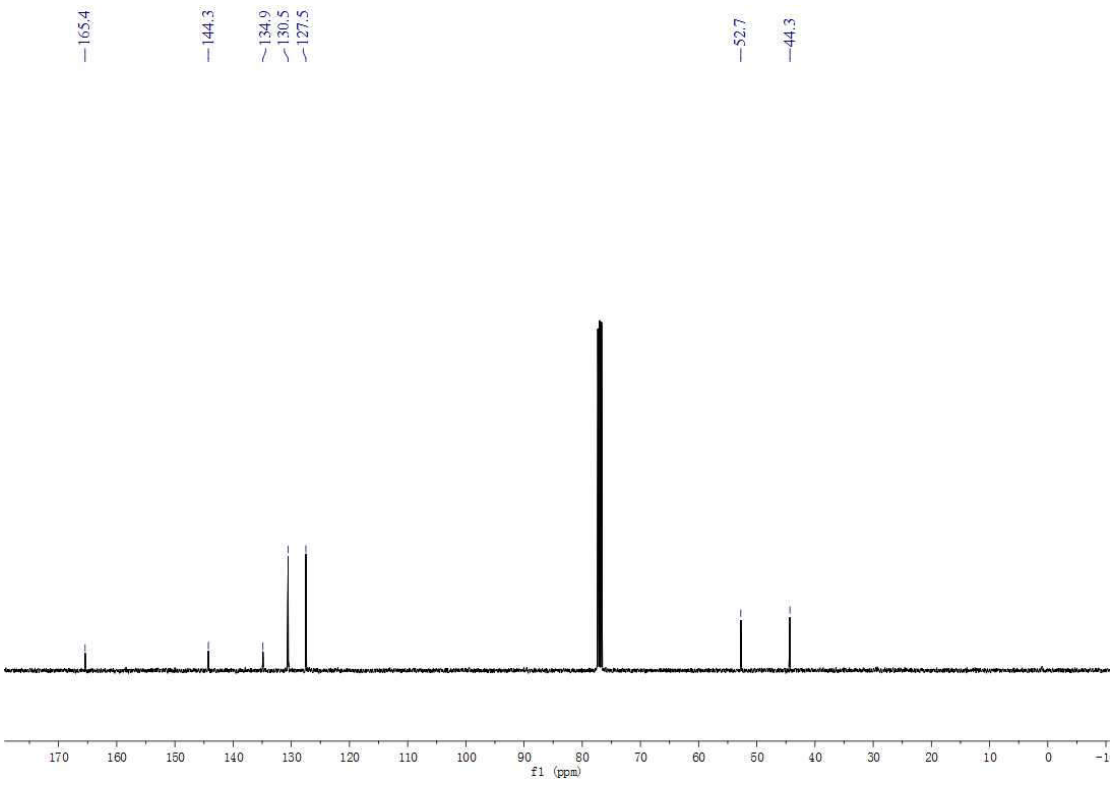
1-(4-(methylsulfonyl)phenyl)ethanone (3g)



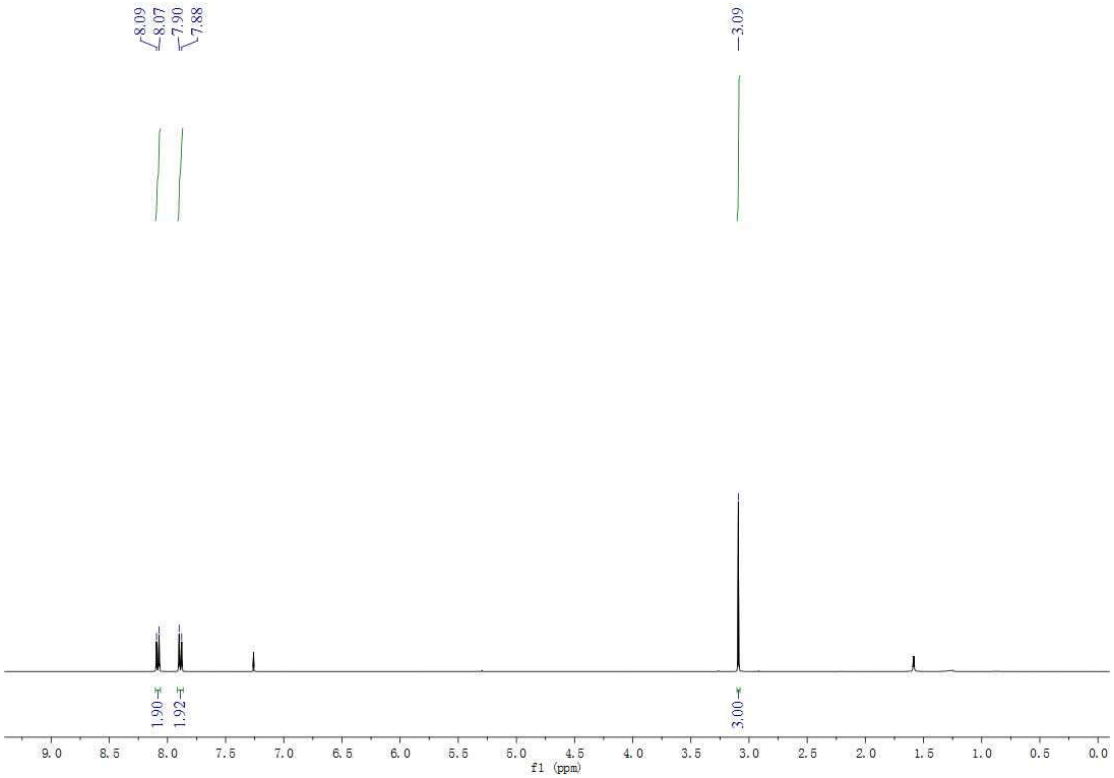


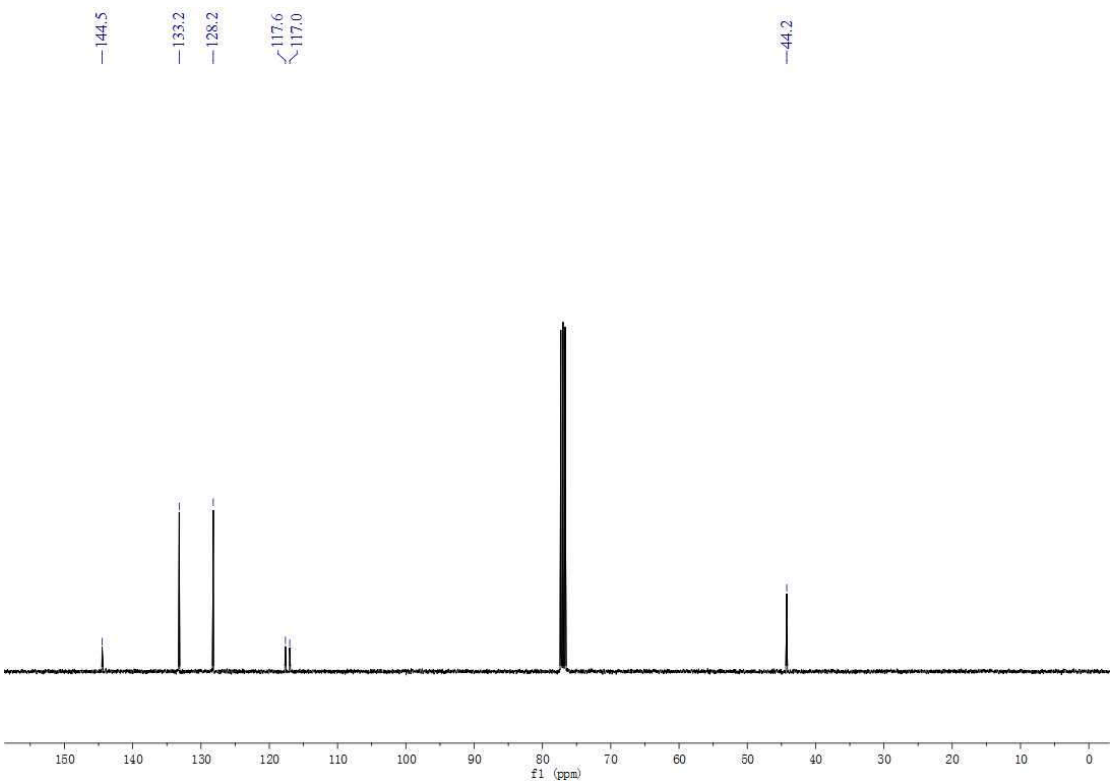
methyl 4-(methylsulfonyl)benzoate (3h)



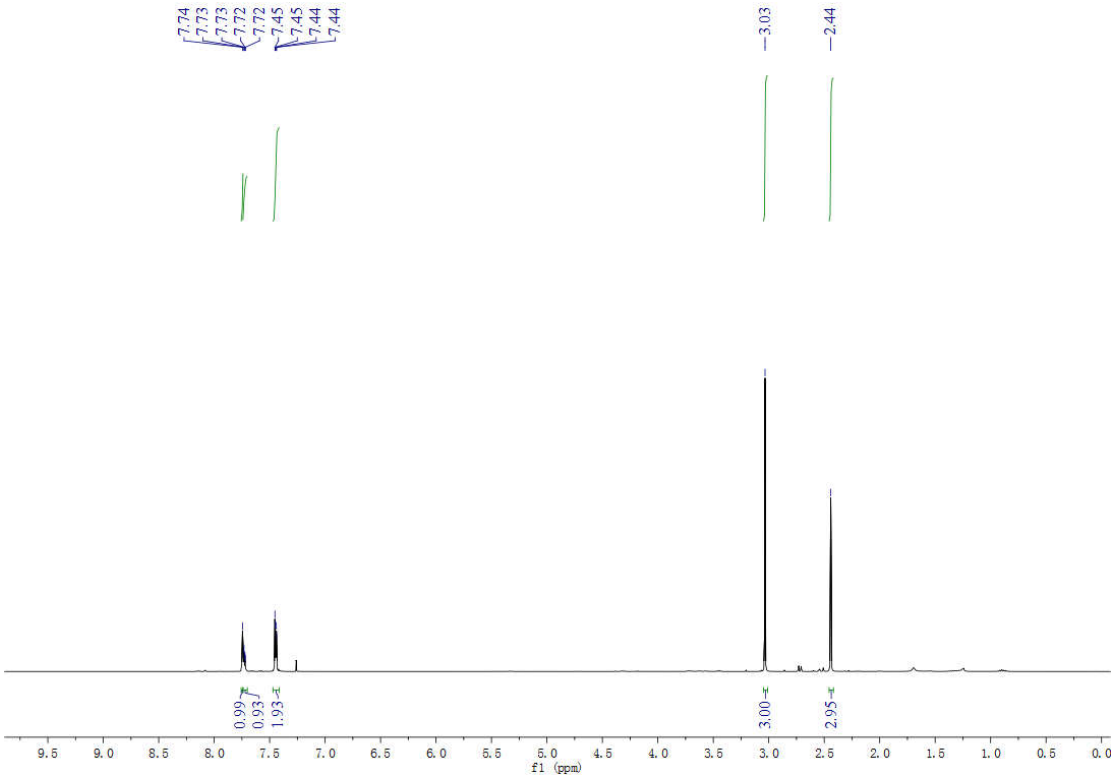


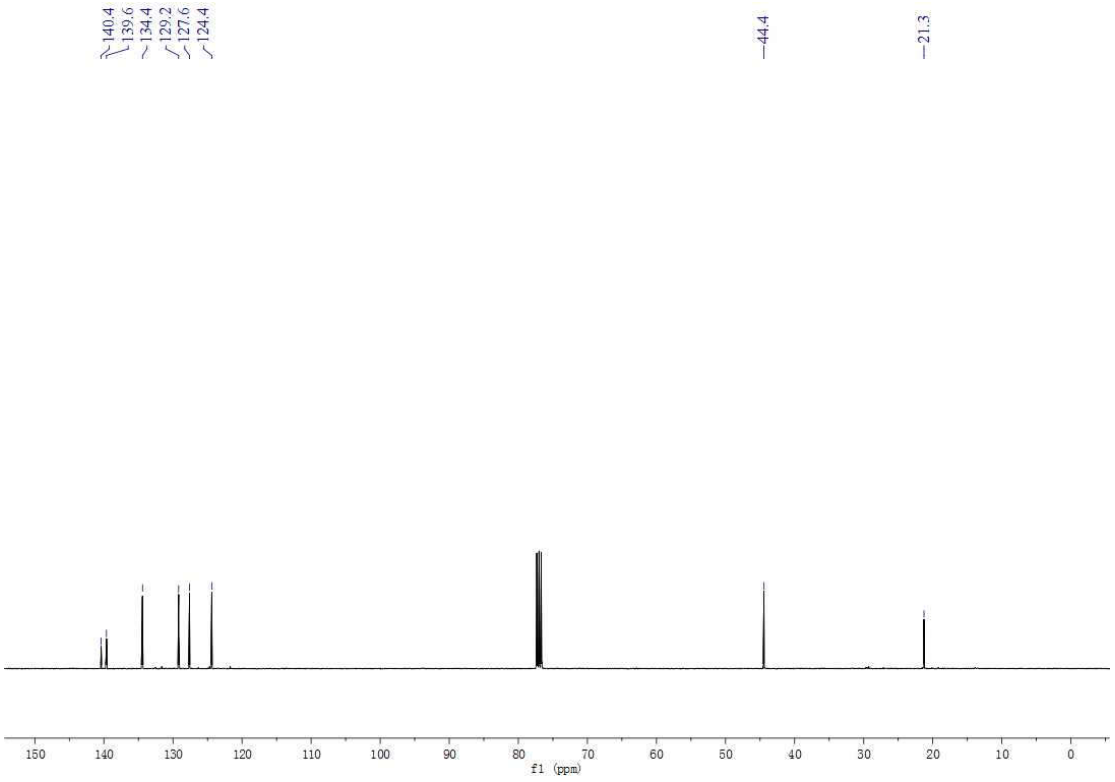
4-(methylsulfonyl)benzonitrile (3i)



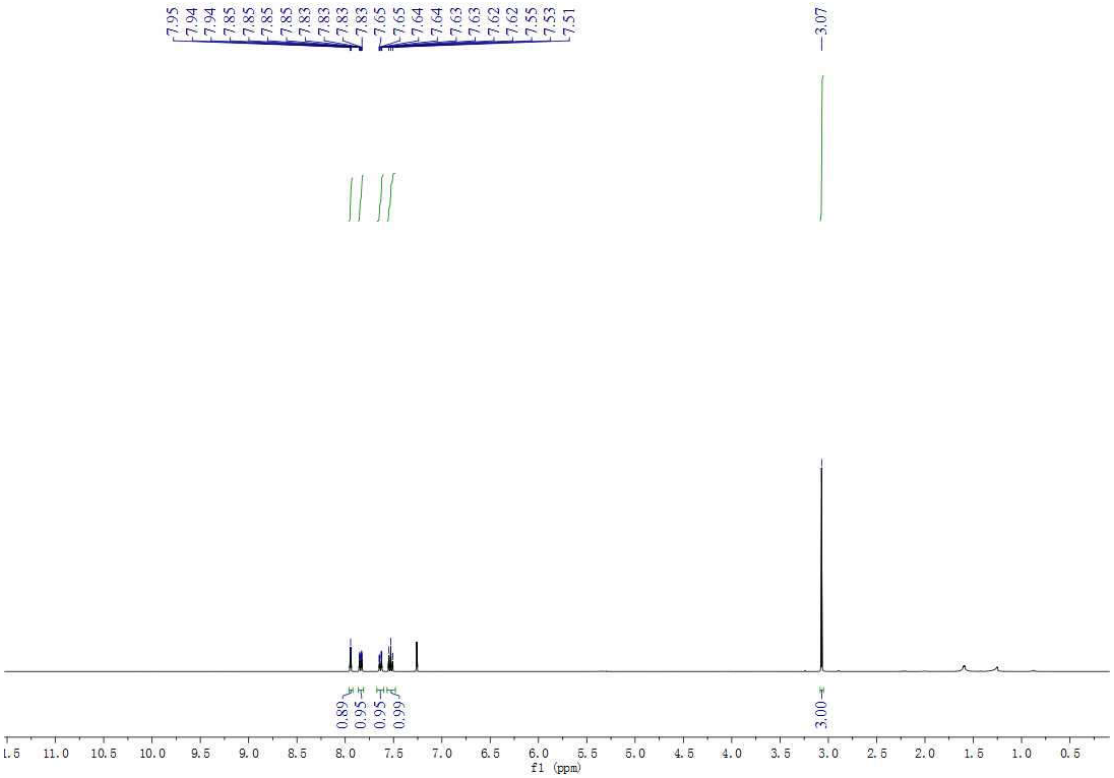


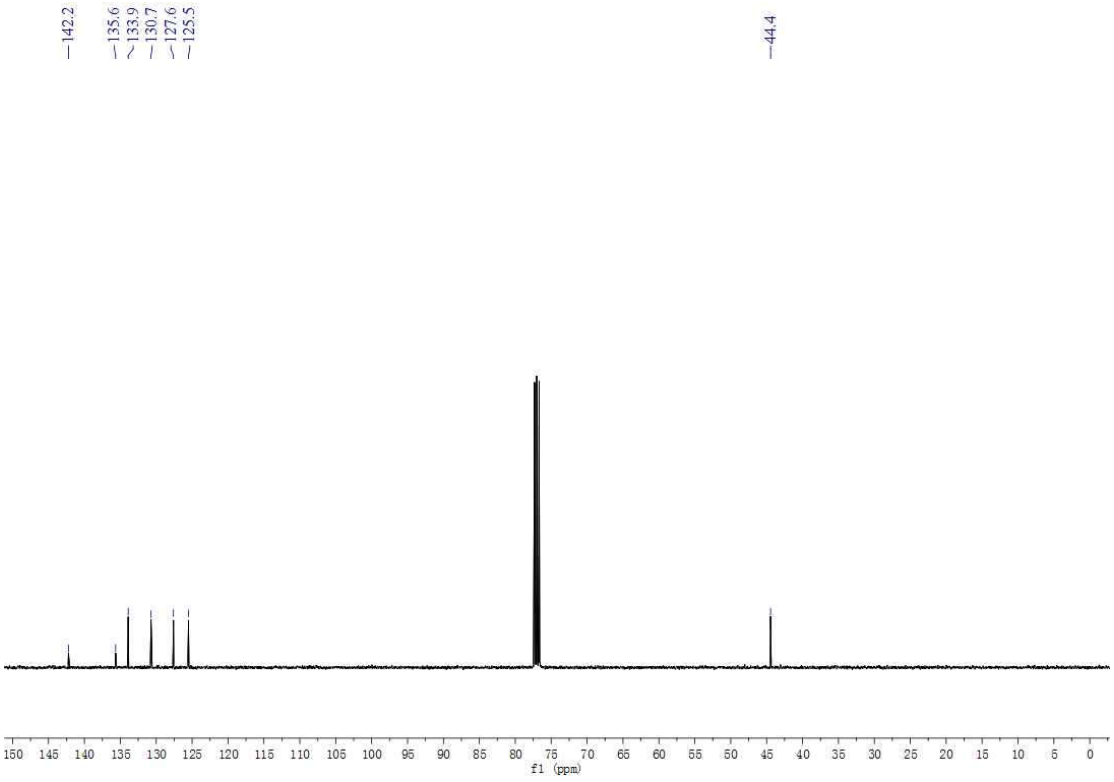
1-methyl-3-(methylsulfinyl)benzene (3j)



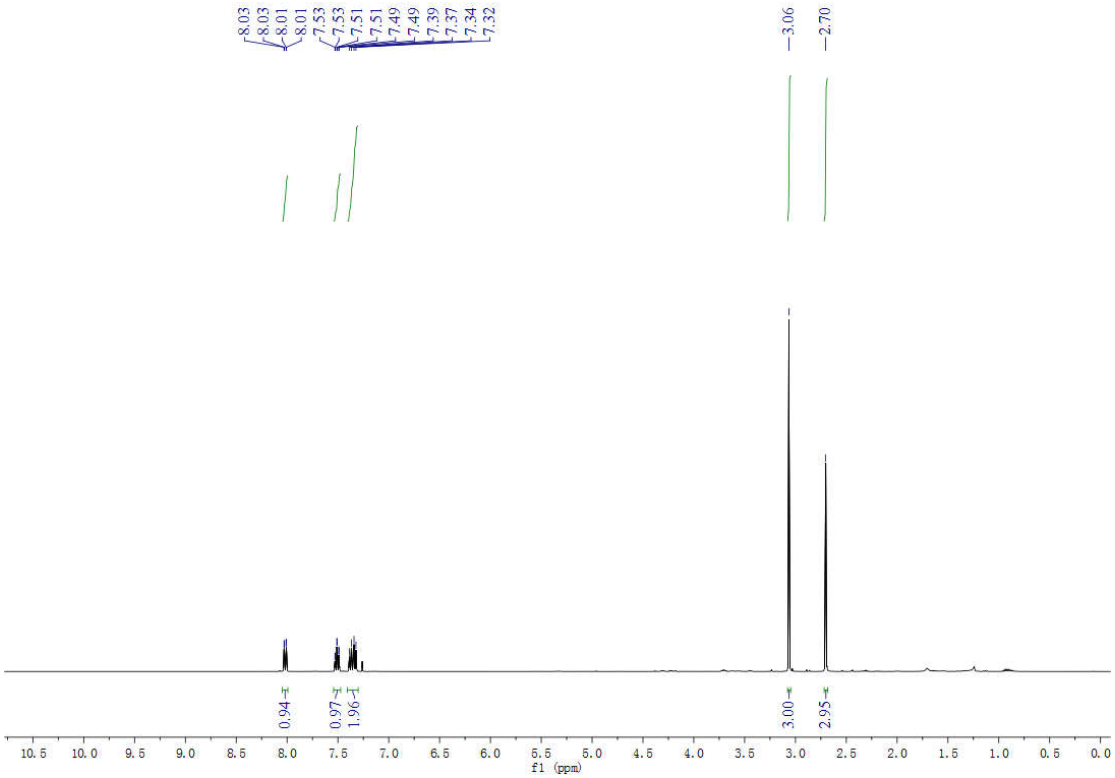


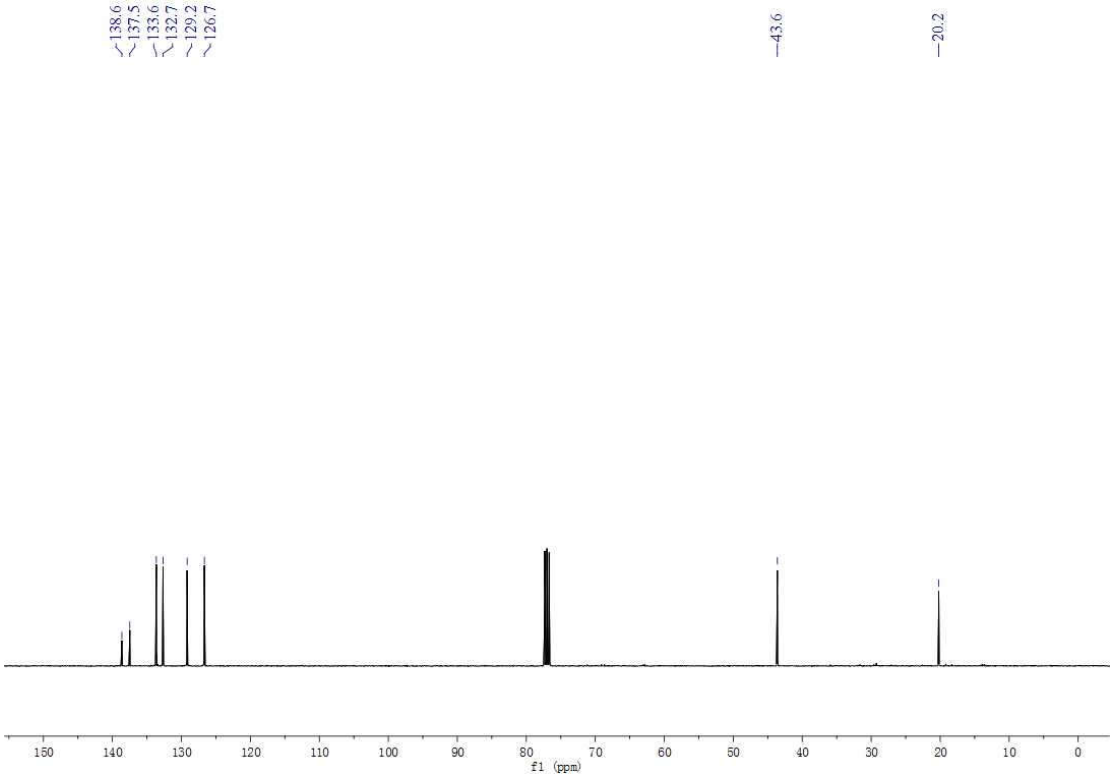
1- chloro -3-(methylsulfonyl)benzene (3k)



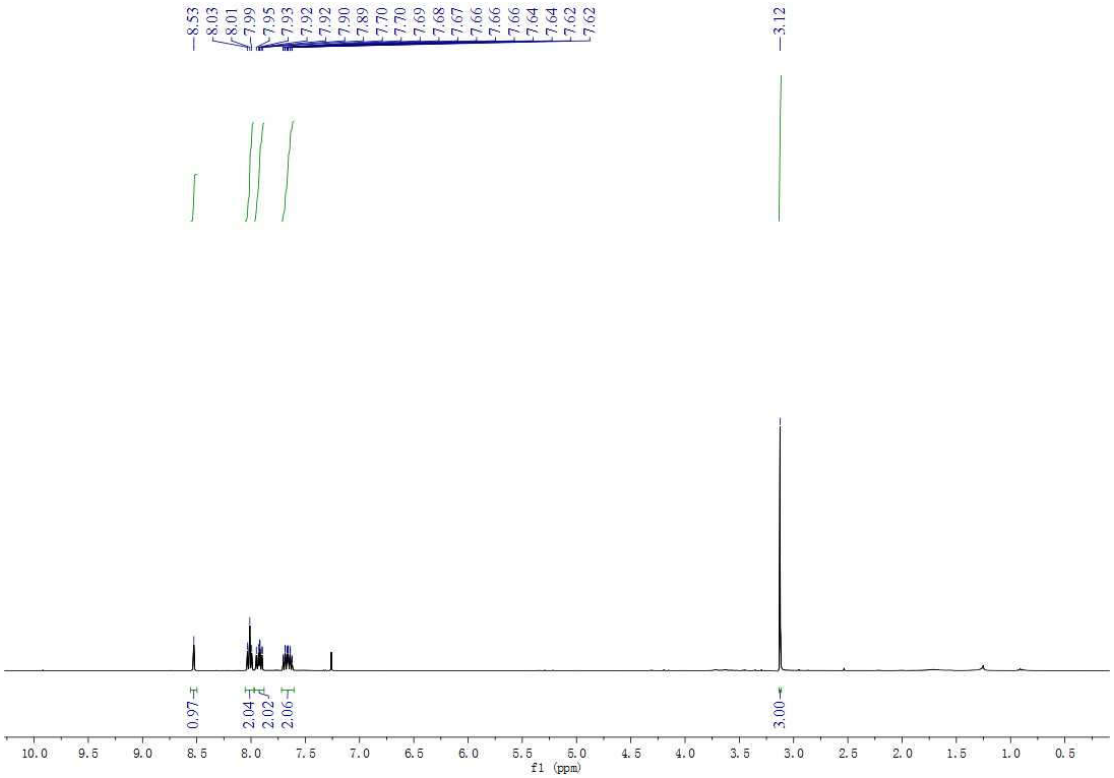


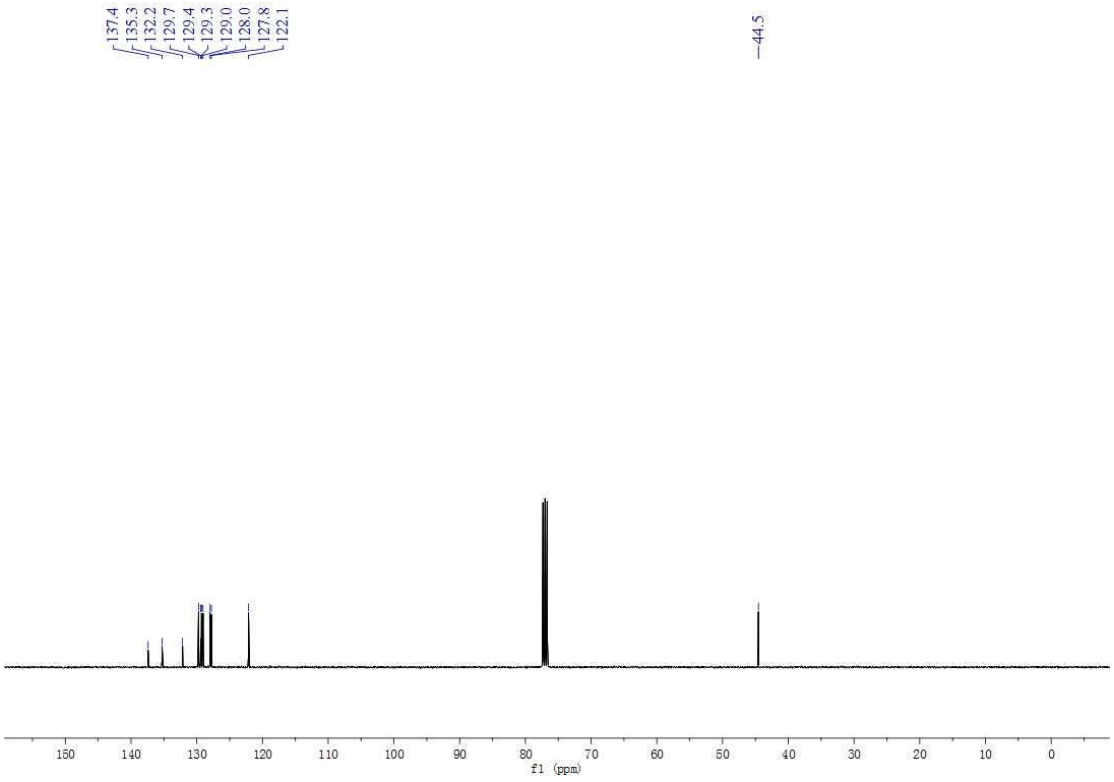
1-methyl-2-(methylsulfinyl)benzene (3l)



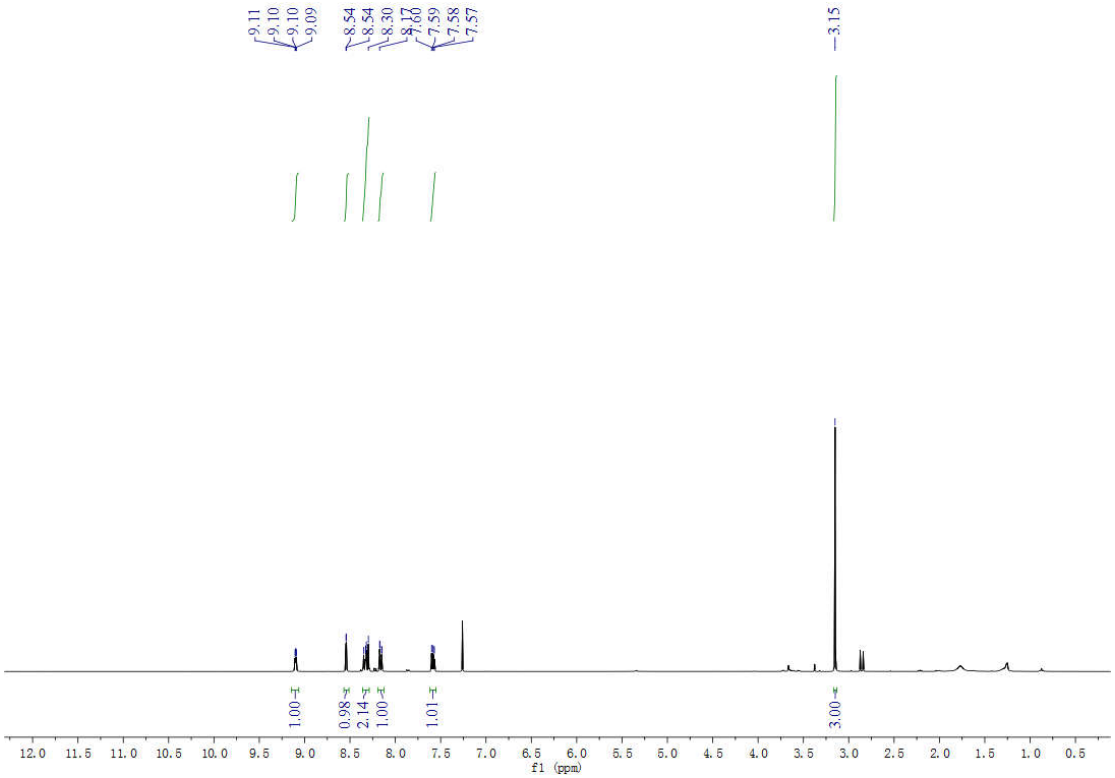


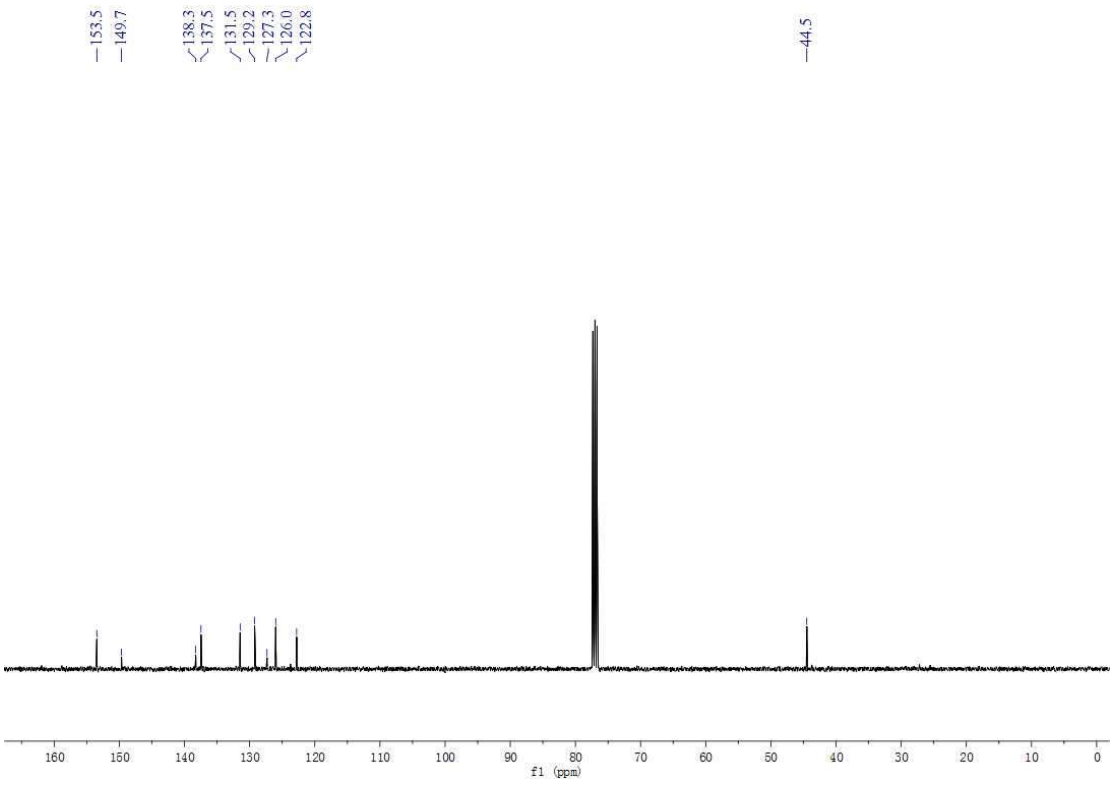
2-(methylsulfonyl)naphthalene (3m)



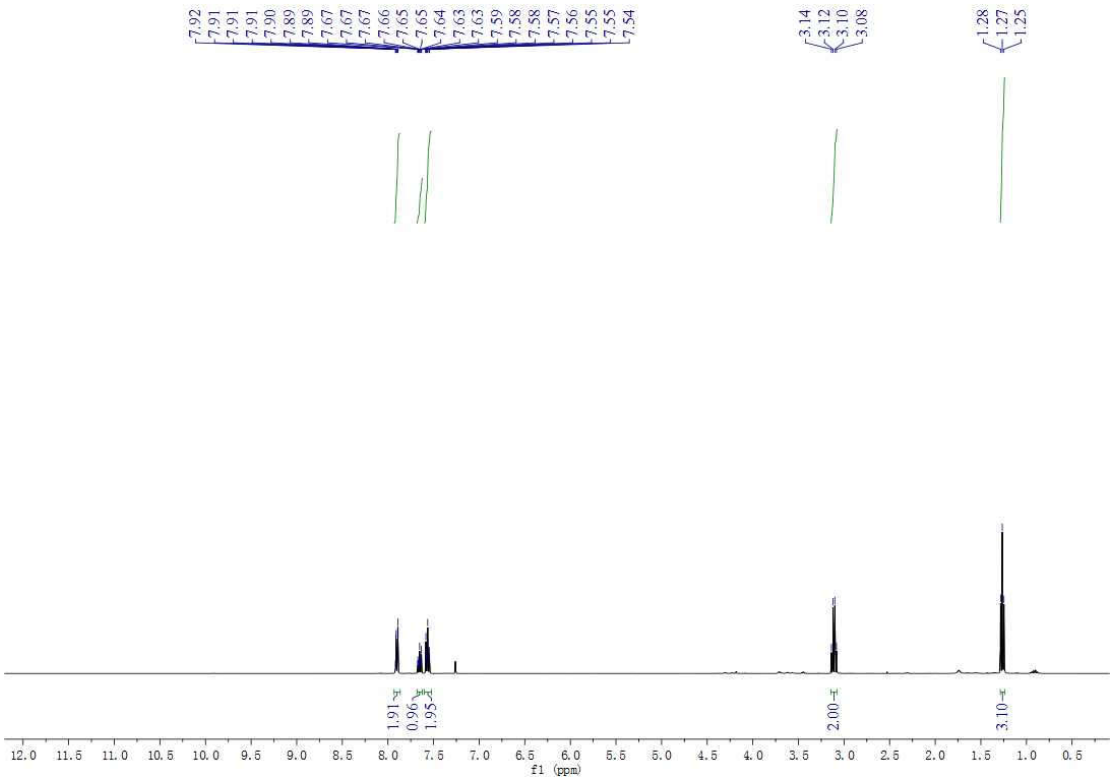


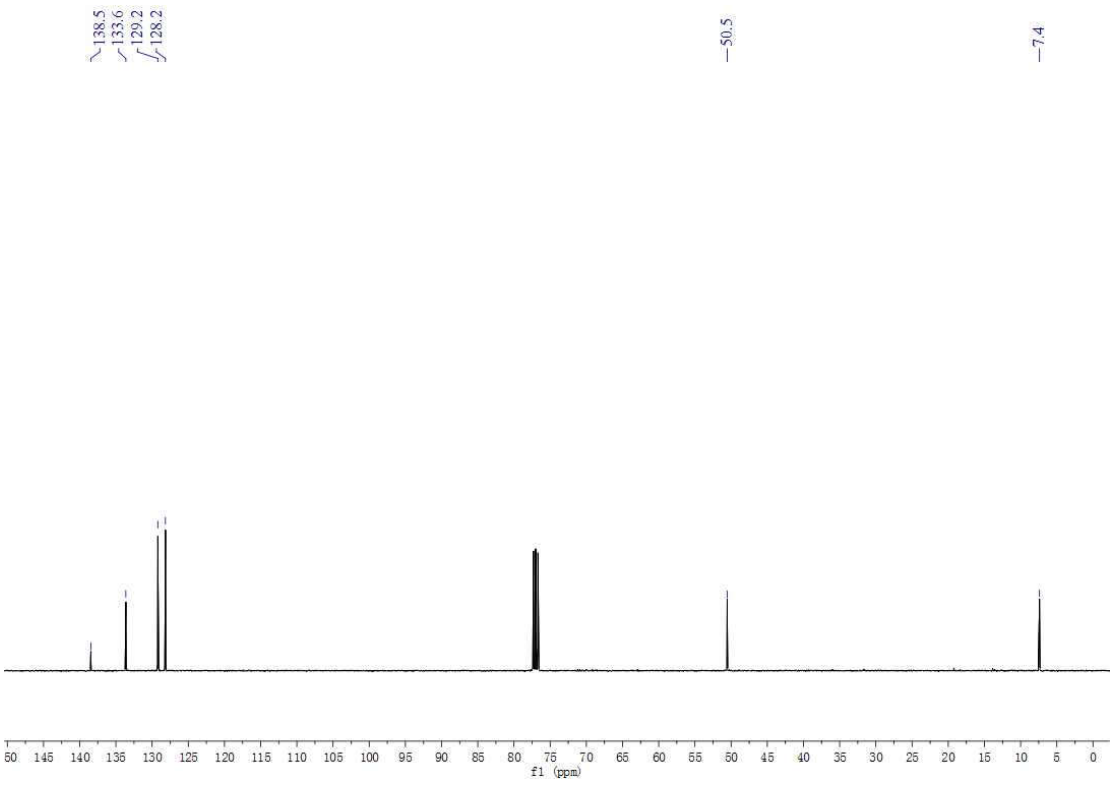
6-(methylsulfonyl)quinoline (3n)



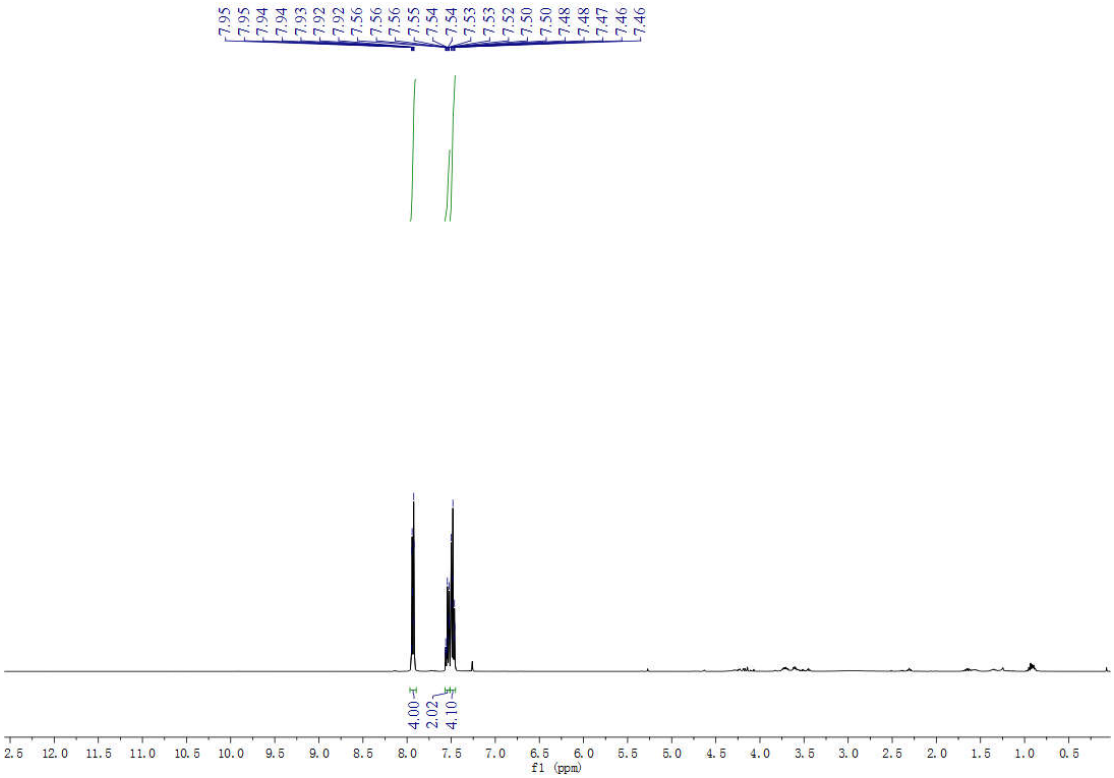


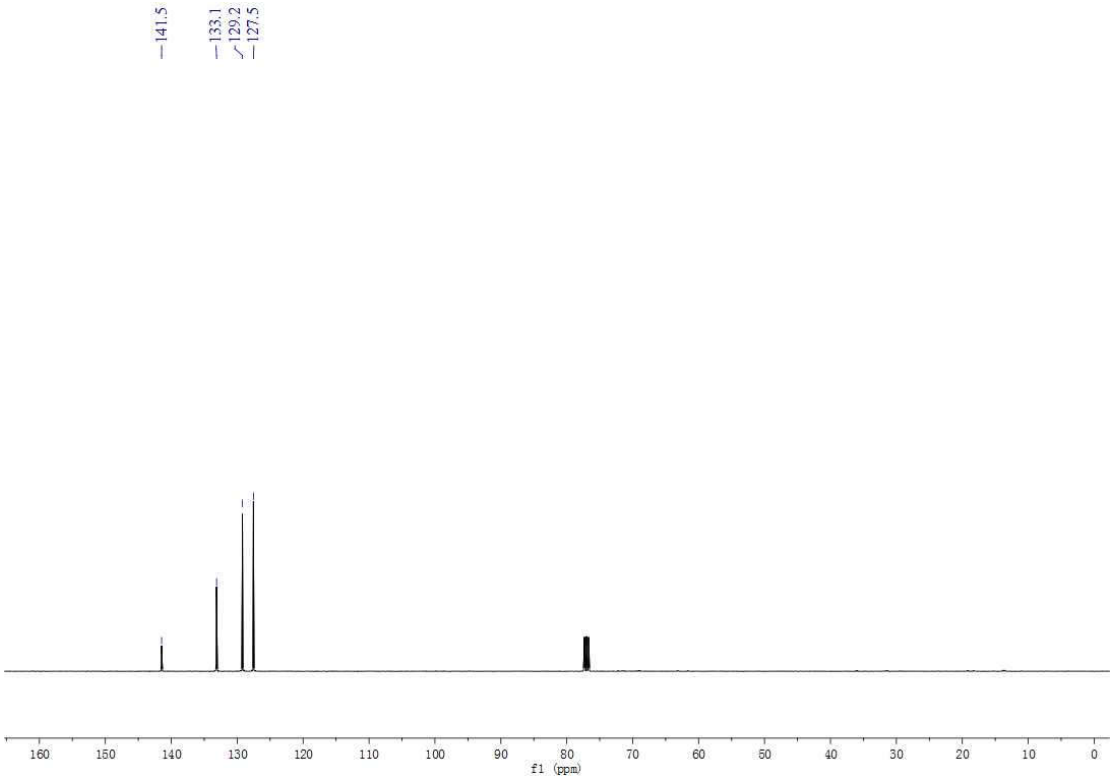
(ethylsulfonyl)benzene (3o)



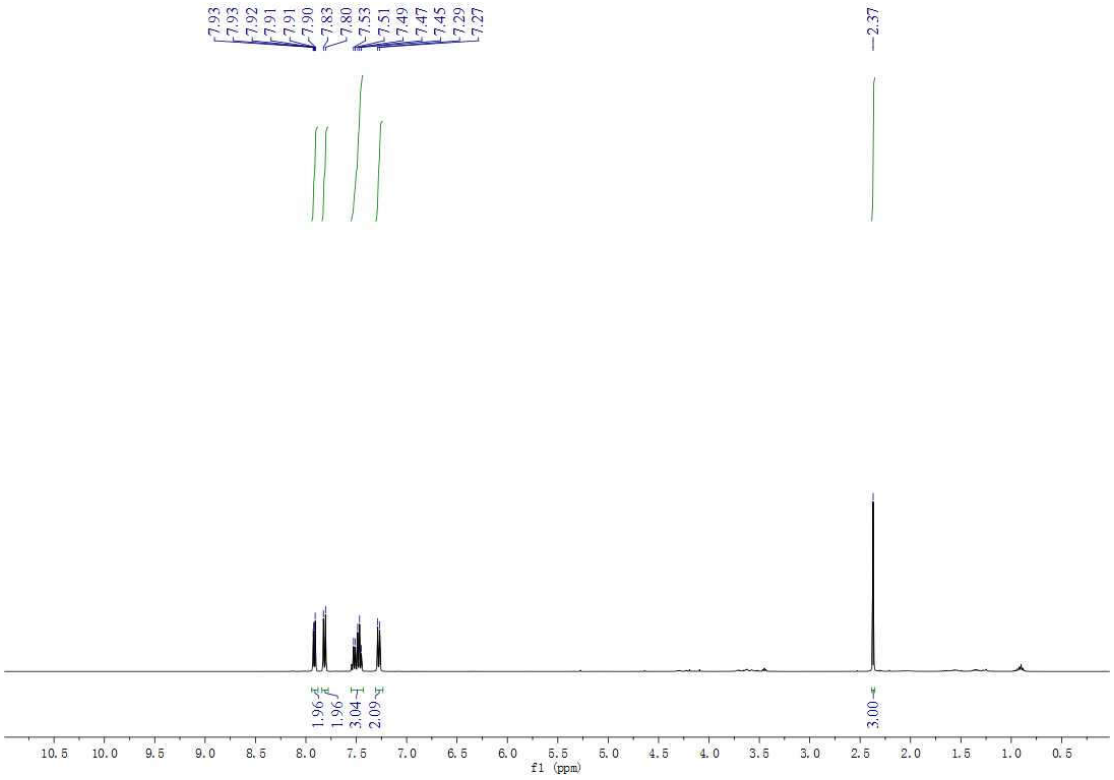


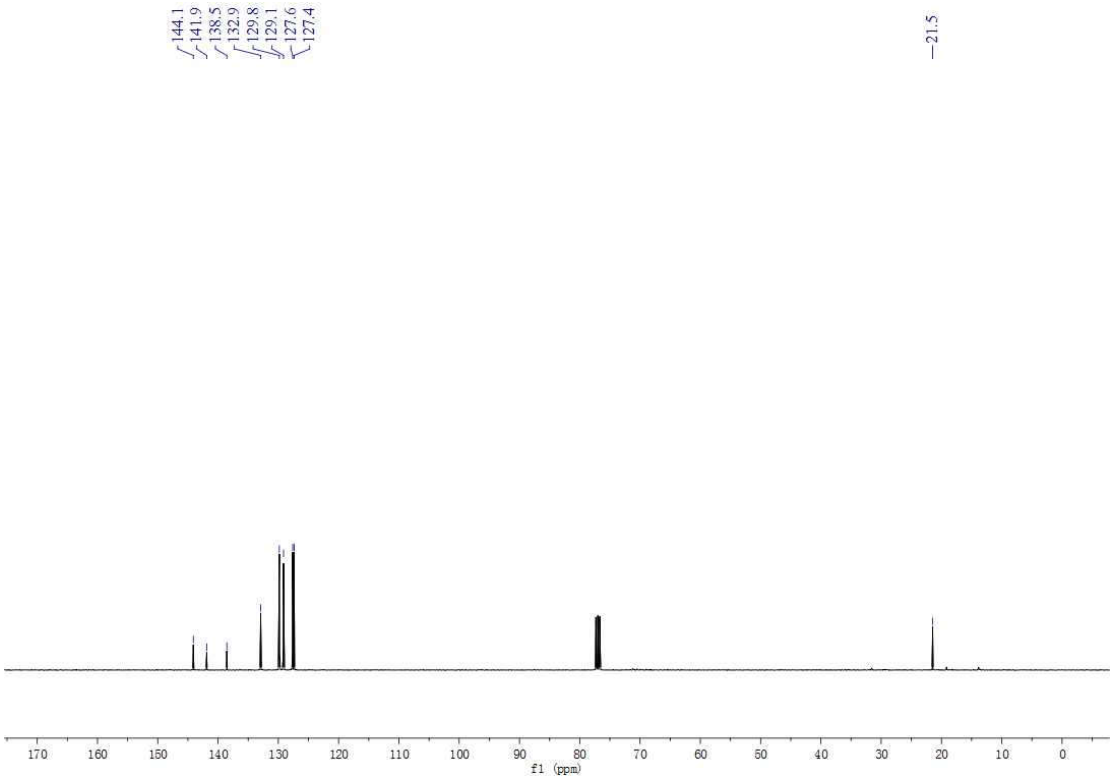
sulfonyldibenzene (3p)



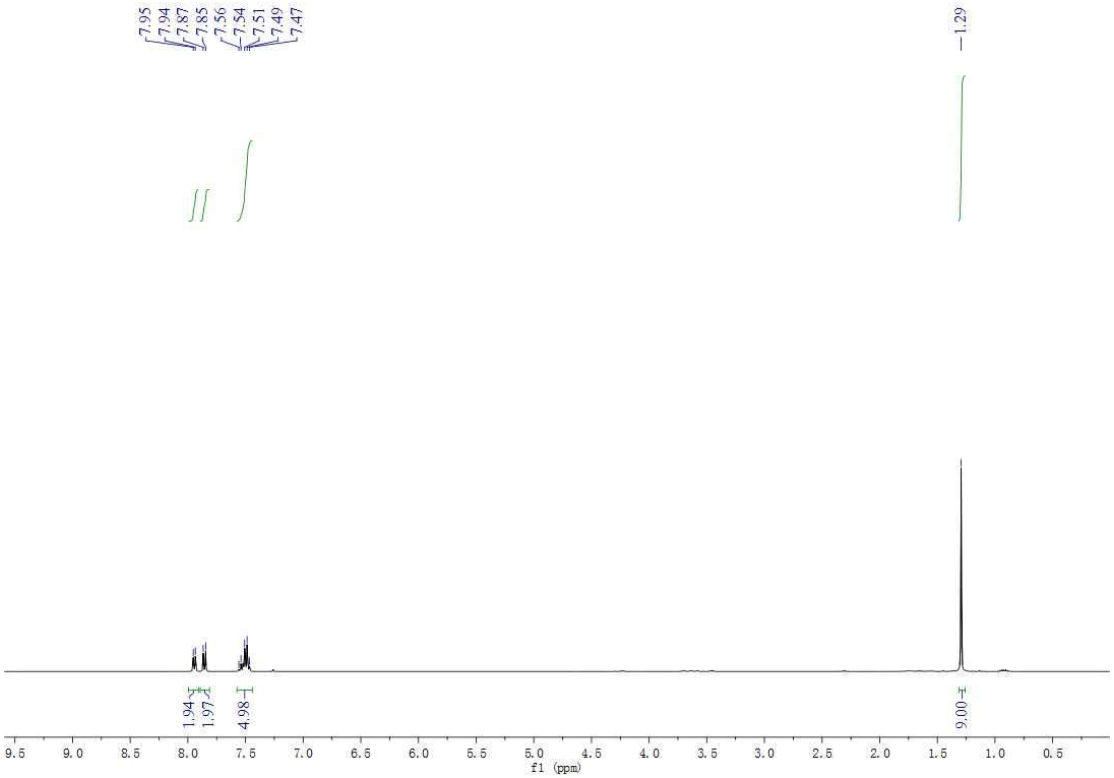


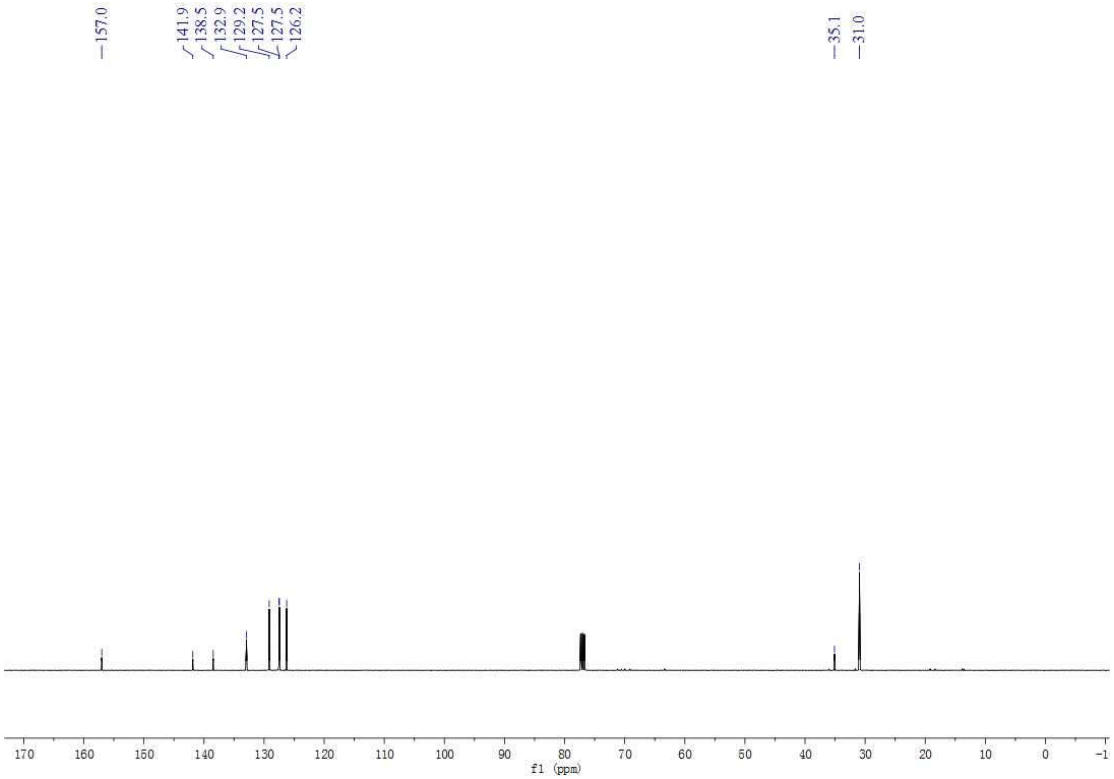
1-methyl-4-(phenylsulfonyl)benzene (3q)



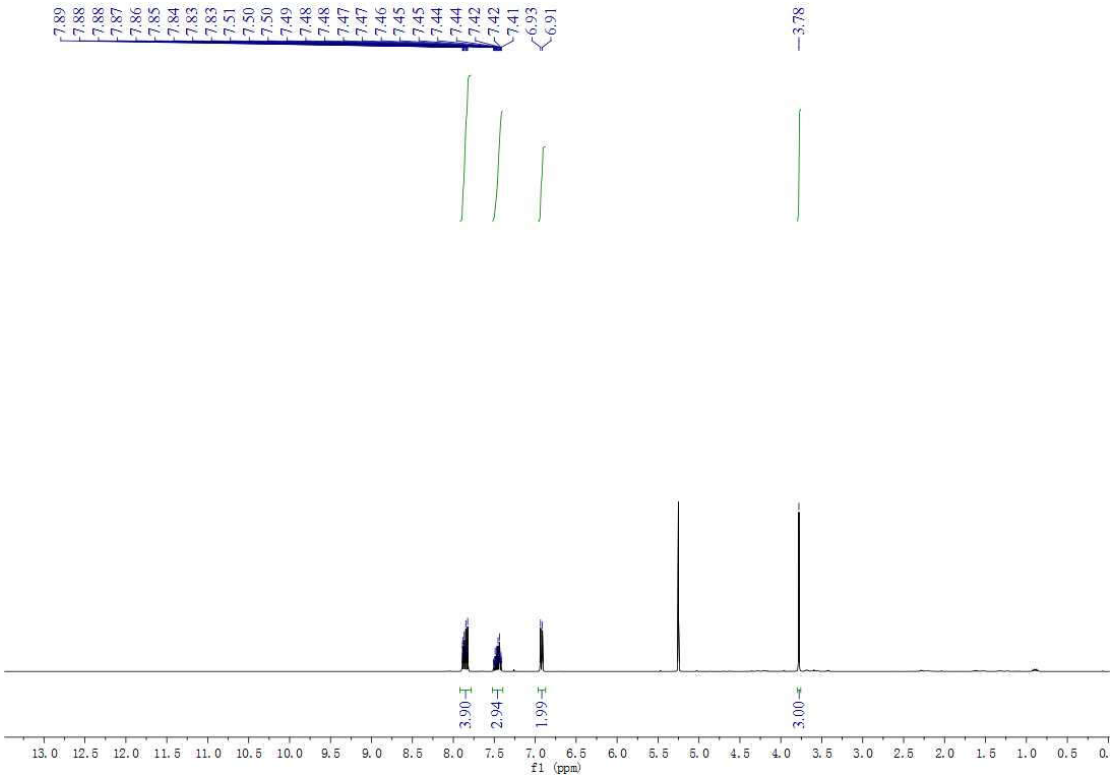


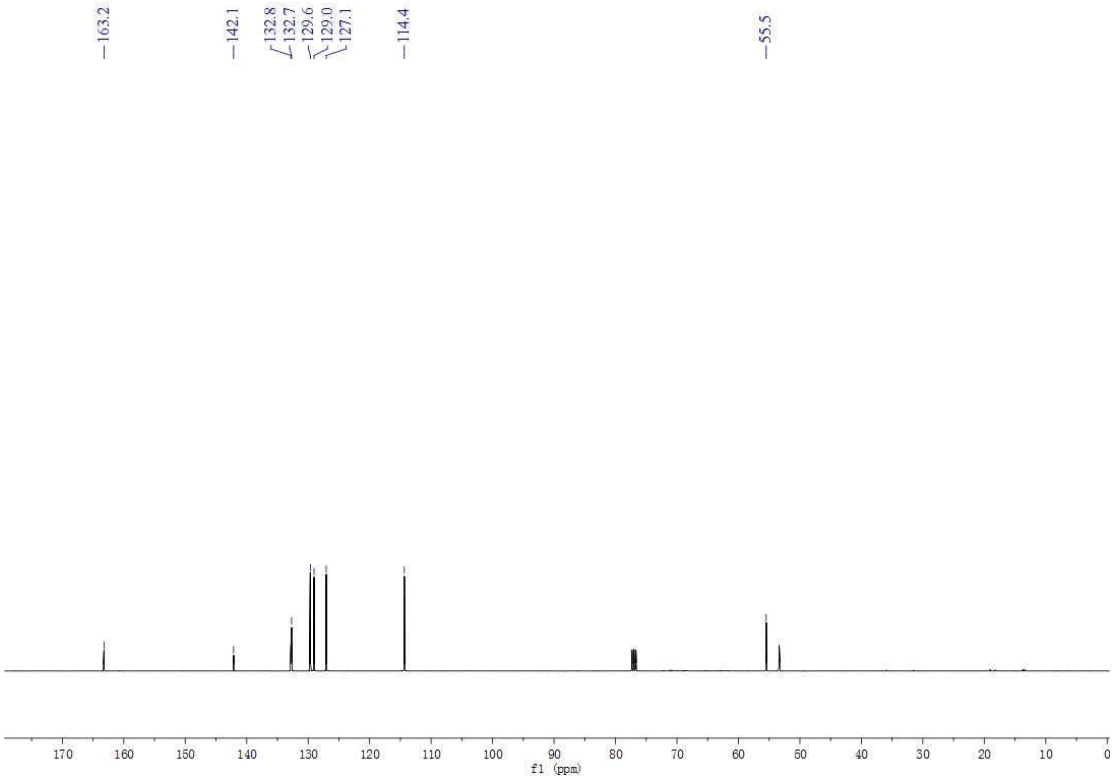
1-(*tert*-butyl)-4-(phenylsulfonyl)benzene (3r)



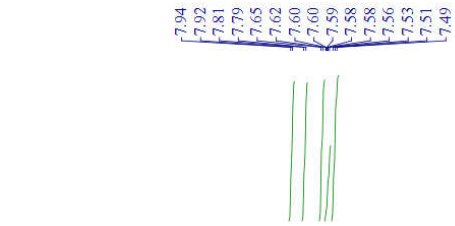


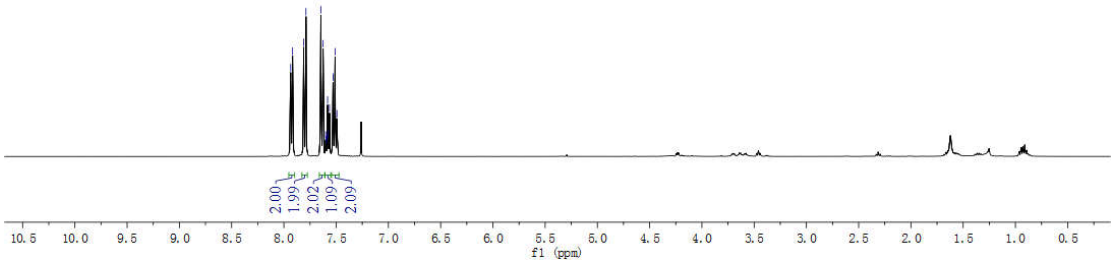
1-methoxy-4-(phenylsulfonyl)benzene (3s)

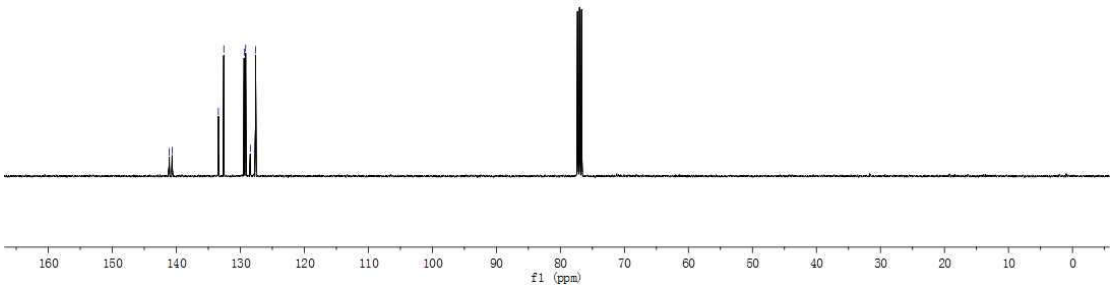




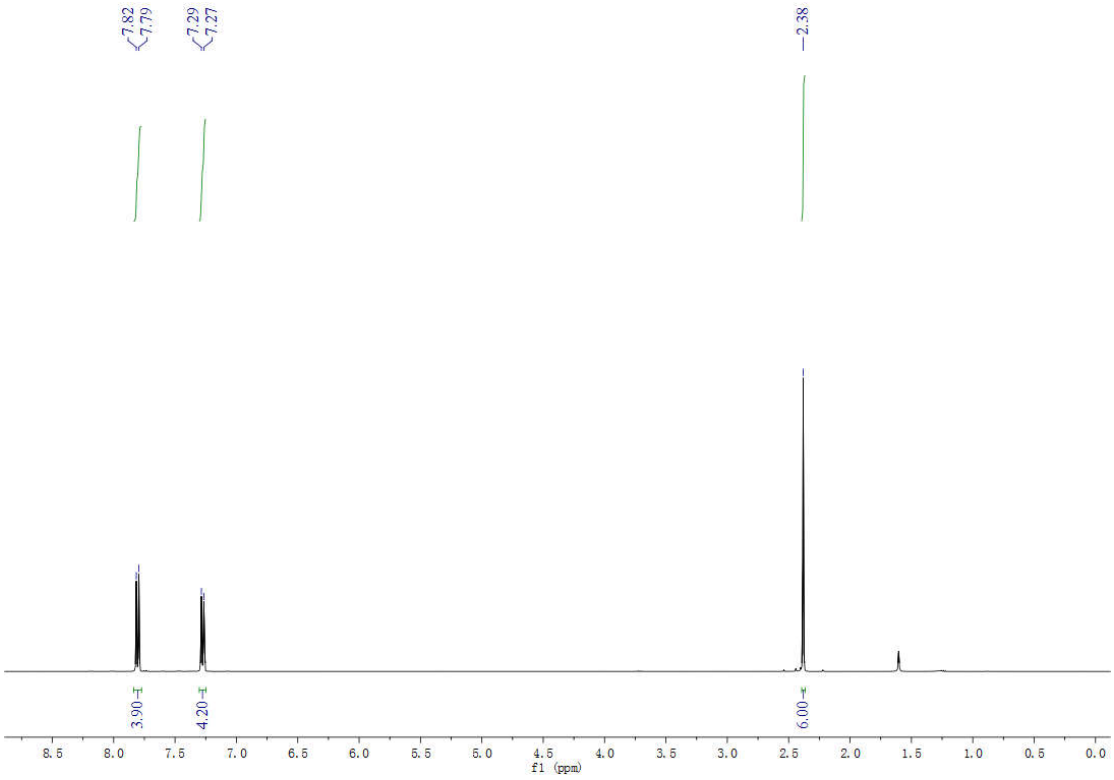
1-bromo-4-(phenylsulfonyl)benzene (3t)

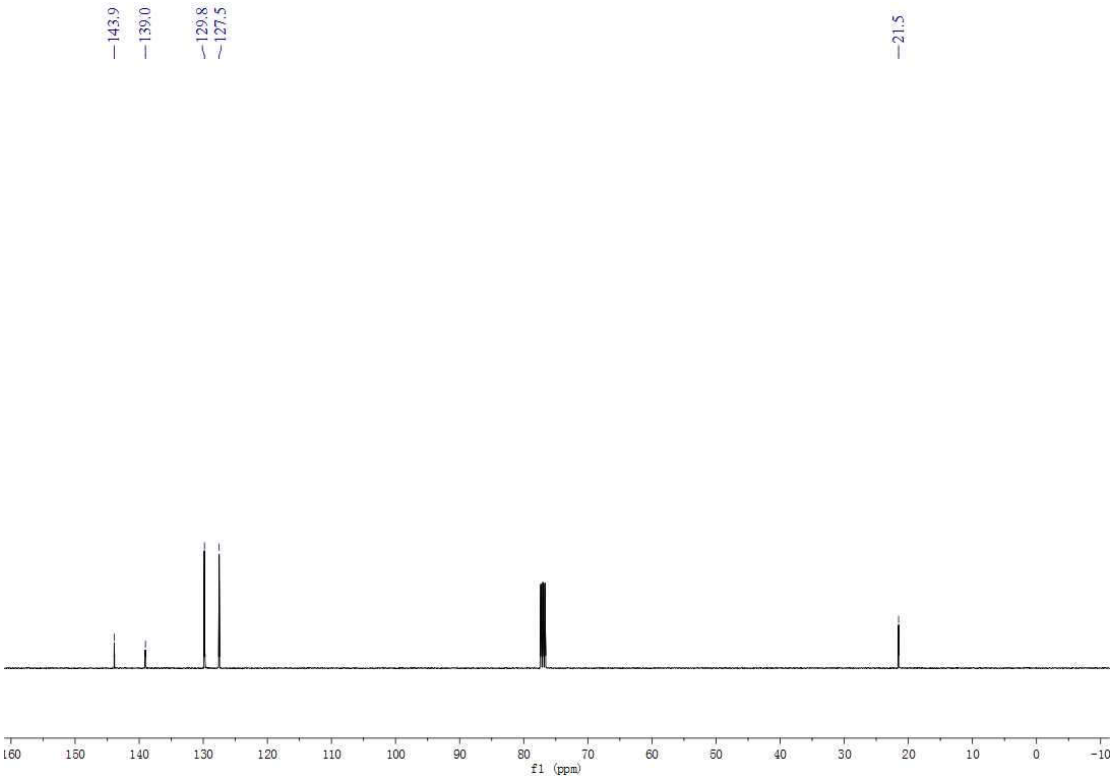




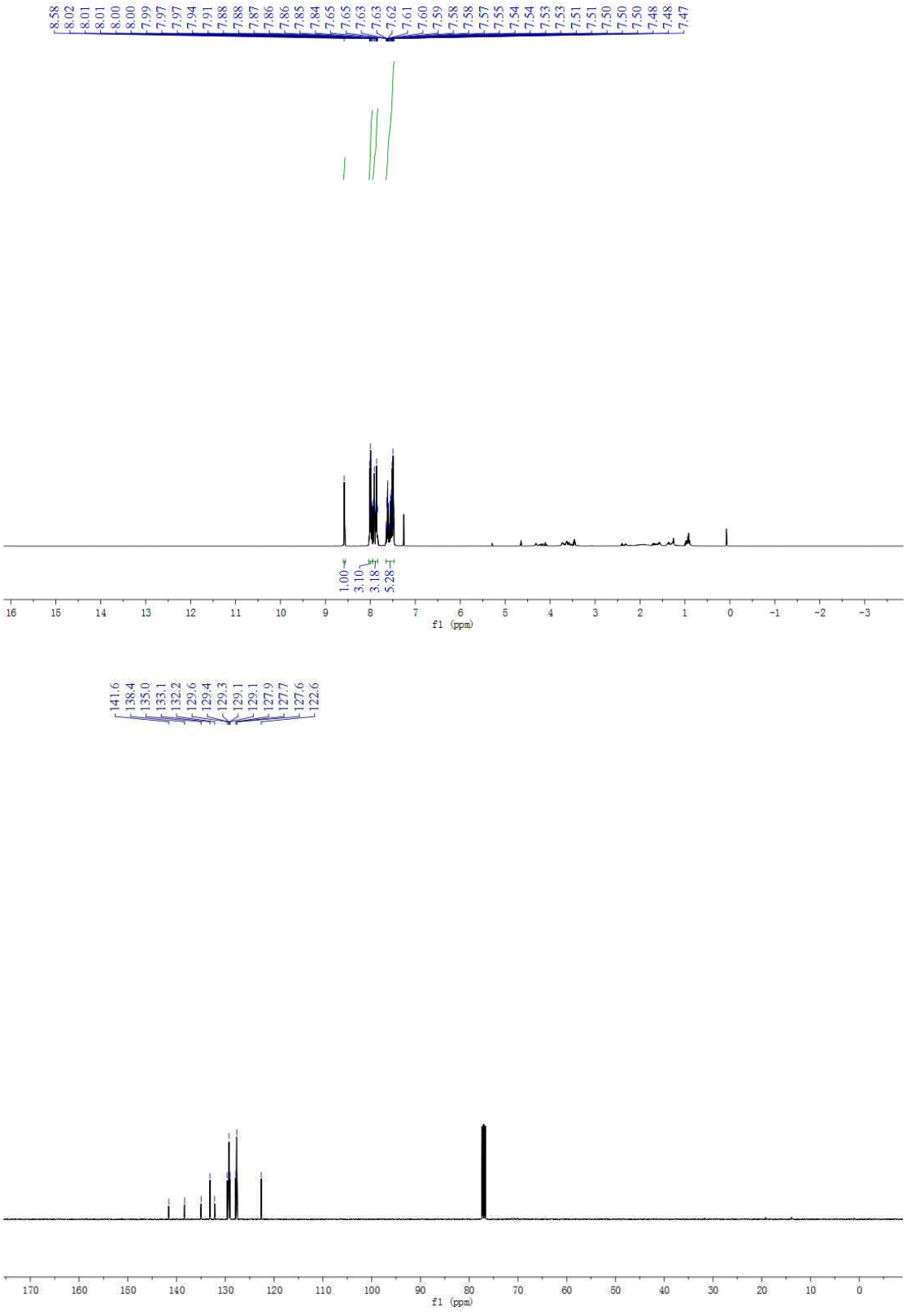


4,4'-sulfonylbis(methylbenzene) (3u)

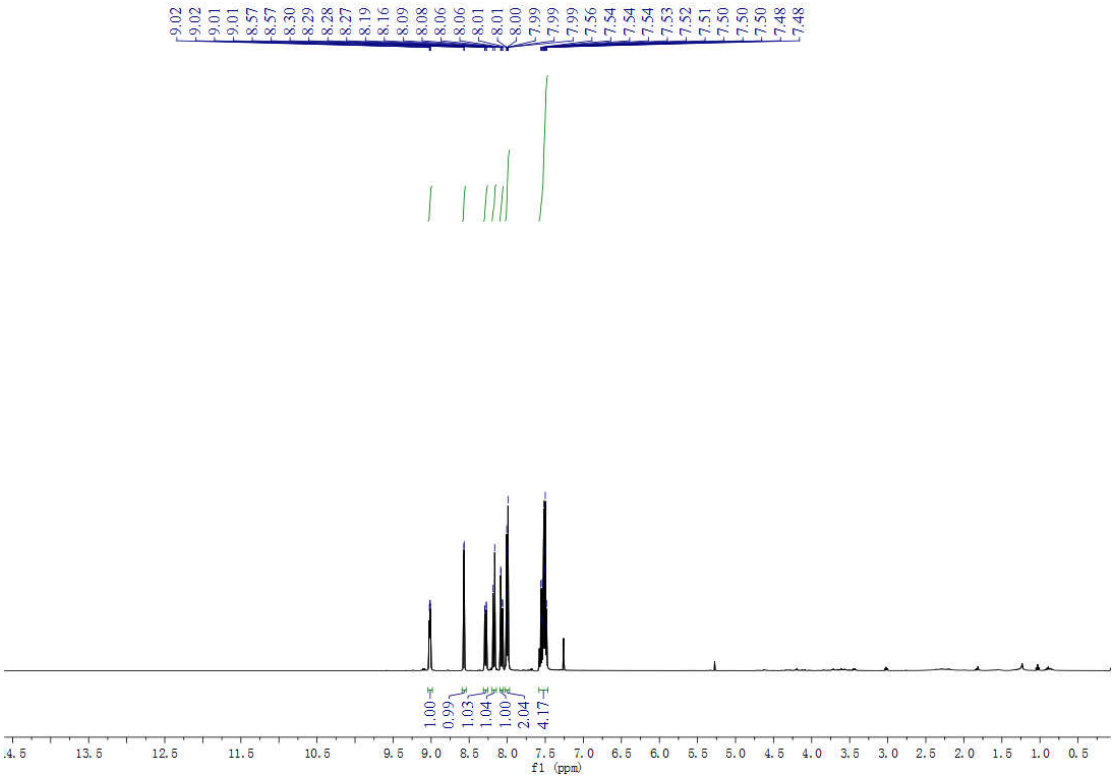


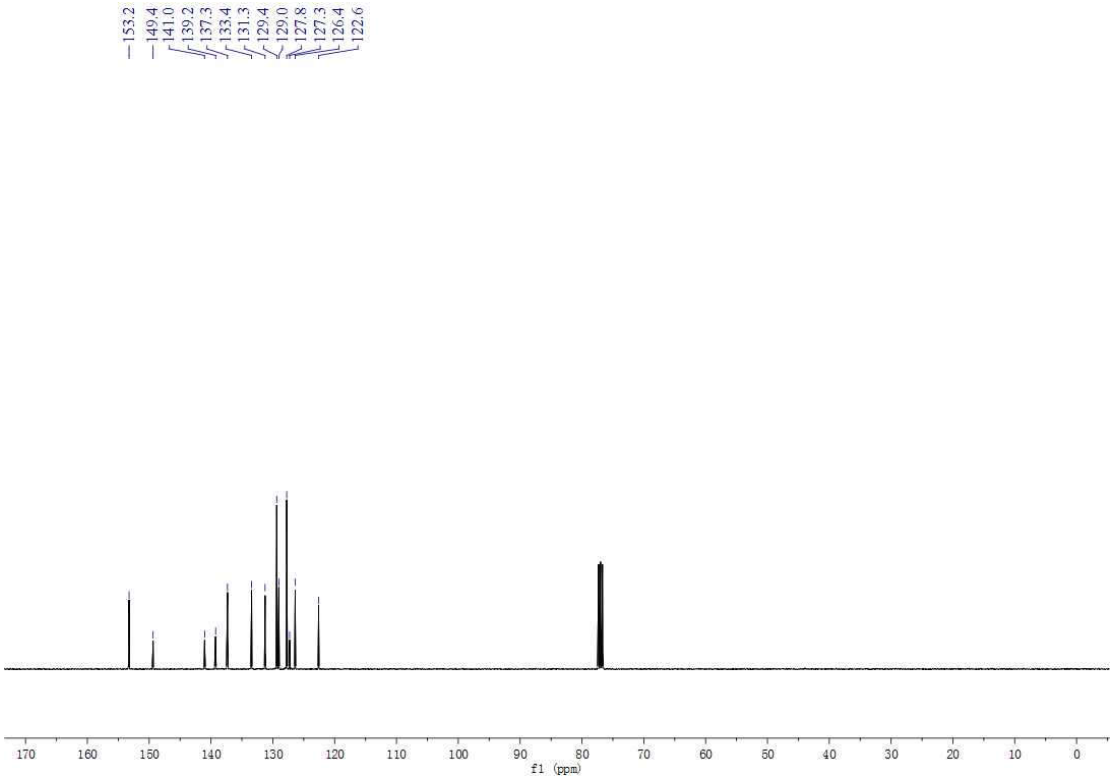


2-(phenylsulfonyl)naphthalene (3v)

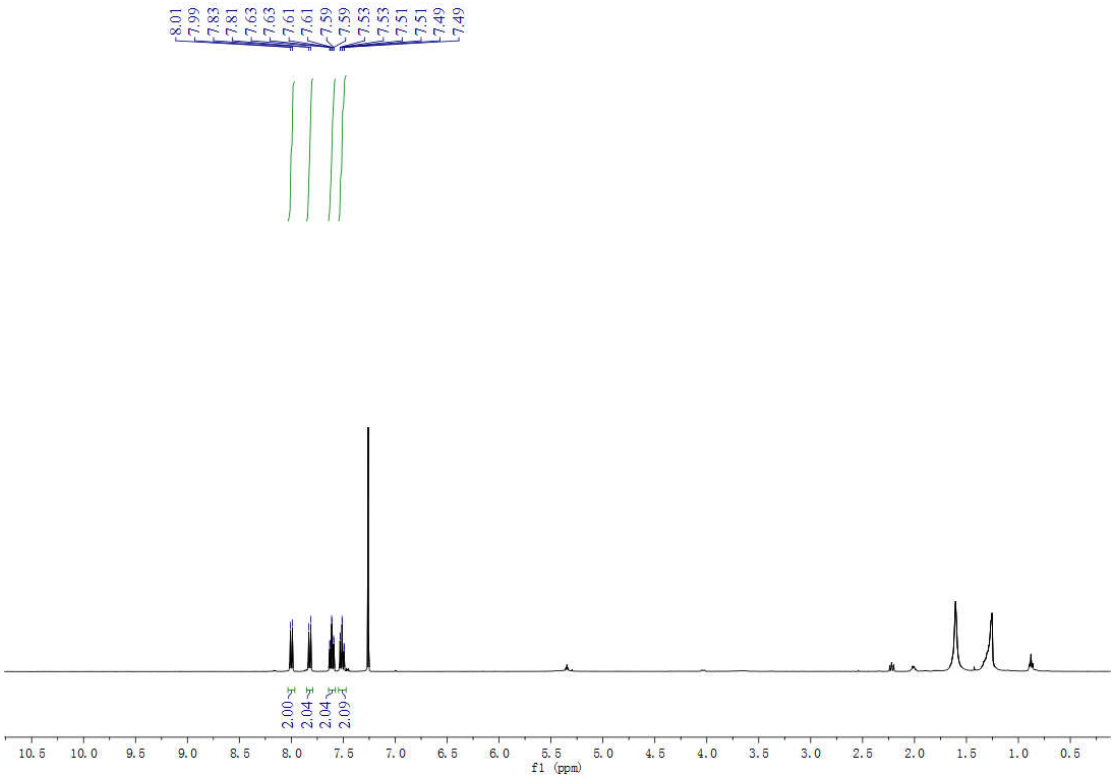


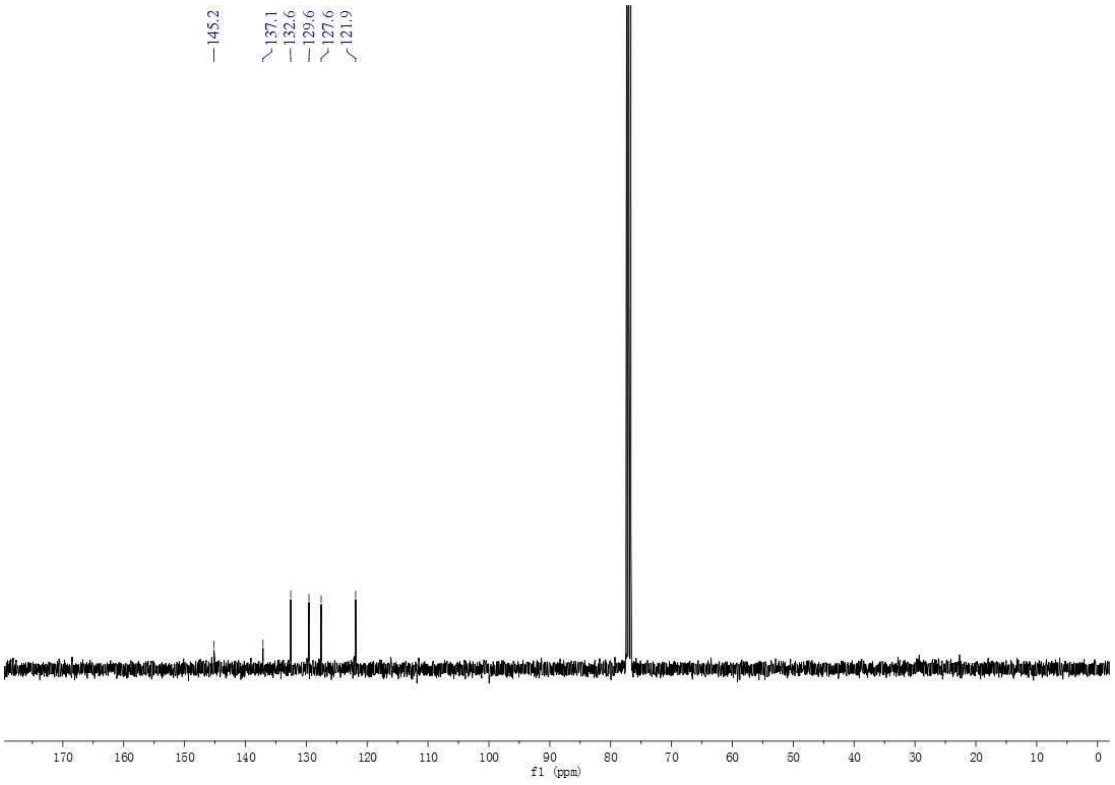
6-(phenylsulfonyl)quinoline (3w)



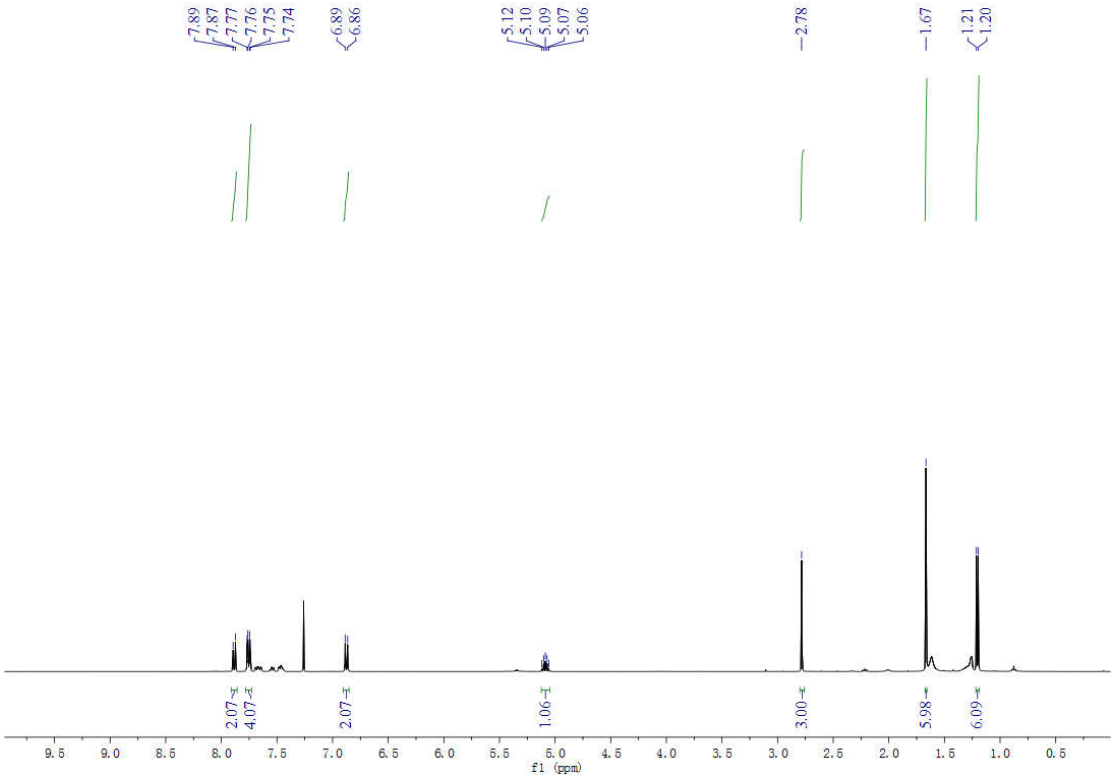


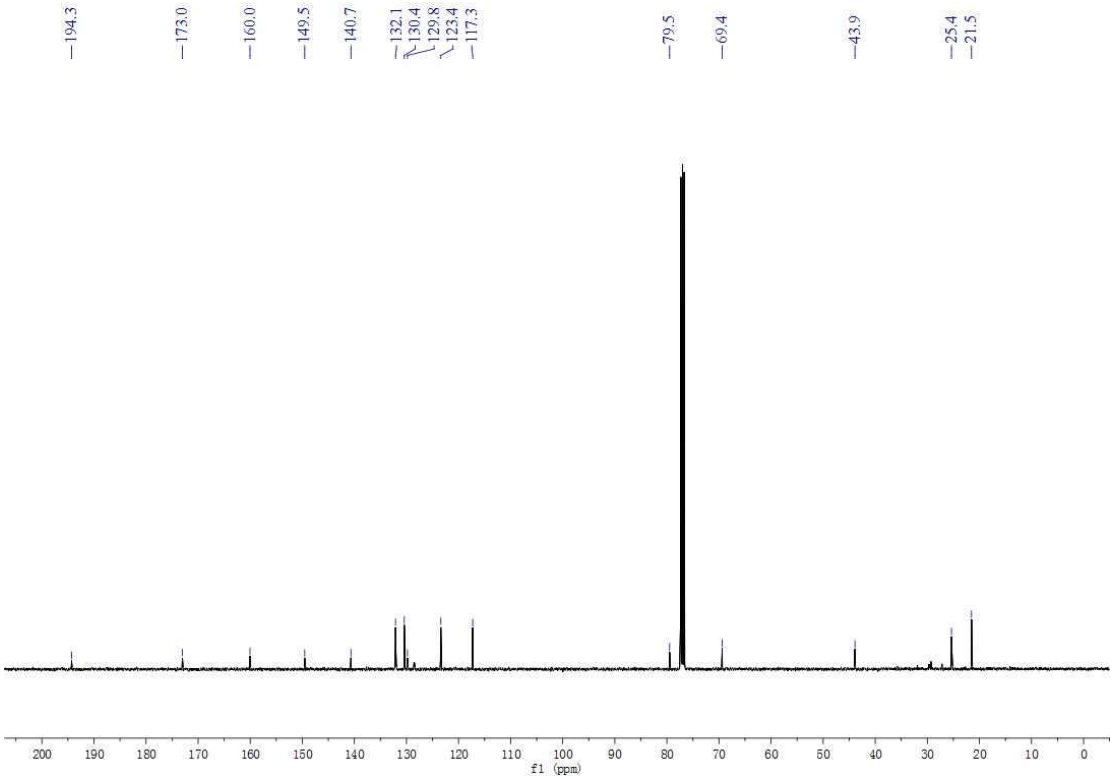
dibenzo[*b,d*]thiophene 5,5-dioxide (3x)



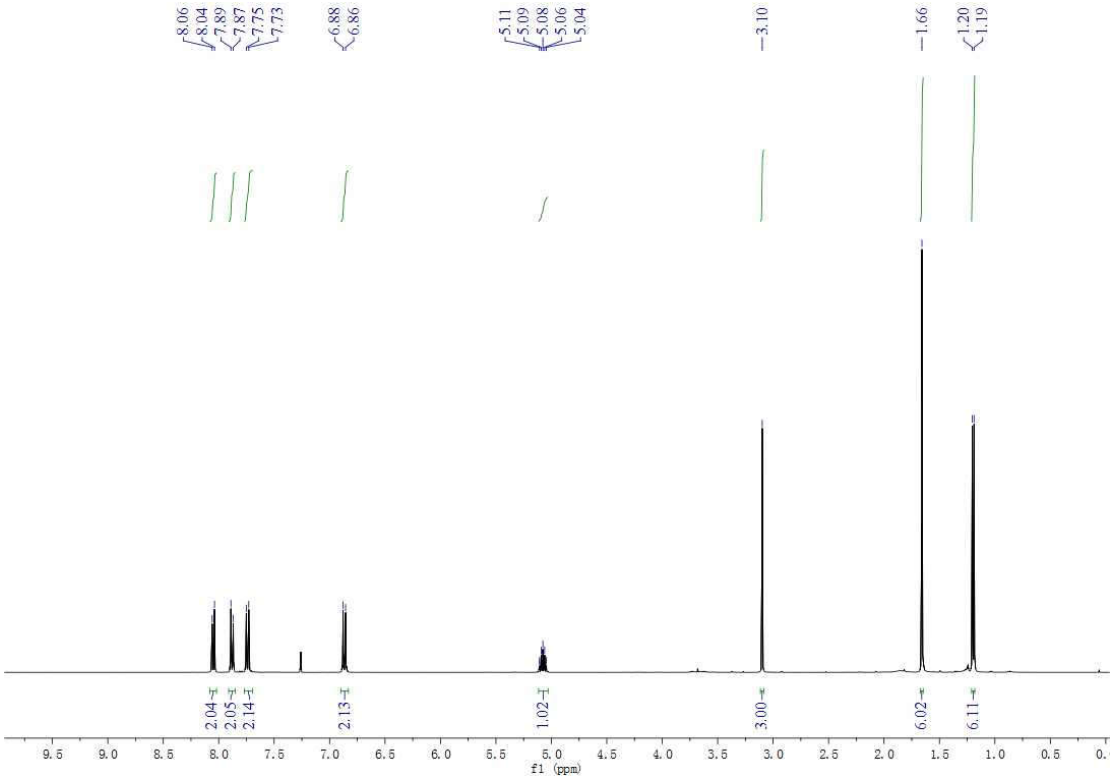


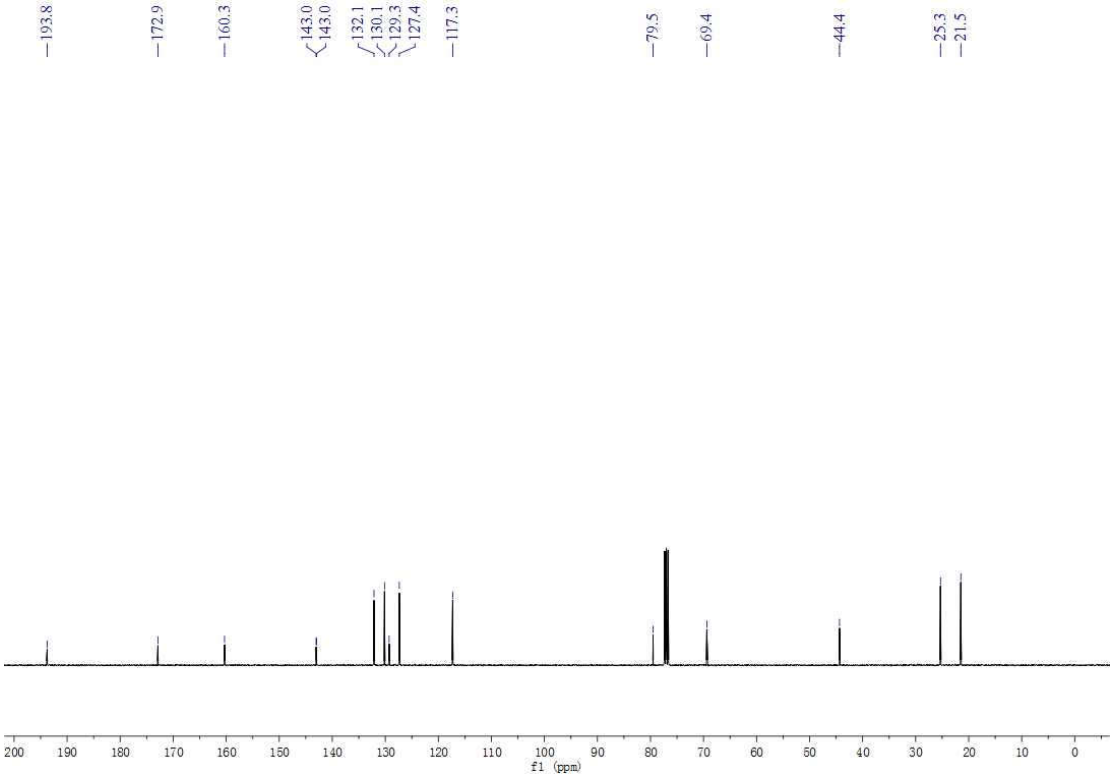
isopropyl 2-methyl-2-(4-(4-(methylsulfinyl)benzoyl)phenoxy)propanoate (4a)



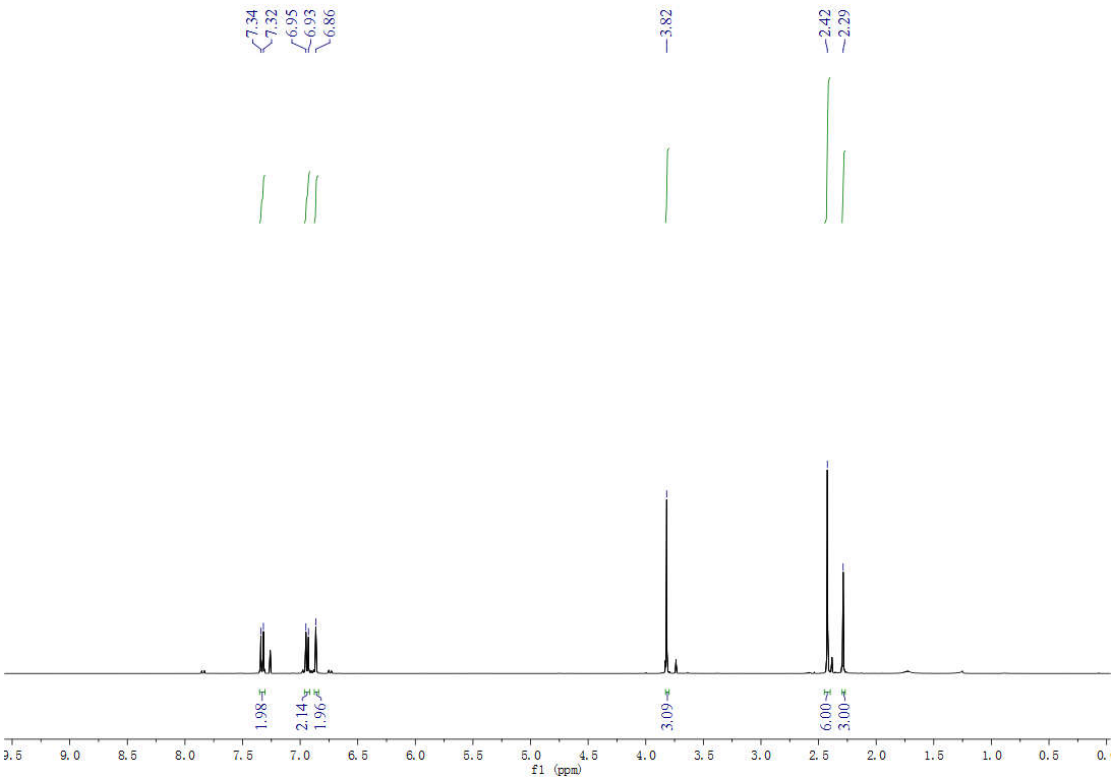


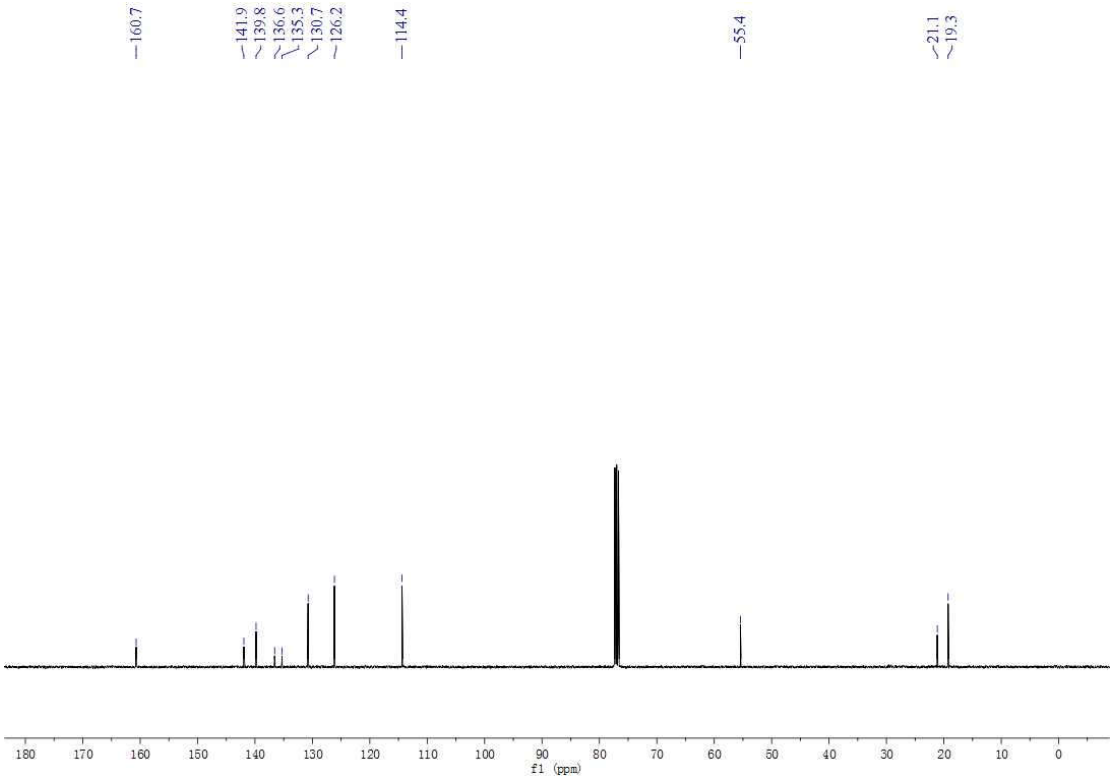
isopropyl 2-methyl-2-(4-(4-(methylsulfonyl)benzoyl)phenoxy)propanoate (4b)



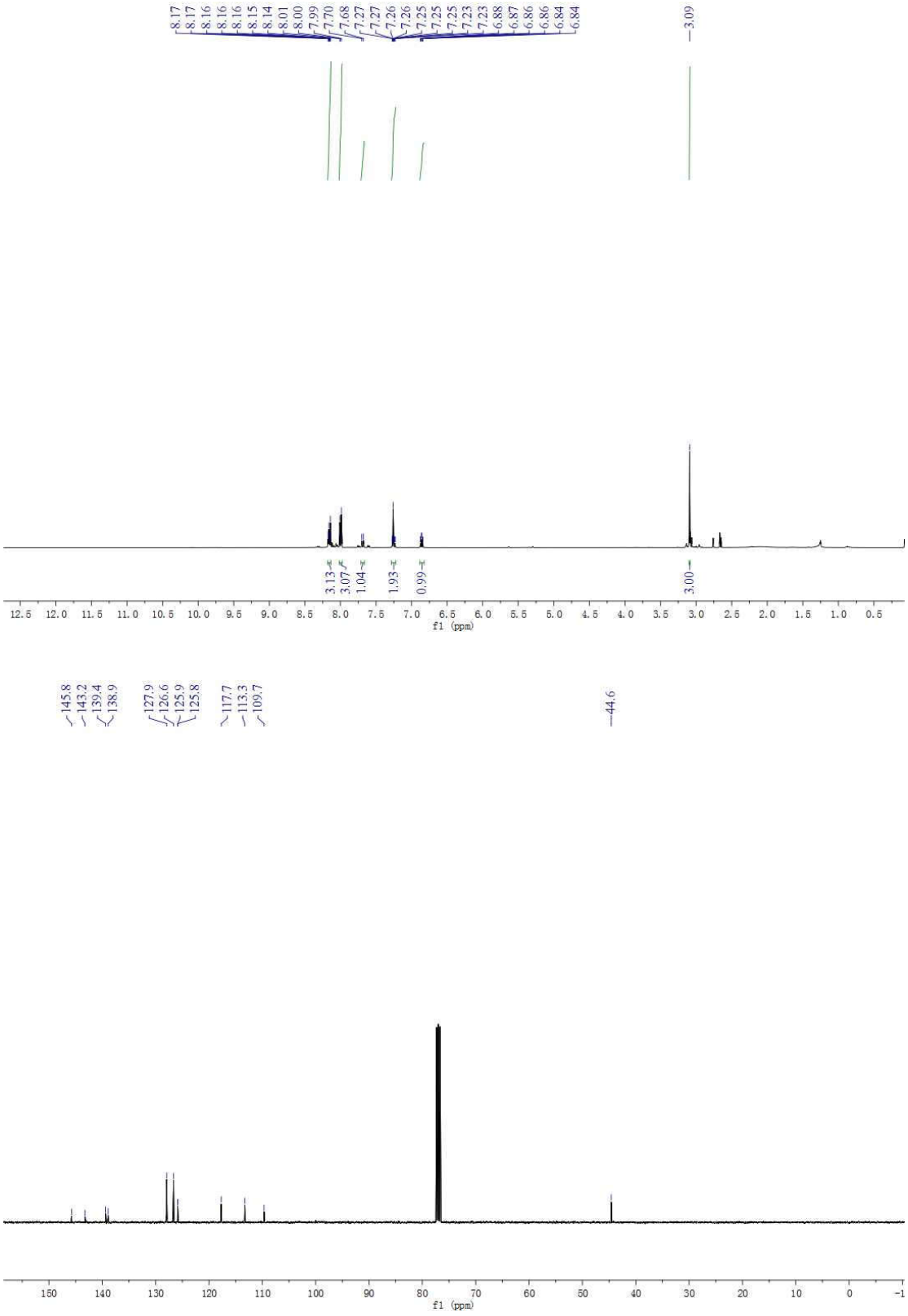


2-((4-methoxyphenyl)sulfinyl)-1,3,5-trimethylbenzene (4c)





2-(4-(methylsulfonyl)phenyl)imidazo[1,2-a]pyridine (4d)



5-chloro-6'-methyl-3-(4-(methylsulfonyl)phenyl)-2,3'-bipyridine (4e)